

(19)



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(11)

EP 1 611 957 A1

(12)

EUROPEAN PATENT APPLICATION

(43) Date of publication:
04.01.2006 Bulletin 2006/01

(51) Int Cl.:
B02C 13/14 (2006.01) B02C 13/286 (2006.01)

(21) Application number: **04078464.7**

(22) Date of filing: **20.12.2004**

(84) Designated Contracting States:
**AT BE BG CH CY CZ DE DK EE ES FI FR GB GR
HU IE IS IT LI LT LU MC NL PL PT RO SE SI SK TR**
Designated Extension States:
AL BA HR LV MK YU

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(30) Priority: **01.07.2004 IT RE20040077**

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(54) "Oil mill with hammers for crushing drupes, in particular olives"

(57) An oil mill (1) with hammers for crushing drupes comprising a perforated cage (2) in which a rotor (3) provided with crushing hammers (4) rotates with respect to a vertical rotation axis (X-X), a supply opening (7), a discharge opening (13) and a stationary annular collection

chamber (11) that surrounds said cage (2), said discharge opening (13) being arranged, at said annular chamber (11), on a discharge plate (12) that is coaxially rotatable with respect to said rotation axis (X-X) and suitable for selectively placing said opening (13) over a plurality of kneaders.

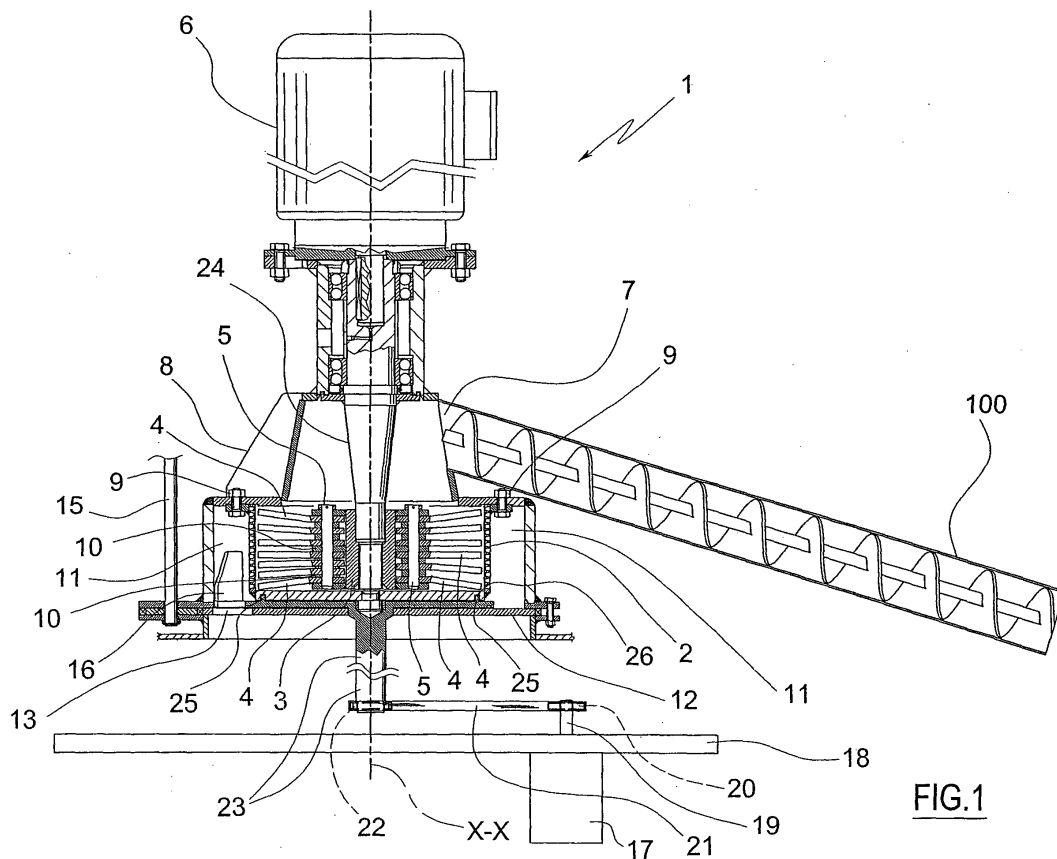


FIG.1

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Description

[0001] The present invention refers to an oil mill with hammers for crushing drupes, in particular olives, in accordance with the preamble of claim 1.

