May 4, 1926. 1,582,899

P. CASSIDY

APPARATUS FOR TREATING OILS

Filed Nov. 21, 1922 2 Sheets-Sheet 1

Fig. 1

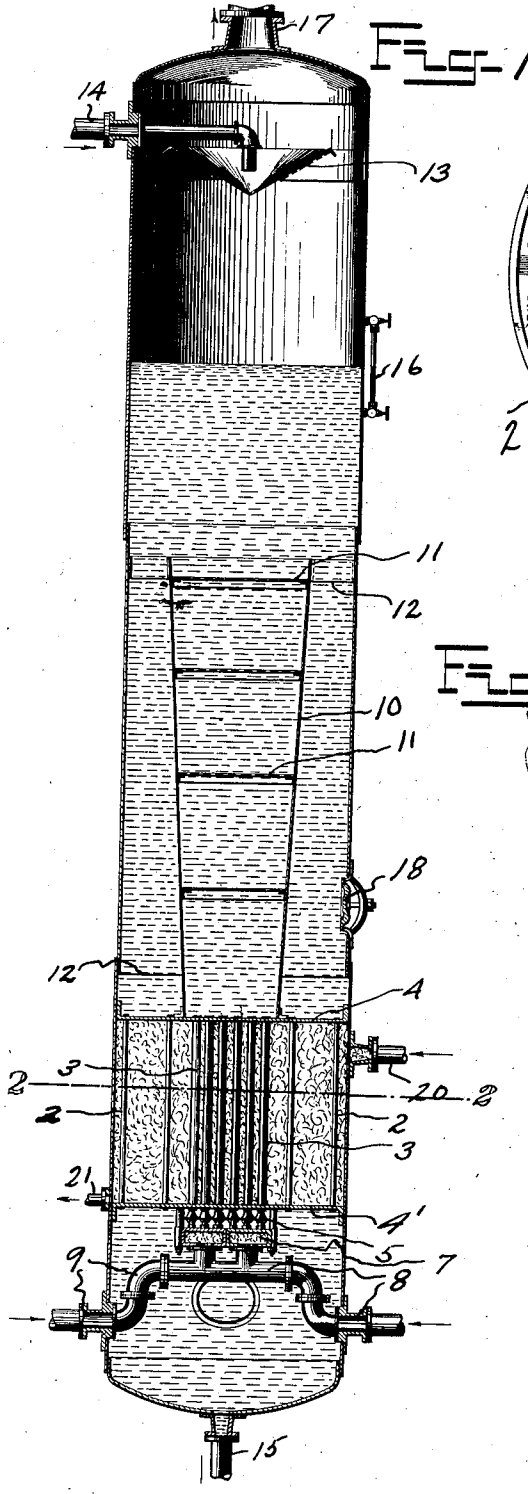


Fig. 2

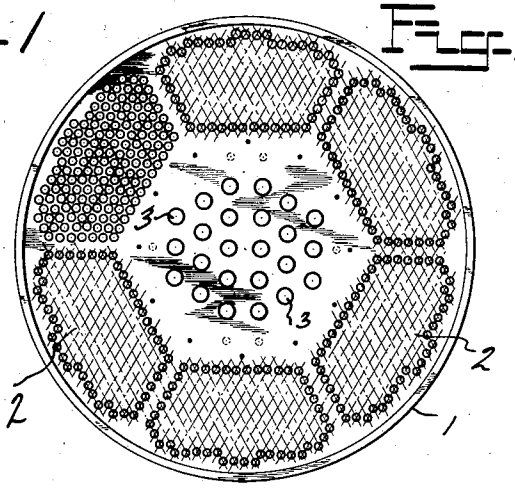


Fig. 3

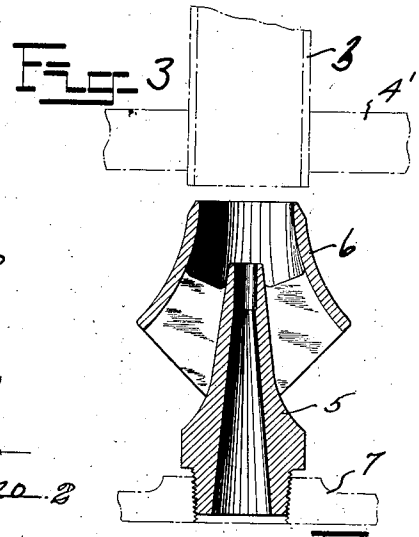
