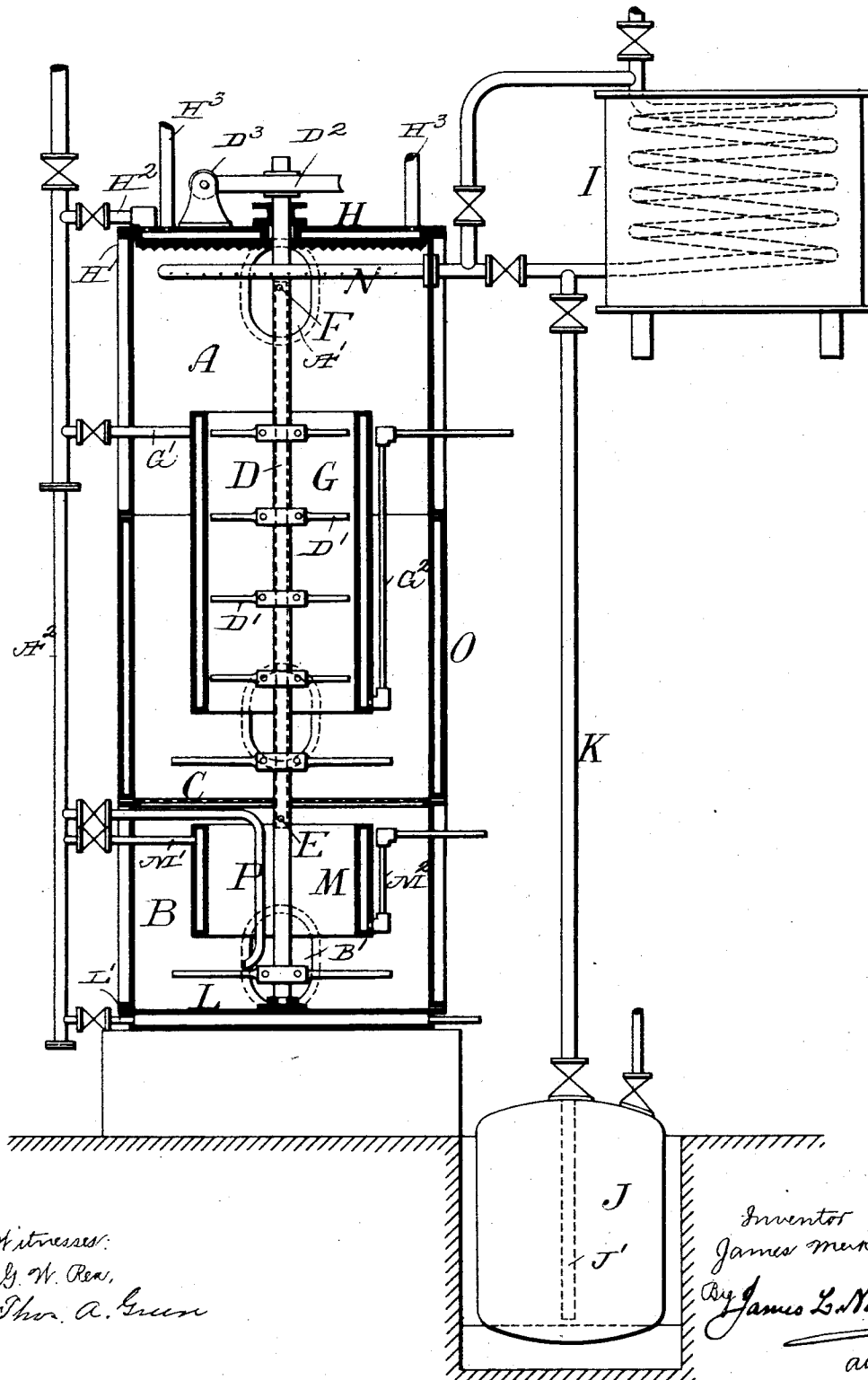


(No Model.)

J. MEIKLE, Jr.  
APPARATUS FOR EXTRACTING OIL.

No. 525,662.

Patented Sept. 4, 1894.



# UNITED STATES PATENT OFFICE.

JAMES MEIKLE, JR., OF GLASGOW, SCOTLAND, ASSIGNOR TO THE RUCHILL  
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## APPARATUS FOR EXTRACTING OIL.

SPECIFICATION forming part of Letters Patent No. 525,662, dated September 4, 1894.

Application filed March 15, 1894. Serial No. 503,774. (No model.) Patented in England May 31, 1893, No. 10,701; in France February 26, 1894, No. 236,589; in Belgium February 27, 1894, No. 108,756; in Austria-Hungary March 20, 1894, No. 172, and March 24, 1894, No. 44 and No. 637; in Italy March 27, 1894, LXX, 248, and in India April 7, 1894, No. 95, and April 13, 1894, No. 94.

*To all whom it may concern:*

Be it known that I, JAMES MEIKLE, Jr., engineer, a subject of the Queen of Great Britain, residing at 342 Gairbraid Street, Glasgow, Scotland, have invented a new and useful Apparatus for Extracting Substances by Volatile Solvents, (for which I have obtained Letters Patent in Great Britain, dated May 31, 1893, No. 10,701; in France, dated February 26, 1894, No. 236,589; in Belgium, dated February 27, 1894, No. 108,756; in Austria, dated March 24, 1894, No. 44 and No. 637; in Hungary, dated March 20, 1894, No. 172; in India, dated April 7, 1894, No. 95, and April 13, 1894, No. 94, and in Italy, dated March 27, 1894, Vol. LXX, No. 248,) of which the following is a specification.