[0002] More specifically, the present invention refers to an oil mill with hammers comprising means suitable for selectively conveying the crushed drupe must into a plurality of kneaders.

[0003] The present invention has its main application in the field of the food oil industry.

[0004] As known, in the past to crush olives mullers were used consisting of a tank, in bygone times made from hard stone, nowadays made from steel, where the olives are poured; in it 2 or 4 granite wheels, known as grinders, arranged vertically and at different distances from the centre of the tank, roll on the base squashing the olives.

[0005] Due to the somewhat slow movement of the grinding wheels (12-14 revolutions per minute) and due to the turning of the paste, the amount of oil that separates in the form of emulsion from the paste, at the end of mulling, is low.

[0006] The muller has the drawback of keeping the paste being turning open to the air for 20-30 minutes, for which reason there are increases in acidity and oxidizing phenomena in the oil.

[0007] Moreover, the process is discontinuous and slow, with low productivity and the need for a larger workforce, as well as accurate and difficult cleaning.

[0008] According to a solution known in the field, more efficient crushing is obtained through so-called mechanical crushers that generally consist of suitable containers, cylindrical in shape, in which the olives are crushed by steel mechanical parts that move at a high speed (1400-2900 revolutions per minute).

[0009] Amongst the most common crushers of the prior art there are those with toothed discs and those with hammers.

[0010] The first consist of two metal discs with the same diameter, one fixed and the other rotating, equipped with a series of teeth with sharp edges; during operation the olives fall violently between the teeth and are crushed.

[0011] The second, in brief, comprise a stationary perforated cylindrical grid with a diameter of the holes of about 5/6 mm and a rotor coaxial to the grid with hammers that carry out the forced extrusion of the olive through the holes with breaking of the stones and of the pulp obtaining quick and fine crushing and high capacities.

[0012] These crushers also have some drawbacks and disadvantages.

[0013] Indeed, although continuous crushing ensures a better yield and quality of the end product, nevertheless said crushers do not lend themselves to selectively supplying a plurality of kneaders without interrupting the crushing process with a consequent loss of the benefits due to the continuous process.

[0014] Therefore, there is a strong requirement to have an oil mill for crushing drupes that operates continuously and allows a plurality of kneaders to be selectively supplied without interrupting the crushing process.

5 **[0015]** This allows operation with a single oil mill that continuously crushes to supply a single kneader at a time, according to needs, from a plurality of kneaders available to receive the crushed material.

10 **[0016]** The purpose of the present invention is that of providing an oil mill for crushing drupes having structural and functional characteristics such as to satisfy the aforementioned requirements and at the same time to avoid the aforementioned drawbacks with reference to the prior art.

15 **[0017]** Such a purpose is accomplished through an oil mill for crushing drupes in accordance with claim 1.

[0018] The dependent claims outline preferred and particularly advantageous embodiments of the oil mill for crushing drupes according to the invention.

20 **[0019]** Further characteristics and advantages of the invention shall become clear from reading the following description provided as an example and not for limiting purposes, with the help of the figures illustrated in the attached tables, in which:

- 25 - figure 1 shows a section view along a vertical plane of an oil mill with hammers for crushing drupes in accordance with the present invention;
- 30 - figure 2 shows a simplified view from above of the oil mill of figure 1 with Archimedean screw arranged radially;
- figure 3 shows the view of figure 2 with Archimedean screw arranged tangentially;
- 35 - figure 4 shows an enlarged portion of figure 1;

40 **[0020]** With reference to the aforementioned figures, an oil mill with hammers for crushing drupes in accordance with the present invention is globally indicated with 1.

[0021] In the rest of the present description explicit reference shall be made to olives for the production of oil.

[0022] The oil mill 1 with hammers for crushing olives comprises a perforated stationary cage 2 in which a rotor 3 rotates extending vertically along an axis X-X provided with crushing hammers 4 extending radially.

