

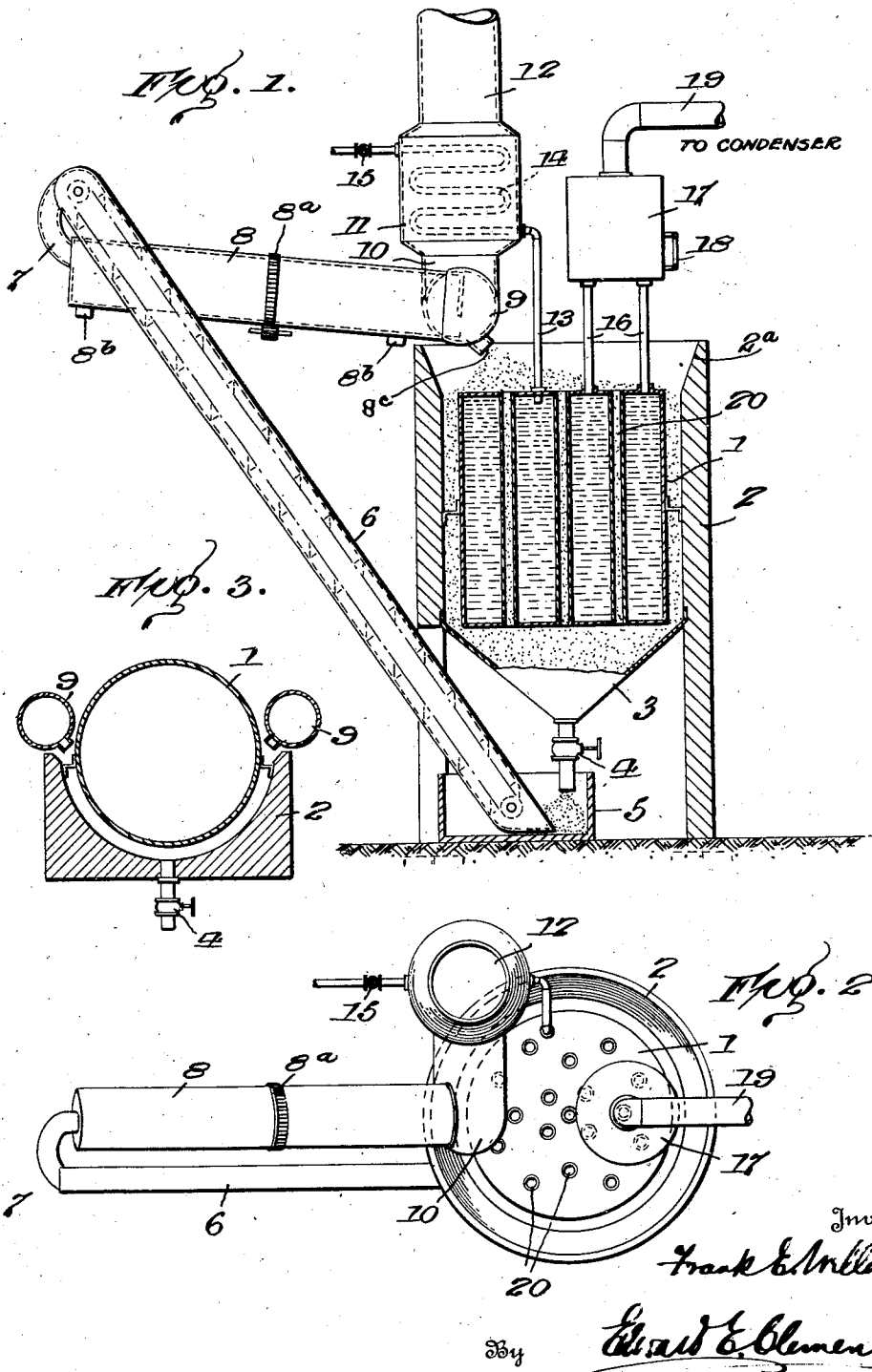
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PROCESS OF HEATING FLUIDS

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PROCESS OF HEATING FLUIDS.

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To all whom it may concern:

Be it known that I, FRANK E. WELLMAN, a citizen of the United States, residing at Kansas City, in the county of Wyandotte and State of Kansas, have invented certain new and useful Improvements in Processes of Heating Fluids, of which the following is a specification, reference being had therein to the accompanying drawing.

My invention relates to heating systems, with particular reference to heating liquids such as oil. In certain operations, such as the cracking of petroleum, and the vaporizing of many liquids, the amount of work done in the liquid, other things being equal, is proportional to the surface heated. By the present invention I greatly increase the surface heated, and at the same time have the advantage of using surfaces not ordinarily available. Certain ancillary advantages flow from this choice of surface. For example, the burning out of still bottoms due to the deposition of carbon while highly heated, can be entirely avoided.

