

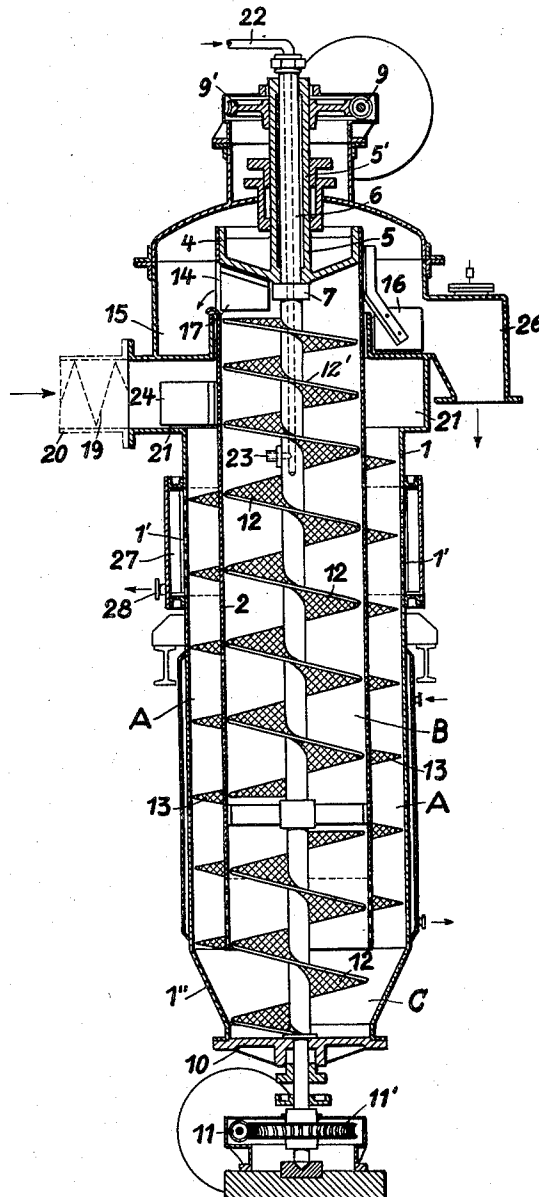
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APPARATUS FOR THE CONTINUOUS EXTRACTION OF MATERIAL

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APPARATUS FOR THE CONTINUOUS
EXTRACTION OF MATERIAL

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4 Claims. (Cl. 87—6)

The invention relates to an apparatus for the extraction of material by means of a solvent, and the invention is particularly intended for the extraction of vegetable oils and fats, in which the extraction material and the solvent move in opposite directions. According to the invention the extraction apparatus consists of an upright receptacle which is subdivided in its interior into two chambers in communication with each other and concentric to each other and in which work feeding means which cause the material to pass through the two chambers successively in the opposite direction to the solvent. These two chambers may be provided by arranging a tube concentrically in the extraction receptacle. The extraction material is delivered at the top into the annular chamber formed between the tube and the wall of the extraction receptacle, whilst the supply of the solvent takes place in the tube at the top, and the extraction material rises in the tube after traversing the annular chamber. The feeding elements in the annular chamber are arranged advantageously externally on the wall of this tube, which is rotatably mounted and driven. The feeding elements may be driven separately in order to enable the speed of the feeding of the extraction material in the annular chamber and in the rotary tube to be regulated.

The invention, as compared with known apparatus, presents the advantage that the extraction of the material takes place in a single receptacle.

A constructional example of the subject-matter of the invention is shown in longitudinal section in the drawing.

In the uprightly arranged extraction receptacle 1 there are provided the two chambers A and B. The chambers A and B are formed as follows: In the extraction receptacle 1 there is arranged centrally a tube 2. This tube is suspended on the supporting ring 4 the hub of which is mounted rotatably on the shaft 6 arranged inside the tube 2 and is supported on the collar 7 of the shaft 6. The hub 5, and consequently also the tube 2, are rotated by means of a gear wheel fastened unrotatably on a prolongation 5' of the hub 5, for example by a worm wheel 9' which is driven by a worm 9. The lower end of the shaft 6 extends through the closing cover 10 of the receptacle 1 and is mounted in any desired manner at the lower end. The shaft 6 is rotated by a driving device 11' arranged in any desired manner in the casing. On the shaft 6 there are arranged feeding elements 12 which feed the

