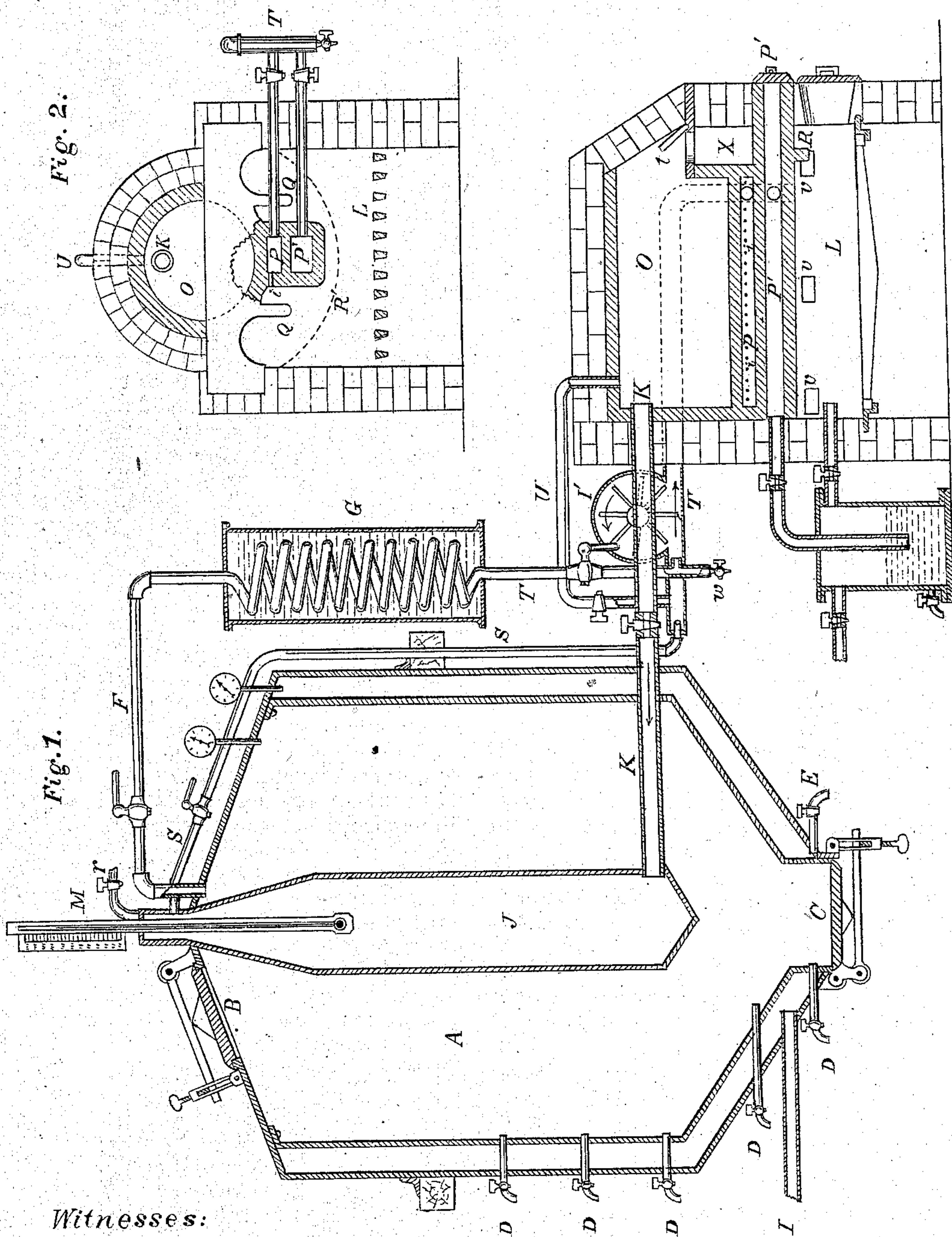


H. S. FIRMAN.

Apparatus for Rendering Fats and Deodorizing the Gases.

No. 136,827.

Patented March 18, 1873.



Witnesses:

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# UNITED STATES PATENT OFFICE.

