

(19)



Europäisches Patentamt
European Patent Office
Office européen des brevets



(11) Publication number:

0 616 024 A1

(12)

EUROPEAN PATENT APPLICATION
published in accordance with Art.
158(3) EPC

(21) Application number: **92919511.3**(51) Int. Cl.⁵: **C11B 1/00, C11B 1/04,
C11B 1/02**(22) Date of filing: **09.09.92**(86) International application number:
PCT/JP92/01143(87) International publication number:
WO 94/05750 (17.03.94 94/07)(43) Date of publication of application:
21.09.94 Bulletin 94/38(84) Designated Contracting States:
ES GR IT

(71) Applicant: **NISSHIN PLANT ENGINEERING CO. LTD.**
23-1, Shinkawa 1-chome,
Chuo-ku
Tokyo 104 (JP)
Applicant: **NIPPON OLIVE CO. LTD.**
3911-10, Ushimado,
Ushimado-cho
Oku-gun, Okayama-ken 701-43 (JP)

(72) Inventor: **OKUMURA, Akira**
2-25-1, Minamiohtamachi,
Minami-ku

Yokohama-shi, Kanagawa-ken 232 (JP)Inventor: **YOSHIHARA, Tamotsu****3-24-7, Shohnandai****Fujisawa-shi, Kanagawa-ken 252 (JP)**Inventor: **WATANABE, Hisashi****8-43-6, Sugita,****Isogo-ku****Yokohama-shi, Kanagawa-ken 235 (JP)**Inventor: **NAKAZAKI, Saburo****321-2, Kimitsu****Okayama-shi, Okayama-ken 704 (JP)**

(74) Representative: **Heusler, Wolfgang, Dipl.-Ing.**
Dr. Dieter von Bezold
Dipl.-Ing. Peter Schütz
Dipl.-Ing. Wolfgang Heusler
Brienner Strasse 52
D-80333 München (DE)

(54) **PROCESS FOR RECOVERING OLIVE OIL.**

(57) An olive oil which little undergoes any deterioration in quality can be obtained in a high yield by pitting olive fruits on a crusher and a strainer, adding 100 to 1,000 ppm of cellulase and optionally protease to the pitted fruits, stirring the mixture at 20 to 50 °C for 30 to 120 min to cause a reaction, and recovering separated oil.

EP 0 616 024 A1

Technical Field

The present invention relates to a method for recovering an oil component of a good quality, with high efficiency, by extracting and separating it from olive drupes with stones removed.

Background Art

A general method of extracting olive oil is as shown in FIG. 1. That is, olive drupes 1 with leaves removed (Step 2) are washed (Step 3), and crushed (Step 4) together with stones (pyrenes). The crushed olive is kneaded for 30 to 90 minutes in a kneading machine (Step 5), and water is added thereto. Then, the mixture is transferred to a decanter and the husk is removed (Step 6), obtaining juice 10. Subsequently, oil is centrifugally separated from the juice 10 (Step 7) and filtrated (Step 8), thereby obtaining pure olive oil 9.

In the above-mentioned method, as the oil component present in the stones simultaneously extracted, it contaminates the olive oil. Since lipid degradable enzyme is contained in a high level in the stones, the quality of oil possibly decreases in an extraction step, and the flavor and taste of oil tends to deteriorate in a storage step.

To solve the above-mentioned problems, the stones should be removed. However, when olive drupes with stones removed are treated, as they are, by the above-mentioned conventional method, a recovering rate of an oil component is extremely low as compared to that obtained from olive drupes with stones. In addition, no practical methods have been known to remove the stones efficiently. Hence, a method for extracting oil from the olive drupes with stones removed has not yet been adopted in factory production.

Disclosure of Invention

It is an object of the present invention to provide a method for extracting oil of a good quality with high efficiency from olive drupes with stones removed.

The present inventors have conducted intensive and extensive studies with a view toward attaining the above-mentioned object, and found that using a specific enzyme, an oil component can be obtained at a good recovering rate from olive drupes with stones removed, and that employing specific means in combination, the stones can be efficiently removed in a practical manner.

