(No Model.) 2 Sheets—Sheet 1.

P. STICKNEY.

APPARATUS FOR DISTILLING FATTY ACIDS.

No. 384,725. Patented June 19, 1888.

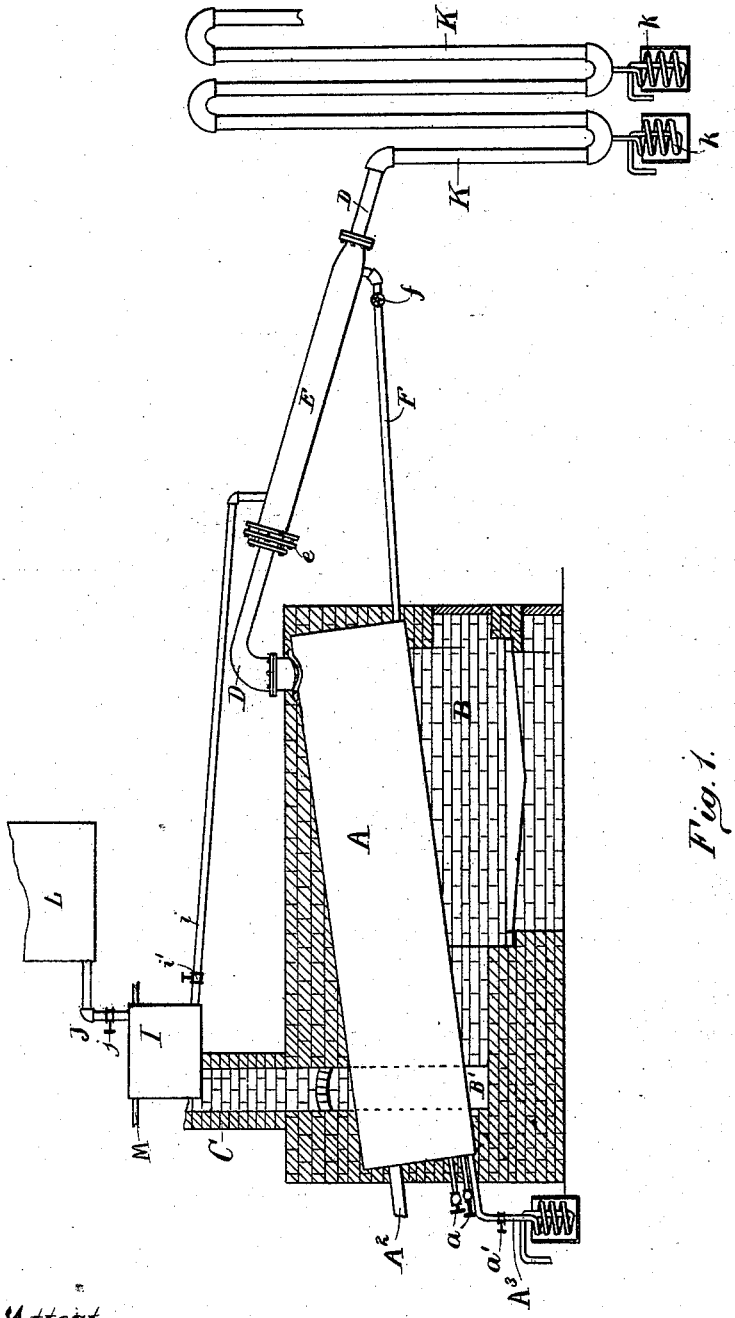

Fig. 1.

