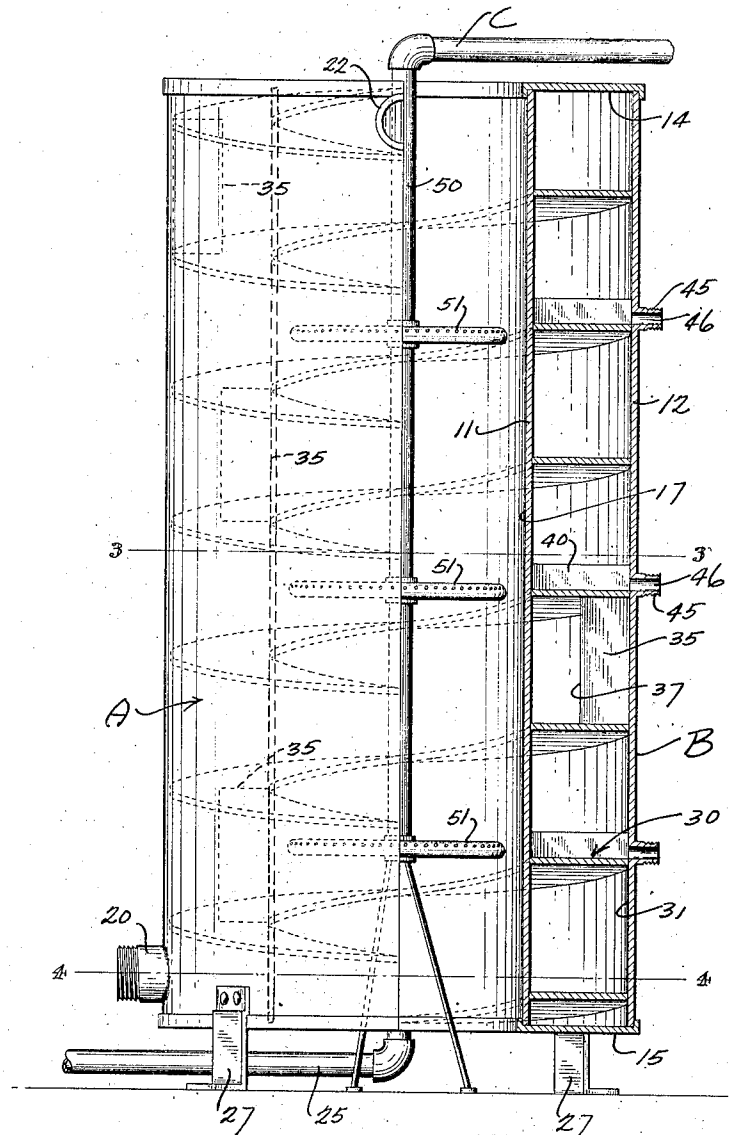
Dec. 1, 1925. 1,563,718

F. J. BROWN

SPIRAL REFLUX CONDENSER

Filed May 25, 1923 2 Sheets-Sheet 1

Fig. 1.



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Fig. 2.