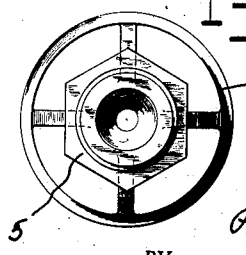


Fig. 4



INVENTOR.
Perry Cassidy
BY
Lyford, Bull & Lull
ATTORNEYS.

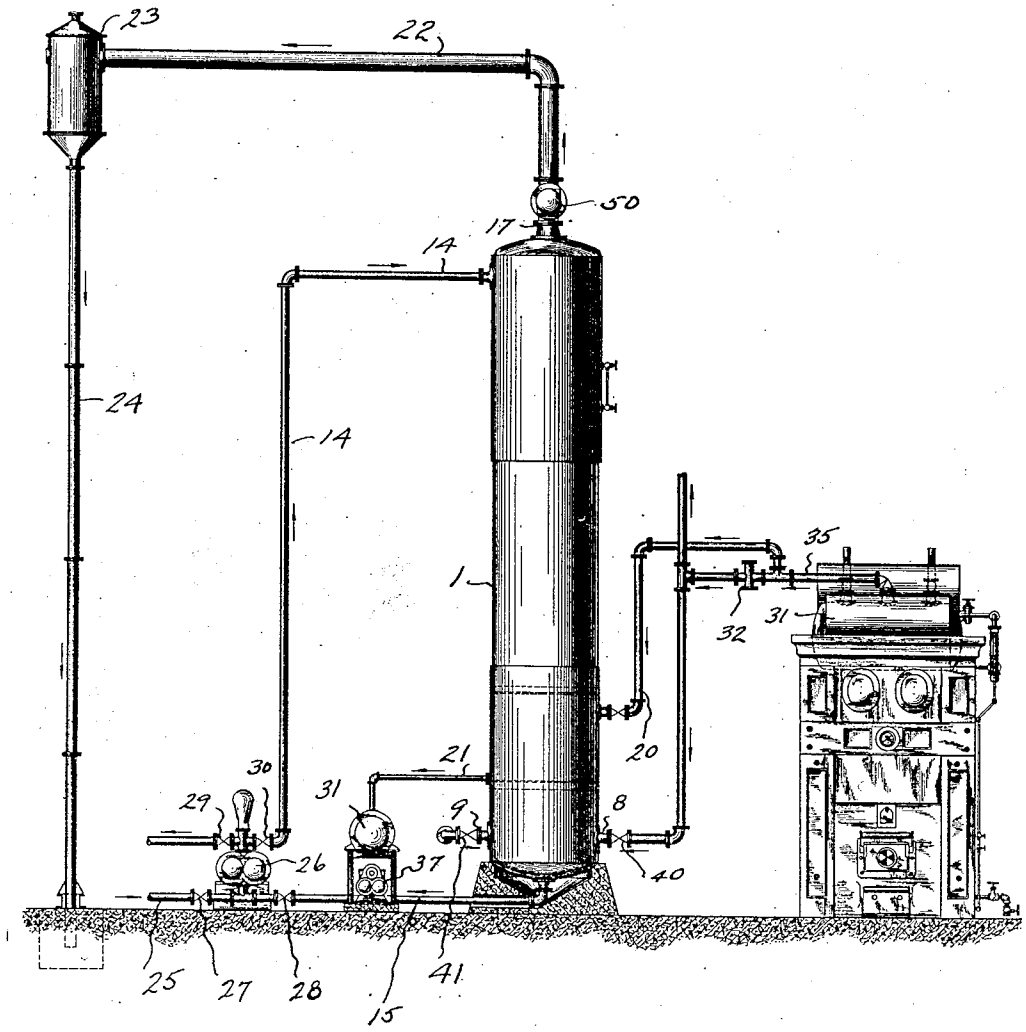
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Fig. 5



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Patented May 4, 1926.