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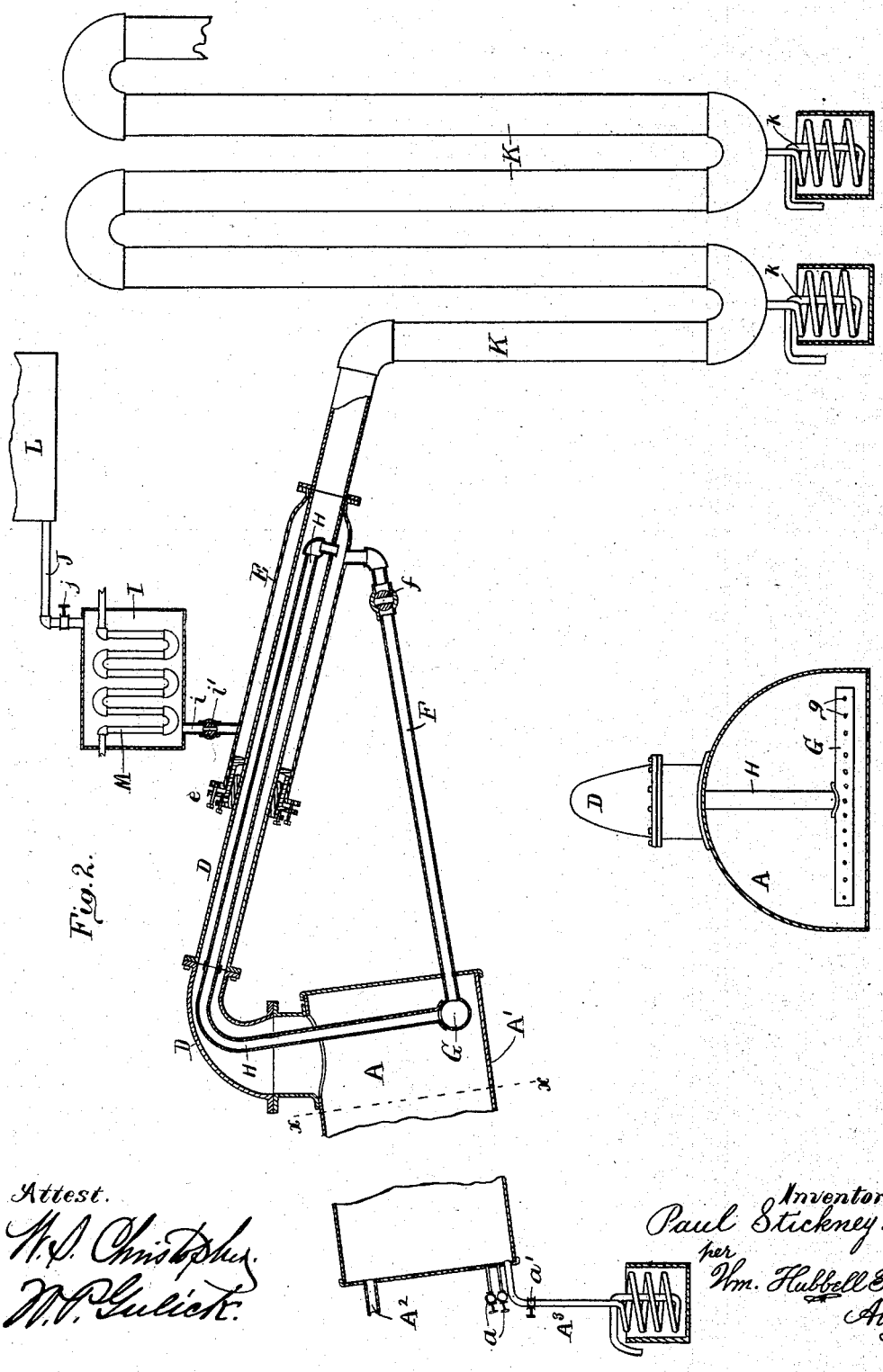

Fig. 2.

Fig. 3.

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UNITED STATES PATENT OFFICE.

PAUL STICKNEY, OF MADEIRA, ASSIGNOR OF ONE-HALF TO JAMES N. GAMBLE, OF HAMILTON, OHIO.

APPARATUS FOR DISTILLING FATTY ACIDS.

SPECIFICATION forming part of Letters Patent No. 384,725, dated June 19, 1888.

Application filed February 28, 1887. Serial No. 229,113. (No model.)

To all whom it may concern:

Be it known that I, PAUL STICKNEY, a resident of Madeira, county of Hamilton, and State of Ohio, have invented certain new and useful Improvements in Apparatus for Distilling Crude Fatty Acids, of which the following is a specification.

The several features of my invention and the advantages resulting from their use, conjointly or otherwise, will be apparent from the following description.

In the accompanying drawings, forming part of this specification, Figure 1 represents my device in elevation and section and shows the relations of the several parts of the device to each other. Fig. 2 is a sectional view of my device on a larger scale than that employed in Fig. 1, and showing the still proper shortened, the furnace being omitted and the heating-box I removed from the chimney. Fig. 3 is a sectional elevation taken at the line *x x*, Fig. 2.

The still A is preferably made of copper, but other material may be employed. The bottom A′ of the still is preferably flat, or practically so, while the sides and top may be curved in any convenient shape. Thus the still in cross-section would appear about as shown in Fig. 3. At the upper part of the still, preferably at the rear end, a steam-pipe, A^2, enters. From the lowest point of the still a pipe, A^3, leads off and terminates in a condensing-worm, which rests in a tub of water. At the rear of the still, near the bottom, there is also preferably placed a series of try-cocks, *a*.

The still A is set in brick-work, much as an ordinary steam-boiler, except that the rear end of the still is set lower than the front end. The furnace B is preferably placed under the front end of the still, and the flue B′ extends backwardly under the bottom until it reaches to the end or nearly to the end of the still, whence it communicates with the chimney C. The outlet-pipe D preferably arises from the highest point of the still. It extends over to the condensing-columns K, which are of the usual construction and provided with the usual condensing-worms, *k*. The pipe D is surrounded for a part of its length by a vessel, E, which at one end is rigidly attached to the pipe D, while at the other end it is preferably provided with an expansion-joint or stuffing-box, *e*, as shown. This vessel E is preferably located as close to the still as possible. The vessel E communicates with the interior of the still, the preferred means of communication being the pipe F, which extends from the lowest point of the vessel E to the distributing-pipe G in the still. The distributing-pipe G extends across the still at its front end parallel to the bottom, and is provided with a series of comparatively small openings, *g*. The pipe H may also be employed. It communicates with the vessel E and returns to the still through the pipe D and terminates in the distributing-pipe G. Either of the pipes H and F may be omitted or both employed, as indicated in the drawings.