material from below upwards through the tube 2. The inclination of the feeding elements 12, which may be imperforate or perforate, may be the same throughout, or as shown, in the upper portion of the tube 2 it may be different from (smaller than) in the lower portion of the tube. The tube 2, which may be perforated at the lower end as illustrated, carries on its periphery feeding elements 13, which may be imperforate or perforate. At the upper end of the tube 2 there are in the wall of the tube several outlet openings 14, which open into the chamber 15 for the delivery of the exhausted material, from which the material is removed by means of the blades 16. In front of the openings 14 there are located in the tube 2 removing devices 17. For delivering the material into the chamber A formed between the tube 2 and the container wall 1 there serves the tube 20 which is provided with a feeding worm 19 and which is connected to the delivery chamber 21. Below the chamber 21 the wall of the container is provided for a short distance with perforations 1'. The lower end 1'' of the container 1 is made preferably conical and forms there a chamber C which connects the two chambers A and B and at the beginning of which the tube 2 ends, whilst the feeding elements 12 extend into the chamber C. The shaft 6 is made hollow in the upper portion and serves for the supply of the solvent which is fed through the pipe 22 and which passes out through nozzles 23 arranged on the shaft 6.

The mode of operation of the extracting apparatus is as follows:—

The material supplied through the delivery tube 20 to the delivery chamber 21 is fed by means of the feeding elements 24 arranged on the tube 2 into the annular chamber A formed between the tube 2 and the wall of the container 1. The loose material is then gradually forwarded into the chamber A downwards into the chamber C of the container 1 by means of the feeding elements 13 arranged on the periphery of the tube 2. From the chamber C the material is fed upwards by means of the feeding elements 12 in the tube 2 and passes through the outlet openings 14 of the said tube 2 into the delivery chamber 15 from which the material is forwarded into the delivery hopper 26 by means of the blades 16. The solvent supplied through the hollow shaft 6 and issuing into the chamber B through the nozzles 23 traverses the material in the opposite direction. In this way the solvent takes up fat or other matter out of the material, passes upwards in the annular

chamber A after leaving the chamber B and traversing the chamber C, and leaves the annular chamber A as a concentrated mixture through the openings 1' of the extraction receptacle 1. When, in accordance with the constructional example, the feeding elements 12' in the upper part of chamber B are given a smaller inclination above the solvent outlet 23 than the feeding elements 12 below the solvent outlet 23, this arrangement brings it about that the lixiviated material impregnated with solvent is lightly squeezed before it passes out of the chamber B. In consequence of this compression of the material in the upper portion of the chamber B it is brought about at the same time that the freshly supplied solvent finds resistance upwards in the chamber B and is thus compelled to pass downwards in the chamber B through the more loosely packed material in the region of the feeding devices of greater inclination. This is assisted also by the difference of level between the solvent inlet 23 and the concentrated liquor outlets 1'. The apparatus is suitable not only for the extraction of oil seeds but also for other fatty and non-fatty material, which is to be treated by lixiviation.

What I claim is:

1. Apparatus for continuous lixiviation of solid materials, comprising an upright receptacle and a tube therein dividing its inner space into two concentric chambers, feeding means to move material to be lixiviated downward in one of said chambers, feeding means to move the material upward in the other of said chambers, separate driving means for said feeding means whereby they may be driven at different speeds, and means to cause a solvent to flow through said chambers in succession in counter-current to the material.

2. Apparatus for continuous lixiviation of solid

materials, comprising an upright receptacle and a tube therein dividing its inner space into two concentric chambers, feeding means to move the material downward within said tube comprising rotary helical blades decreasing in pitch at the upper end of said tube, separate driving means for said feeding means whereby they may be driven at different speeds, and means to cause a solvent to flow through said chambers in succession in counter-current to the material.

3. Apparatus for continuous lixiviation of solid materials, comprising an upright receptacle and a tube therein dividing its inner space into two concentric chambers, feeding means to move material to be lixiviated downward in one of said chambers, feeding means to move the material upward in the other of said chambers, separate driving means for said feeding means whereby they may be driven at different speeds, said receptacle being perforated near its upper end on its circumference as a sieve forming outlets for the concentrated liquor, and means to cause a solvent to flow through said chambers in succession in counter-current to the material.

4. Apparatus for continuous lixiviation of solid materials, comprising an upright receptacle and a tube therein dividing its inner space into two concentric chambers, feeding means to move material to be lixiviated downward in one of said chambers, feeding means to move the material upward in the other of said chambers, separate driving means for said feeding means whereby they may be driven at different speeds, and means to cause a solvent to flow through said chambers in succession in counter-current to the material, the lower end of the tube being perforated on its circumference as a sieve.

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