Jan. 24, 1933. R. B. PARKER 1,895,294

CONDENSER

Filed Dec. 11, 1929 2 Sheets-Sheet 1

Fig. 2.

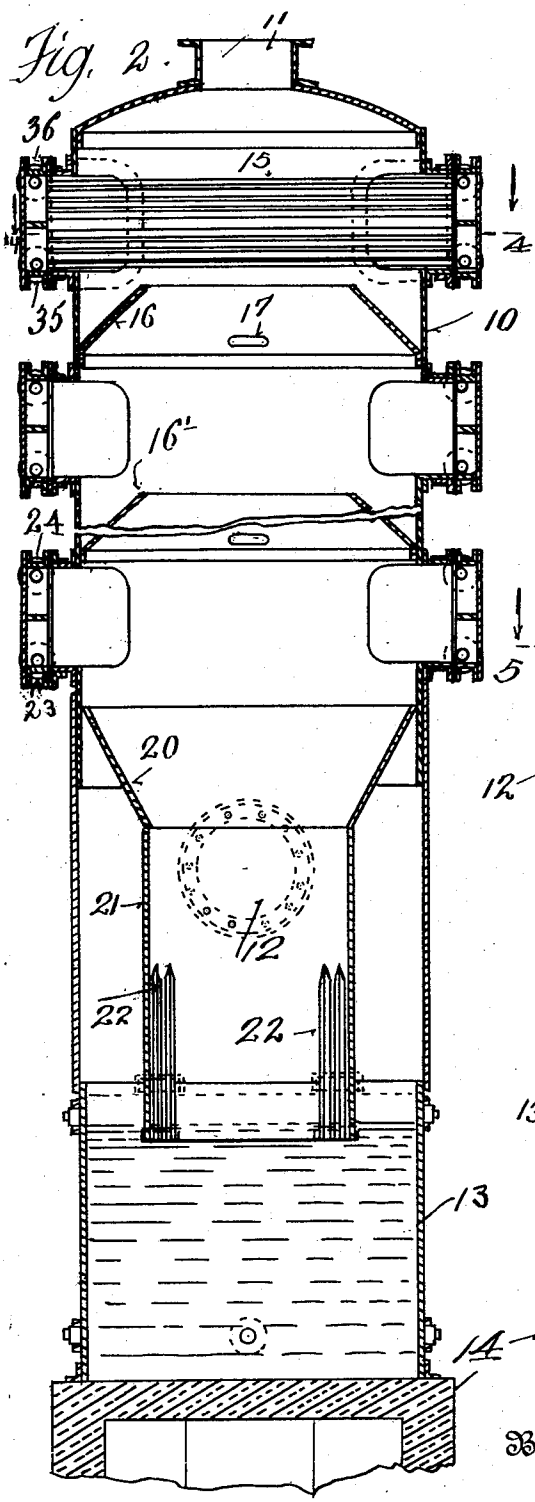
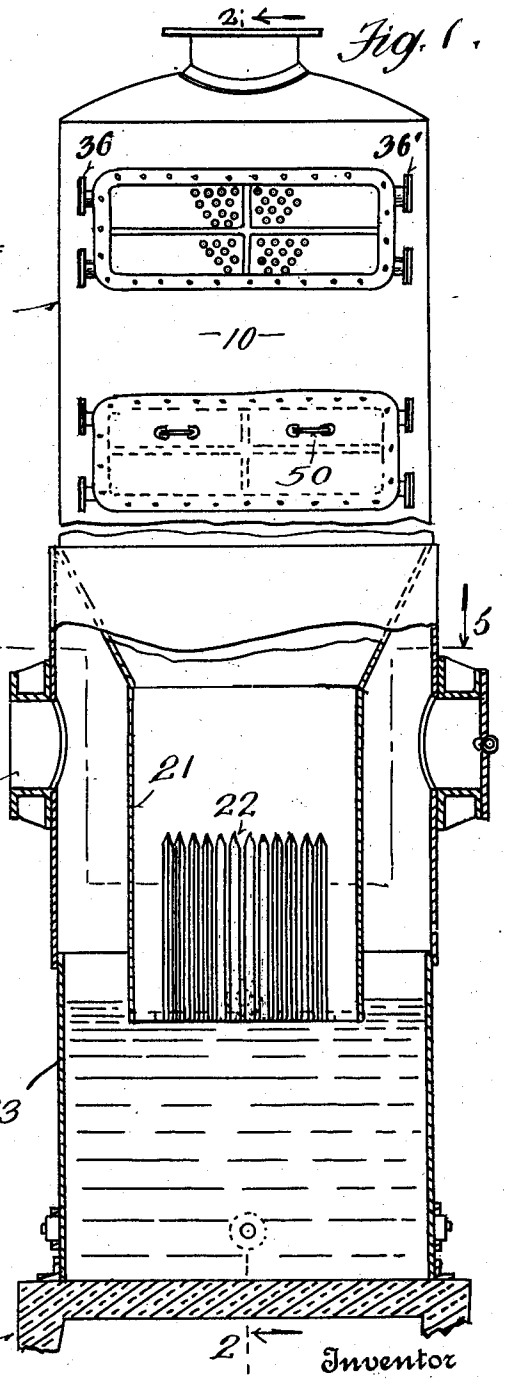


