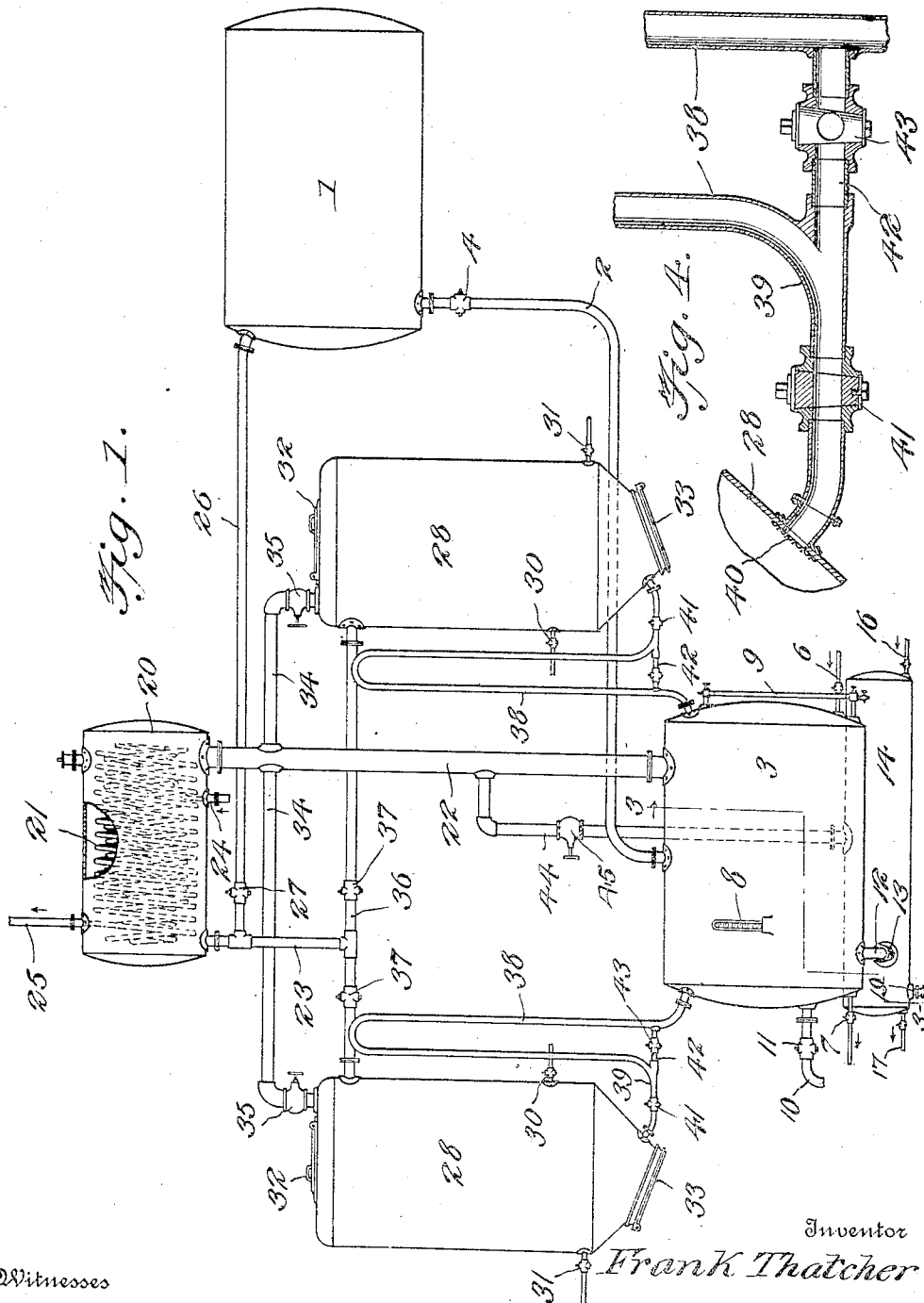


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 APPARATUS FOR EXTRACTING WAX FROM PLANTS.
 APPLICATION FILED MAR. 14, 1911.

1,056,378.

Patented Mar. 18, 1913.