The heating-box I consists of a closed receptacle, which is provided with an outlet-pipe, *i*, which communicates with the upper part of the vessel E. The feed-pipe J connects the heating-box I with the stock-tank L. A steam-pipe, M, passes through the heating-box I, and is arranged in the box in return bends or coils, so as to impart the greatest possible amount of heat to the contents of the box I.

The box I may be placed in the chimney, as shown in Fig. 1, so as to utilize the waste heat from the furnace, or it may be located in any other convenient position.

It is desirable to provide the apparatus at various points with stop-cocks which control the rate of supply. Thus it is desirable to have a stop-cock, *j*, in the pipe J; also a stop-cock, *i′*, in the pipe *i*; also a stop-cock, *f*, in the pipe F, and a stop-cock, *a′*, in the pipe A^3.

In the manufacture of candles the grease or fats employed are first decomposed and the fatty acids separated from the glycerine. The crude fatty acids thus obtained are purified by distillation. In the process of distillation the fatty acids are vaporized and pass over from the still into condensers, where they are reduced to the liquid state, while there remains in the still a black tarry substance. Every few days it becomes necessary to remove from the still this "tar" by stopping the distillation and blowing off the accumulated residue.

With my apparatus the difficulties and losses incident to the above-described process are avoided, or at least much diminished.

The mode of operation of my device is as follows: The crude acids are kept in the stock-tank L and admitted as desired to the heating-box I, where a considerable degree of heat is imparted to the mass by the waste heat of the chimney as well as by the steam in the pipe M. Superheated steam is preferably employed, in order to heat the acids as much as possible. From the heating-box I the hot acids pass into the vessel E, where they are raised to a still higher temperature by the hot vapors passing through the pipe D. In the vessel E the acids are heated almost to the point required for distillation, and when they enter the still but very little more heat is required to effect the desired object. The acids are conveyed to the still from the vessel E either through the pipe F or the pipe H or, both, if both are employed. For this purpose the pipe H has the advantage of passing through the hot vapors from the still, and in this way assists very materially in heating the acids; but the pipe F is more accessible than the pipe H, and therefore more easily repaired, and when properly jacketed the acids passing through it suffer no loss of heat. The acids are received in the still in the distributing-pipe G, from which they escape in small streams through the openings *g* and fall onto the flat inclined bottom A′. The bottom A′ is heated by the furnace beneath, and the acids being already highly heated before entering the still the distillation proceeds rapidly as the material moves over the inclined surface of the still-bottom. By the time the material has reached the lower end of the still the distillation is complete, the vapors fill the upper part of the still, while the tar has collected at the lower end, where it is continuously drawn off through the pipe A^3. The superheated steam entering through the pipe A^2 forces the vapors through the pipe D to the condensing-columns K, where they are condensed to the liquid state. When the still is first started, it must be charged with crude acid before the fire is started. In this case it becomes necessary to close the cock *a′* until the try-cocks *a* show that tar has collected at the lower end of the still, when the cock *a′* may be opened sufficiently to allow the tar to escape. Care should be taken, however, to prevent the escape of any other material than tar through the pipe A^3 by regulating the cock *a′*.

Several advantages result from the use of my apparatus, the principal one being the continuous distillation of the crude acid and the continuous removal of the refuse matter from the still. The location of the vessel E around the pipe D is also advantageous, because not only is the material on the way to the still heated by the waste heat of the escaping vapors, but these vapors are also cooled down somewhat by the material in the vessel E. By this means I have been enabled to reduce the number of condensing-columns from six or eight to two or three.

While the various features of my invention are advantageously employed together, they may also be employed separately and fall within the scope of my invention.

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

1. The combination of the exhaust-pipe D and vessel E, surrounding the exhaust-pipe and rigidly attached thereto at one end and provided with an expansion-joint at the other end, and also provided with inlet and outlet pipes, substantially as and for the purposes specified.

2. In combination with a still, the outlet-pipe D, vessel E, surrounding pipe D, pipe F, communicating with the still from vessel E, and inlet to vessel E, substantially as specified.

3. In combination with a still, the outlet-pipe D, vessel E, surrounding pipe D, pipe H, communicating with the still from vessel E and passing into the still through pipe D, and inlet to vessel E, substantially as specified.

4. In combination with a still, the outlet-pipe D, vessel E, surrounding outlet-pipe D, pipes F and H, communicating with the still from vessel E, the latter pipe passing into the still through the pipe D, and inlet to vessel E, substantially as specified.

5. In combination with a still, the outlet-pipe D, vessel E, surrounding pipe D, pipe H, passing from vessel E through pipe D into the still, pipe F, passing from vessel E into the still, pipe G, provided with openings *g* and communicating with pipes F and H, and inlet to vessel E, substantially as specified.

6. In combination with a still, heating-box I, containing steam-pipe M, outlet-pipe D, vessel E, surrounding pipe D, pipe *i*, connecting box I and vessel E, and pipe from vessel E communicating with the interior of the still, substantially as specified.

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Attest:
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