No. 704,011. Patented July 8, 1902.

E. R. EDSON.

APPARATUS FOR SEPARATING NAPHTHA FROM OIL.

(Application filed Aug. 26, 1901.)

(No Model.)

FIG. II

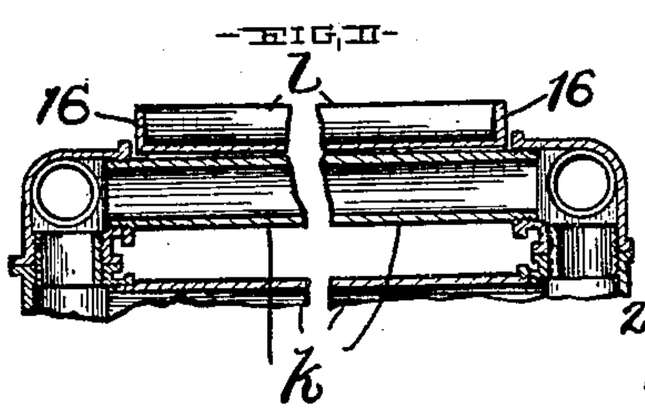

FIG. I

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EUGENE R. EDSON, OF CLEVELAND, OHIO.

APPARATUS FOR SEPARATING NAPHTHA FROM OIL.

SPECIFICATION forming part of Letters Patent No. 704,011, dated July 8, 1902.

Application filed August 26, 1901. Serial No. 73,379. (No model.)

To all whom it may concern:

Be it known that I, EUGENE R. EDSON, a resident of Cleveland, in the county of Cuyahoga and State of Ohio, have invented certain new and useful Improvements in Apparatus for Separating Naphtha or Similar Solvent from Oil; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to an improved apparatus for separating naphtha or similar solvent from oil which has been extracted from oil-yielding material by the treatment of the said oil-yielding material with the solvent.

The object of this invention is to provide simple and inexpensive apparatus for economically separating the said solvent from the oil.

With this object in view and to the end of realizing other advantages hereinafter appearing the invention consists in certain features of construction and combinations of parts hereinafter described, and pointed out in the claims.

In the accompanying drawings, Figure I is a side elevation, largely in section and diagrammatic, of apparatus embodying my invention. Fig. II is a side elevation in section showing one of the oil-receiving troughs in the solvent-vaporizing chamber and the adjacent portion of the system of heating-coils within the said chamber.

Referring to the drawings, *a* designates a percolator, into which is introduced the oil-yieldable material which is to be treated with naphtha or similar solvent for the purpose of extracting oil from the said material, and *b* represents a solvent-storage tank or reservoir wherein the naphtha or solvent is stored. A pipe 5 connects the tank *b* at the bottom of the latter with the percolator. The pipe 5 is provided with a valve 6 for controlling continuity in the passage-way formed by the said pipe. The pipe 5 is arranged, therefore, to conduct naphtha or solvent from within the tank *b* into the percolator upon opening the valve 6, which is normally closed. Oil-storage tanks or receptacles *c* are arranged side by side at an elevation below the percolator. A pipe 7 is arranged to conduct mixed oil and solvent from the bottom of the percolator. The pipe 7 is provided with a valve 8 for controlling continuity in the passage-way formed by the said pipe. The pipe 7 has branches 9 discharging into the different tanks *c*, respectively. Each branch 9 is provided with a valve 10 for controlling continuity in the passage-way formed by the said branch. The valves 8 and 10 are normally closed; but the oil discharged from the percolator and having naphtha or solvent mixed therewith is conducted into any one of the receptacles *c* upon opening the valve 8 of the pipe 7 and the valve 10 of the branch pipe 9 directly connected with the said receptacle.

An evaporator comprising a tank or receptacle *f* is arranged at an elevation above the oil-storage receptacles *c*. The receptacle *f* is constructed in any approved manner to form a vaporizing-chamber *h* therein, and a system of heating-coils is arranged within the chamber *h* and comprises several vertically-arranged or approximately vertically-arranged rows *k* of horizontally-arranged coils connected together in any approved manner. A pipe 12 is connected with and adapted to supply the steam, hot air, or heating agent to the said system of heating-coils and is provided with a normally closed valve 13. A drain-pipe 14 is connected with and leads from the system of heating-coils and has a normally closed valve 15. A trough *l*, which is closed at the ends, as at 16, (see Fig. II,) is arranged above and longitudinally of each row of coils. There are therefore as many troughs *l* as there are rows of coils in the system of heating-coils.

A pipe *m* is arranged below the oil-storage receptacle *c* and has branches 17 communicating with the chambers of the receptacles at the bottom of the latter, and each branch 17 is provided with a normally closed valve 18 for controlling continuity in the passage-way formed by the said branch. The system of pipes *m* and 17 are arranged to conduct oil from the receptacles *c* to a suitably-operated pump *o*, with whose receiving end the pipe *m* is connected. The discharging end of the pump *o* is connected with the receiving end of a pipe-line *p*, which extends from the pump into the vaporizing-chamber *h* and is provided within the said chamber with branches

