Nov. 18, 1924. 1,516,285

C. L. FREELAND

PROCESS OF AND APPARATUS FOR REFINING CRUDE OILS

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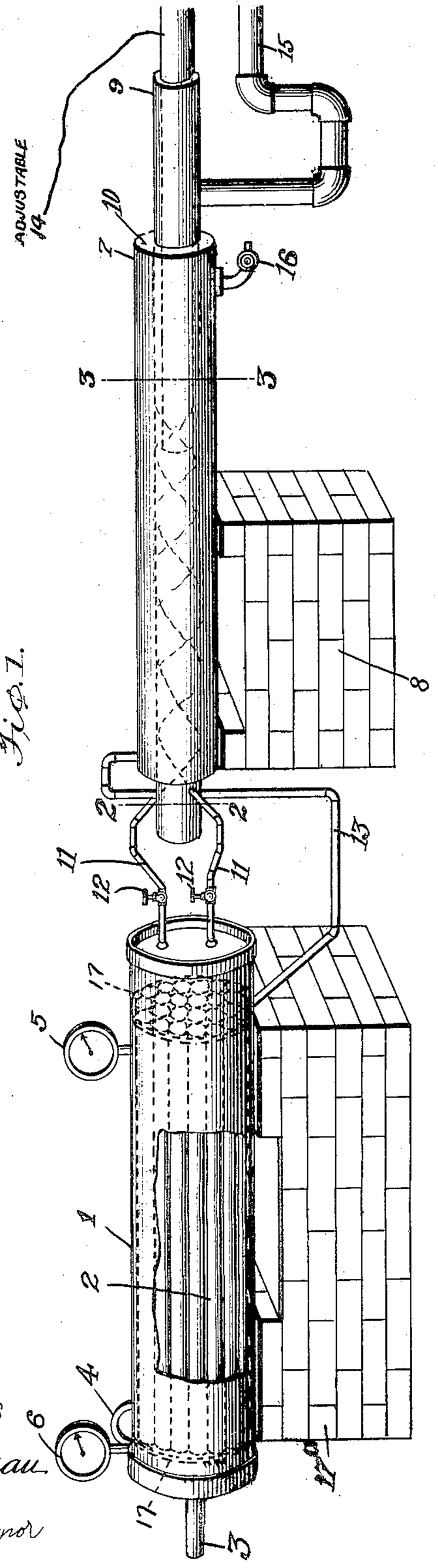

Fig. 1.

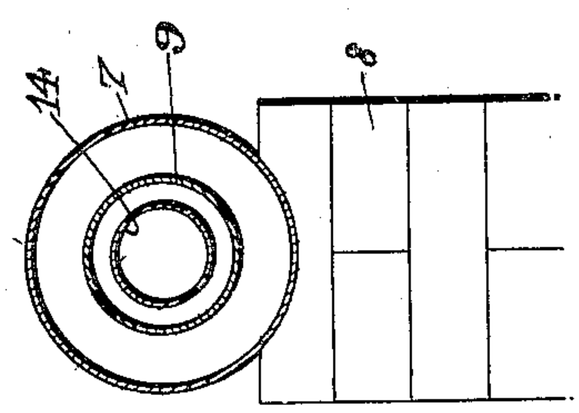

Fig. 3.

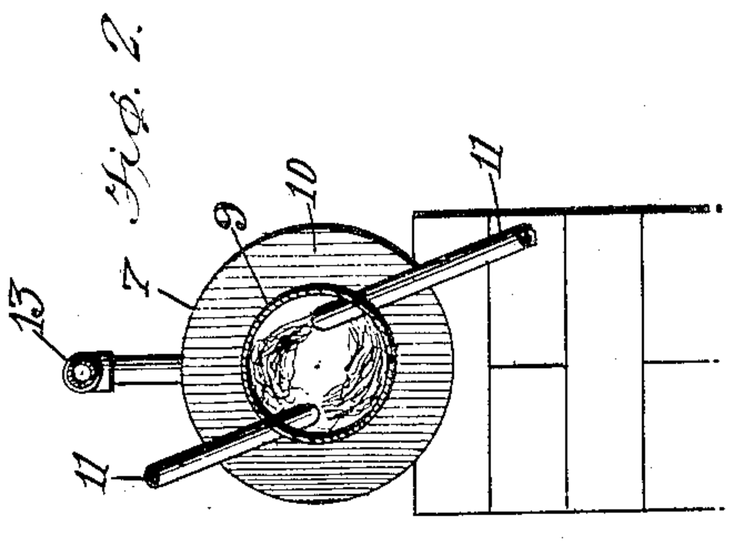

Fig. 2.

WITNESSES

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UNITED STATES PATENT OFFICE.

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PROCESS OF AND APPARATUS FOR REFINING CRUDE OILS.

Application filed October 10, 1919. Serial No. 329,725.

To all whom it may concern:

Be it known that I, CLAUDE LESLIE FREELAND, a citizen of the United States, and a resident of Bristow, in the county of Creek and State of Oklahoma, have invented certain new and useful Improvements in Processes of and Apparatus for Refining Crude Oils, of which the following is a specification.

My invention is an improvement in process and apparatus for refining crude oils, and has for its object to provide a simple, easily controlled and economical process and apparatus.

I will describe one process and one form of apparatus, each embodying my invention, and will then point out the novel features thereof in claims.

In the drawings:

Figure 1 is a perspective view of the apparatus,

Figures 2 and 3 are sections taken substantially on the lines 2—2 and 3—3 of Figure 1.

