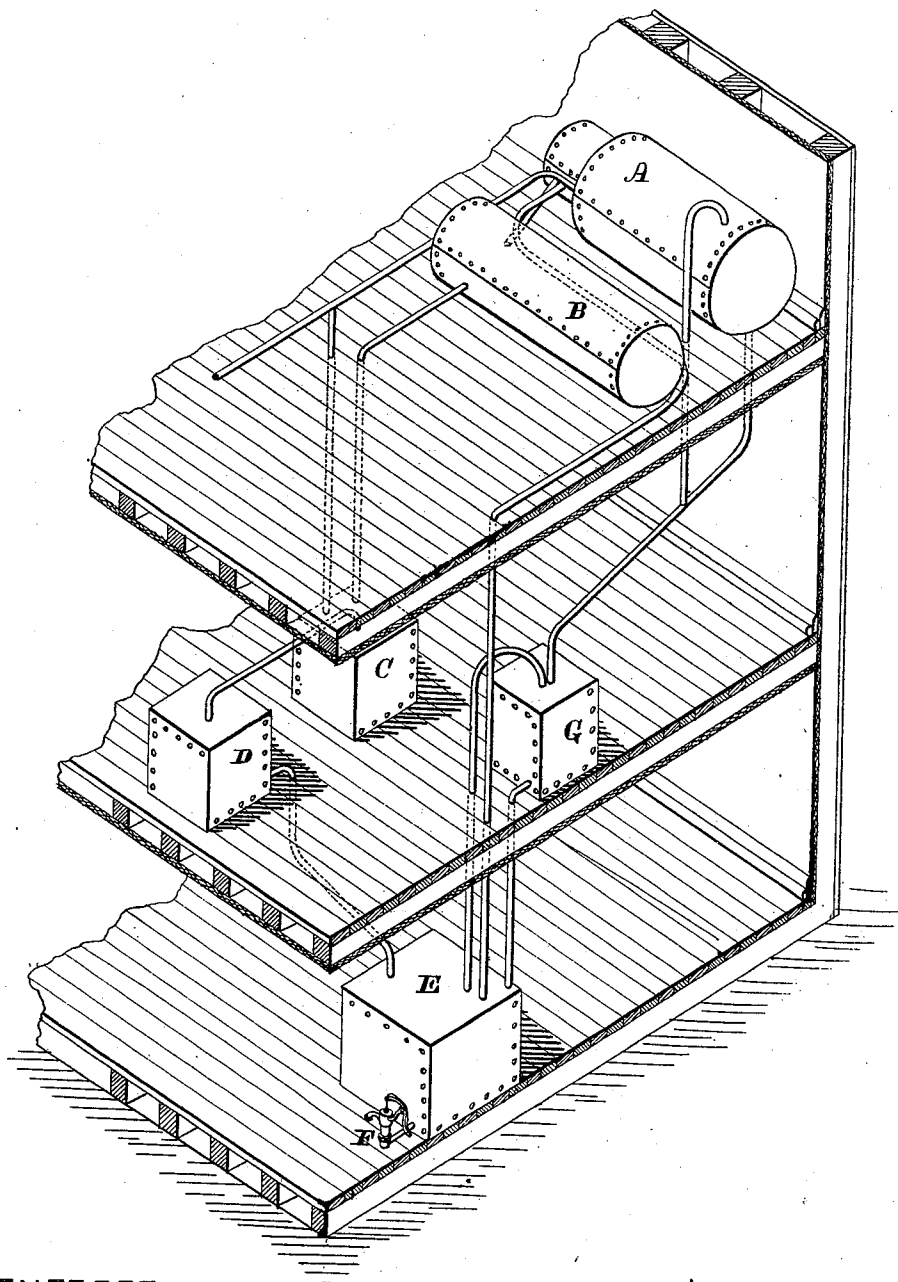


J. R. WHITING & W. A. LAWRENCE.
APPARATUS FOR THE USE AND RECOVERY OF VAPORIZED
SOLVENTS.

No. 170,424.

Patented Nov. 23, 1875.



WITNESSES:

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UNITED STATES PATENT OFFICE

JAMES R. WHITING, OF NEW YORK, AND WILLIAM A. LAWRENCE, OF
SPRINGFIELD, L. I., NEW YORK.