The present invention has been achieved based on the above-findings, and provides a method for extracting an oil component, which comprises the steps of: adding either cellulase or cellulase and protease to olive drupes with stones removed; reacting the resultant mixture while stirring; and separating an elated oil component. Further the present invention provides a method of performing the above-mentioned removal of stones by a crusher, which crushes only the sarcocarp (pulp) of olive with stones removed, and by a strainer.

Brief Description of Drawings

FIG. 1 is a block diagram to explain a conventional method for recovering olive oil.

FIG. 2 is a block diagram to explain an example of the method for recovering olive oil of the present invention.

Best Mode of Carrying Out the Invention

Hereinbelow, the present invention will be explained with reference to FIG. 2.

In FIG. 2, after leaves of harvested olive drupes 21 are removed (Step 22) by the conventional method and washed (Step 23), the olive drupes are crushed by a crusher in cooperation with a strainer, thereby removing the stones (Step 24). The crusher should crush only olive sarcocarps. As an example of the crusher, a Micrograter is used. The Micrograter is a low-height and hard-type cylindrical container having a stirring means with projections disposed therein and has a function of separating the sarcocarp of olive from the stones without giving damage to the stones and make the sarcocarp into pieces with high efficiency. To ensure this function, a slope is provided to the cylindrical container to adjust the holding-time in the container of olive drupes. As an example of a stainer, a Seed Pulper is used. The seed pulper is a horizontal cylindrical container composed of double cylinders. Using the inner cylinder as a kind of grating, the sarcocarps are pushed out through the grating with a scraper disposed in the cylinder and the separated stones left in the cylinder are discarded from an end of the cylinder. The crusher and the strainer of the present invention will not be limited by the structures of the above mentioned ones, which are merely

introduced by way of example.

Crushed olive with stones removed is in a paste state. To this olive paste, water is added, and then either cellulase or cellulase and protease 25 are added as an enzyme. The resultant mixture is allowed to react while being stirred (Step 26). These enzymes destroy the cellular membrane of olive to facilitate oil extraction from the sarcocarp.

As examples of the enzymes, OLIVEX, PECTINEX (provided by Novo Nordisk Bioindustry, Ltd.) may be used. However, as long as it has an activity equivalent to that of the above-mentioned enzyme product, any commercially available enzyme product may be used. The amount of enzyme to be added and time for stirring vary depending on types and the ripening of olive. The amount of enzyme to be added is approximately 100 to 1000 ppm relative to olive, preferably 200 to 500 ppm. The time for stirring is preferably about 30 to 120 minutes. The reaction temperature is adjusted to 20 to 50 °C and a pH value is desirably 3 to 5.

After a completion of the reaction with enzyme, the husk is decanted and removed from the enzyme reaction product (Step 27). Then, oil is centrifugally separated from juice 31 (Step 28), and filtrated (Step 29), thereby obtaining olive oil 30. Since the enzyme is still remained in the separated juice 31, the juice can be used again as the water to be added to the reaction 26 with stirring. Applying a three-phase separating decanter to the decanting step, the oil component, juice, and the husk can be separated, thereby reducing the load of the next centrifugation step.

Example 1

After removing leaves, the olive drupes (an oil component: 18.5 %, water: 71 %, a solid composition: 10.5 %, and pH: 3.5) were washed, and their stones were manually removed. Then, 300 g of the olive drupes was crushed by a blender to obtain olive paste. To the paste, water was added in an equal amount to that of the paste, and the mixture was divided into two fractions. To one of the fractions, 400 ppm of PECTINEX (provided by Novo Nordisk Bioindustry, Ltd.,) was added. Both fractions were agitated by a stirrer with propeller blades for one hour, subjected to centrifugal separation at 5000 rpm for 15 minutes. The separated liquid portion was further centrifuged at 5000 rpm for 5 minutes, thereby collecting a separated oil component. The temperature was 24 °C during the reaction with stirring. The flavor and taste of olive oil extracted from the fraction containing the enzyme is superior to those of the fraction containing no enzyme. The results of this Example are shown in Table 1.