2 SHEETS—SHEET 1.



Witnesses

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Inventor

Frank Thatcher

By

Victor J. Evans

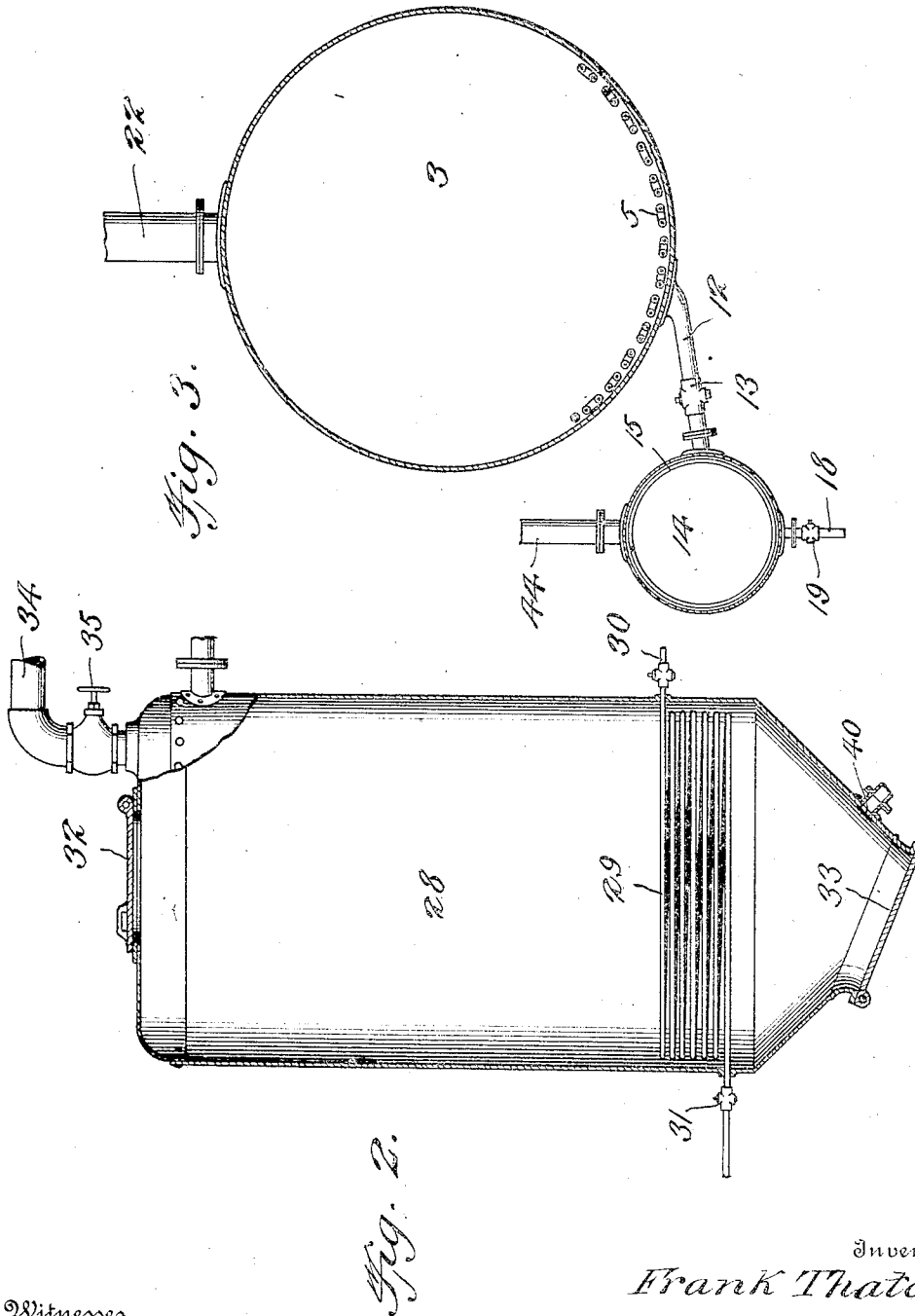
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UNITED STATES PATENT OFFICE.

FRANK THATCHER, OF EL PASO, TEXAS.

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Specification of Letters Patent.

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Application filed March 14, 1911. Serial No. 614,314.

To all whom it may concern:

Be it known that I, FRANK THATCHER, a citizen of the United States, residing at El Paso, in the county of El Paso and State of Texas, have invented new and useful Improvements in Apparatus for Extracting Wax from Plants, of which the following is a specification.

This invention relates to an apparatus for extracting wax from the candelilla plant and other species of plants of the class *Myrica* (Lin).

The object of the invention is to provide an apparatus whereby the material may be subjected to a series of successive extractions by the use of a quantity of solvent which is employed over and over again until all the waxes and oils are extracted from the material, and whereby a continuous automatic process may be carried out in an economical manner and with a minimum amount of care and attention.

The invention consists of the features of construction, combination and arrangement of parts, hereinafter fully described and claimed, reference being had to the accompanying drawings, in which:—

Figure 1 is a diagrammatic elevation of an extracting apparatus embodying my invention. Fig. 2 is a vertical section through one of the digesters and the siphon connected therewith. Fig. 3 is a vertical transverse section on the line 3—3 of Fig. 1. Fig. 4 is a detail vertical section through the lower end of one of the siphon feeders.

