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R. DUMAS

1,976,547

FILTER FOR LIQUID AND GAS SUBSTANCES

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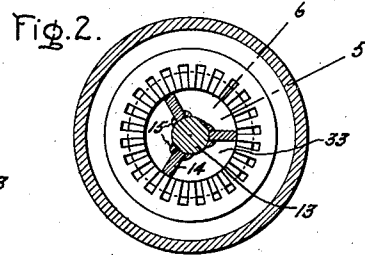
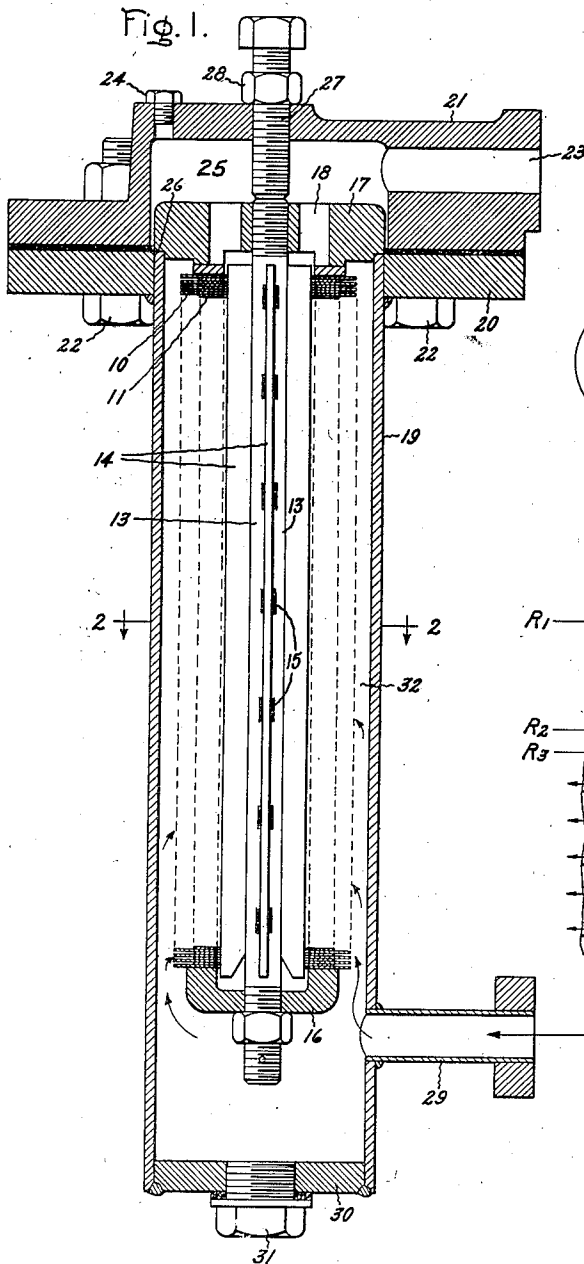


Fig. 3.

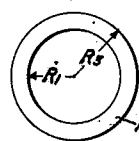


Fig. 4.

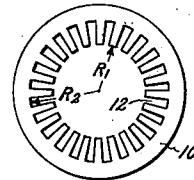


Fig. 5.

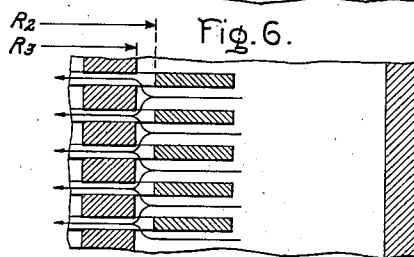
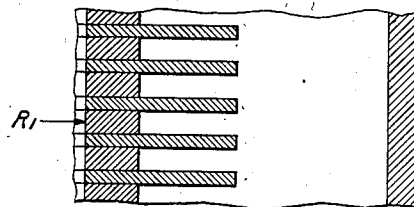


Fig. 6.

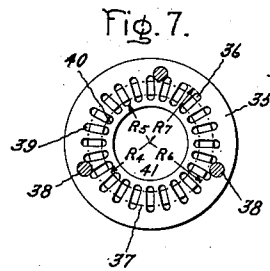


Fig. 7.

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His Attorney.

UNITED STATES PATENT OFFICE

1,976,547

FILTER FOR LIQUID AND GAS SUBSTANCES

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3 Claims. (Cl. 210-169)

The present invention relates to filters for liquid and gaseous substances, more particularly to the kind of filters which comprise a stack of perforated discs with spacing means intermediate adjacent discs.

The general object of the invention is to provide an improved construction and arrangement of such filters which have a large filtering surface and can be manufactured at comparatively low cost.

For a consideration of what I believe to be novel and my invention, attention is directed to the following specification and the claims appended thereto in connection with the accompanying drawing.

In the drawing, Fig. 1 represents a sectional view of a filter embodying my invention; Fig. 2 is a section along the lines 2-2 of Fig. 1; Figs. 3 and 4 represent filtering elements used in the arrangement of Fig. 1; Fig. 5 is a sectional view along the radial line 5 of Fig. 2; Fig. 6 is a sectional view along the radial line 6 of Fig. 2; and Fig. 7 shows a modification according to my invention.