Briefly stated, my invention depends upon the use of sand or equivalent material as a heat carrier, first heating it to the desired temperature in a furnace or retort, then passing it into contact with the body to be heated, then discharging it from said contact and continuously replacing it with freshly heated material until the desired heating operation is complete. For economy, the discharged material is returned to the furnace for re-heating and the same material is thus employed repeatedly, the process becoming a cyclic one for the continuous transfer of heat energy from furnace to still or equivalent body.

My invention is illustrated in the accompanying drawings, in which:—

Figure 1 is a side view with parts in section;

Figure 2 is a plan view; and

Figure 3 is a sectional view without detail, showing a modification.

Referring to the drawings, 1 represents a still body; 2 the setting therefor (usually of fire brick); 3 a hopper; 4 a discharge valve for the hopper; 5 a discharge receptacle; 6 a conveyor, (shown as of the bucket type); 7 a chute from the upper end of the conveyor to the furnace; 8 the furnace (supported on rocking or rolling supports 8^b and oscillated or rotated by mechanism 8^a); 9,

10, 11 and 12 are stack connections; and 8^c is the discharge spout from the heater to the still.

It is not my purpose in the present application to describe or claim details of the mechanism 8 for heating, or 6 for hoisting. Both of these are, in various forms and for their general purpose, well known, and so far as they are concerned the illustration herein is typical only. For examples of similar heating apparatus reference is made to the following U. S. Letters Patent: J. S. Fasting, No. 997,381, patented July 11, 1911; B. E. Eldred, No. 821,994, patented May 29, 1906; C. Ellis, No. 813,630, patented February 13, 1906; C. Ellis, No. 812,786, patented February 13, 1906; and E. H. Hurry and H. J. Seaman, No. 645,031, patented March 6, 1900. It will be understood that the character of the fuel employed may vary in accordance with the process to which my present invention is applied, and that it may be directly or indirectly applied to the kiln member 8, that is to say directly by combustion within or around the tube, or indirectly by generating hot gases or electric heating current which in turn will heat the contents of the tube in any well known manner.

Extending through Figures 1 and 2 I have shown a vertical cylinder still 1, with supports leaving a space all around between it and the setting or enclosure 2, which is of fire-brick or other suitable material. The upper and lower heads of this still are connected by tubes 20 which furnish additional heating surface in a manner to be presently described. The feed for the still is through pipe 13, controlled by valve 15, and having a portion of its length formed into a pre-heater coil 14 enclosed within a casing 11 through which stack gases pass from elbow 10 as they leave the kiln 8.

Risers 16 are placed in the head of the still and connected to a regulating tank 17, in the side of which is a glass 18 so placed that the level of the liquid is continuously shown.

The pipe line 19 goes to the condensing system; or fractionator, and as shown is intended to be typical of any usual arrangement for taking off, refluxing, fractionating or condensing. This and other details of the oil containing part of the system may be varied without departing from

the spirit of my invention, which has to do only with the heating, and the direct relation between the heating part of the system and the oil under treatment.

5 The operation of the foregoing apparatus will now be understood. Sand is introduced into the heating system, as at 5, or directly into 8, and as the kiln 8 rotates or oscillates, circulation commences. The
10 sand passes through the kiln and is heated to the desired temperature, and then flows from the heater to the hopper 2^a in the top of fire-brick setting 2, then falls by gravity down the outside of the still and also
15 through the tubes 20 extending through the inside of the still, then into the hopper 3. The throttle 4 enables the flow of sand through and around the still to be controlled and regulated. From hopper 3 the
20 sand falls into receiver 5, from which it is raised by the hoist or conveyer 6 back to the heater 8, which it enters via chute 7.

In Figure 3 I have suggested a modified arrangement in which the still or boiler
25 is a horizontal cylinder, the setting 2 being modified accordingly, and the sand flowing down around the sides from pipes 9 taking the place of elbow 9 in Figures 1 and 2. The rest of the apparatus would be the
30 same as shown in Figures 1 and 2.

With the system here illustrated I obtain approximately ten times the heating sur-

face that can be obtained on previously known forms of stills. In cracking oil this is very important, as the cracking process is peculiarly dependent for success on the area of surface heated. Moreover, there is another important result flowing from my use of sand as a heat conveyer in the manner described, viz, the conservation of fuel. In a properly designed system, there need be practically no expenditure of heat energy except that actually and use-
40 fully employed.

What I claim is:

1. The process of heating fluids and the like which consists in first heating a mass of granular refractory material and then flowing the same over and about the body of fluid to be heated and out of contact
45 therewith.

2. The process of heating fluids and the like which consists in isolating the fluid to be heated in a heat conducting container, heating a mass of granular refractory material in a separate zone, flowing the same over and about the container to effect a transmission of heat therethrough to the liquid, then returning the same to be re-
55 heated, and repeating said steps in continuously recurring cycles.

In testimony whereof I affix my signature.

FRANK E. WELLMAN.