HENRY S. FIRMAN, OF NEW YORK, N. Y.

IMPROVEMENT IN APPARATUS FOR RENDERING FATS AND DEODORIZING THE GASES.

Specification forming part of Letters Patent No. 136,827, dated March 18, 1873.

*To all whom it may concern:*

Be it known that I, HENRY S. FIRMAN, in the city, county, and State of New York, have invented certain new and useful Improvements in Rendering Apparatus for rendering tallow, lard, and all kinds of animal fats and tissues, of which the following is a specification:

My invention consists in a method of constructing rendering apparatus, by which steam and hot air can be advantageously employed in combination, and in the devices and arrangements for carrying their combined application into practice, as hereinafter described.

Figure 1 is a central vertical section of my improved rendering apparatus, and the air-heating furnace; also showing the gas-seal as connected therewith when the apparatus is employed for the production of illuminating-gas; Fig. 2, a transverse section of the furnace on the line *y y* of Fig. 1, being partly broken to show the interior of the perforated pipe P and retort P'.

The accompanying drawing represents a steam-tight cylinder or digester, A, made of boiler-iron, with a lining throughout, except at the top, (or, if preferred, it may also be lined at the top,) of the same material which makes it equivalent to an ordinary jacketed tank; but if it is preferred to admit the steam directly into the interior of the cylinder the lining or jacket may be dispensed with, and the ordinary "Wilson tank" may be employed, the latter being simply a single steam-tight iron cylinder or digester. This digester may be set in brick-work, but by preference I cover it with felt or composition to prevent loss of heat by radiation. It is provided with a filling-hole, B, at the top, and with a discharging-hole, C, at the bottom. It is also suitably provided with cocks D D D D D, for drawing off the melted fat and water, and with a cock, E, for drawing off condensed water from the jacket. I is the pipe by which the steam from the boiler is admitted into the jacket when the double cylinder is used, and into the inside of the digester when the single tank is used. At or about the center of the digester, I place a heated air-drum, J, communicating, by the pipe, K with furnace L, by which pipe the drum is supplied with the heated air. I provide the heated air-drum with a thermometer, M, by means of which the temperature

within can at all times be ascertained by external observation.

My mode of destroying the foul gases evolved during the process of rendering, is to pass them through the pipe F into a condenser, G, which is provided with a suitable coil immersed in water for partial condensation, and thence lead them into the furnace L, discharging them through a perforated delivery retort or pipe, P, into the fire, to be burned. In some cases, (that is, whenever the character of the material under treatment will warrant, and when for any reason it may be desirable,) instead of delivering the vapors through the perforated retort or pipe P, I provide, adjacent thereto, a closed retort, P', which then makes it equivalent to an ordinary gas-retort. I then heat this retort to a suitable temperature, and thus convert the partially-condensed foul gases and vapors from the rendering apparatus into a gas for illuminating or heating purposes; and when I desire to give to the gas thus manufactured a higher degree of illuminating or heating power, I combine with these gases and vapors in the retort a suitable proportion of tallow, grease, "scrap," wood, oil, or any material from which gas for illuminating or heating purposes may be manufactured. By these means the vapors evolved in the digester may be utilized, instead of being merely consumed in the furnace. I also place charcoal, or its equivalent, in the retort for the purpose of deodorizing the noxious gases and vapors, as well as to facilitate the manufacture of the gas for illuminating and heating purposes. I place at a suitable point between condenser G and furnace L, a fan-blower I, or other equivalent device, to facilitate and hasten the removal of vapors and gases from the digester, and force them into the discharge-pipe P, to be consumed in the furnace; also to create a circulation of air through the heated-air drum J by exhausting a portion through the pipe S, the place of which is immediately filled by the expansion of that contained in the air-chamber O in the furnace. The delivery-pipe P and retort P', I make either of fire-clay, or its equivalent, or of iron, and provide perforations *i i* in the former, in order to distribute the gases in small jets and insure a proper presentation thereof to the fire, so as to insure their perfect com-



bustion and the complete destruction of all noxious and offensive odors.