Example 2

After 500 kg of olive drupes was washed, 115 kg of the olive stones was separated through a Micrograter in cooperation with a Seed Pulper, thereby obtaining 385 kg of olive paste. The olive paste was composed of an oil component of 13.5 %, water of 78.5 %, and a solid component of 8.1 % (pH of 4.2). To this paste, water was added in an equal amount to that of the paste, and then, 400 ppm of OLIVEX (provided by Novo Nordisk Bioindustry Ltd.,) was added thereto. The mixture was agitated by a stirrer with propeller blades at 80 rpm for 1.5 hours. After a completion of the reaction while stirring, the mixture was separated into the oil component, juice, and the husk through a three-phase separating decanter. The oil component was further subjected to centrifugal separation to remove contaminated juice and a trace amount of the husk, thereby obtaining 48.2 kg of pure olive oil. The temperature was kept to 25 °C at the time of initiation of the reaction with stirring and to 50 °C at the end of the reaction. The acid value of the obtained olive oil was 1.6. The flavor and taste were excellent. The results of this example are summarized in Table 2.

Effect of Invention

According to the present invention, olive oil can be efficiently extracted in a high yield from olive drupes with stones removed.

Since the stones are not crushed while being removed, the lipid degradable enzyme of the stones does not contaminate the olive oil. Therefore, the obtained oil are free from the quality deterioration in an oil extraction step. Consequently, the obtained oil product is excellent in the quality, and in a flavor and taste keeping ability.

Table 1

	Total amount	Volume of first centrifugation	Volume of second centrifugation	Yield
Fraction with an enzyme	300g	200g	20g	13.3% (Relative to olive paste) 72.0% (Relative to oil contained in paste)
Fraction without an enzyme	300g	130g	6.5g	4.3% (Relative to olive paste) 23.9% (Relative to oil contained in paste)

Table 2

	Olive drupes	Paste of the sarcocarp	Extracted olive oil
Total amount	500kg	385.0kg	48.2kg
Oil		53.0kg (13.5%)	
Fruit juice		301.9kg (78.4%)	
Husk		31.2kg (8.1%)	
Stone			
Yield	Relative to olive drupes	Relative to paste of the sarcocarp	Relative to oil contained in paste of the sarcocarp
	9.6%	12.5%	92.7%

Claims

1. A method for recovering olive oil characterized by comprising the steps of: adding cellulase to olive drupes with stones removed; reacting a resultant mixture while stirring; and extracting and separating an oil component from the reaction product.
2. A method for recovering olive oil according to claim 1, characterized in that an amount of said cellulase is 100 to 1000 ppm relative to olive.
3. A method for recovering olive oil according to claim 1, characterized in that said step of reacting a resultant mixture while stirring, is performed at pH of 3 to 5.
4. A method for recovering olive oil according to claim 1, characterized in that said step of extracting and separating an oil component is performed by a three-phase separating decanter to separate into an oil component, juice, and a husk.
5. A method for recovering olive oil of recovering olive oil characterized by comprising the steps of: adding cellulase and protease to olive drupes with sarcocarps removed; reacting a resultant mixture while stirring; and extracting and separating an oil component from the reaction product.
6. A method for recovering olive oil according to claim 5, characterized in that an amount of said cellulase and protease is 100 to 1000 ppm relative to olive.

7. A method for recovering olive oil according to claim 5, characterized in that said step of reacting a resultant mixture while stirring is performed at pH of 3 to 5.
- 5 8. A method for recovering olive oil according to claim 5, wherein said step of extracting and separating an oil component is performed by a three-phase separating decanter to separate into an oil component, juice, and a husk.
- 10 9. A method for recovering olive oil according to either claim 1 or claim 8, characterized by further comprising a step of removing stones from olive drupes by using a crusher, which crushes only the sarcocarp of olive in cooperation with a strainer.