19, arranged to discharge into the aforesaid troughs *l*. The pipe-line *p* is provided with a normally closed valve 20 for controlling continuity in the passage-way formed by the said pipe-line. The operation of the pump *o* after opening the valve 20 and the valve 18, which controls the flow of oil from an oil-receptacle *c* to the pump, results in conducting the oil and any solvent mixed with the oil from the said receptacle to the vaporizing-chamber *h*. The valve 13 of the heating-agent-supply pipe is of course opened preparatory to the operation of the pump *o*, so as to heat the system of heating-coils of the evaporator to the extent required to vaporize, and thereby liberate the solvent from the oil. The mixed oil and solvent overflows from the troughs *l* at the sides of the said troughs onto the uppermost coils of the various rows of heating-coils and flows adown the said rows of coils, so that the naphtha or solvent is rapidly vaporized. During the operation of the evaporator the vaporized solvent and air are conducted off by a flue or pipe *r*, which connects the top of the vaporizing-chamber *h* with the lower portion of the chamber of a condenser *s*, wherein the naphtha or solvent is condensed and gravitates into the pipe 21, which connects said condenser-chamber with the chamber of the reservoir *b*. The pipe 21 has a normally closed valve 22, which is of course opened preparatory to the operation of the evaporator. The condenser is provided at its upper end with an air-conducting pipe 23, provided with a normally closed valve 24. The pipe 23 is connected with a fan or pump or suction-creating device *t*. Obviously the operation of the device *t* upon opening the valve 24 results in the creation of suction within the vaporizing-chamber *h*, and the vaporized naphtha and air are drawn from the said chamber through the pipe or flue *r* into the chamber of the condenser, and the air ascends through the condenser and is conducted off by the pipe 23. The condenser has any approved internal construction, but comprises, preferably, a system of water-pipes *u*, having perforations arranged to spray or discharge water, as at 25, within the condenser above the discharging end of the flue or pipe *r* and above the sinuous passage-way 26, formed between the said pipe or flue and the aforesaid system of pipes *u*. Air and the naphtha or solvent drawn into the condenser passes along the sinuous passage-way 26, as indicated by the arrows, to and among the water-discharging pipes *u*. The air continues to ascend and escape at the pipe 23, whereas the naphtha or solvent is condensed and gravitates or descends, as already indicated.

A pipe *x* connects with and leads from the bottom of the vaporizing-chamber and has branches 27 discharging into the oil-receptacles *c*, and each branch pipe 27 is provided with a normally closed valve 28. Obviously oil from which the naphtha or solvent has been eliminated in the evaporator is, upon opening the valve 28 of a pipe 27, conducted from the evaporator to and stored within the receptacle *c*, connected with the said pipe. It will be observed, therefore, that the receptacles *c* are used in the first place to form reservoirs for receiving the mixed oil and solvent from the percolator and are afterward employed in storing the oil after the solvent has been eliminated from the oil.

A drain-pipe *y* is arranged below the oil-receptacles *c* and has branches 29 connecting with the chambers of the said receptacles at the bottom of the said receptacles. The branch pipes 29 have normally closed valves 30, upon opening which preparatory to cleaning the receptacles *c* with water internally the said water and foreign matter are drained from the said receptacles.

By the apparatus hereinbefore described the elimination of the naphtha or solvent from the oil extracted from oil-yieldable material by the treatment of the material with a naphtha or similar solvent is speedily, thoroughly, and economically eliminated.

What I claim is—

1. Apparatus of the character indicated, comprising a percolator; an oil-storage tank or reservoir; a valved pipe arranged to conduct oil from the percolator to the said reservoir; a pump; a valved pipe arranged to conduct oil from the said reservoir and connected with the receiving end of the pump; an evaporator comprising a vaporizing-chamber; a pipe-line extending from the discharging end of the pump into the aforesaid vaporizing-chamber; a condenser having an oil-outlet; a pipe or flue connecting the vaporizing-chamber with the chamber of the condenser; a suction-creating device for drawing air and vapor from the vaporizing-chamber into the condenser, and a valved pipe-line connecting the vaporizing-chamber at the bottom with the chamber of the aforesaid reservoir.

2. Apparatus of the character indicated, comprising a percolator; oil-storage tanks or reservoirs *c* arranged at an elevation below the percolator; a valved pipe 7 extending from the bottom of the percolator and having branches 9 discharging into the said reservoirs; a pump *o;* a pipe *m* arranged below the oil-reservoirs and connected with the receiving end of the pump and having valved branches 17 arranged to conduct oil and solvent from the said reservoirs; an evaporator comprising a vaporizing-chamber; a valved pipe-line *p* extending from the discharging end of the pump into the aforesaid vaporizing-chamber; a condenser having an oil-outlet at the bottom; a pipe or flue *r* connecting the vaporizing-chamber with the chamber of the condenser; a pipe for conducting air from the upper end of the condenser; a suction-creating device connected with the said air-conducting pipe; and a valved pipe-line *x* leading from the bottom of the vaporizing-chamber and having valved branches 27 discharging into the aforesaid oil-reservoirs.

3. Apparatus of the character indicated, comprising a percolator, an oil-storage tank or reservoir, means for conducting oil from the percolator to the said reservoir, an evaporator comprising a vaporizing-chamber, means for conducting oil from the reservoir to the said vaporizing-chamber, a condenser having an oil-outlet, a pipe or flue connecting the vaporizing-chamber with the chamber of the condenser, a suction-creating device for drawing air and vapor from the vaporizing-chamber into the condenser, and means for conducting oil from the vaporizing-chamber to the aforesaid reservoir.

4. Apparatus of the character indicated, comprising a percolator, an oil-storage tank or reservoir, a pump, a pipe arranged to conduct oil from the reservoir and connected with the receiving end of the pump, an evaporator comprising a vaporizing-chamber, a pipe-line extending from the discharging end of the pump to the vaporizing-chamber, a condenser having an oil-outlet, a pipe or flue connecting the vaporizing-chamber with the chamber of the condenser, and a valved pipe-line connecting the vaporizing-chamber at the bottom with the chamber of the aforesaid reservoir.

Signed by me at Cleveland, Ohio, this 7th day of August, 1901.

EUGENE R. EDSON.

Witnesses:
C. H. DORER,
A. H. PARRATT.