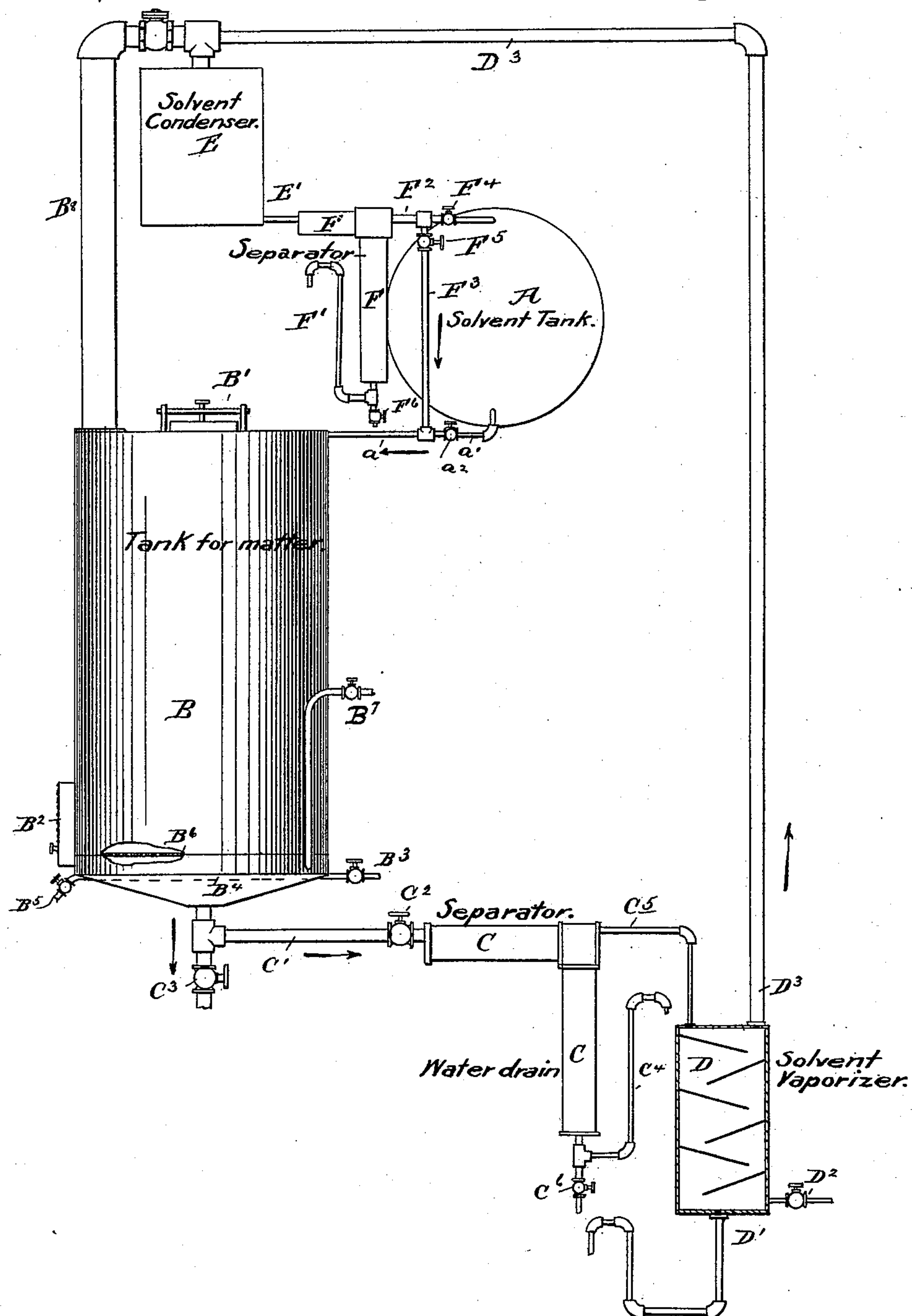


(No Model.)

C. W. PRESTON.
EXTRACTING APPARATUS.

No. 494,647.

Patented Apr. 4, 1893.



Attest,
C. M. Benjamin
R. M. Tamm

Inventor,
Charles W. Preston
by Louis F. Hall
att'y

UNITED STATES PATENT OFFICE.

CHARLES W. PRESTON, OF BROOKLYN, ASSIGNOR TO THE MERZ UNIVERSAL EXTRACTOR AND CONSTRUCTION COMPANY, OF NEW YORK, N. Y.

EXTRACTING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 494,647, dated April 4, 1893.

Application filed January 24, 1893. Serial No. 459,595. (No model.)

To all whom it may concern:

Be it known that I, CHARLES W. PRESTON, a citizen of the United States of America, and a resident of the city of Brooklyn, county of Kings, and State of New York, have invented certain new and useful Improvements in Extracting Apparatus, of which the following is a specification, reference being had to the accompanying drawings, forming part of the same, in which the different portions of the apparatus are represented in side elevation.