45 **[0023]** In accordance with the present invention, on the periphery of the rotor 3, arranged inside the cage 2, some pins 5 for fastening the hammers 4 are foreseen, parallel to the axis X-X.

50 **[0024]** By hammers we mean crushing members with a cutting maul.

[0025] In the illustrated example, the cage 2 has a hollow circular cylindrical configuration having the side surface perforated with holes having a diameter preferably of between 5 and 15 mm, decreasing vertically downwards.

[0026] The olives arrive at the crusher 1 in a continuous flow and in a balanced manner according to the crushing

capacity thereof through an Archimedean supply screw 100. The supply of the olives takes place through a supply opening 7 arranged so as to supply the cage 2 axially from above.

[0027] In the example, the supply opening is arranged laterally on a cover 8 fixed on top of the cage 2 through common fastening means, such as bolts 9.

[0028] Said cover 8 prevents the accidental entry of undesired material into the cage 2 and acts as a supply distribution chamber and, moreover, it is crossed on top as desired by the transmission shaft of the motion to the rotor 3.

[0029] The Archimedean supply screw 100 has its delivery end arranged at the supply opening 7 and can be arranged either radially (fig. 2) or tangentially (fig. 3) with respect to the cage 2.

[0030] The olives fall from the opening 7 by gravity onto the hammers 4 below.

[0031] Said hammers 4 have an oblong configuration with the end distal from the fastening pin 5 that licks the perforated side surface of the cage 2 without touching it, however.

[0032] In the example, the number of fastening pins 5 is three arranged on the periphery of the rotor 3 spaced apart by 120°.

[0033] On each pin six hammers 4 are fixed suitably grouped together in a pack with spacers 10 between them having a thickness equal to that of the hammers 4.

[0034] Of course, the number and arrangement of the hammers 4 and of the pins 5 can be varied as desired.

[0035] In order to improve the crushing action of the hammers 4 it is possible to make the hammers 4 arranged at the vertically distal ends of each fastening pin 5 with an inclination going away from the corresponding proximal hammer 4.

[0036] Basically, the bottom hammer 4 is inclined by a few degrees upwards, whereas the top hammer 4 is inclined by a few degrees downwards, as can clearly be seen in figure 4.

[0037] In accordance with the present invention, the oil mill 1 further comprises a stationary annular collection chamber 11 that surrounds the perforated side surface of the cage 2.

[0038] Below the cage 2 a discharge plate 12 is arranged having a circular configuration and arranged coaxially with respect to the rotation axis X-X.

[0039] On said discharge plate 12, at the annular chamber, a discharge opening 13 is formed for emptying the annular chamber 11.

[0040] In order to convey the oil must collected in the annular chamber 11 directly and selectively to a kneader below the oil mill 1, selected from a plurality of kneaders (not illustrated), the discharge plate 12 is circumferentially equipped with a toothing 12a, extending for at least a limited portion, meshing with a pinion 14 suitable for making it rotate.

[0041] The pinion 14 can be made to rotate manually or else through a motor reducer, not illustrated, which

actuates a shaft 15, partially illustrated in fig. 1, fitted centrally on the pinion 14.

[0042] Basically, the discharge plate 12 acts as a rotating distributor.

[0043] To convey the oil must from the annular chamber 11 to the discharge opening 13 arranged on the discharge plate 12, between the discharge plate 12 and the lower base of the cage 2 a rotatable dish 15 is arranged provided radially on the edge with at least one cantilevered paddle 16, in the example three in number arranged 120° apart.

[0044] The paddles 16 are arranged in the annular chamber 11 extending vertically for a limited portion along the axis X-X, as well as grazing the rotatable plate 12 below.

[0045] The rotatable dish 15 provided with paddles 16 is associated, free to rotate, with the cage 2 through an annular ribbing 25 formed on the upper face and slidably inserted in a corresponding groove 26 formed on the lower face of the lower surface of the cage 2 (fig. 4).

[0046] The rotation of the dish 15 can be obtained through a transmission system of the motion comprising a motor reducer 17 fixed to a block 18 actuating into rotation a drive shaft 19 fitted centrally to a driving pulley 20 that, through a chain 21, transmits the motion to a pulley 22 on which a driven shaft 23 is fitted actuating into rotation the dish 15 provided with radially projecting paddles.