Fig. 1.



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Filed Dec. 11, 1929 2 Sheets-Sheet 2

Fig. 3.

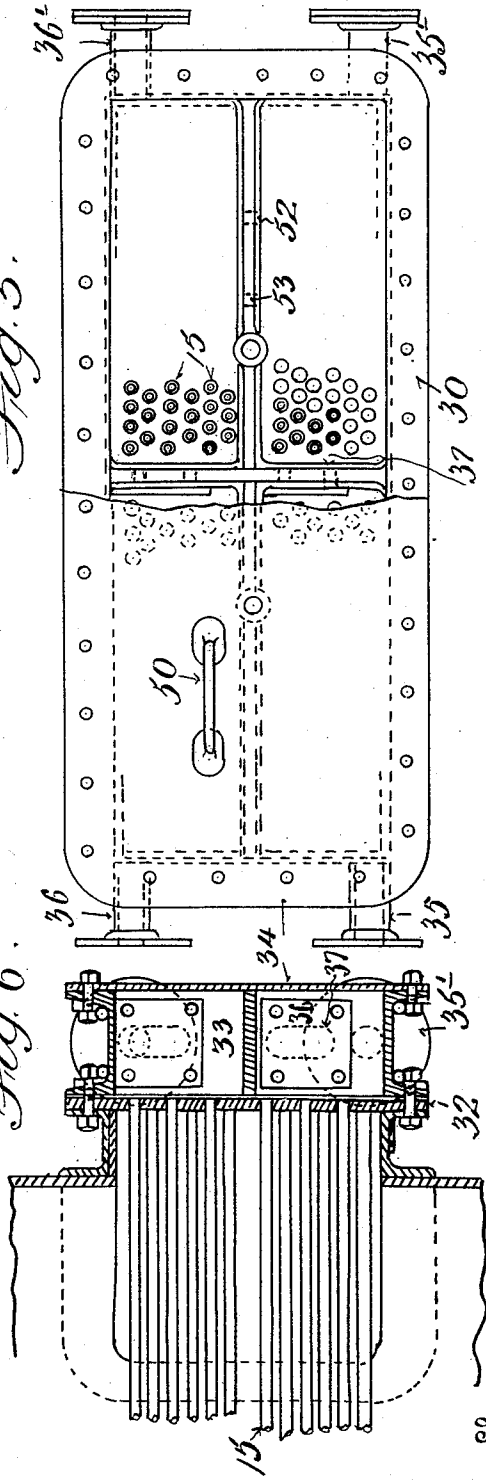


Fig. 5.

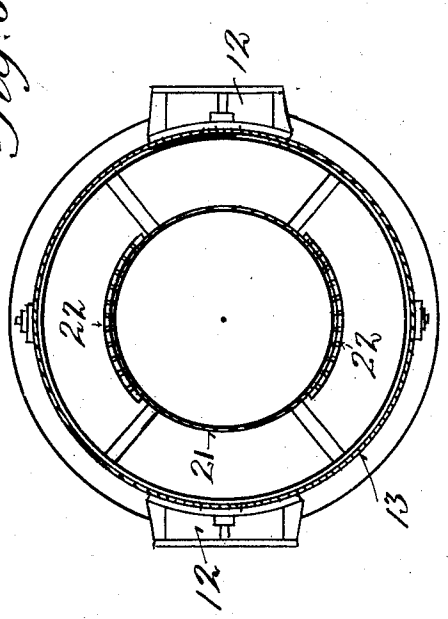


Fig. 4.