My invention relates to improvements for extracting from various substances, particularly bones and garbage, such of its constituents as are soluble in volatile solvents, whereby I am enabled to separate them from the mass leaving a residuum which is frequently of value as a fertilizer and by thereafter separating the water from the liquid parts and recovering the solvent to obtain the fatty matter, &c., in condition for use and to again use the solvent in the same apparatus. It is necessary that this should be accomplished in an inexpensive manner or the expenses of the process will more than equal the value of the products and the net result would be a loss.

In the apparatus which I have devised, the operations of the devices are automatic, I make use of gravity for the greater part of the separation and am thereby enabled to attain satisfactory results with great economy, though in addition to the main feature of the invention there are minor ones which also add to the efficiency of the apparatus as a whole. B is the receiving tank or digesting tank provided with a charging orifice for the introduction of the material to be treated, closed by a door B' and an outlet for the residuum closed by door B². It has also a perforated false bottom B⁶ between which and the bottom face of the tank a heating coil B⁴ is arranged with inlet and outlet pipes governed by valves B³ and B⁵. I also provide a live steam pipe controlled by valve B⁷ and opening into tank B, preferably below the bottom B⁶ in evaporating what solvent may remain in the material after it has been allowed to drain off.

A is a tank for holding the solvent preferably located above the level of tank B and below the level of condenser E. Said tank

A is provided with an inlet pipe F² and valve F⁴ and an outlet pipe a' and valve a². These two pipes are connected by a third pipe F³ having a valve F⁵, the joints being made farther from tank a' than are valves F⁴ and a² that the liquid may be lead directly from pipe F² to tank B without entering tank A, if that should be desired.

E is a condenser of ordinary construction with an inlet at the top and an outlet at the bottom and in the connection between it and tank A, I prefer to locate a separator F to be presently described.

From the lower end of tank B, a discharge pipe C' leads to a separator C and from thence a pipe C⁵ leads to the vaporizer D whence a connection D³ extends to the condenser E. Pipe C' may be, and usually is, provided with a drip valve C³ and a controlling valve C², but they are only preferable features.

The main feature is the separator C as shown; it consists of two cylinders connected at right angles, to the horizontal one of which pipe C' is an inlet and pipe C⁵ an outlet, the latter being located above the bottom of the device. The vertical pipe or well is preferably provided with a gravity over-flow pipe C⁴, that is, a pipe extending from, at or near the bottom of the separator to a point some distance above said bottom but below the level of the port of exit C⁵ otherwise though the separation will take place as stated some one must watch that the water (if its escape were prevented by a valve) does not get too high in separator C; a pet cock C⁶ may also be connected to C. The separator F and attachments are substantially similar to separator C, but, of course, differently lettered. The vaporizer D is preferably provided with inclined and overlapping plates or shelves d. It has a live steam inlet governed by valve D² and a gravity overflow D' extending from its lower part. Connection between D³ or some source of pressure and tank B may be made by a pipe B⁸ to enable the apparatus to be operated under pressure if desired.

The operation is as follows: Tank A is charged with a volatile solvent having an affinity for grease or fats and a specific gravity less than that of water, such, for instance, as benzine or naphtha, and tank B is charged

with garbage or the substance to be treated. Then valve α^2 is opened and the solvent flows into tank B and into and through the substance therein, which meanwhile has been heated from the coil B¹ and if desired, by live steam through B⁷. I may close valve C² and permit the mass to be digested by steeping in the solvent, or I may leave it open and permit the solvent to percolate through the matter under treatment. In either case it will take up the grease, oils, fatty matter &c., and displace whatever water there may be. The charged solvent and water will pass out through pipe C'. Now, to recover the grease and the solvent, a separation must be effected and to do this by vaporization of the entire liquid would be too expensive, though that is the best method of finally recovering the solvent. I therefore arrange the gravity separator C in the path of the liquid between the extractor and the vaporizer. The liquids enter the separator through pipe C' and the water having the greater specific gravity, of course, seeks the bottom, the solvent and fatty matter being borne upon it. This water will continue to rise until in both the separator and the overflow pipe it reaches the level of the orifice of the overflow from which time any increase will flow out of said overflow and escape automatically, though effectually preventing the escape of the solvent and other matters held in suspension thereby; the quantity of said solvent will increase on the surface of the water until it reaches the level of outlet C⁵ when any further increase will escape through C⁵ to the vaporizer and this separation will proceed continuously so long as there is any flow from tank B. The great task of the process therefore, that of freeing the solvent and suspended matter from the water, is automatically, continuously and economically accomplished. It will be readily manifest that the separator need not be in the exact form shown, the requisites are, an inclosed space sufficient to present opportunity for separation, an inlet for the material, an outlet for the solvent, an outlet for the water with its opening at a point lower than the outlet for the solvent and an overflow extending from said water outlet upward to a point above it but below the level of the outlet for the solvent. These features being present, the exact form or arrangement is not material. So, too, while I prefer to locate the separator below the level of the bottom of tank B, it might be otherwise placed and as long as the water and solvent could find their way into it by gravity, it would act in the manner described. The water having been eliminated, the solvent and suspended matter pass on into vaporizer D where they are subjected to heat and this is most conveniently applied by introducing the liquid at the top and causing it to flow, as gravity will cause it, down one plate and upon another and another. By the time the last plate is reached, the volatile solvent will be almost, if not quite, all