1,582,899

UNITED STATES PATENT OFFICE.

PERRY CASSIDY, OF RIVERSIDE, CONNECTICUT, ASSIGNOR TO THE BABCOCK & WILCOX COMPANY, OF BAYONNE, NEW JERSEY, A CORPORATION OF NEW JERSEY.

APPARATUS FOR TREATING OILS.

Application filed November 21, 1922. Serial No. 602,461.

To all whom it may concern:

Be it known that I, PERRY CASSIDY, a citizen of the United States, residing at Riverside, in the county of Fairfield and State of Connecticut, have invented certain new and useful Improvements in Apparatus for Treating Oils, of which the following is a specification.

My invention relates to the treatment of vegetable oils wherein the oil is subjected to the action of a gaseous medium, and it is an object of my invention to provide an apparatus in which the oil may be treated efficiently and effectively.

My invention will be best understood from the following description and the annexed drawings of one form of apparatus which I have chosen for purposes of illustration, in which Figure 1 is a vertical section of the illustrative form of the apparatus; Fig. 2 is an enlarged view, in plan, of the tube heads and is taken on line 2—2 of Figure 1; Fig. 3 is a sectional view of a nozzle employed in my illustrative device; Fig. 4 is a bottom plan view of Fig. 3 and Fig. 5 represents an arrangement of apparatus according to one embodiment of the invention for treating the oil with steam.

Referring to Fig. 1, a container 1 is provided intermediate its ends with a set of tubes 3 extending through tube-sheets 4 and 4', the latter being secured to the tank 1, as shown. Preferably secured to the same tube-sheets is a second set of tubes 2, the purpose of which will appear hereinafter. Associated with each tube 3 of the set is a nozzle 5, preferably located adjacent one end of the tube, as shown, each nozzle preferably being provided with a conical element 6 of Venturi shape to increase the injector action. The nozzles 5 may be secured to one or more common chambers 7, and these, in turn, to the conduit 8, whereby steam or any desired gas may be admitted through the latter and into the nozzles. Surrounding the tube set 3 is provided a conical baffle 10 to assist in the circulation of the oil, and this baffle may be advantageously provided with screens 11 to assist in the stirring and mixing of the oil with the gaseous medium introduced at 8 or 9. The baffle 10 is preferably secured to the tank by means of the brace 12, as shown. Near the top of the tank is provided a pan or baffle 13, preferably of conical shape, whereby oil entering the container through pipe 14 may spill over the baffle 13 and be maintained separate from the gaseous medium leaving the container at the outlet 17 at the top. The baffle 13 also acts to prevent oil being blown out of the steam outlet 17 when the apparatus is in use. The container is also conveniently provided with a level gauge 16 and manhole 18.

Means are provided to heat the oil passing through the tube sets 3 and 2, comprising an inlet 20 for the heating medium, preferably high-pressure steam, and the exit 21.