[0047] Operatively, the oil mill 1 is supplied with olives through the Archimedean supply screw 100.

[0048] The hammers 4 actuated into rotation crush the olives that come out in the form of oil must through the perforated side wall of the cage 2.

[0049] The oil must thus obtained collects in the annular chamber 11 from where, with the contribution of the rotating paddles 16, it is conveyed towards the discharge opening 13 of the plate 12 that, in a certain position, supplies a kneader, not illustrated.

[0050] At the end of the filling of the kneader arranged at the discharge opening 13, or else when one wants to, the rotation means of the plate 12 can be activated to rotate the discharge opening 13 and arrange it on a different kneader to be filled.

[0051] As can be appreciated from that which has been described, the oil mill with hammers for crushing drupes according to the present invention allows the requirements to be satisfied and the drawbacks mentioned in the introductory part of the present description with reference to the prior art to be overcome.

[0052] Indeed, said oil mill allows a plurality of kneaders, suitable for receiving the oil must coming from the oil mill, to be selectively supplied.

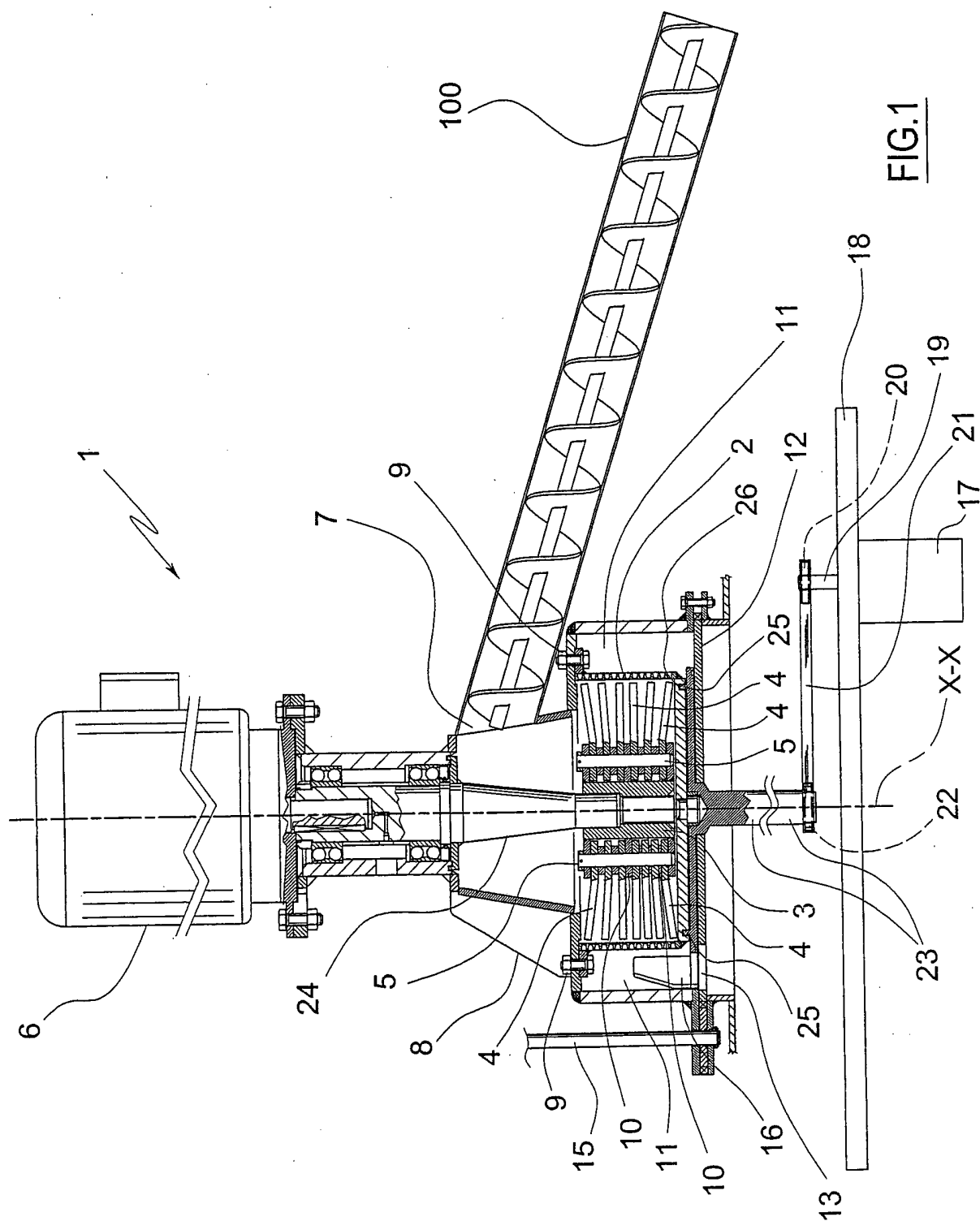
[0053] Moreover, said oil mill allows continuous work obtaining high yields.