The apparatus shown in Figs. 1 to 6 comprises an outer casing or body and a filter stack. The filter stack is composed of a plurality of disk elements 10 (Fig. 4) spaced by means of spacers or washers 11 (Fig. 3). The disk elements 10 are preferably made of sheet metal and provided with openings or perforations, in the present instance shown as slots 12 in their inner portions. The disk elements 10 have an inner radius R_1 which is equal to the inner radius R_1 of the spacers 11, and the slots have an outer radius R_2 (Fig. 4) which in accordance with my invention is larger than the outer radius R_3 (Fig. 3) of the spacers 11. These elements and spacers are alternately slid onto a holder comprising a spindle or rod 13 (Fig. 2) and a plurality of spiders or webs 14 fastened to the spindle 13 by means of welds 15. An end plate 16 having an upwardly projecting edge bearing against the lower end of the filter elements is fastened to the spindle, and another end plate 17 having a plurality of holes 18 is screwed onto the upper end of the spindle. The spindle together with the plates 16 and 17 and the elements 10 and 11 form the filter stack.

The outer casing comprises a tubular member 19 provided with an upper flange 20. A cover 21 is fastened to the flange 20 by means of bolts 22. The cover is provided with a discharge opening 23. A plug or screw 24 fastened in an opening of the cover permits the discharge of gases

such as air from a chamber 25 defined within the cover. The end plate 17 of the filter stack has a recessed edge 26 which engages a seat formed by the end face of the tubular member 19. The filter stack, more specifically the plate 16 thereof, is forced against the seat 26 and thereby maintained in central position within the casing by means of a bolt 27 screwed into a central opening of the cover 21 and engaging the upper end of the spindle 13. The bolt 27 is secured in its position by means of a lock nut 28. A flanged conduit 29 fastened to a lateral opening of the tubular member 19 serves for conducting liquid or gases to the filter. The lower end of the casing has a bottom 30 welded to the tubular member 19. A plug 31 fastened in a hole of the bottom 30 serves for discharging impurities from the lower portion of the casing.

During operation, liquid or gaseous substance to be filtered is conducted through the supply conduit 29 whence it passes upward through an annular space 32 defined between the filter stack and the tubular member 19. A part of the impurities, that is, the heavier particles, are precipitated while the fluid flows upward through the annular space 32. These particles settle and are collected in the chamber defined between the lower end of the stack and the bottom 30, whence they may be discharged through the plug hole 31. The liquid flows from the annular space 32 radially inward through the free spaces defined between the disks 10, whence it flows through the slotted portions of the disks 10 into channels 33 defined by the spiders or webs 14. The flow of substance has been indicated by arrows in Figs. 1 and 6. It will be readily understood that the radial flow through the slotted disk portions takes place in the form of many individual screens because no flow of liquid takes place intermediate adjacent slots, that is, where the elements 10 form teeth as indicated by Fig. 5, showing a section through a toothed portion of the stack.

In Figs. 7 I have shown a different arrangement of the filter stack comprising a plurality of filtering elements or annular disks 35 corresponding to the elements 10 in Fig. 1. The disks 35 have an intermediate portion provided with a plurality of radial openings or perforations 36 uniformly spaced about the center of the disk. Adjacent elements 35 are spaced by means of rings 37 having an inner radius R_4 , which is larger than the inner radius R_5 of the openings, and an outer radius R_6 which is smaller than the outer radius R_7 of the openings. The rings 37 and the disks

35 are retained in their position by a plurality (at least 3) of rods 38 projecting through holes in the disks 35 and engaging the outer edge of the rings 37. In the present instance I have shown three rods 38 provided at 120 angular degrees apart from each other.

During operation, the liquid to be filtered enters through the outer ends 39 of the openings 35 and passes radially inward through the openings towards the inner ends 40 thereof, whence it flows into a channel 41 defined by the central holes of the disks 35.

The arrangement according to my invention has the advantage of a rather simple, inexpensive construction. The filtering elements are preferably manufactured by punching from sheet metal. The provision of the spindle with the webs or a plurality of rods and the provision of a single ring between adjacent disks retains the filtering elements in their relative positions, resulting in a uniform filtering through the free spaces defined between the disks. The large outer surface of the filter stack through which the substance to be filtered enters permits the filtering of considerable quantities of liquid or like substances in a comparatively small space.

Having described the method of operation of my invention, together with the apparatus which I now consider to represent the best embodiment thereof, I desire to have it understood that the apparatus shown is only illustrative and that the

invention may be carried out by other means. What I claim as new and desire to secure by Letters Patent of the United States, is:

1. In a filter, a filter stack comprising a spindle, webs on the spindle, a plurality of disks having slotted inner portions slid onto the webs in concentric relation with the spindle, an annular spacer between adjacent disks having an inner diameter equal to the inner diameter of the disk and an outer diameter smaller than the outer diameter of the slotted portions.

2. In a filter, a filter stack comprising a plurality of annular punched disks, each disk having an intermediate portion with a plurality of openings, a spacer between adjacent disks covering an intermediate portion of the openings of each disk, and at least three rods provided at 120 angular degrees projecting through openings in the disks and engaging the edges of the spacers to retain the relative position between the disks and the spacers.

3. In a filter, the combination of a casing, a filter stack centrally held in the casing and comprising a plurality of punched disks, each disk having a central bore and a plurality of like openings concentrically arranged with the bore, and a ring between each pair of adjacent disks having a central bore and an outer diameter smaller than the outer diameter of said plurality of openings.

ROBERT DUMAS.

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40	115
45	120
50	125
55	130
60	135
65	
70	
75	