(No Model.)

L. J. CADWELL.

APPARATUS FOR TREATING THE PRODUCTS OF RENDERING TANKS.

No. 320,911. Patented June 30, 1885.

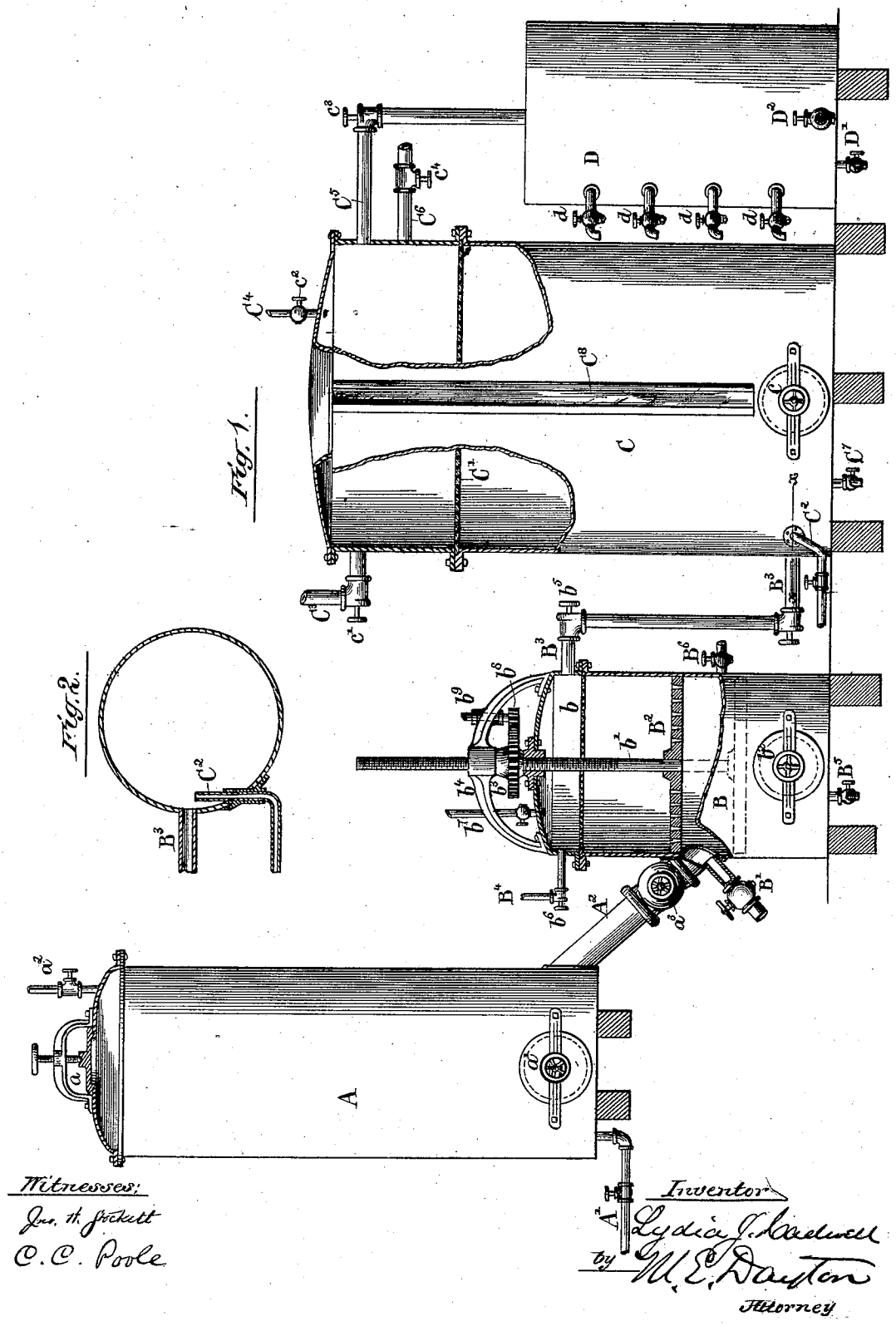

Fig. 1.