[0054] Of course, a man skilled in the art can bring numerous modifications and variants to the oil mill with hammers for crushing drupes described above in order to satisfy contingent and specific requirements, all of

which are covered by the scope of protection of the invention, as defined by the following claims.

Claims

1. Oil mill (1) with hammers for crushing drupes comprising a perforated cage (2) in which a rotor (3) provided with crushing hammers (4) rotates with respect to a vertical rotation axis (X-X), a supply opening (7) and a discharge opening (13), **characterised in that** it comprises a stationary annular collection chamber (11) that surrounds said cage (2) and **in that** said discharge opening (13) is arranged, at said annular chamber (11), on a discharge plate (12) that is coaxially rotatable with respect to said rotation axis (X-X) suitable for selectively placing said opening (13) over a plurality of kneaders.
2. Oil mill (1) according to claim 1, wherein the edge of said discharge plate (12) is partially toothed (12a) and meshes with a pinion (14) suitable for making said plate (12) rotate.
3. Oil mill (1) according to claim 1, wherein between said discharge plate (12) and said cage (2) a rotatable dish (15) is arranged provided radially on the edge with at least one paddle (16) at said annular chamber (11) and grazing said discharge plate (12) to convey the crushed drupes towards the discharge opening (13).
4. Oil mill (1) according to claim 3, wherein said dish (15) is rotatably associated with said cage (2).
5. Oil mill (1) according to claim 1, wherein said cage (2) has a circular cylindrical configuration and is perforated along its entire side surface.
6. Oil mill (1) according to claim 5, wherein said perforated surface has holes having a diameter of between 5 and 15 mm, decreasing vertically towards said discharge opening (13).
7. Oil mill (1) according to claim 1, wherein on the periphery of said rotor (3) some pins (5) are foreseen for fastening said hammers (4) extending radially.
8. Oil mill (1) according to claim 7, wherein said hammers (4) extending radially have an oblong configuration with the end distal from the fastening pin (5) that licks said cage (2).
9. Oil mill (1) according to claim 7, wherein the hammers (4) arranged at the vertically distal ends of each fastening pin (5) have an inclination going away from the corresponding proximal hammer (4).
10. Oil mill (1) according to claim 7, wherein said hammers (4) are grouped together in a pack with spacers (10) placed between them.
11. Oil mill (1) according to claim 10, wherein said spacers (10) have a thickness equal to that of the hammers (4).
12. Oil mill (1) according to claim 1, wherein said supply opening (7) is arranged so as to supply the drupes axially from above.
13. Oil mill (1) according to claim 1, comprising a cover (8) suitable for preventing the accidental entry of undesired material in said cage (2).