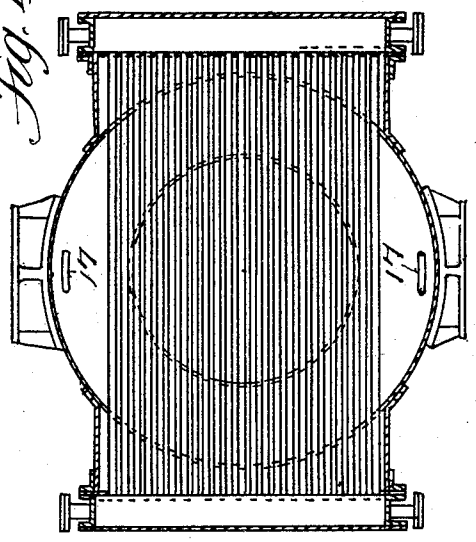


Fig. 6.

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UNITED STATES PATENT OFFICE

RICHARD B. PARKER, OF SKANEATELES, NEW YORK, ASSIGNOR TO SAMUEL E. DARBY, AS TRUSTEE, OF PALISADE, NEW JERSEY

CONDENSER

Application filed December 11, 1929. Serial No. 413,172.

This invention relates to apparatus for and method of removing oil and water from gas prepared in the carbonization of coal and the like and has for its object the provision of means whereby the condensate is removed from the gas when and as formed at constantly successive lower temperatures.

Another object includes the provision of means for introducing the hottest gas into that part of the apparatus which is hottest and then advancing said gas through the apparatus to constantly lower temperatures.

A further object includes the provision of baffles grouped between successive nests of cooling pipes for condensing and separating the condensates from said gas when formed to thereby prevent re-evaporation. I further provide a series of nested cooling means disposed in the path of the hot gases and alternated by baffles formed to restrict the passage of the gases.

Other objects will appear hereinafter and I obtain these objects by a construction illustrated in the accompanying drawings, in which—

Figure 1 is a broken view in elevation of a condenser column which embodies my invention;

Fig. 2 is a view taken on the line 2—2 of Fig. 1;

Fig. 3 is an enlarged view showing the manner in which the cooling pipes are supported and supplied with a cooling medium, as water;

Fig. 4 is a view taken on the line 4—4 of Fig. 2;

Fig. 5 is a view taken on the line 5—5 of Fig. 1; and

Fig. 6 is a view showing one end of the nested tubes and a portion of the water chest section.

Like reference numerals apply to similar parts throughout the several views.

It is the prime purpose of my invention to produce a simplified efficient condensing column wherein the undesirable elements, such as water and oil vapors, are efficiently and successfully removed. To this end I provide an apparatus wherein the cooling medium is introduced in one end and conducted through a series of nested cooling tubes to the upper end of the apparatus to there meet the inflowing heated gas from which the undesirable condensates are to be removed as and when formed. For this purpose I provide baffles adjacent the series of tubes to collect and conduct off the condensate as the same is formed and to collect said condensates in the bottom of the vessel.

The apparatus consists of a condenser column in the shape of a vertical cylinder. The lower portion of the said column constitutes a storage for the condensate and the upper portion serves as a gas container and separator. A cooling medium, such as water, enters the lowest nest of tubes and passes successively through the apparatus to the upper nests. The hot gases at approximately a temperature of 180° F. enter the container at the top and strike the nests of horizontal tubes at right angles. At the temperature of the gas as it enters the condenser it contains a quantity of oil and water in the form of vapor. It is the purpose of this invention to remove the vapor.

Immediately after leaving the first nest of tubes the area of the container is reduced by means of a baffle in the form of a truncated cone. The sides of this baffle form a collector for the condensate from the first nest of tubes. This condensate escapes through openings at the base of the baffle, which condensate may thus run down the sides of the cylinder to collect in the tank at the base or the condensate may be collected by an external pipe (not shown).

