Sept. 11, 1934. C. H. BUNN, JR 1,973,607

METHOD AND APPARATUS FOR PUMPING AND SEPARATING LIQUIDS

Filed July 2, 1930

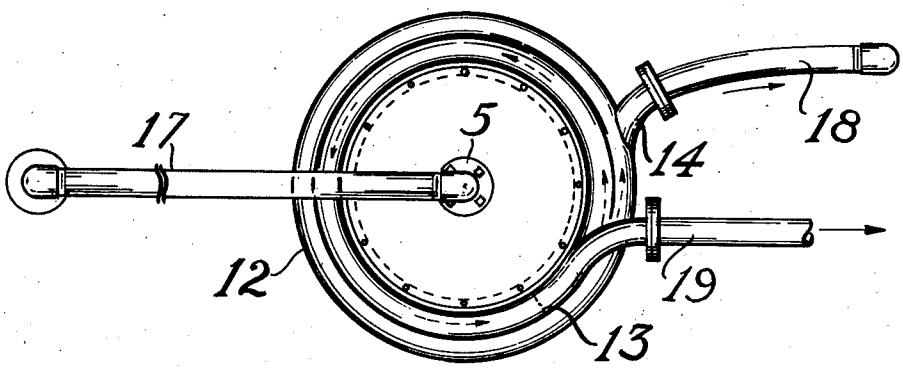

Fig.-2

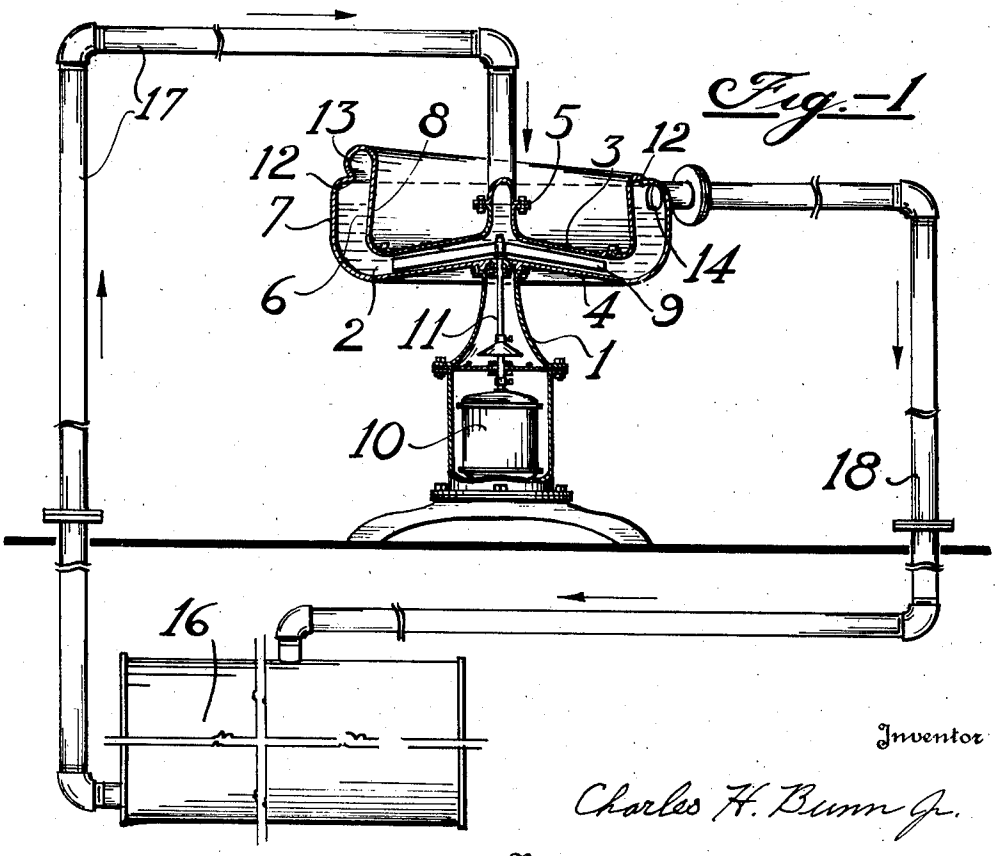

Fig.-1

Inventor

Charles H. Bunn Jr.

By

W. E. Currie Attorney

Patented Sept. 11, 1934 1,973,607

UNITED STATES PATENT OFFICE

1,973,607

METHOD AND APPARATUS FOR PUMPING AND SEPARATING LIQUIDS

Charles H. Bunn, Jr., Westfield, N. J., assignor to Standard Oil Development Company, a corporation of Delaware

Application July 2, 1930, Serial No. 465,371

6 Claims. (Cl. 210—51)

This invention relates to the centrifugal separation of relatively heavy impurities from liquids and is particularly applicable to the separation of water, or the like, from motor fuels such as naphtha, gasoline and the like. In a preferred form of the invention the centrifugal motion also acts to force the separated liquid to the place where it is to be used, and/or to continuously supply the machine with liquid to be separated. The invention will be fully understood from the following description taken in connection with the accompanying drawing, in which latter

Fig. 1 is a diagrammatic view of a separating system showing in transverse section the details of a centrifuge machine according to this invention, and

Fig. 2 is a top plan view of the centrifuge machine.

In the drawing, reference numeral 1 designates a supporting pedestal upon which is mounted the bowl of the centrifuge. The bowl comprises a base chamber 2 formed by the walls 3 and 4 and provided with an inlet 5, and an annular chamber 6 constituted by the walls 7 and 8 disposed at an angle to the base chamber. The base chamber opens around its periphery into the annular chamber, the annular chamber being concentric with respect to the base chamber. Impeller blades 9 are mounted for rotation in the base chamber and are driven by the motor 10 through shaft 11.