15

20

25

30

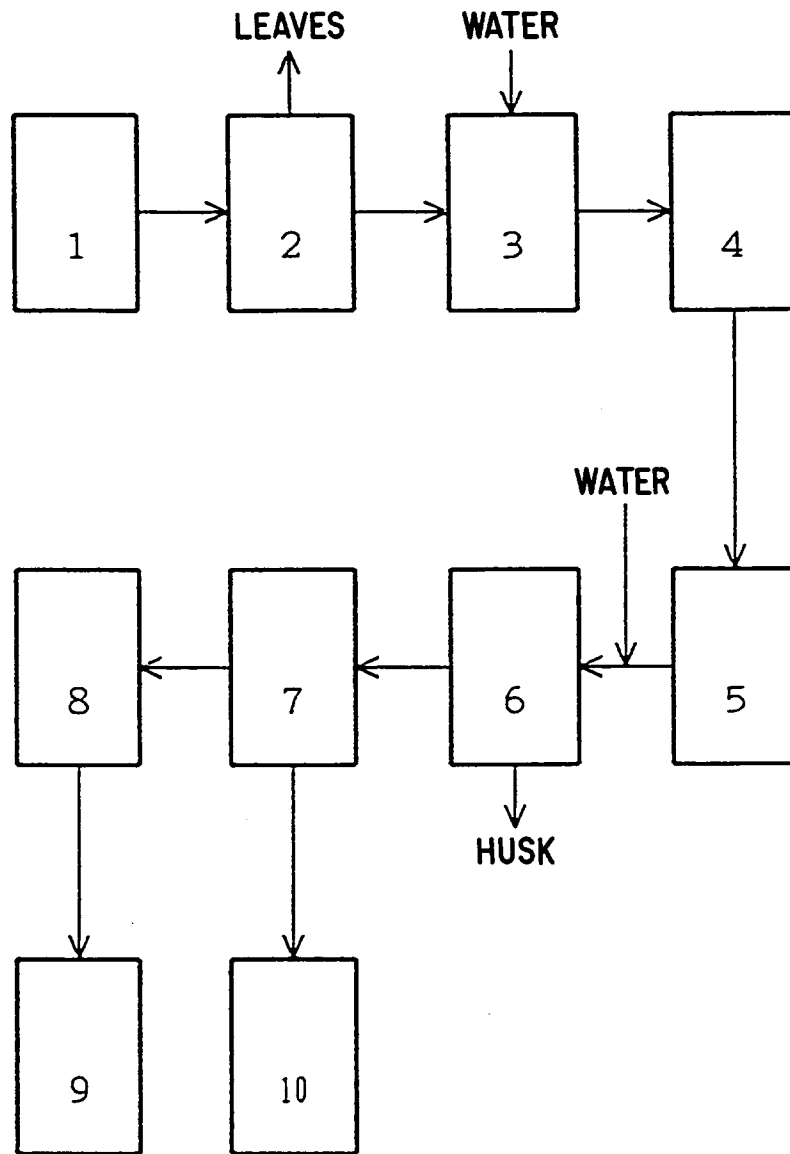
35

40

45

50

55



F I G. 1

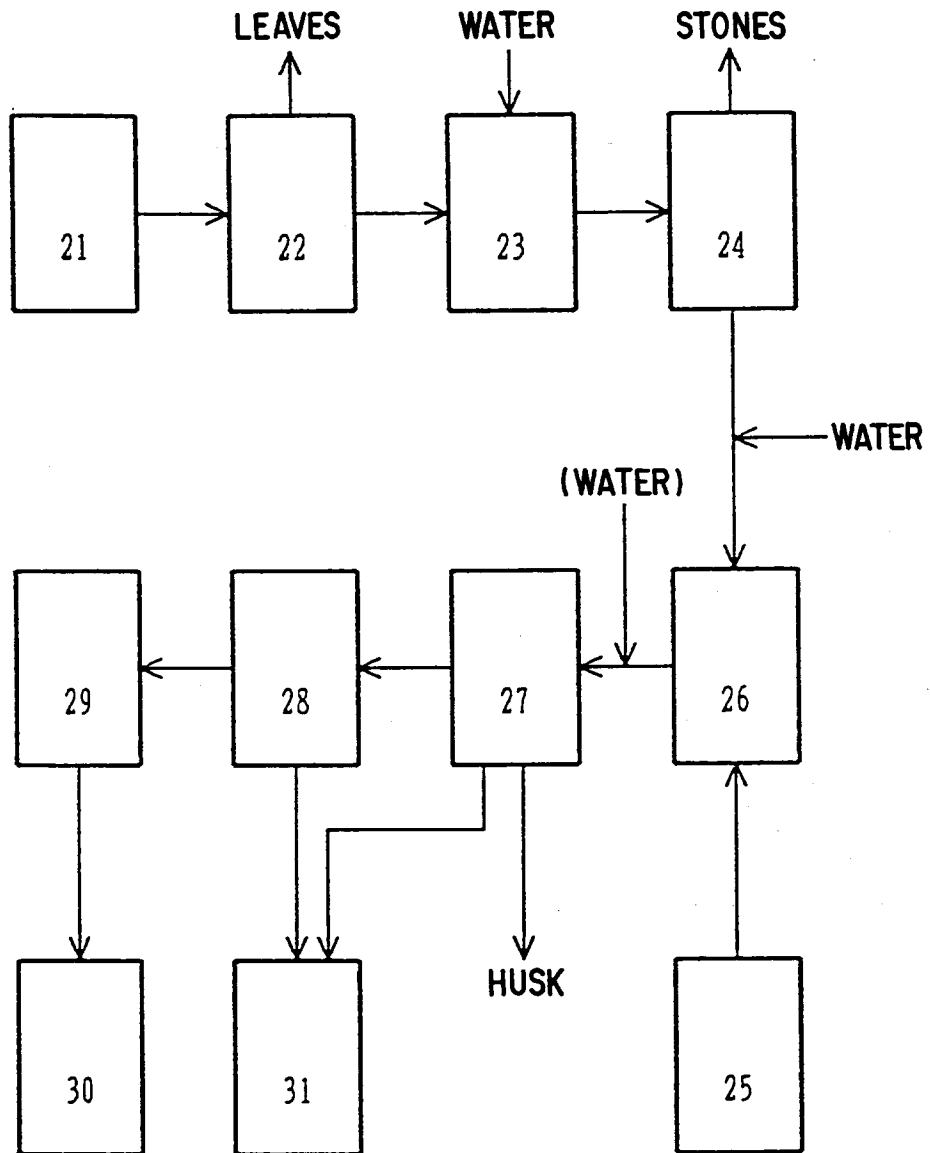


FIG. 2

INTERNATIONAL SEARCH REPORT

International Application No PCT/JP92/01143

I. CLASSIFICATION OF SUBJECT MATTER (if several classification symbols apply, indicate all) ⁶		
According to International Patent Classification (IPC) or to both National Classification and IPC		
Int. Cl ⁵ C11B1/00, 1/04		
II. FIELDS SEARCHED		
Minimum Documentation Searched ⁷		
Classification System	Classification Symbols	
IPC	C11B1/00, 1/02, 1/04	
Documentation Searched other than Minimum Documentation to the Extent that such Documents are Included in the Fields Searched ⁸		
III. DOCUMENTS CONSIDERED TO BE RELEVANT ⁹		
Category ¹⁰	Citation of Document, ¹¹ with indication, where appropriate, of the relevant passages ¹²	Relevant to Claim No. ¹³
X	DE, A1, 3843027 (Battelle-Institut e. v.), June 28, 1990 (28. 06. 90), (Family: none)	1-9
Y	Acta Vitaminol. Enzymol., 26(5-6), (1972), G. Montedoro, G. Petruccioli, "Trattamenti enzimatici nell' estrazione dell' olio di oliva con mezzi meccanici (Olive Oil Mechanic Extraction by Enzymatic Treatments.)", p. 171-180	1-9
¹⁰ Special categories of cited documents: "A" document defining the general state of the art which is not considered to be of particular relevance "E" earlier document but published on or after the international filing date "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified) "O" document referring to an oral disclosure, use, exhibition or other means "P" document published prior to the international filing date but later than the priority date claimed "T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention "X" document of particular relevance: the claimed invention cannot be considered novel or cannot be considered to involve an inventive step "Y" document of particular relevance: the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art "&" document member of the same patent family		
IV. CERTIFICATION		
Date of the Actual Completion of the International Search	Date of Mailing of this International Search Report	
October 28, 1992 (28. 10. 92)	November 17, 1992 (17. 11. 92)	
International Searching Authority	Signature of Authorized Officer	
Japanese Patent Office		