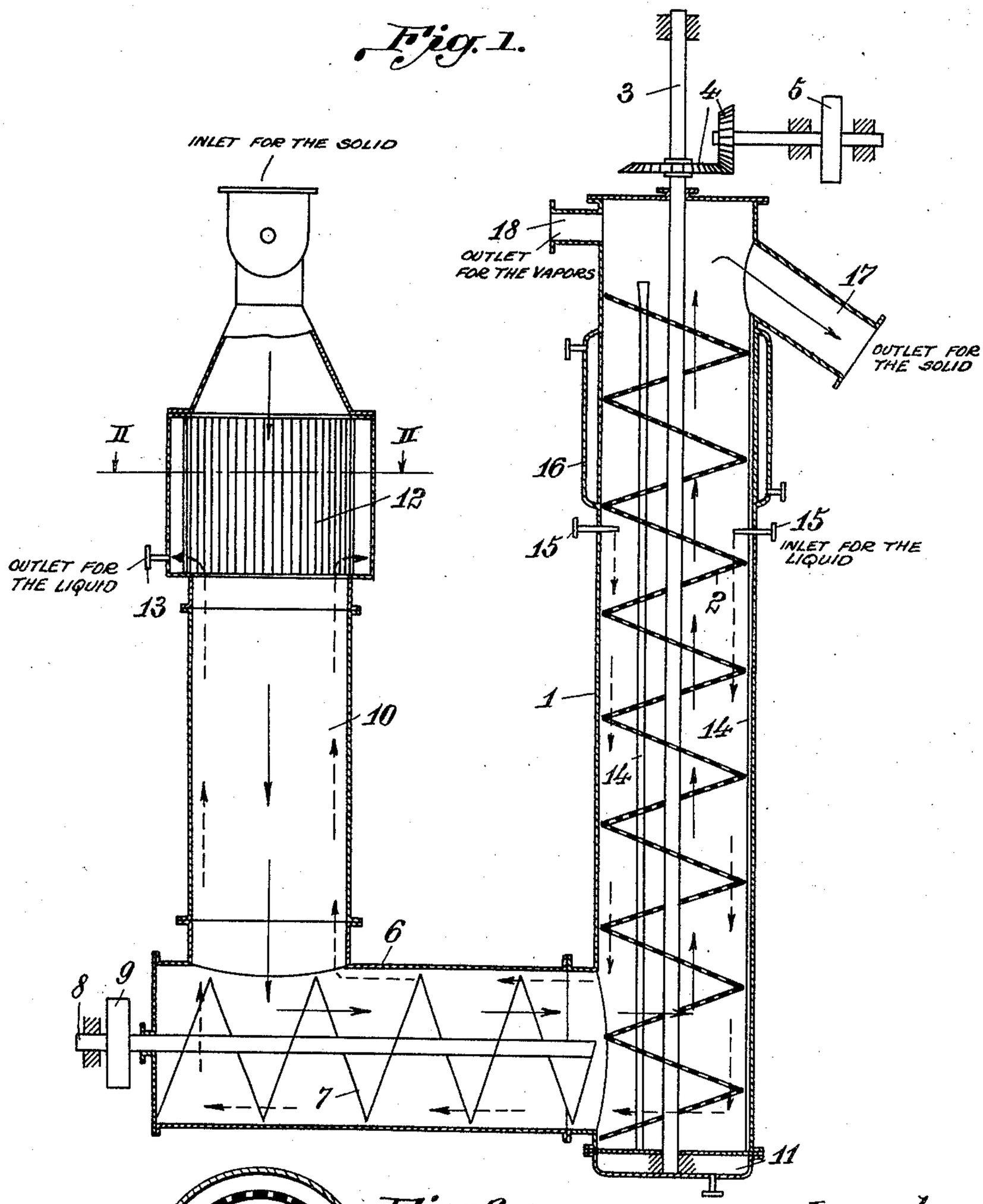
June 5, 1934. K. HILDEBRANDT 1,961,420

APPARATUS FOR CONTINUOUS EXTRACTION OF OILS AND FATS

Filed March 12, 1931

Fig. 1.



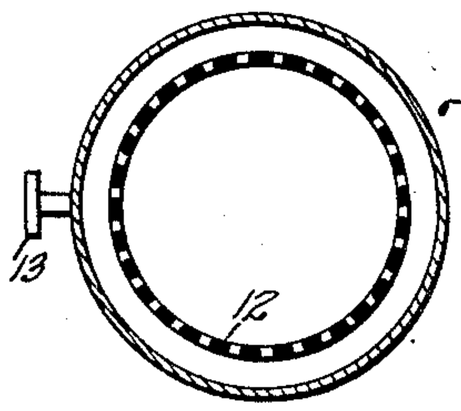


Fig. 2.

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APPARATUS FOR CONTINUOUS EXTRACTION OF OILS AND FATS

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1 Claim. (Cl. 87—6)

The present invention relates to an apparatus for continuous extraction of oils and fats from materials containing such substances.

The extraction of oil is today carried out after a plurality of different methods and by means of various devices. A frequently used method consists in charging a series of interconnected containers with a material containing oil or fatty matters, closing said containers and passing a solvent or extraction agent through the same. According to another commonly used method the containers for the material to be treated form a closed system through which the extraction agent circulates. In both cases the extraction is an intermittent one, as the treatment is interrupted at intervals in order to remove spent material and recharge the containers.