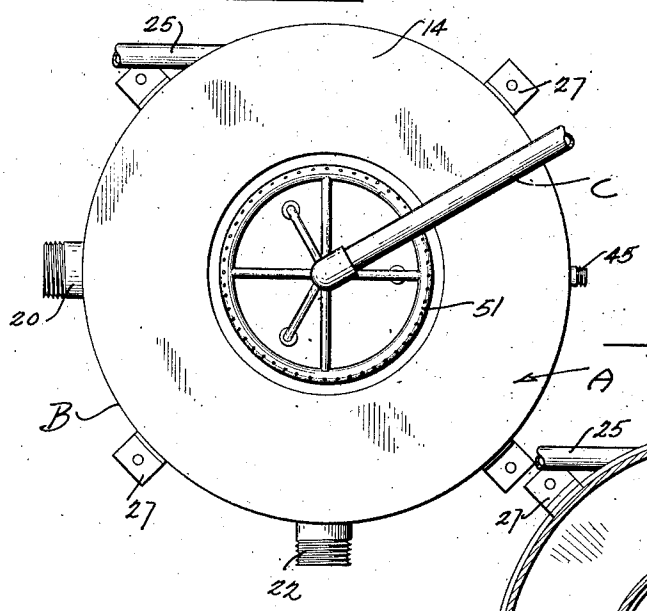


Fig. 3

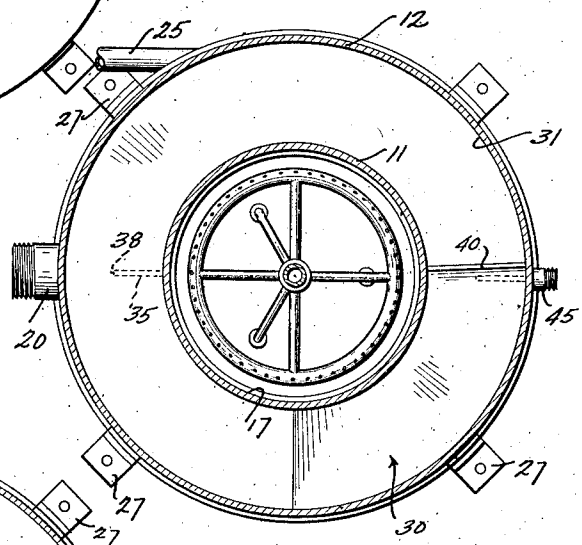
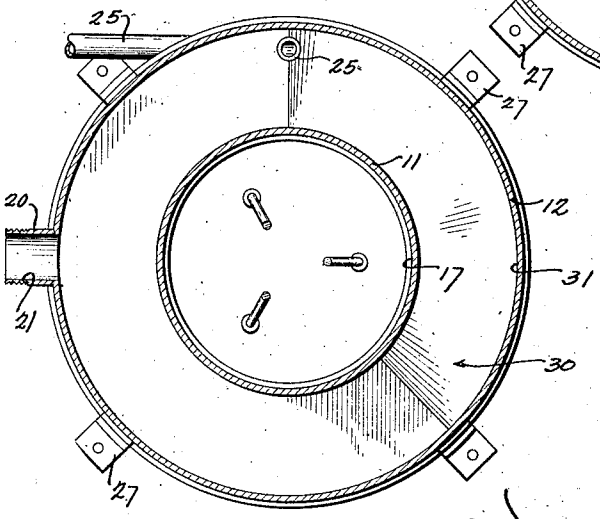


Fig. 4.



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UNITED STATES PATENT OFFICE.

FAY J. BROWN, OF SHREVEPORT, LOUISIANA.

SPIRAL REFLUX CONDENSER.

Application filed May 25, 1923. Serial No. 641,448.

To all whom it may concern:

Be it known that I, FAY J. BROWN, a citizen of the United States, residing at Shreveport, in the parish of Caddo and State of Louisiana, have invented certain new and useful Improvements in Spiral Reflux Condensers, of which the following is a specification.

This invention relates to improvements in condensing apparatus.

The primary object of this invention is the provision of a condenser, particularly well adapted for use in connection with oil refining apparatus, embodying relatively simple and compact arrangements for the effective condensation of hydro-carbon vapors as to obtain a maximum yield of the different fractions thereof.

A further object of this invention is the provision of a condenser of the above mentioned character, which so controls hydrocarbon vapors after passing from a still, that the same will effectively treat the vapors as the same are received from the still, effectively separating the vapors into the desired fractions, and in this respect cooperating with the still in that the vapors will be effectively handled as discharged from the still, so that the still may run its capacity in the required time.

A further object of this invention is the provision of a reflux condenser of a spiral type, embodying novel means for controlling vapor travel therethrough, so that the vapor may be most effectively cooled at proper stages, and the condensates thereof trapped to provide desired fractions of a maximum yield.

Other objects and advantages of this invention will be apparent during the course of the following detailed description.

In the accompanying drawings, forming a part of this specification, and wherein similar reference characters designate corresponding parts throughout the several views,

Figure 1 is a side elevation, partly in cross section, showing the novel construction of the spiral reflux condenser.

Figure 2 is a plan view of the improved condenser.

Figure 3 is a cross sectional view of the improved condenser, taken substantially on the line 3—3 of Figure 1.

Figure 4 is a cross sectional view, taken substantially on the line 4—4 of Figure 1.

In the drawings, wherein for the purpose of illustration is shown but the preferred embodiment of this invention, the letter A generally may designate the improved condenser, which may include the housing B, and cooling means C.

Referring to the housing B, the same preferably comprises a casing formed of an inner cylindrical shaped shell 11, of uniform diameter throughout the height thereof, and an outer cylindrical shaped shell 12, of considerably greater diameter than the inner shaped shell 11, and likewise of uniform diameter from end to end. Annular or ring shaped top and bottom members 14 and 15 are preferably attached at the upper and lower marginal edges of the inner and outer shells 11 and 12, so that said shells are arranged upon a common axis, and in relative spaced relation to povide an annular chamber or passageway intermediate said shells and the top and bottom connection members 14 and 15 thereof. The passageway 17 defined by the inner shell 11 is open at the ends of the housing B and receives therein the cooling means C to be subsequently described.

