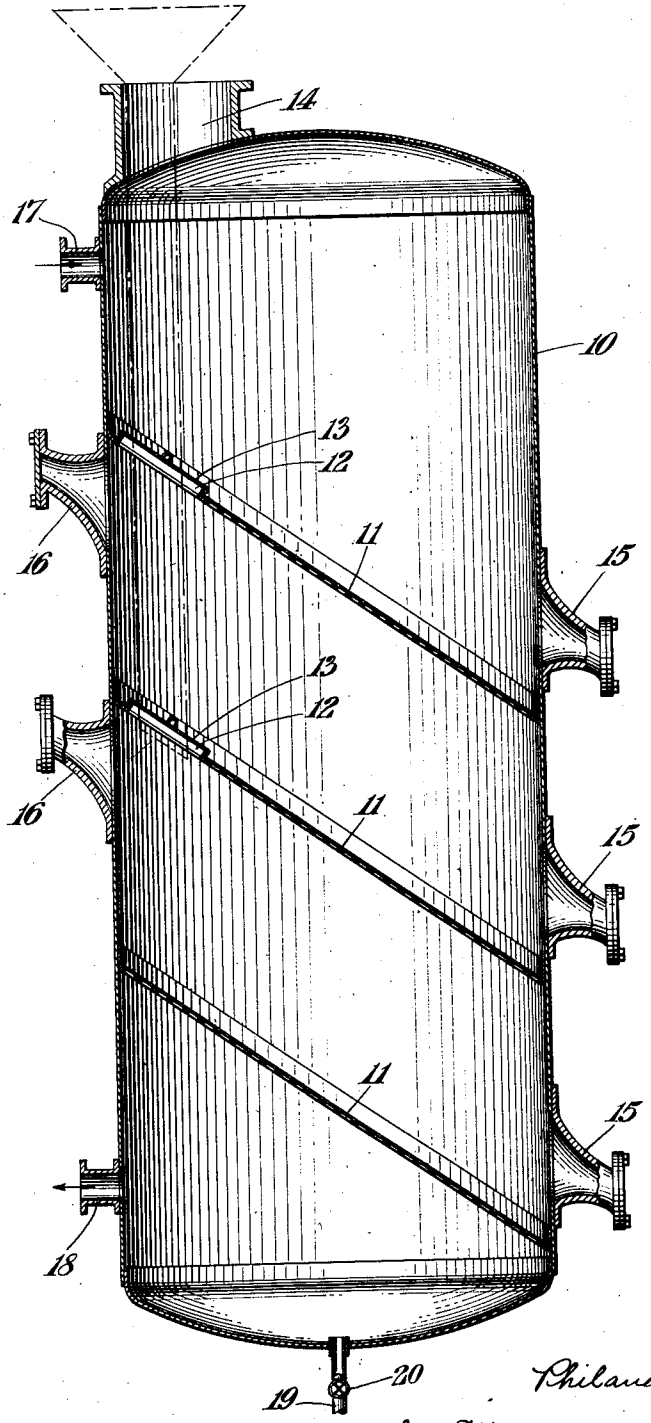
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APPARATUS FOR CONTACTING FLUIDS WITH SOLIDS

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APPARATUS FOR CONTACTING FLUIDS WITH SOLIDS.

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This application relates to an apparatus for contacting fluids with solids and has for an object an apparatus by means of which vapors or liquid may be successively contacted with different solid-treating materials.

This object is attained by providing a tower having a plurality of treating chambers formed by shelves pervious to fluids but impervious to solids. The shelves, except the bottom one, are provided with aligned ports which are closed by covers, each port being large enough to permit withdrawal therethrough of the cover for the port in the shelf directly below it. A charging port is provided in the top of the tower in alignment with the ports in the shelves and is of sufficient size to permit the withdrawal therethrough of any of the covers for the shelf ports. Treating material is introduced into the chambers by means of a spout passing through the ports and having its lower end arranged to discharge into the chamber which it is desired to charge with treating material. A cleansing port is provided for each chamber and the fluid to be treated is fed into one end of the tower and discharged from the other end so that in its passage through the tower it traverses the various chambers, thereby being brought into contact with the various treating materials.

Other objects, novel features and advantages of the invention will be apparent from the following specification and accompanying drawings wherein the single figure is a vertical section through an apparatus embodying the invention.