My invention relates to apparatus by which volatile solvents are applied to extract substances from materials containing them and the solvents themselves are recovered after effecting the extraction. For this purpose I provide apparatus of which the accompanying drawing is a vertical section. A closed vessel is divided into two compartments an upper A. and a lower B. by a horizontal perforated partition C. on which is placed suitable filtering material. The cover H. of the vessel is hollow and contains a chamber H' having a steam pipe H<sup>2</sup> and water pipes H<sup>3</sup>, whereby it is possible to heat the chamber by introducing steam thereinto, or to cool the chamber by introducing cold water thereinto. When steam is introduced, one of the pipes, H<sup>3</sup>, can be utilized as an outlet, and when cold water is used one of the pipes, H<sup>3</sup>, is used as an inlet and the other as an outlet. The under side of this chamber is formed with a number of conical projections, so that liquid deposited on them by condensation, drops down, not in one place, but from all the apices of the cones. In the upper compartment A. which has a steam jacket O. there is a heater which may be a steam pipe coil or a cylindrical steam jacket G. as shown. The lower compartment B. is provided with a similar heater M. and has a steam jacket L. at its bot-

tom, also a steam pipe L'. opening into it. A steam pipe P opens into the chamber B. Both compartments A and B are provided with agitators consisting of arms D' projecting from a central vertical shaft D. which passes through the perforated partition C. The shaft D is rotated by suitable gears D<sup>2</sup>, D<sup>3</sup>, but as other means for rotating the shaft may be employed, further illustration is deemed unnecessary. There is a communication from the upper part of the lower compartment to the upper part of the upper compartment, and for this purpose, the agitator shaft D. may be made tubular as shown with lateral openings E and F into both compartments. A condensing worm I. is arranged in a tank in communication with A. and also by a pipe K. with a closed receptacle or tank J. containing solvent preferably placed in the ground.

The steam-pipes H<sup>2</sup>, P, and L' connect with a main steam supply-pipe A<sup>2</sup>, and the heaters G and M are provided, respectively, with pipes G' and M' connected with the main steam-pipe A<sup>2</sup>, while outlet pipes G<sup>3</sup> and M<sup>2</sup> lead respectively from the heaters.

The material to be treated is charged into the upper compartment A. through a feed hole at the side which is closed and then solvent is forced by air pressure from tank J, through pipe J' up the pipe K through the worm I. and through a distributing pipe N. arranged in the upper compartment A. on to the material, through which it percolates taking extracted matter along with it, through the filtering material and the perforated partition, into the lower compartment B.

By means of suitable cocks or valves with which all the pipes are furnished the distributing pipe N. is then cut off from pipe K and put in communication with the lower part of the condensing coil I and steam is admitted to the jacket L. and heater M. of the lower compartment vaporizing the solvent therein.

In the operation of the apparatus, the partition C, operating as a filter, obstructs the ascent of the vapor, and the latter is caused to enter the opening E, pass up through the

tubular shaft D, and escape by the opening F into the upper compartment where it is condensed on meeting the cover H. which at that time is kept cold by water circulating through its chamber by the pipes H<sup>3</sup>. The condensed solvent dropping from the cones of the cover by which it is distributed over the material, again percolates through it; and thus solvent is caused to pass repeatedly through the material, which is agitated either continuously or occasionally, and the soluble substances extracted are collected in solution in the lower compartment B. When the extracting process has been carried on in this manner for a sufficient time, the distributing pipe N. is connected to the upper part of the condensing coil, the lower part of which is then connected with the pipe K, the cold water is cut off from the chamber in the cover H. and steam is admitted to it and also to the heater G. in the upper compartment. The solvent is thus vaporized, is condensed by the coil and is collected in the receptacle J. The substance extracted can then be run off if it is liquid, or removed through a suitable opening B' if it is solid from the lower compartment B.

The apparatus above described may be used for extraction of various substances, such as sulphur from ores or residues containing it, paraffine from substances such as bone, charcoal, oils and fats from seeds, fish and other solids, cotton waste and the like, or generally for separation of bodies soluble in appropriate solvents from bodies which are not soluble in the same solvents.

Having thus described the nature of this

invention and the best means I know of carrying the same into practical effect, I claim—

1. An apparatus for extracting substances by volatile solvents and recovering the solvents, consisting of a vessel having two compartments separated by a perforated partition, a steam heater located in each compartment, a steam jacket at the bottom of one compartment, a steam jacket surrounding the sides of the other compartment, a hollow cover having projections on its inner side, a central tubular shaft having lateral openings and agitator arms, a condenser, a receptacle for the solvent, and connecting pipes, substantially as described.

2. An apparatus for extracting substances by volatile solvents and recovering the solvents, consisting of a vessel divided into two compartments by a perforated partition and having a steam-jacket, a steam-heater arranged in each compartment, a steam supply-pipe connected with both heaters, a central tubular shaft having lateral openings and agitator arms, a condenser, a receptacle for the solvent, and connecting pipes, substantially as described.

In testimony whereof I have signed my name to this specification, in the presence of two subscribing witnesses, this 27th day of February, A. D. 1894.

JAMES MEIKLE, JUNIOR.

Witnesses:

J. BRYCE HENDRIE,

ROB CONNING,

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