Fig. 2.

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LYDIA J. CADWELL, OF CHICAGO, ILLINOIS.

APPARATUS FOR TREATING THE PRODUCTS OF RENDERING-TANKS.

SPECIFICATION forming part of Letters Patent No. 320,911, dated June 30, 1885.

Application filed November 3, 1884. (No model.)

To all whom it may concern:

Be it known that I, LYDIA J. CADWELL, of Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Apparatus for Treating the Products of Rendering-Tanks; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form a part of this specification.

This invention relates to the handling or treatment of material in the manufacture of lard and other fatty products after the process of rendering has been completed, and particularly embraces the filtration of the lard, oil, or fatty substance, or its separation from the solids from which it has been extracted.

The object of the invention is to provide a practical means for performing the work of separation and filtration, by which the labor and expense heretofore involved in this operation when conducted by hand may be lessened, and by which the work may be more expeditiously accomplished.

In the absence of suitable apparatus for doing the work it has heretofore been the usual practice in the manufacture of lard and similar fatty products from solids to first let off the steam from the rendering-tank in which the operation of digestion has been performed, and to next discharge the contents of the rendering-tank into a vat, after which the oil or fat which rises to the surface of the liquid in the vat is skimmed off by hand and the solid residuum or scrap is placed in gunny bags and subjected to pressure for the purpose of removing the oil therefrom. The oil obtained both by skimming the contents of the receiving-vat and by pressing the scrap is subsequently passed through filters, and is subjected to any further treatment necessary or desirable for its purification and final preparation for the market.

In the apparatus herein described the contents of the rendering-tank are discharged through a closed passage into an ascending filter, which is also constructed to include in its lower part a powerful press. The steam is not let off the rendering-tank previous to the discharge of said tank, but is preferably utilized in forcing the solid and liquid contents from said tank into the filter-press, and also in performing the work of forcing the liquid portion of such material through the filter or filters.

To accomplish a more complete separation of the fatty substances from the solids within the filter-press, a jet of hot water is forcibly introduced into the mass of solids as it enters the lower portion of the filter, so that the work required of the press is considerably lessened. By the operation of the press the fats not thus separated by the action of the hot-water jet are expelled from the mass of solids and rise through the superposed body of water, through the filter, and to the upper portion of the filtering-chamber, whence they pass off into a receiving-tank. After the expression of the fats from the solids, the latter are withdrawn from the filter-press and are preferably delivered through a chute into a revolving or other suitable drier (not here shown, but of familiar construction and operation) to prepare them for further use as fertilizers. The liquids enter the receiving-tank at the bottom the of and rise through another ascend n y filter to the upper part of said tank, whence they are withdrawn into any suitable vessel, which, if desired, may be constructed to admit such chemicals or other matters as may be employed for bleaching or other treatment.

In the accompanying drawings, Figure 1 shows an apparatus embracing the vessels above-mentioned with their connections, parts being broken away to illustrate certain details of construction. Fig. 2 is a horizontal section of the receiver reduced in size, taken on the line *x x* of Fig. 1.

A represents a rendering-tank, which may be of any desired size. B is a filter-press, usually about two-thirds the size of the rendering-tank. C is the receiving-tank, and D is a receptacle for the oil, lard, or other fatty product. The rendering-tank A is provided with any suitable opening at the top for the admission of the material to be digested, such opening being, for convenience of illustration, in the present case shown in the form of a man-hole with cover and fastening at *a*. Said tank is also provided with a man-hole, *a'*, at the bottom. A valved steam-inlet pipe, A', connects with the lower portion of the rendering-tank, and a valved steam-outlet, a^2,