A tower 10 has arranged therein a plurality of shelves 11 forming a plurality of treating chambers or compartments. The shelves 11 which are pervious to fluids but impervious to solids comprise perforated plates supporting fine mesh screens over which may be arranged a layer of mineral wool or the like. In each shelf 11, except the lower shelf, there is provided a port 12 which is closed by a cover 13, preferably pervious to fluid but impervious to solids. These ports are in alignment with each other and with a charging port 14 in the cover of the tower. Each port 12 is of sufficient size to permit the withdrawal therethrough of the cover 13 for the next lower port, and the port 14 is of sufficient size to permit the withdrawal therethrough of any one of the covers 13. Each cover 13 is provided with an eye bolt into which may be engaged a hook manipulated from the exterior of the tower.

The shelves are obliquely arranged and near the lower portion of each shelf is provided a cleaning port 15. Because of the oblique arrangement and the position of the port 15, treating material may readily be removed from any one of the chambers. Opposite the discharge ports are provided ports 16 through which a suitable tool may be inserted for trimming and leveling the treating material contained in the chambers.

A fluid inlet port 17 is provided near the top of the tower and the fluid outlet port 18 is provided near the bottom. A pipe 19, controlled by a valve 20, is arranged at the bottom of the tower.

The various chambers may be filled with treating material by using funnels having spouts of different length, the lengths being so chosen that the end of the spout just projects into the chamber into which it is desired to introduce the treating material. It is apparent, of course, that the lower chamber would be filled first and then the upper chambers filled in order. In filling the lowest chamber, all the covers 13 are to be removed. After the filling of this chamber is completed, the cover for the second shelf is put in place through the port 14 and the upper ports 12 and the next chamber filled. This is continued until all the chambers have been provided with the proper treating material.

This apparatus may be employed, for example, in the refining of the vapors obtained by cracking hydrocarbon oil. Vapor introduced at 17 has to travel successively through the materials contained in the different chambers and may be subjected to similar or different treatments in each chamber. After passing through the different treating materials, the vapor is discharged through the conduit 18. By way of example of the different treating materials that may be used, one chamber may contain a material having a high affinity for sulphur, another chamber may contain a sweetening material and a third chamber may contain a catalytic material capable of polymerizing unstable, unsaturated hydrocarbons. Any condensate resulting from the treating operation and collecting in the bottom of the tower may be removed through the pipe 19. The apparatus may also be employed for treating liquid such as lubricating oil and the like with

solid treating materials, such, for example, as fuller's earth, copper oxide and other treating materials, the treating materials in each chamber being similar or different as desired. In such case, the oil to be treated will be introduced into the tower through the pipe 17 and discharged therefrom through the pipe 18. The pipe 19 may be used to drain any residuum collecting in the bottom of the tower.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent of the United States is:—

1. An apparatus for contacting solids and fluids comprising a tower, a plurality of shelves in said tower forming superposed chambers, each shelf being pervious to fluid and impervious to solids, means for causing fluid to pass successively through said chambers, and means provided in the shelves and the top of the tower for permitting the introduction of solids into each of said chambers.

2. An apparatus for contacting solids and fluids comprising a tower, a plurality of shelves forming superposed chambers, each shelf being pervious to fluid and impervious to solids, means for causing the fluid to pass successively through said chambers, aligned ports in said shelves and the top of said tower, and covers for said ports.

3. An apparatus for contacting solids and fluids comprising a tower, a plurality of shelves forming superposed chambers, each shelf being pervious to fluid and impervious to solids, means for causing the fluid to pass successively through said chambers, aligned ports in said shelves and the top of said tower, and covers for said ports, each port being of sufficient size to permit the withdrawal therethrough of the cover for the port next below it.

4. An apparatus for contacting solids and fluids comprising a tower, a plurality of shelves forming superposed chambers, each shelf being pervious to fluid and impervious to solids, means for causing the fluid to pass successively through said chambers, aligned ports in said shelves and the top of said tower, covers for said ports, each port being of sufficient size to permit the withdrawal therethrough of the cover for the port next below it, and an eye bolt carried by each cover to be engaged by a hook manipulated from the exterior of the tower.

5. An apparatus for contacting solids and fluids comprising a tower, a plurality of oblique shelves forming chambers, each shelf being pervious to fluids and impervious to solids, aligned ports in said shelves and the cover of the tower through which treating material may be introduced into said chambers, and cleaning ports in the tower wall adjacent the lower ends of said shelves.

In testimony whereof, I have signed my name to this specification.

PHILANDER R. GRAY.