Referring to the drawings, 1 designates a storage tank or other suitable source of supply for the solvent to be employed, which tank is in communication through a pipe 2 with a vaporizer 3, said pipe having a controlling valve 4. The vaporizer comprises a vessel or tank containing a steam heating coil 5 provided with a valved inlet 6 and a valved outlet 7. The tank is also provided with a thermometer 8, whereby the temperature of its contents may be determined at any time, and with a gage glass 9, for indicating the level of the liquid contents therein. At one end of the tank is an outlet pipe 10 having a valve 11, through which pipe any portion of the contents of the tank may be drawn off whenever it is desired to determine the condition thereof. The tank 3 communicates at its bottom through a draw-off pipe 12 having a controlling valve 13 with a separator tank or vessel 14 containing

a steam heating coil 15 having a steam inlet communication 16 and a steam outlet or exhaust connection 17, said tank also being provided with a draw-off pipe 18 having a valve 19, whereby the oil and wax separated therein from the solvent may be discharged.

Arranged at a suitable elevation above the vaporizer is a condenser 20 comprising a vessel containing a condenser coil 21 communicating at its inlet end through a main vapor flow pipe 22 with the vaporizer and at its outlet or discharge end with a delivery pipe 23. The condenser is provided with a water inlet 24 and a water outlet 25, whereby cold water may be continuously circulated therethrough to cool the coil and its contents and effect the condensation of the solvent. Leading from the delivery pipe 23 to the storage tank or source of supply 1 is a conducting pipe 26 having a controlling valve 27, through which pipe the condensed solvent may be conducted back to the source of supply when desired.

In the practical operation of the apparatus and carrying out of the process, I employ one or more digesters 28, two being shown in the present instance, arranged at an intermediate level between the vaporizer and condenser. Each of these digesters comprises an ordinary tank or vessel containing a steam heating coil 29 provided with a valved steam inlet 30, and a valved steam outlet 31. At the top of each digester is a charging inlet 32, having a suitable door or closure, through which inlet the plant, in a suitable divided or comminuted condition, is introduced. The bottom of each digester is preferably of conical form and provided with an outlet 33 for the discharge of the refuse material, which outlet is normally covered by a suitable closure.

Leading from the main vapor flow pipe 22 to the top of each digester is a vapor conducting pipe 34 containing a controlling valve 35, through which pipe the vapor liberated by the solvent in the digester may flow to the main vapor flow pipe and thence to the condenser for liquefaction, the valves 35 allowing either pipe to be thrown into and out of operation at will. A conducting pipe 36 containing a controlling valve 37 connects the upper portion of each digester with the pipe 23 for the supply of liquefied solvent from the condenser to each digester, said valves 37 permitting either digester to be cut out of communication with the

condenser whenever desired, so that either one or both digesters may be employed in the extracting operation, as will be readily understood.

5 Arranged alongside each digester is a siphon feeder 33, which terminates just below the bevel of the top of the pipe 36, and consequently below the top of the digester. The shorter, inner and inlet leg of this siphon feeder communicates at its lower end 10 through a pipe 39 with the bottom of the digester, through which pipe the liquid solvent and extracted oil and waxes may flow from the tank to the feeder. A screen 40 15 is provided at the outlet with which the pipe 39 communicates to prevent the passage of any solid particles or plant refuse to the feeder and a valve 41 is provided in said pipe for cutting off communication between 20 the digester and feeder, when desired. The lower end of the outer, discharge leg of the siphon communicates with the top of the vaporizer 3, as shown, and also communicates through a bypass pipe 42 with the pipe 25 39, said bypass pipe having a cut off valve 43, by which the solvent and extracted oils and waxes may be caused to pass directly from the digester to the vaporizer during the final stage of extraction. Leading from 30 the separator 14 to the vapor flow pipe 22 is a pipe 44 containing a controlling valve 45 through which pipe any vapor from the solvent in the separator may pass to the condenser for liquefaction.

35 In operation, each digester is charged with a suitable amount of the weed in a finely divided or comminuted condition, steam supplied to the vaporizer coil, the valve 4 opened for the supply of a desired 40 amount of the solvent to the vaporizer, and the valves 35, 37 and 41 opened to establish communication between the different operative elements of the system. The valves controlling the supply of steam to the digesters 45 are also opened at the same time, and the valve 4 closed when the desired amount of the solvent has entered the vaporizer 3. The heat from the steam coil in the vaporizer effects the vaporization of the solvent, and 50 the vapor flows through the pipe 22 to the condenser, in which it is liquefied, the liquefied solvent passing from the condenser to the digesters and flowing downward through the mass of material therein. The feed of 55 the solvent to the digesters is practically continuous, and the material is allowed to macerate therein until the level of the solvent reaches the top of the siphon feeder, when all of the solvent in the digester is automatically drained off through said 60 feeder into the vaporizer, carrying with it the extracted waxes and oils. This operation is at once repeated, the solvent being vaporized in the vaporizer, then condensed 65 in the condenser, and the material in the di-