In the arrangement shown in Fig. 5, a boiler, preferably of the ordinary high-pressure type, is used to supply high pressure steam for heating the oil through pipe 20 and also to supply the medium, supplied through the nozzles 5, for treating the oil, this steam being preferably at a lower pressure than the heating steam. In this arrangement, steam under boiler pressure from boiler 31 passes through conduits 35 and 20, around the tube sets 3 and 2, out at 21, and into the receiver 31, whence it is returned by means of pump 37 to the boiler, the return connection thereto not being shown. In conduit 35 is inserted a reducing valve 32, whereby steam under reduced pressure is admitted to the chamber 7 by valve 40. If desired, steam from other sources, as, for example, exhaust steam from the pumps, may be admitted by means of valve 41 into the chambers 7. The steam, or other gaseous medium, admitted through the nozzles is withdrawn from the container at the top through the outlet 17 and pipe 22 and thence passes to condenser 23, which, conveniently, may be of the barometric type, as shown. If desired, a feed-water heater 50 may be inserted in the conduit 22, as shown.

Oil is admitted to the system through conduit 25, passing through valve 27, pump 26, and valve 30, through pipe 14 into the top of the container, valves 28 and 29 remaining closed. Oil may be circulated exteriorly of the container by means of pipe 15, valve 28, pump 26, valve 30, and pipe 14, valves 27 and 29 being closed. When it is desired to drain the container of the oil, valves 28 and 29 are open and valves 27 and 30 closed.

In use, oil is placed in the container 1, and, if desired, may be first brought to a suitable temperature by admitting steam to the exterior of the tube sets 2 and 3 and circulating the oil through the container and pipe 14 by means of pump 26. When the desired temperature has been reached in this manner, the gaseous medium, for example, hydrogen, or, in the embodiment illustrated, steam is introduced through either or both of the pipes 8 and 9. The gaseous medium issues from the nozzles 5 with increased velocity and causes the oil to be injected through the tubes 3. Here the oil and gaseous medium are thoroughly mingled and are subjected to considerable scrubbing action by virtue of the extended tube surface afforded. The mixture leaves the tubes at considerable velocity and partially owing to the fact that the mixture of oil and gas or steam is considerably lighter than the rest of the oil, ascends the space enclosed by the baffle 10, passing through the screens 11, where it is more intimately mixed. At the same time, the oil on the outside of the baffle 10 descends through tubes 2, thus maintaining the circulation.

In the arrangement described, it will be noted that the oil is heated in the same container in which it is treated with steam or gas. This simplifies the apparatus. By using high pressure steam for heating the oil, care is not required to prevent heating the oil above the temperature which would injure the oil, since the steam pressure (and consequently its temperature) may be set below the danger point. Moreover, heat may be supplied to the oil while under treatment. By using high pressure steam for heating the oil, high efficiency may be obtained, because the temperature of such steam remains constant while it is giving up its heat to the oil, and, therefore, the heat transfer rate is constant. This would not be true if superheated steam were used.

By using the oil-treating steam or gas to produce circulation of the oil in the container, all circulating pumps or the like may be dispensed with. In the arrangement described, the energy in this oil-treating steam or gas is utilized to produce a positive circulation of the oil.

The circular baffle 10 separates the rising column of oil mixed with steam or gas from the descending column of oil alone, so that the circulation of the oil is thereby assured and the screens in this rising column add materially to the scrubbing action of the steam or gas on the oil.

By providing the injector nozzles at the lower ends of relatively long tubes, in the manner described, the oil attains a high velocity through these tubes and a correspondingly rapid circulation of the oil in the container and this, together with the scouring action obtained in these tubes and by means of the screens, greatly reduces the time required for the treatment of a batch of oil.

It will be understood that the arrangement described is merely illustrative and that the embodiment of the invention may be varied within wide limits.

I claim:

1. An apparatus for treating oils comprising a container, a plurality of substantially upright tubes within the container and having their open ends spaced from the top and bottom thereof, nozzles placed near the ends of some of said tubes so as to induce a flow of the oil through the tubes when steam or a gas is injected through the nozzles, means for supplying steam or a gas to said nozzles, an upright conduit superposed around the ends of the tubes remote from the nozzles, said conduit being spaced from the walls of the container.