At its lower end the housing B, and more particularly the outer cylindrical shaped shell 12, has a nipple or connection 20 welded thereon of a desired size, which provides an inlet opening 21 so that the hydrocarbon vapors may flow from the still of distilling apparatus into the housing B and be treated therein as will be subsequently mentioned. At its upper end, an outlet nipple 22 of a particular size may be welded, or otherwise secured to the outer shell 12, and from whence the lighter vapors may flow, after passing through the condenser B. A conduit 25 is preferably provided below the housing B, which has communication with the chamber intermediate the inner and outer shells 11 and 12, as through the bottom 15. The improved housing B may be supported so that the bottom 15 is elevated from a supporting surface, as by means of substantially L-shaped legs 27, which may be suitably secured to the housing B as to the outer shell 12.

A spiral runway, partition, or baffle 30 is arranged within the housing B, intermediate the inner and outer shells 11 and 12 thereof, and between the top and bottom walls 14 and 15, which is arranged upon a vertical axis. It may be of any desired pitch and is preferably imperforate, being fixedly se-

cured at the inner and outer margins thereof to the outer and inner surfaces respectively of the inner and outer shells 11 and 12. This runway or baffle 30 may be provided of one length or in sections, and is of any approved material. The lower end thereof is attached to the bottom wall 15, and the upper end thereof to the top wall 14, so that as arranged within the housing B it provides a spiral compartment 31 which extends intermediate the inner and outer shells 11 and 12 from the bottom wall 15 to the top wall 14. Vapors thus entering the housing C from the inlet connection 20 will pass in spiral manner, or be guided in such manner within the spiral chamber 31 by the runway or baffle 30, as can be readily understood. It is thus obvious that the vapors may be regulated within the housing B, so that the same have a path of travel which is relatively great, considering the external dimensions of the housing B, providing a very compact arrangement.

In order to insure a thorough condensing action on all of the vapors, it is desirable to provide vertical baffle plates 35 within the chamber 31, at different elevations and distances. These baffle plates 35 have their upper and lower ends connected to the upper and lower surfaces of adjacent convolutions of the runway or baffle 30. Certain of said vertical baffles 35 are attached at one longitudinal edge to the outer shell 12, to provide a constricted opening 37 adjacent the inner shell, through which the vapor must pass in its upward flow. Certain other of the vertical baffles 35 are arranged immediately adjacent the inner shell 11, so that openings 38 of constricted nature are provided in the chamber 31 immediately adjacent the outer shell and through which the vapor must flow. The baffles 35 tend to retard the flow of vapor, and insure a thorough agitation thereof to prevent irregular cooling. The condensing action upon the vapor incident to the provision of the baffles is enhanced. In order to trap the different fractions of the hydro-carbon being treated, as the same condense, it is preferred to provide horizontal baffle plates or members 40, at predetermined distances and different elevations, upon the runway or baffle 30, which extend from the inner to the outer shells, and are arranged directly upon the baffles 30 so that any fractions which may be condensed upon the baffle or runway 30 above one of the trap baffles 40 will flow downwardly over the runway or baffle 30 till the same reaches the trapped baffle or plate 40 and is prevented from further downward flow.

By this arrangement, it is of course obvious that the spiral chamber 31 may be separated into zones and any vapors condensing in the different zones may be effectively trapped and segregated from adjacent zones, as is very obvious. Adjacent each of the trap or baffle plates 40, and at the upside thereof, exit nipples or connections 45 may be provided, having passageways 46 therein, through which the condensate or fractions of the vapor may flow, and be conveyed to any desired locations. While the baffles 35 have been specifically illustrated and described, other means may be provided so that the heavier and lighter constituents of the vapor will pursue a tortuous path within the spiral chamber. Similarly, the trap plates or baffles 40 may be dispensed with and other trap means provided, such as transversely crimping the spiral runway or baffle 30 so that any downwardly flowing condensate may be trapped within a transverse opening provided by the crimp and guided through the exit openings 46.

Referring to the cooling means C, the same preferably includes a conduit 50, axially arranged within the shell compartment 17, and upon which horizontal disc or ring sprays 51 may be mounted, at any desired intervals, so that water flowing through the conduit 50 may be sprayed laterally from the sprays 51 to flow over the inner surface of the inner shell 17, for cooling the spiral chamber 31, and thus enhancing the condensation action of the hydrocarbon vapor therein. It is noted that the outer shell 12 is exposed to atmospheric cooling, so that vapors immediately adjacent the outer shell are likewise cooled, although to a lesser extent than the vapors immediately adjacent the inner shell.