vaporized and the fatty matter may fill and finally escape through overflow pipe D', this, too, providing a continuous, ready and automatic means for removing the fatty matter. The vaporized solvent rising through pipe D³ will pass into condenser E and there be condensed, whence it escapes through pipe E' and connections to tank A and is again ready for use.

To provide for separating from it any water which in the form of aqueous vapor may have passed over and been condensed with it, I have inserted a second separator in the connections between the condenser and tank A, the operation of which being similar to the first needs no further explanation. I have thus devised a simple, efficacious and economical apparatus, substantially automatic in its action which will continuously digest and extract from the mass to be treated, the soluble parts, separate the water therefrom, recover the solvent and return it to the reservoir and lead off the fatty matters; requiring but little attention and yet complete in its operation. Whenever desired, the valve α^2 may be closed, the liquids allowed to escape as described and the solid residuum then removed through door B². New charges of material may be at any time introduced through door B' with or without suspending the operation meanwhile.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. In an extracting apparatus the combination with a solvent holder and digesting tank connected by a gravity feed, of a vaporizer, a gravity separator, connections between the digesting tank and separator and the separator and vaporizer, a condenser, suitable connections between the latter and the vaporizer, and a gravity separator connecting the said holder and condenser, substantially as set forth.

2. In an extracting apparatus the combination with a solvent holder and digesting tank, gravity feed connections between the same, a vaporizer, connections between the latter and the tank, including a device for automatically separating the heavier from the lighter liquids, a condenser and suitable connections between the latter and the vaporizer and between the condenser and the holder, substantially as set forth.

3. In an extractor the combination of a digesting tank, and an escape pipe leading therefrom, a gravity separator, substantially as described, connected to said escape pipe, a vaporizer, a pipe connecting said vaporizer with the upper outlet of the separator, a gravity overflow connected to said vaporizer, together with a condenser, a vapor pipe leading from the vaporizer to the condenser, and a solvent holder with connections, one leading into it from the condenser and one out of it to the digesting tank, substantially as set forth.

4. The combination in an extractor with a

digesting tank and a vaporizer, connections between the two, the inlet to which vaporizer is located below the final outlet of the digesting tank, of a separator located in a connection between the digesting tank and the vaporizer, and consisting of a vessel provided with an inlet located below the level of the outlet of the digesting tank, an outlet for the lighter liquid leading to the vaporizer and entering above the level of the bottom of said vaporizer, an outlet for the heavier liquid, whose inner port is below the port of the outlet for the lighter liquid, and an overflow leading from the outlet port to the heavier liquid to a spout above said port, but below the outlet port for the lighter liquid, whereby through gravity the water is separated from the solvent and grease and carried off automatically, substantially as set forth.

5. The combination in an extractor with a solvent holder and a digesting tank of a vaporizer and a separator located somewhere in a connection between the digesting tank and the vaporizer, and below the level of the bottom of said digesting tank, and consisting of a vessel provided with an inlet, an outlet for the lighter liquid, an outlet for the heavier liquid whose inner port is below the port of the outlet for the lighter liquid, and an overflow leading from the port or outlet for the heavier liquid to a point above said port, but below the outlet for the lighter liquid, substantially as set forth.

6. The combination in an extractor with a

digesting tank and a vaporizer, of connections between said vaporizer and tank, including a separator, connected to an outlet for liquids leading from said tank and consisting of a vessel provided with an inlet, an outlet for the lighter liquid, an outlet for the heavier liquid, whose inner port is below the port of the outlet for the lighter liquid, and an overflow leading from the port or outlet for the heavier liquid to a point above said port, but below the outlet for the lighter liquid, substantially as set forth.

7. The combination in an extractor with a digesting tank and vaporizer, of connections between said vaporizer and tank, including a separator, connected to the outlet for liquids leading from said digesting tank, and consisting of a vessel provided with an inlet, an outlet for the lighter liquid and an outlet for the heavier liquid, whose inner port is below the port of the outlet for the lighter liquid, whereby the lighter liquid being carried on the surface of the heavier liquid will separate therefrom and pass on through its outlet, while the heavier liquid is below the level thereof, substantially as set forth.

In testimony that I claim the foregoing as my invention I have signed my name, in presence of two witnesses, this 23d day of January, 1893.

CHARLES W. PRESTON.

Witnesses:

W. GREVEL,

ROBT. L. PRANGE.