IMPROVEMENT IN APPARATUS FOR THE USE AND RECOVERY OF VAPORIZED SOLVENTS.

Specification forming part of Letters Patent No. **170,424**, dated November 23, 1875; application filed
August 14, 1875.

To all whom it may concern:

Be it known that we, J. R. WHITING, of New York city, and W. A. LAWRENCE, of Springfield, L. I., in the county of Queens and in the State of New York, have invented certain new and useful Improvements in Apparatus for the Use and Recovery of Vaporized Solvents; and do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawing, making a part of this specification, in which is shown, in perspective, our improved apparatus.

Our invention is an improvement upon the process ordinarily employed for extracting the active principle from hops or other like material; and it consists in the employment of a supplemental condensing-coil, attached to or connected with the apparatus, for vaporizing the solvent, substantially as and for the purpose hereinafter specified.

In the use of the process commonly employed, the following-described apparatus has been found essential:

First, an extractor, A, in which the solvent and materials to be dissolved are combined; second, a chamber, B, into which the saturated solvent is forced from the extractor and is held for distillation; third, a hot coil, C, for receiving the saturated solvent, and separating said solvent from the substance held in solution, and discharging the latter; fourth, a cold coil, D, for condensing the solvent as it proceeds in a vaporized condition from the hot coil; fifth, a holder, E, for receiving the solvent as it comes from the cold coil, and containing the same until required for use again within the extractor, when it is forced into the latter by means of a pump, F, and suitable connecting pipes and valves.

With this apparatus, the materials to be acted upon are first placed in the extractor A, and the solvent then pumped into the same from the holder B, where they remain until said solvent has become saturated, said result being usually accelerated by the application of heat. The saturated solvent is now forced into the distilling-chamber C, partly by its own expansive force, and afterward by the

injection of steam or air into the extractor A, where it is distilled, discharged of the substance held in solution, and condensed in the hot and cold coils described, and then from the latter returned to the holder for another operation.

Now, as the solvents used are principally hydrocarbons and very volatile, it is found that when first introduced into the extractor A, a portion of the solvent vaporizes and must be displaced, to make room for the liquid remainder, for which purpose an escape-valve is provided, through which such vaporized portion passes, by which means a portion of said solvent is lost at each operation. Again, on emptying the extractor A of the saturated solvent, it is found that after the expansive pressure has exhausted its power, there will still be left in said extractor a portion of the solvent, which, when forced out by injected air or steam, has injured the resulting extract, while, if permitted to remain in said extractor, upon opening the latter to introduce a new charge of material to be operated upon, said solvent will vaporize, escape into the open air, and be lost. Again, as the separated and recovered solvent is received from the condensing-coil D into the holder E, that portion which first enters vaporizes, and must be allowed to escape before the remaining liquid can be made to enter.

These difficulties and losses are overcome by our process, in which we employ a supplemental condensing-coil, G, which is at all times surrounded with cold water, and is connected directly with the escape-valves of the extractor A and holder E, when the operation is as follows:

Before filling the extractor A with the solvent, we open the escape-valve and place its interior in communication with the supplemental condensing-coil G, by which means the vapor first formed from said solvent is withdrawn into said condensing-coil, after which said escape-valve is closed.

When the extractor A is to be discharged of its saturated solvent, it is permitted to "blow over" into the chamber B by its expansive force until no more will pass, when the

escape-valve of said extractor is opened, and the remaining solvent rapidly and effectually removed by the operation of a vacuum within the condensing-coil G, all without the necessity of introducing air or steam.

Upon the commencement of distillation from the chamber B, the holder E is placed in communication with the supplemental condensing-coil G, by which means all back pressure is prevented, and all vapor is condensed and saved.

We find that, by the use of our improvement, the resulting extracts are materially improved in quality and purity; that the operations are conducted with more speed and less labor than heretofore, and that a valuable portion of the solvent and materials heretofore lost are saved and made available for further use.

Having thus fully set forth the nature and merits of our invention, what we claim as new is—

In combination with the apparatus for making extracts by use of vaporizable solvents, a supplemental condenser, G, connected with either or both the extractor A and holder E, substantially as and for the purpose specified.

In testimony that we claim the foregoing we have hereunto set our hands this 24th day of May, 1875.

JAMES R. WHITING.
WILLIAM A. LAWRENCE.

Witnesses:

HENRY E. BRUCE,
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