Referring to the operation of the body of vapor within the improved condenser A, the vapor flows into the chamber 31 at the inlet opening 21 and pursues a spiral and tortuous path within the chamber 31 upwardly thereof. The different fractions of the hydrocarbon vapor will condense upon the top surface of the baffle or runway 30 in the different zones, and flow downwardly thereover to be trapped by the various baffle plates 40, so that the various fractions of different specific gravities may be segregated. The very lightest vapors which may be permanent or fixed gas may exit through the connection 22 at the top of the housing B. The very heaviest condensate may be back trapped through the conduit 25 for rerun.

From the foregoing description of this invention, it is apparent that a condenser has been provided, which is very simple in construction, and by means of which the various fractions in a hydro-carbon may be separated within a very compact range of distillation, and effectively treated so that a maximum yield of gasoline or the desired fractions may be obtained at one distilla-

tion, without necessity of rerunning the same. Continued operation of this type of condenser demonstrates the practical nature of the same, and in comparison with the best known types of condensers is able to obtain an increased yield of from five to eight per cent of the desired fraction.

Certain outstanding features of the improved condenser are compactness, economical construction, safety, and quick and effective treatment of vapors.

Various changes in the shape, size and arrangement of parts, may be made to the form of invention herein shown and described, without departing from the spirit of the invention or scope of the claims.

I claim:

1. A condenser comprising a housing providing a spiral chamber therein, means for trapping and removing different fractions from the chamber, and baffle means in the chamber for making the vapor therein pursue a laterally tortuous path therein.

2. A condenser comprising a casing including an inner cylindrical shaped shell, an outer cylindrical shaped shell spaced from the inner cylindrical shaped shell, a spiral partition in the space intermediate said inner and outer shells providing a spiral vapor travel chamber therein, and means communicating with the chamber at different elevations therealong for withdrawing fractions of different densities.

3. A condenser comprising a casing including an inner cylindrical shaped shell, an outer cylindrical shaped shell, a spiral partition connected to said inner and outer shells intermediate the same to provide a substantially spiral shaped vapor travel chamber therein, trap plates mounted upon the spiral partition to subdivide the same into zones and at the upsides of which trap plates condensates of the vapor within the chamber may collect, and means for withdrawing said condensates.

4. A condenser comprising a casing including an inner cylindrical shell and an outer cylindrical shell, a spiral partition in the space intermediate said shells providing a spiral vapor travel chamber, baffle plates mounted within said spiral chamber providing constricted openings at various distances adjacent the inner and outer shells through which the vapor must pass during travel through said spiral chamber, and means communicating with the chamber at different elevations for withdrawing condensed fractions of the vapor.

5. A condenser comprising a casing including an inner cylindrical shell and an outer cylindrical shell, a spiral partition in the space intermediate said shells providing a spiral vapor travel chamber, baffle plates mounted within said spiral chamber providing constricted openings at various distances adjacent the inner and outer shells through which the vapor must pass during travel through said spiral chamber, and trap plates mounted upon said spiral partition for receiving and conveying different distillates from said spiral chamber.

6. A condenser comprising a casing including an inner cylindrical shell and an outer cylindrical shell, a spiral runway providing a spiral chamber intermediate said inner and outer shells, said casing having an inlet opening at the lower end of said spiral chamber and an outlet opening at the upper end of said spiral chamber, and means communicating with the chamber at intervals and different elevations for withdrawing different fractions from said spiral chamber as the same are condensed upon said spiral runway.

7. A condenser comprising a casing including inner and outer cylindrical shaped shells, means providing a spiral passageway intermediate said shells, means permitting the passage of a vapor through said spiral passageway cooling means within the inner shell, and traps means in said spiral passageway for trapping and conveying away of fractions condensing at different zones in said spiral passageway.

8. A condenser comprising a casing providing a spiral vapor travel chamber therein, a series of baffles arranged in the chamber providing restricted passageways for the vapor therein, and means for withdrawing condensed fractions from said chamber at different elevations.

9. A hydro-carbon condenser comprising a casing providing inner and outer shells, and a spiral runway intermediate said inner and outer shells to provide a spiral vapor travel chamber, baffle means within the travel chamber arranged at different distances therealong to deflect vapors during their upward travel adjacent the outer shell to adjacent the inner shell and vice versa, transverse baffles supported by the spiral runway at the upper surface thereof and at various elevations thereon for trapping condensates of different specific gravities, and means for withdrawing said condensates.

10. A condenser comprising a housing providing a spirally disposed vapor travel chamber therein arranged substantially on a vertical axis, said housing having a vapor inlet opening at the lower end of said vapor travel chamber and a vapor outlet at the upper end of said vapor travel chamber, and means for trapping and removing condensed fractions from the chamber at different spaced points between the vapor inlet and outlet openings of said housing.

FAY J. BROWN.