2. An apparatus for treating oils comprising a container, a plurality of substantially upright tubes within the container and spaced from the top and bottom thereof, nozzles placed near the ends of said tubes so as to induce a flow of the oil through the tubes when steam or a gas is injected through the nozzles, means for supplying steam or a gas to said nozzles, an upright conduit superposed around the ends of the tubes remote from the nozzles, said conduit being spaced from the walls of the container and having a foraminous diaphragm therein.

3. A apparatus for treating oils comprising a container for the oil, heads spaced apart and dividing the container into compartments, tubes extending through the space between the heads and connecting the compartments at either end thereof, nozzles placed near the ends of some of said tubes so as to induce a flow of oil through the tubes when steam or a gas is injected through the nozzles, and means for supplying steam or a gas to said nozzles.

4. An apparatus for treating oils comprising a container for the oil, heads spaced apart and dividing the container into compartments, tubes extending through the space between the heads and connecting the compartments at either end thereof, nozzles placed near the ends of some of said tubes, means for injecting steam or a gas through the nozzles so as to induce a flow of oil through the tubes, and means to pass a heating fluid through the compartment between the heads.

5. An apparatus for treating oils comprising a container for the oil, heads spaced apart and dividing the container into compartments, tubes extending through the space between the heads and connecting the compartments at either end thereof, a nozzle placed near the end of each of a group of

some of said tubes near the center of the container so as to induce a flow of oil through said group of tubes when steam or a gas is injected therethrough, and means for supplying steam or a gas to the nozzles.

6. An apparatus for treating oils comprising a container for the oil, heads spaced apart and dividing the container into compartments, tubes extending through the space between the heads and connecting the compartments at either end thereof, means for injecting steam or a gas into one end of each of a group of some of said tubes near the center of the container, and a conduit connecting with the head opposite the injecting means and surrounding the ends of the tubes in said group, said conduit being spaced from the walls of the container.

7. An apparatus for treating oils comprising a container for the oil, heads spaced apart and dividing the container into compartments, tubes extending through the space between the heads and connecting the compartments at either end thereof, means for injecting steam or a gas into one end of each of a group of some of said tubes near the center of the container, and a conduit connecting with the head opposite the injecting means and surrounding the ends of the tubes in said group, said conduit being spaced from the walls of the container and increasing in area from the head to the end of the conduit.

8. An apparatus for treating oils comprising a container for the oil, heads spaced apart and dividing the container into compartments, tubes extending through the space between the heads and connecting the compartments at either end thereof, means for injecting steam or a gas into one end of each of a group of some of said tubes near the center of the container, a conduit connecting with the head opposite the injecting means and surrounding the ends of the tubes in said group, said conduit being spaced from the walls of the container, and a foraminous diaphragm in said conduit.

9. An apparatus for treating oils comprising a container for the oil, heads spaced apart and dividing the container into compartments, tubes extending through the space between the heads and connecting the compartments at either end thereof, means for injecting steam or a gas into one end of each of a group of some of said tubes near the center of the container, a conduit connecting with the head opposite the injecting means and surrounding the ends of the tubes in said group, said conduit being spaced from the walls of the container, and means for passing a heating fluid through the compartment between the heads.

10. An apparatus for treating oils comprising a container for the oil, heads spaced apart and dividing the container into compartments, tubes extending through the space between the heads and connecting the compartments at either end thereof, nozzles placed near the ends of some of said tubes so as to induce a flow of oil through the tubes when steam or a gas is injected through the nozzles, and means for supplying low pressure saturated steam to said nozzles, and means for passing high pressure saturated steam through the compartment between the heads.

11. An apparatus for treating oils comprising a container for the oil, heads spaced apart and dividing the container into compartments, tubes extending through the space between the heads and connecting the compartments at either end thereof, a nozzle placed near the end of each of a group of some of said tubes near the center of the container, so as to induce a flow of oil through said group of tubes when steam or a gas is injected therethrough, other and surrounding tubes serving for the return of the oil.

PERRY CASSIDY.