with the top. The filter-press B is preferably located somewhat lower than the tank A, and is connected with said tank by a downwardly-inclined pipe, A^2, having a valve, a^3, through which the solid and liquid matters may freely pass from the rendering-tank to the lower portion of the said filter-press, subject to the will of the operator. The vessel B is preferably cylindric in shape, and has near the top, as herein shown, a transverse perforated stationary diaphragm, *b*, which constitutes the filter or strainer. It is to be understood that the filter, while represented in the drawings as being in the form of a perforated diaphragm, may be of any desired construction suited to the particular material to be filtered. Below the diaphragm or other form of filter, at *b*, there is fitted to the interior of the cylindric vessel B a movable perforated diaphragm or piston, B^2, having a centrally and upwardly directed rod, *b'*, which protrudes through the top of the vessel B. Any one of several obvious forms of device may be employed to operate the piston through the means of a rod, *b'*, other than that herein shown. In the present instance said rod *b'* is provided with a screw-thread and a nut, b^3, held vertically in place between a bearing on the top of the vessel B and a yoke, b^4, extending over the nut. Said nut b^3 is here also shown as being in the form of a gear-wheel, with which a pinion, b^8, engages, said pinion being mounted on a shaft, b^9, which may be driven by any suitable power. The vessel B is provided with a man-hole, b^2, at or near its bottom, with a hot-water inlet-pipe, B', at the delivery end of the pipe A^2, with a steam-discharge pipe, b^7, at the top, with a water-inlet pipe, B^4, near the top or above the filter *b*, with an oil-outlet, B^3, also above the filter *b*, with a discharge-pipe, B^5, at the bottom, and with a discharge-pipe, B^6, at the side, the said several pipes being provided with valves, as indicated. The pipe B^3, leading from the top of the filter-press B, delivers near the bottom of the receiving-tank C. Said receiving-tank is provided with a man-hole, *c*, at the bottom, with a transverse filter of suitable form or construction at C', with a water-inlet, C^2, opposite the oil-inlet B^3, with a water-inlet, C^3, near the top, with a steam-outlet, C^4, in the top, with a lateral oil-outlet, C^5, near the top, with a lateral water-outlet, C^6, below the oil-outlet C^5, with a bottom discharge-pipe, C^7, and with a transparent vertical strip or section, C^8, in one of its walls, whereby the height of the contents of the receiver may be readily observed by the eye. The receptacle D for the oil product receives the pipe C^5 leading from the top of the receiver C, as stated, and is provided with a suitable discharge-pipe, D' or D^2, at the bottom, one of which may, if desired, be employed for the introduction of chemicals in liquid form. The receptacle D may also be provided, if desired, with a series of discharge cocks or pipes, *d d*, arranged at different elevations, by which the material of different quality or specific gravity, or of different condition of purity, may be separately withdrawn, albeit this is not an essential feature of the invention. The receptacle D may of course be simply a reservoir, from which the oil shall be conducted elsewhere for further treatment.

It will be observed from Figs. 1 and 2 that the water-pipes B' and C^2 are arranged to direct jets across the mouths of the pipes A^2 and B^3, respectively. By means of this construction as to pipe B' a forcible stream of hot water from any suitable source is made to pass through the material delivered from the rendering-tank A into the lower portion of the filter-press, and by means of the pipe C^2 either hot or cold water may be injected into the oil received by the tank C, according as one or the other may be required to give the proper temperature to the material to cause it to pass through the filter C' or to separate promptly from the accompanying liquid.

In the operation of the apparatus constructed as above described the material to be digested is placed in the rendering-tank A in the usual quantity, and steam is let into said tank through the pipe A' until the desired pressure (usually about twenty pounds to the square inch) is reached, and such pressure is maintained so long as is necessary to accomplish the work of digestion. Thereupon, and preferably without lowering the pressure within the tank A, a part or the whole of the contents of said tank is allowed to pass through the pipe A^2 into the lower portion of the filter-press B, the perforated diaphragm or piston B^2 being raised to a point near the filter *b* while such material is being admitted. During the operation of admitting material from the rendering-tank to the filter-press through the pipe A^2 a stream of hot air is forcibly injected through the pipe B', which operates to detach from the solid matter entering the filter-press such fatty substances as mechanically adhere thereto, so that such detached fats are free to ascend with the liquid through the apertures in the piston B^2 and through the filter *b*.