Liquid such as naphtha introduced into the base chamber through inlet 5 is propelled centrifugally from the base chamber around the annular chamber toward the discharge end thereof. During this travel of the naphtha, the relatively heavy impurities therein such as water, or dirt, are thrown to the outer side of the liquid body within the annular chamber. Means are provided for accumulating and withdrawing these relatively heavy constituents, preferably together with considerable naphtha, from the body of liquid during its travel through the annular chamber. In the preferred embodiment these means are formed by insetting the upper part of the outer wall of the annular chamber to form an annular abutment 12 which checks the upward passage of the relatively heavy material. This is believed to be the simplest way of obtaining a separation between the purified liquid and the impurities centrifugally thrown to the outer wall. However, various other types of baffles or deflectors may be used to accomplish the same result.

The annular chamber is provided with discharge openings 13 and 14 on opposite sides of or at opposite ends of the abutment. In the preferred embodiment these discharge openings are disposed in spaced relation longitudinally of the annular chamber. The discharge opening 14 which is preferably nearest the entrance to the annular chamber is disposed at the periphery of the chamber and preferably at the base of the abutment 12. It will be understood that the discharge openings 13 and 14 can be disposed in approximately the same position longitudinally of the annular chamber and some of the advantages of the invention retained. Discharge opening 13 is preferably positioned radially inwardly with respect to discharge opening 14 and is preferably formed by progressively extending the end of the annular chamber beyond abutment 12 to form a passageway which terminates in a discharge line 19.

The naphtha, or the like, is fed to the inlet 5 of the base chamber from a reservoir 16 through a line 17. A discharge line 18 communicates with the discharge opening 14 and delivers the relatively heavy ingredients together with a relatively large proportion of naphtha back into the reservoir 16. If desired, any suitable type of gravity separator or the like, not shown, adapted to remove the major portion of water and sediment from the naphtha before returning the naphtha to the reservoir, can be installed in the line 18. A discharge line 19 leads from the discharge opening 13 to a suitable place of disposal such as the tank of an airplane to which naphtha free of relatively heavy impurities is to be conducted.

By the construction described, the flow of water-free naphtha from the centrifuge can be shut off instantaneously without stopping the centrifuge as the outlet for the relatively heavy impurities together with naphtha through discharge opening 14 is sufficiently large to relieve the pressure which would otherwise result when the outlet for water-free naphtha is closed. The construction permits of supplying water-free and sediment free naphtha at a relatively high speed and under substantial pressure to a place of delivery, such as an airplane. This is accomplished with a minimum of danger of a spark occurring from generation of static electricity. A unitary device effects the pumping and the separation of the liquid. It will be understood, however, that separate or additional means for pumping may be used.

Various changes may be made within the scope of the appended claims, in which it is desired to

claim all novelty inherent in the invention as broadly as the prior art permits.

I claim:

1. In a centrifuge machine, comprising a bowl including a base chamber having an inlet, an annular chamber disposed at an angle to the base chamber, the base chamber opening around its periphery into the annular chamber, the annular chamber having discharge openings spaced longitudinally of the bowl, a circumferentially extending portion of the radially outer wall of the annular chamber projecting radially inwardly between the openings, and means for propelling liquid centrifugally from the base chamber around the annular chamber toward the discharge openings.

2. A centrifuge machine, comprising a bowl including a base chamber having an inlet, an annular chamber disposed at an angle to the base chamber, the base chamber opening around its periphery into the annular chamber, the annular chamber having discharge openings spaced longitudinally thereof, an annular member projecting inwardly from the radially outer wall of the annular chamber between the openings, and means for propelling liquid centrifugally from the base chamber around the annular chamber toward the discharge openings.

3. A centrifuge machine, comprising a bowl including a base chamber having an inlet, an annular chamber disposed at an angle to the base chamber, the base chamber opening around its periphery into the annular chamber, the annular chamber having an upper inset annular abutment, the annular chamber having openings on opposite sides of the abutment, the opening nearer the entrance to the annular chamber being disposed at the periphery of the chamber, and means for propelling liquid centrifugally from the base chamber around the annular chamber toward the discharge openings.

4. A centrifugal machine, comprising a bowl including a chamber having an inlet, means for propelling liquids under pressure centrifugally around and longitudinally of the chamber, discharge lines leading from openings spaced longitudinally of the chamber for discharging liquids under pressure, a solid means constituting an annular shoulder projecting inwardly from the radially outer wall of the chamber between the discharge openings permitting passage of the liquid longitudinally of the chamber over the inner periphery of the shoulder only.

5. The method of treating liquids, which comprises pumping the liquids from a body thereof under pressure, centrifugally separating the liquids while maintaining the liquids under the pump pressure, delivering one of the separated liquids in a confined stream under the pump pressure to a source of disposal, and returning the other separated liquid under the pump pressure to the body.

6. The method of treating non-miscible liquids of different specific gravity, which comprises rotating a member in a radially outwardly facing portion of a closed zone to exert rotary force to draw the liquids into the zone and impart a substantially circular motion to the liquids while forcing the liquids tangentially outwardly into an annularly disposed portion of the closed zone which rotary force simultaneously subjects the liquids to pressure and furnishes the motive force to effect centrifugal movement and result in separation of the liquids, and delivering one of the separated liquids from the annular portion in a confined stream under the pressure of the rotary force.

CHARLES H. BUNN, Jr.