Also an apparatus for continuous operation is known. This apparatus comprises a vertically arranged container in which the extraction takes place and to which the material to be treated is supplied under pressure. The material is moved through the container by means of worms and simultaneously the extraction agent flows through the container in opposite direction. To this apparatus however several drawbacks adhere, which mainly are due to the fact, that the material under treatment is raised or conveyed through the container by means of two worm conveyors. When working with this apparatus the material is not conveyed through the conveyor in a uniform layer and the oils and fats will therefore only be partially extracted, since the extraction agent or solvent naturally will choose the path offering the least resistance and therefore mainly will flow through spaces in which only little or no material is present, whereas thicker layers or relatively large heaps or lumps of material will be only partially penetrated by the extraction fluid.

According to the present invention the above named drawbacks are avoided by performing the extraction of oils and fats in a substantially U-shaped apparatus comprising two vertically arranged containers the lower ends of which are interconnected by means of a transverse member containing a screw conveyor, which operates at an automatically controlled pressure. The material to be treated is fed into the apparatus at the upper end of one of the containers and drops to the bottom of the same where it is caught by the conveyor in the transverse member and forced into the lower part of the second container. In this container a single worm conveyor is arranged by means of which the material is lifted substantially vertically through the container and during this upward movement the material is subjected to the influence of the extraction agent, which flows from the top of the container towards the bottom of the same. By using a single worm conveyor the material will be moved uniformly through the container in such a manner that it is always evenly distributed over the entire cross-sectional area of the same and therefore will be evenly penetrated by the extraction agent flowing in counter current through the container. The ends of the tubes through which the extraction agent is fed into the container are preferably arranged in such a manner that they project into the interior of the container. Through this measure a still more even distribution of the extraction fluid is obtained.

The screw conveyor may be perforated in such a manner, that it also will act as a sieve. The pressure of the transverse conveyor is regulated automatically. The extraction agent flowing through the last mentioned container will pass through the transversal member into the first mentioned container in which it will rise and pass through a sieve or basket, which is equipped with outlet elements through which the extraction agent will leave the apparatus. The sieve or basket and the outlet elements are arranged at the upper end of the container through which the material is fed into the apparatus. The material is thus subjected to the influence of the extraction agent through all parts of the apparatus and for a long time and the extraction agent will get into intimate contact with every particle of the said material. It is therefore possible to use a relatively small quantity of extraction agent and to obtain a product of high concentration.

An apparatus by means of which the invention may be carried into effect is shown schematically by way of example in the accompanying drawing.

In a vertically arranged container 1 a perforated worm conveyor 2 is arranged, the shaft 3 of which is rotated by means of bevel gears 4 and a pulley 5. A horizontally arranged feeding tube 6 is connected with one end to the lower or bottom part of the container 1 and with the other end to the end of the container 10. In the tube or cylinder 6 a feeding worm 7 is arranged the horizontal shaft 8 of which is rotated by means of a pulley 9. If desired, the feeding worm 7 may be equipped with a coupling adapted to be released automatically at a predestined

maximal pressure, the value of which varies in accordance with the nature of the material to be treated and certain other factors. The coupling may at each treatment be set to release at a desired pressure. When the material to be treated has passed the sieve or basket 12 it drops onto the worm 7 and is passed into the container 1. The extraction agent which is admitted through the nozzles 15, flows through the entire apparatus in counter current and leaves the apparatus through one or more outlet openings 13. At the lower end of the container 1 a detachable member 11 is arranged, which is removed when it is desired to empty the apparatus. The material is fed into the container 1 in such a manner, that it always fills the cross-sectional area of the container and the spaces between the lower windings of the worm completely. In order to facilitate the upward movement of the material guide lists 14 may be arranged on the inner side of the container 1. On account of the inlet tubes 15 projecting into the interior of the mass proper and the perforations in the worm 2 the extraction agent will be evenly distributed over the entire interior of the container 1. The worm 2 and the container 1 are prolonged above the tube 15. The extraction agent is evaporated from the treated material by means of a heating jacket 16. The treated material is removed through the tube 17 and the vapors of the extraction agent are let off through the outlet tube 18.

The treatment is a fully continuous one and will call forth a complete extraction of the oils and fatty matters.

The described method and apparatus may be modified in several ways without departing from the spirit of the invention or the scope of the claims.

I claim:

An apparatus for continuous extraction of oils and fats from materials containing such substances by means of an extraction agent comprising two substantially upright containers, means for charging one of said containers, a hollow body interconnecting said containers, screw means located in said hollow body and having a substantially tight fit with the wall thereof for forcing material to be extracted through said hollow body from the container receiving the charge into the second container at a predetermined pressure, a perforated screw conveyor located in said second container with a substantially tight fit for lifting the material through said second container, said second container having inlet openings for the extracting agent, said second container also having a discharge opening for the extracted product, said charging container having outlet openings for said extraction agent, independent driving means for said screw conveyor and said screw means for forcing material to be extracted into said second container and rails upon said second container cooperating with the material upon said screw conveyor for preventing a rotation of said material about said screw conveyor whereby a pressure upon said material to be extracted may be exerted.

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