During the operation of charging the filter-press, as described, the valve b^5 in the pipe B^3 and the valve c^3 in the pipe C^5 are open, so that the pressure within the rendering-tank A may operate to force the liquids within the filter-press through the piston and filter therein and into the receiver C. When the contents of the receiver C rise sufficiently, the pressure from the tank A will also obviously force the liquid material within the said receiver through the filter C' and out through the pipe C^5. The transparent section C^8 of the receiver-wall enables the attendant to observe the height of the liquids within the receiver, and by means of the valve c^4 in the pipe C^6 he may let off the water from said receiver, so that nothing but oil shall pass out from the more elevated outlet C^5. Should the pressure from the tank A be insufficient to force the liquids forward through the filters, the pipe B^3 may be connected with a suitable pump, by which such

tank-pressure may be supplemented; or which pump, if desired, may on occasion perform the entire work of conducting the liquids forward through the apparatus.

Returning to the filter-press, when the lower portion of said press is suitably filled with solids through the pipe A^2, the valve a^3 in said pipe is closed and the perforated piston B^2 is forced downward through the operation of the geared nut B^3 in an obvious manner. In the descent of the piston the liquids expressed thereby obviously rise through the apertures of said piston and occupy a position above the same. The flow of water through the pipe B′ is preferably continued during the descent of the piston B^2, and the movement of the latter is continued until it is brought to the position indicated in dotted lines, or below the entrance of said pipes A^2 and B′. At this point the work of compression upon the solids is understood to be completed. The piston is allowed to remain in this lower position until the water entering through the pipe B′ shall have forced the oil through the filter *b* and expelled it through the pipe B^3. At this point the valve b^5 is closed and the water shuts off at the pipe B′. The pipe B^6 is located at a point above the piston B^2 when the latter is depressed, and may be opened to let off the water from the vessel B above the piston. Said piston is then raised to its original position, preparatory to the admission of another charge from the tank A. The solid material or scrap will be withdrawn from the filtering-press either through the man-hole B^2 or, preferably, will be let off through a valved passage of sufficient size connected with the bottom of said filter-press, and not here shown, and it will be commonly conducted directly through such a chute into a revolving drum covered with metal, and will be exposed to heat for its rapid desiccation. This device will save handling and partial cooling of such material as now performed in the rude way in which the scrap is commonly manipulated; but while in keeping with the general purposes of this invention to lessen labor, it is not made a part of the invention here claimed, and is not, therefore, illustrated. The water-inlet pipe B^4, located in the side and near the top of the filter-press and above the filter *b* therein, enables the filter to be cleansed with a comparatively small amount of water, which being admitted above the filter obviously descends by gravity through the latter and through the apertures of the piston B^2 and removes any obstructions accumulated within said apertures or on the under side of said filter and piston. The pipe B^4 will preferably be arranged to direct a stream around the sides of the space above the filter *b* in a familiar manner, and to thereby cleanse the walls of said space, as well as the filter itself and the lower portions of the filter-press. This operation of cleansing may be performed after each operation of the press, or at such intervals as may be found necessary, and the water admitted through the pipe B^4 may be discharged through the pipe B^5 preparatory to the further operation of the apparatus. The pipe C^3 is preferably arranged to operate in the same manner as the pipe B^4 for cleansing the walls and filter of the receiver C, the water admitted by said pipe C^3 being withdrawn at c^7. The manner of using the steam-escape pipes of the several vessels is so obvious as not to require special description. The piston B^2 will ordinarily and preferably be constructed of wood suitably braced upon its upper surface by metal cross-bars. The details of construction not being essential to the invention, they are not illustrated. It is of course to be understood that the pressure at the water-inlet P′ must be at least equal to the pressure from the tank A; and it is also obvious that, if necessary to maintain an effective movement of the material from the tank A to the filter-press and of the liquids thence into the receiver C and oil-receptacle D, the steam-pressure within said tank A may be maintained, or even increased, if desired, through the steam-inlet A′. Through the pipe C^2 either cold or warm water may be admitted, as circumstances may require. In the continuous operation of the machine the material passing from the filter-press and the receiver will be hot, and ordinarily it will be desirable to inject cold water through the pipe C^2, in order to cool somewhat the oil or fatty substances admitted through the pipe B^3 and to thereby facilitate its separation from the water within said receptacle, in order that such oil and fatty material may form in a distinct body upon the surface of the liquid within said receiver at and below the level of the outlet-pipe C^5.