After leaving the first nest of tubes and condenser cone, which for convenience will be designated a condenser section, the gas passes directly over a second nest of tubes and cone similarly arranged. This arrangement of sections one above the other may be multiplied to any desired extent and for practical purposes I find that five such condenser sections usually afford ample means for completely condensing and removing the undesirable water and oil vapors. At the same time the gas has been cooled and is in a condition for being collected in the condenser or to be drawn off and used as de-

sired. In the broken view shown in Fig. 2 three condenser sections are illustrated. It will be observed that the collector cone beneath the lowest nest of tubes is inverted so as to direct the final condensate into a tube which is provided with slots of special design.

Referring now to the drawings, the condenser column comprises a vertical cylinder of suitable dimensions. This column is formed by an outer shell 10 having an upper gas inlet 11, a lower gas outlet 12 and a reservoir 13 for the condensates. The condenser column may be supported on the convenient base 14 of concrete or the like. The condenser sections, above described, contain horizontally disposed parallel condenser cooling tubes 15 and a baffle 16 therebeneath. This baffle is in the form of a truncated cone and has the lower portions thereof fastened to the outer shell wall as shown. Near the base of the cone there are provided two outlets 17 for permitting the condensates to be collected in the base of the column, as described above. It will be noted that immediately beneath the first condenser section, a repetition of the nested tubes (not shown) and cone 16′ forming a second condenser section is provided. In this manner the condenser sections are multiplied to a sufficient number (usually five) for completely removing the condensates and for cooling the gas to a proper temperature. Beneath the last nest of tubes the truncated baffle 20 is provided so as to collect the condensate within the tube 21. This tube is provided with oppositely disposed pointed narrow slots 22 on the edges of which the final condensate collects and through which the cooled dehydrate and de-oiled gas passes. The gas then rises through the annular space to the outlet 12, completely freed from oil and water and properly cooled. A cooling medium, such as water, enters the lower nest of tubes at 23 to flow through the cooling tubes and out at 24 to the next nest of cooling tubes above and so on through 35 and out at 36 through the whole series of tubes. It will be noted that the flanges 35 and 36, Fig. 3, through which the cooling medium is conducted and situated at the left hand side of the figure, are open while the right hand side of the corresponding flanges 35′ and 36′ are closed by blanks. This condition is provided for additional water supply or for an extension of columns. The water is distributed by water chest 33, as shown in Figs. 3 and 6. The cover 34 is provided with handles 50 and the division plates are provided with holes 52 and 53 for the distribution of water as desired. Any suitable means for distributing water to the cooling tubes may be provided and these may be blanked off if desired, as shown in Fig. 6, where numeral 36 represents a blank and 37 an elongated hole in said blank or in the partition wall of the water chest. The ends of the tubes are fastened into tube plate 32, see Fig. 6. It is obvious that various modifications will suggest themselves to those versed in the art.

What I claim, therefore, as new and useful and desire to secure by Letters Patent is:

1. In a condenser column, the combination of groups of nested tubes maintained at successively lower temperatures, a truncated baffle beneath each of said groups of tubes for collecting condensates, the last of said baffles being inverted, and an extension on said inverted baffle, said extension being provided with vertical slots, and a reservoir for said condensates.

2. In a condenser column, the combination of successive groups of horizontally disposed tubes, a truncated baffle beneath each of said groups of tubes, said baffles forming means for collecting and removing condensates immediately upon being formed, and means for reducing the transverse area of the condenser column, said means having slots.

3. A condenser column comprising a multiple of condenser sections, each provided with cooling means disposed transversely across the path of passing gas, a restrictive truncated baffle means beneath each of said cooling means, said baffle constituting means for collecting and separating condensate formed as the gas passes over said cooling means, and means for reducing the gas passage area in the condenser column said means having slots for collecting and separating the final condensate from the gas.

4. A condenser column comprising a multiple of condenser sections, each provided with cooling means disposed transversely across the path of passing gas, a truncated baffle beneath each of said cooling means, said baffles constituting means for separating and collecting the condensate formed as the gas passes through said cooling means, means for storing the condensate, an extension on the last baffle, said extension having slots therein through which the gas passes and on the edges of which the final condensate collects.

In testimony whereof I have hereunto set my hand on this 9th day of December, A. D. 1929.

RICHARD B. PARKER.