gester again subjected to the freshly distilled solvent, such operation of continuous extraction being carried out until all the waxes and oils are extracted from the material. This condition may be determined by 70 drawing off a portion of the contents of the

porizer through the pipe 10 by opening the valve therein, the density of the contents indicating approximately when the 75 total amount of oils and wax contained in any given amount of the material have been extracted. As the solvent, together with the oils and waxes, flows from the digester into the vaporizer, the oils and waxes settle, while the solvent is revaporized and 80 recondensed in the condenser for further use. When all the oils and waxes have been extracted from the material, the amount of solvent, oils and waxes remaining in the digester may be quickly drawn off into the 85 vaporizer by opening the valve 43, whereupon the entire liquid contents of the digester will flow by gravity into the vaporizer. The valve 13 is then opened to allow the contents of the vaporizer to pass into 90 the separator 14, through the coil 15 of which steam or other heating fluid and cold water or other suitable cooling fluid are alternately passed, to alternately heat the 95 contents for the vaporization of the solvent and cool the same to separate the oil therefrom. After a thorough separation has been effected and the solvent driven off, the oil and wax are discharged through the 100 pipe 18 by opening the valve 19. The digesters are then relieved of the refuse material, fresh charges of material placed therein, and the operation above described repeated. It will, of course, be understood 105 that in the carrying out of the process more or less of the solvent is vaporized in the digesters, which vapor passes out through the pipes 34 to the condenser for liquefaction and subsequent use.

It will thus be understood that after the 110 apparatus is started into operation, the working of the apparatus is practically continuous, without requiring any particular amount of care or attention, the solvent being constantly vaporized and condensed and 115 the extracted material with the solvent automatically discharged from the digester into the vaporizer, no amount of manual labor being required until it is necessary to discharge the contents of the vaporizer into 120 the separator. Hence, the material may be treated in a simple and economical manner, the repeated actions of the solvent thereon insuring the extraction of all the oils and 125 waxes.

Having thus described the invention, I claim:—

1. An apparatus of the character described comprising a vaporizer, a condenser, a main vapor feed pipe leading from the 130

vaporizer to the condenser, a digester, a siphon feed connection between the digester and vaporizer, a valved connection between the condenser and digester, a valved vapor conducting connection between the digester and main vapor conducting pipe, a separator having a valved communication with the vaporizer, and a vapor conducting pipe leading from said separator to said main vapor conducting pipe.

2. An apparatus of the character described comprising a vaporizer, a condenser, a main vapor feed pipe leading from the vaporizer to the condenser, a digester, a siphon feed connection between the digester and vaporizer, a valved connection between the condenser and digester, a valved vapor conducting connection between the digester and main vapor conducting pipe, a separator having a valved communication with the vaporizer, a coil in said separator having valved terminals extending out at opposite ends thereof, and a vapor conducting pipe leading from said separator to said main conducting pipe.

3. An apparatus of the character described comprising a vaporizer, a condenser, a pair of digesters, a main vapor pipe leading from the vaporizer to the condenser, valved vapor conducting pipes leading from the digesters to said main vapor pipe, a feed pipe leading from the condenser, valved pipes connected therewith and leading to the respective digesters, a separator having a valved connection with the vaporizer, a siphon feed connection between each digester and the vaporizer, a valved bypass connection between the lower ends of the legs of each siphon feed device, and a vapor pipe leading from the separator to said main vapor pipe.

4. An apparatus of the character described comprising a vaporizer, a condenser,

a solvent feed pipe leading from the condenser, a solvent reservoir, valved conducting pipes leading respectively from the reservoir to the vaporizer and solvent feed pipe, a pair of digesters, siphon feed connections between the same and the vaporizer, each of said siphon feed connections having a valved bypass between the lower ends of the legs thereof, valved conducting pipes leading from the solvent feed pipe to the digesters, a separator in valved communication with the vaporizer, a main vapor pipe leading from the vaporizer to the condenser, valved branch pipes leading from said main vapor pipe to the digesters, and a vapor pipe connecting the separator with said main vapor pipe.

5. An apparatus for extracting wax from the candelilla and similar plants comprising a vaporizer, a condenser, a main vapor feed pipe leading from the vaporizer to the condenser, a digester, a valved solvent supply pipe connected with the top thereof, a siphon arranged alongside said digester, a valved pipe connecting the inlet leg of said siphon with the bottom of the digester, a valved pipe connecting the lower ends of the legs of the siphon with each other, the outlet leg of said siphon being in communication with the vaporizer, a separator arranged below and having a valved connection with the vaporizer, a coil in said separator having valved terminals extending outwardly at opposite ends thereof, and a vapor conducting pipe leading from said separator to said main vapor feed pipe.

In testimony whereof I affix my signature in presence of two witnesses.

FRANK THATCHER.

Witnesses:

D. F. SULLIVAN,
W. H. BROOKS.