While the arrangement of the filter is preferably such as to call for the ascent of the liquids through the same, such arrangement is not essential to my invention, since, obviously, the opposite and more common arrangement may be employed. For example, the several parts in the vessel B may be simply removed and the discharge effected from the bottom of said vessel without departure from my said invention.

I claim as my invention—

1. The combination, with a steam rendering-tank, of a filter or strainer having a valved connection with the rendering-tank, whereby the pressure within the latter may operate to force the liquid containing the fat through the filter, substantially as described.

2. The combination, with a steam rendering-tank and a vessel provided with a filter or strainer and connected with the rendering-tank, of an inlet-pipe arranged to deliver into the mass of solid material supplied to the filtering-vessel, substantially as and for the purpose set forth.

3. The combination, with a steam rendering-tank, a filter or strainer, and a connecting-pipe leading from the former to the latter, of a pipe arranged to discharge in or adjacent to the delivery end of said connecting-pipe,

whereby the fatty substances may be mechanically detached from the solids as the latter are admitted to the filter through said connecting-pipe, substantially as described.

4. The combination, with a steam rendering-tank, of a vessel constructed to express liquid from solids, and a valved pipe or passage connecting said vessel with the rendering-tank, substantially as described.

5. The combination, with a steam rendering-tank, of a vessel connected by a valved passage with the said tank, a perforated piston within said vessel, means for operating said piston, and a filter arranged to strain the material passed through the apertures of the piston, substantially as described.

6. The combination, with a steam rendering apparatus, of an ascending filter connected at its receiving end by a valved passage with the rendering-tank, a perforated piston within said filter-vessel, and a water-inlet pipe entering the filter-vessel at a point above the lowest position of the piston, substantially as described.

7. The combination, with a steam rendering-tank, of an ascending filter connected at its receiving end with the rendering-tank, a perforated piston within said filter-vessel, a valved inlet-pipe entering the filter at a point above the lowest position of the piston, and a valved outlet arranged to discharge the water from the space above the piston when the latter is depressed, substantially as described.

8. The combination, with the ascending filter of a steam rendering apparatus, of a water-inlet pipe arranged to deliver into the space above the filter proper, and a discharge-pipe at the bottom of the filter-vessel, substantially as described.

9. The combination of a steam rendering-tank, a filter-press, a receiving-tank, and valved pipes connecting them, respectively, whereby the separation of the fatty matters from the solids after rendering may be effected by a continuous operation, substantially as as described.

10. The combination, with a steam rendering-tank, of an ascending filter, B or C', connected at its receiving end with the tank, and an inlet-pipe discharging into the filter, by which water may be admitted to float the fatty substances to the elevated point of discharge, substantially as described.

In testimony that I claim the foregoing as my invention I affix my signature in presence of two witnesses.

LYDIA J. CADWELL.

Witnesses:

M. E. DAYTON,

OLIVER E. PAGIN.