The destruction of the noxious gases may be effected equally well by leading them into the boiler-furnace, but by preference I use for this purpose the same furnace which I employ for heating the air supplied to the air-drum J. This furnace L is constructed in the lower part (that is to say, the ash-pit, grate-bars, and flues,) in the ordinary manner; but the upper part I construct as a heating-chamber, in which the air supplied to the drum J is heated to a suitable temperature for the purpose required. This chamber may be made of fire-clay, or equivalent material, or of iron, and may be square or other form, but is preferably cylindrical, and covers the entire fire-space over the furnace, except a space, X, left in front for an air-flue. A pipe, K, conducts the hot air to the drum J. Fresh air is supplied to the heating-chamber by the blower I, or it is taken directly from the fire-chamber L of the furnace when the fire is in such a condition as not to evolve much smoke. In this case the damper *t* is kept open, allowing the heated air and gases of combustion to ascend through the flue X and enter the chamber O. The expansion of the air by heating in the chamber O will generate sufficient force to drive it into the drum J, but I provide for its regular supply thereto, and a steady circulation through the same, by means, first, of the pipe S, from the top of the drum, through which the action of the blower slowly exhausts a portion of the contents of the drum, the equivalent of which will be constantly flowing in from the chamber O to maintain an equilibrium; secondly, by allowing a small part to escape by opening the stop-cock *r* through a pipe communicating with the chimney, causing an inflow from the chamber O to maintain the uniformity of temperature. I also introduce a pipe, U, which takes hot air from the chamber O, and leading it into the pipe T for mixture with the condensed gases before they enter the furnace, thereby insuring their perfect combustion. On the bottom, or lowest part of the cylindrical air-heater, O, I place my perforated discharge-pipe P, through which the foul gases are delivered into the fire, or closed retort for making the illuminating-gas, as previously described. On each side, parallel with and a short distance from this retort and perforated pipe in the chamber of the furnace, I place a downwardly-projecting molding or curtain, Q, leaving an open space between. These are for the purpose of checking the gases when issuing from the perforated pipe into the furnace to be burned. These moldings or projections may be increased in number and size, if

desired. At the front end of the cylinder I drop a curtain or molding, preferably of a semicircular shape, or approximating to that of the heater, it being shown in cross-section at R, Fig. 1, and its form and position indicated by the dotted lines R', Fig. 2. The office of this curtain is to check the flame and products of combustion, and cause them to circulate around the under surface of the heater before escaping either by the ordinary flues *v v v* or the air-passage X. The pipe S is connected with the heated air-drum in the digester, and has its terminal end or nozzle *s* inserted in the pipe T, through which the foul gases are fed to the furnace, the suction of the blower I' acting as an exhaust on the pipe S, also. A drip-cock, *w*, is provided to the pipe T for the withdrawal of any water which may condense therein.

I claim as my invention—

1. Forming the arch or upper portion of the furnace with one or more downward or downwardly-inclined projections, Q Q, substantially as and for the purposes set forth.

2. In combination with the furnace L and heating-chamber O, the hot-air flue X, for conveying the heated air and gaseous products of the furnace directly into the heating-chamber, substantially as set forth.

3. The retort, or delivery-pipe P, either perforated or close, arranged along the top and center of the furnace L, as and for the purposes set forth.

4. Mixing hot air from the drum J with the vapors and gases evolved in the rendering-tank, before burning in the furnace, as set forth.

5. The shield or curtain R, in combination with the furnace L, and heating-chamber O, for checking the flames and heated products until perfect combustion has occurred, substantially as set forth.

6. The arrangement of the pipe U for withdrawing air from the heating-chamber O and mingling it with the condensed vapors and gases before burning the same, substantially as set forth.

7. The use of charcoal, or its equivalent, in the retort, as a deodorizer of the noxious gases and vapors from a rendering apparatus, as described.

In witness whereof I have hereunto signed my name in the presence of two subscribing witnesses.

HENRY S. FIRMAN.

Witnesses:

J. FRASER,

CHARLES M. HIGGINS.