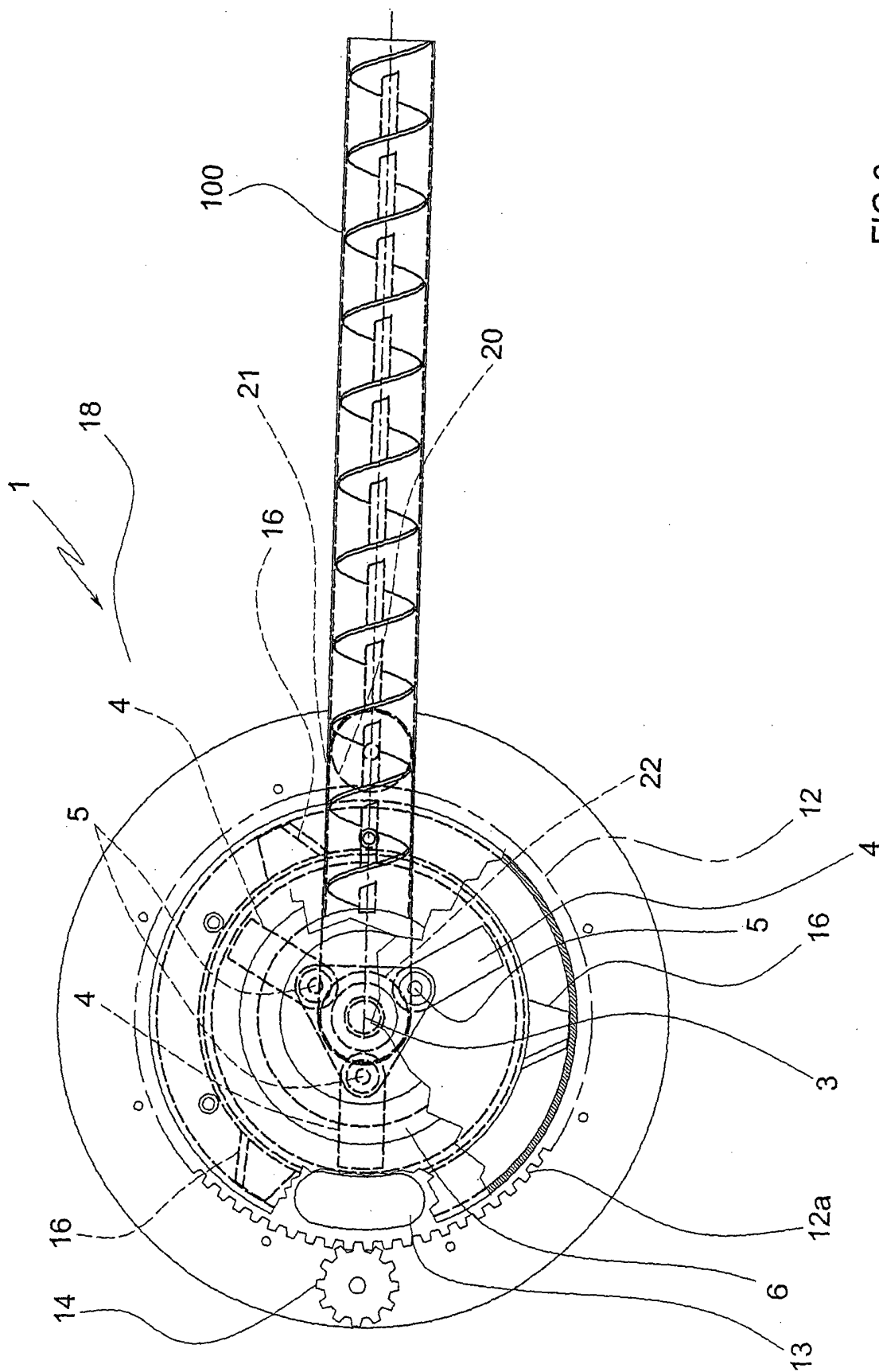
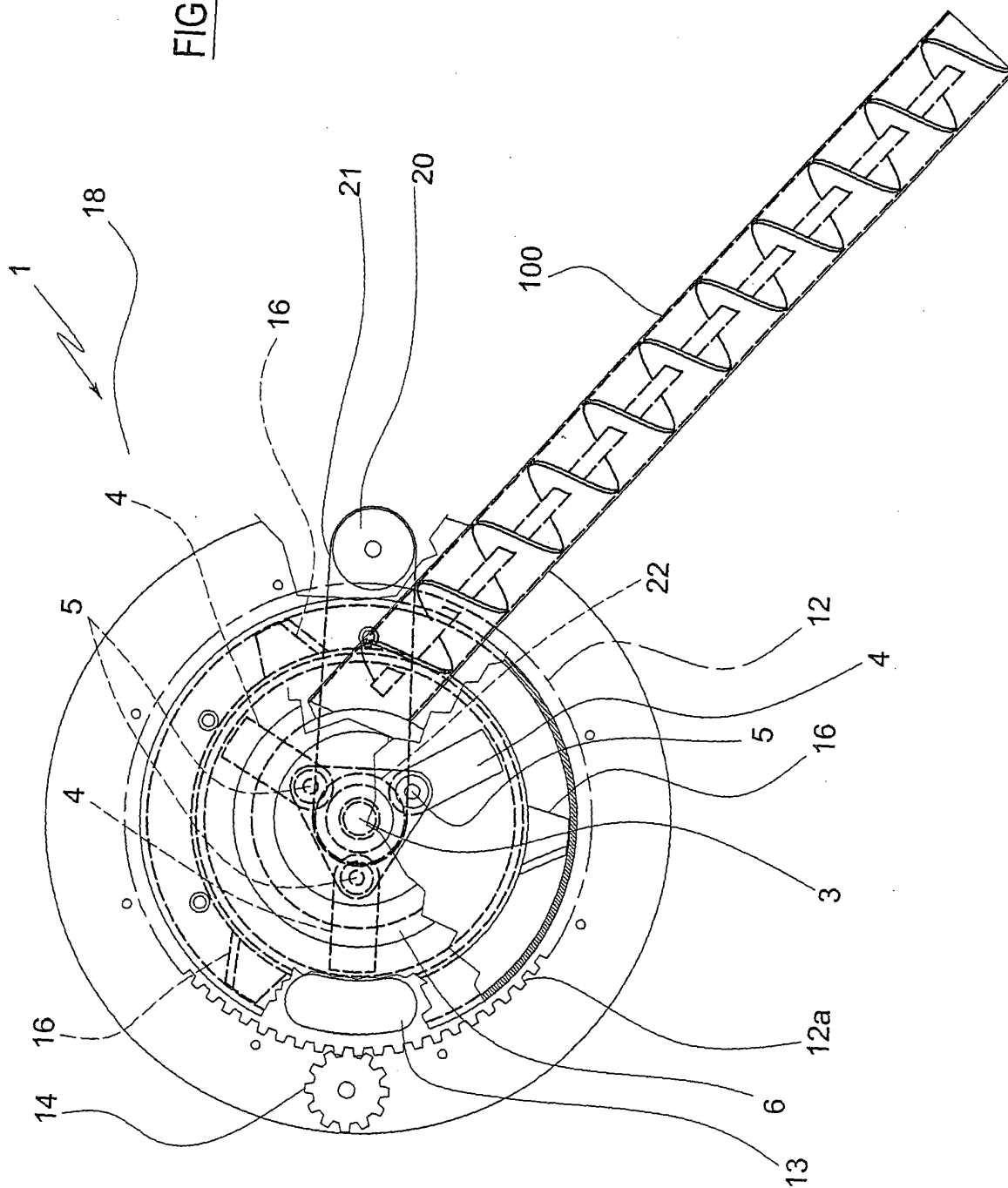
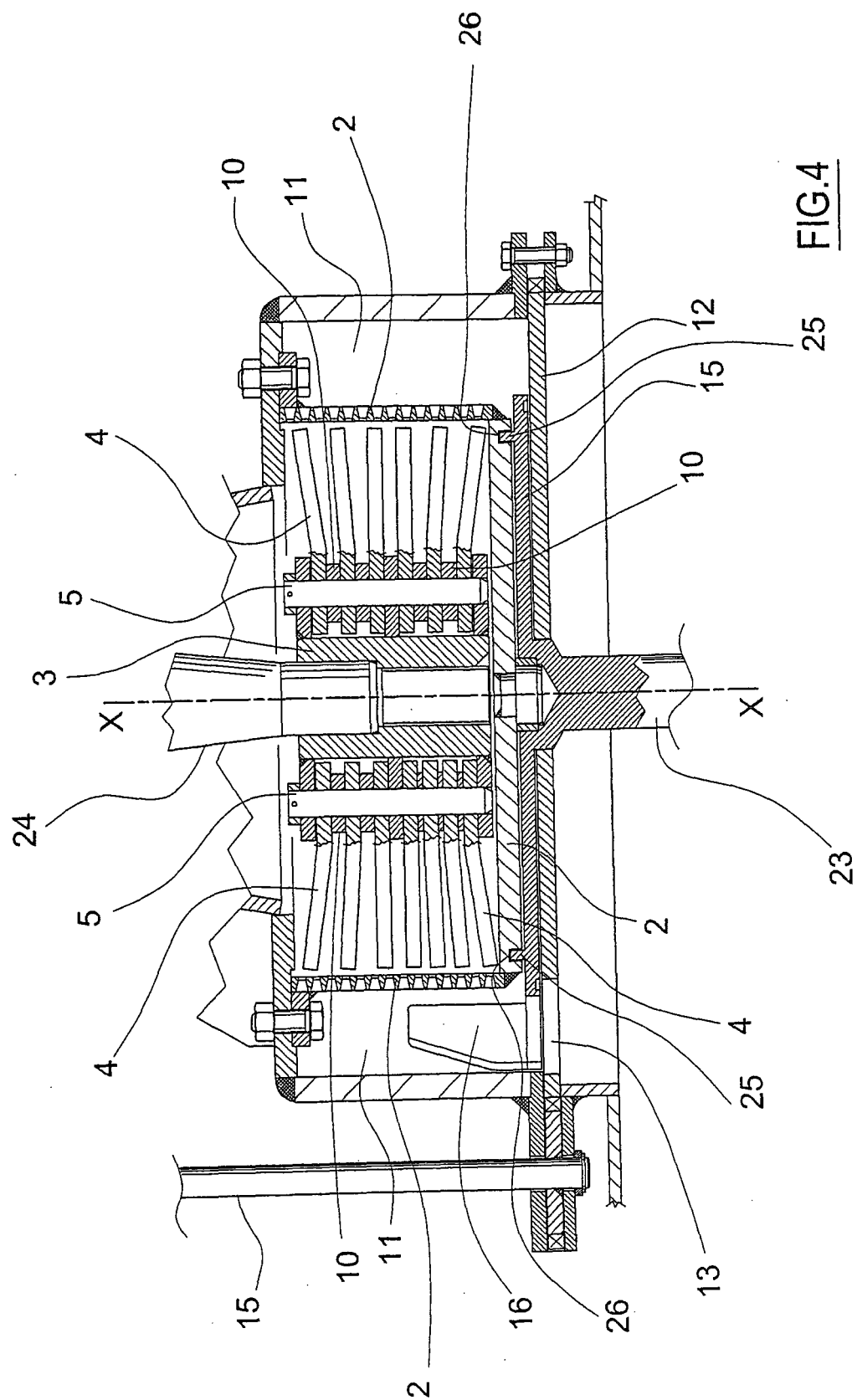


FIG. 2

FIG.3







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EUROPEAN SEARCH REPORT

Application Number
EP 04 07 8464

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.7)
A	US 2 325 426 A (RIETZ CARL A) 27 July 1943 (1943-07-27) * page 1, right-hand column, line 12 - line 34 * * page 2, right-hand column, line 5 - page 3, right-hand column, line 34; figures *	1	B02C13/14 B02C13/286
A	US 1 977 771 A (MCMAHAN STANLEY) 23 October 1934 (1934-10-23) * page 1, line 75 - page 2, line 90; figures *	1	
A	EP 0 173 831 A (GEBRUDER BUHLER AG) 12 March 1986 (1986-03-12)		
A	GR 97 100 255 A (POTTIS ANASTASIOU MICHAIL) 26 February 1999 (1999-02-26)		
			TECHNICAL FIELDS SEARCHED (Int.Cl.7)
			B02C C11B A23N
The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 20 September 2005	Examiner Leitner, J
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			

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EPO FORM 1503 03.82 (P04C01)

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

EP 04 07 8464

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
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20-09-2005

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