The improved process consists in pumping the crude oil under pressure through heated tubes, and in afterwards discharging the heated oil under pressure in a direction to cause the same to whirl about an axis as it travels longitudinally of the axis, and in arranging means at the axis for collecting and removing the high gravity vapors.

The apparatus for carrying out the process comprises in the present instance a steam heater 1 in the form of a cylindrical casing having arranged therein a series of tubes 2 for the oil. The ends of these tubes are set in headers 17. The oil is admitted to the casing by a feed pipe 3 from any suitable source of supply. The steam is supplied to the casing 1 from any suitable source of supply by a feed pipe 4, so as to circulate around the tubes. The heater has a steam pressure indicator 5 and a crude oil pressure indicator 6, the latter being connected with the tubes and the former with the interior of the casing.

A shell or casing 7 is supported co-axially with the casing 1 at the delivery end thereof by a suitable pedestal 8, and supported within this casing 7 is another casing 9 of relatively small diameter and of relatively great length. The space between the casings 7 and 9 is closed at each end of the casing 7 by a gland or packing in any other suitable manner as indicated at 10, and the heated crude oil is supplied to the casing 9 by pipes 11, which lead from the heater 1 to the interior of the casing 9. Each of these pipes is controlled by a valve 12, and the pipes 11 are introduced tangentially into the casing 9 (Fig. 2) so that the sprayed oil will whirl about the axis of the casing 9, as it travels longitudinally of the casing. This longitudinal whirling of the oil causes it to collect around the wall of the casing, the heavier portions assembling close to the casing while the lighter portions remain on the center of vortex. The space between the casings 7 and 9 is heated by steam from the heater, the said steam being conducted from the heater to the said space by a pipe 13.

Means is provided for collecting the vapor at the center of the aforesaid vortex and for conveying said vapor to a condenser. The said means comprises a pipe 14 held co-axially with the pipe or casing 9 and extending into the said pipe a distance corresponding approximately to one-third of the length of the casing 7. The residue of the oil is carried away from the casing 9 by a pipe 15, and an exhaust valve 16 for exhaust steam is provided in the casing 7 at the end remote from the heater. The heater 1 is supported by a suitable foundation 17ª, and the foundation 17ª and the pedestal 8 may be furnaces if desired to heat the casings 7 and 1, instead of using steam. The casing 9 is held in spaced relation with respect to the casing 7 in any suitable manner, as for instance by spiders, and the pipe 14 is similarly supported from the casing 9. The vapor collecting tube or pipe 14 is longitudinally adjustable in the casing 9, so that the point where it takes up the vapor may be varied.

The adjustment may be effected by any well known means and the mere friction between the collecting tube and the casing 9 serves to hold the tube to the adjustment.

Although I have herein shown and described only one process and one apparatus for refining crude oil, it is to be understood that various changes and modifications may be made herein without departing from the spirit of the invention or the spirit and scope of the appended claims.

I claim:

1. Apparatus for refining crude oil comprising a heater for the crude oil, tubular concentric casings spaced apart from each other, means for heating the space between

the casings, connecting means between the inner casing and heater for delivering the heated oil to the inner casing, means associated with said connecting means for imparting a whirling motion to the heated oil about the axis of said casing so as to separate the low gravity products from the high gravity products while moving longitudinally thereof, and means at the delivery end of the inner casing for collecting the vapor at the center of the whirling oil, said means being adjustable into and out of the casing.

2. Apparatus for refining crude oil comprising a heater for the crude oil, tubular concentric casings spaced apart from each other, means for heating the space between the casings, means connected to the outer casing for establishing communication between said space and the atmosphere, connecting means between the inner casing and the heater for delivering the heated oil to the inner casing, means associated with said connecting means for imparting a whirling motion to the heated oil as it is introduced into the inner casing causing a separation of the low gravity products from the high gravity products while moving longitudinally thereof, means at the delivery end of the inner casing for collecting the vapor at the center of the whirling oil, and means connected with the inner casing for conducting away residual oil.

3. Apparatus for refining crude oil comprising a heater for the crude oil, tubular concentric casings spaced apart from each other, means for heating the space between the casings, connecting means between the inner casing and the heater for delivering the heated oil to the inner casing, means associated with said connecting means for injecting the oil tangentially to impart a whirling motion thereto about the axis of said casing so as to separate the low gravity products from the high gravity products while moving longitudinally thereof, and means projecting into the inner casing at the delivery end thereof for collecting the high gravity products which assemble at the center of the whirling oil.

4. The combination in apparatus for refining crude oil comprising concentric casings, means for injecting heated oil into one end of the inner casing to cause it to take a spiral motion longitudinally of said casing, means at the other end of the casing for separately collecting the lighter products of the oil assembled in the center of the whirl, and means for heating the space around the inner casing.

5. Apparatus for refining crude oil comprising a tubular casing, means for delivering heated oil tangentially of the casing at one end to thereby impart a whirling movement to the oil about the axis of the casing and cause the separation of the heavier products from the lighter products while the oil moves longitudinally of the casing, and means disposed and adjustable axially of the casing to conduct away the lighter products assembled at the center of the whirl.

6. A process of refining crude oil consisting of preliminarily heating the oil, spraying the heated oil at an angle into a closed and unobstructed container, thereby imparting to the sprayed oil a whirling movement about an axis so as to separate the low gravity products from the high gravity products as it travels along said axis, and separately collecting the high gravity products assembled at the center of the vortex.

CLAUDE LESLIE FREELAND.