Aug. 16, 1932. W. E. WOOD ET AL 1,871,870

FILTER CONSTRUCTION

Filed July 26, 1929 2 Sheets-Sheet 1

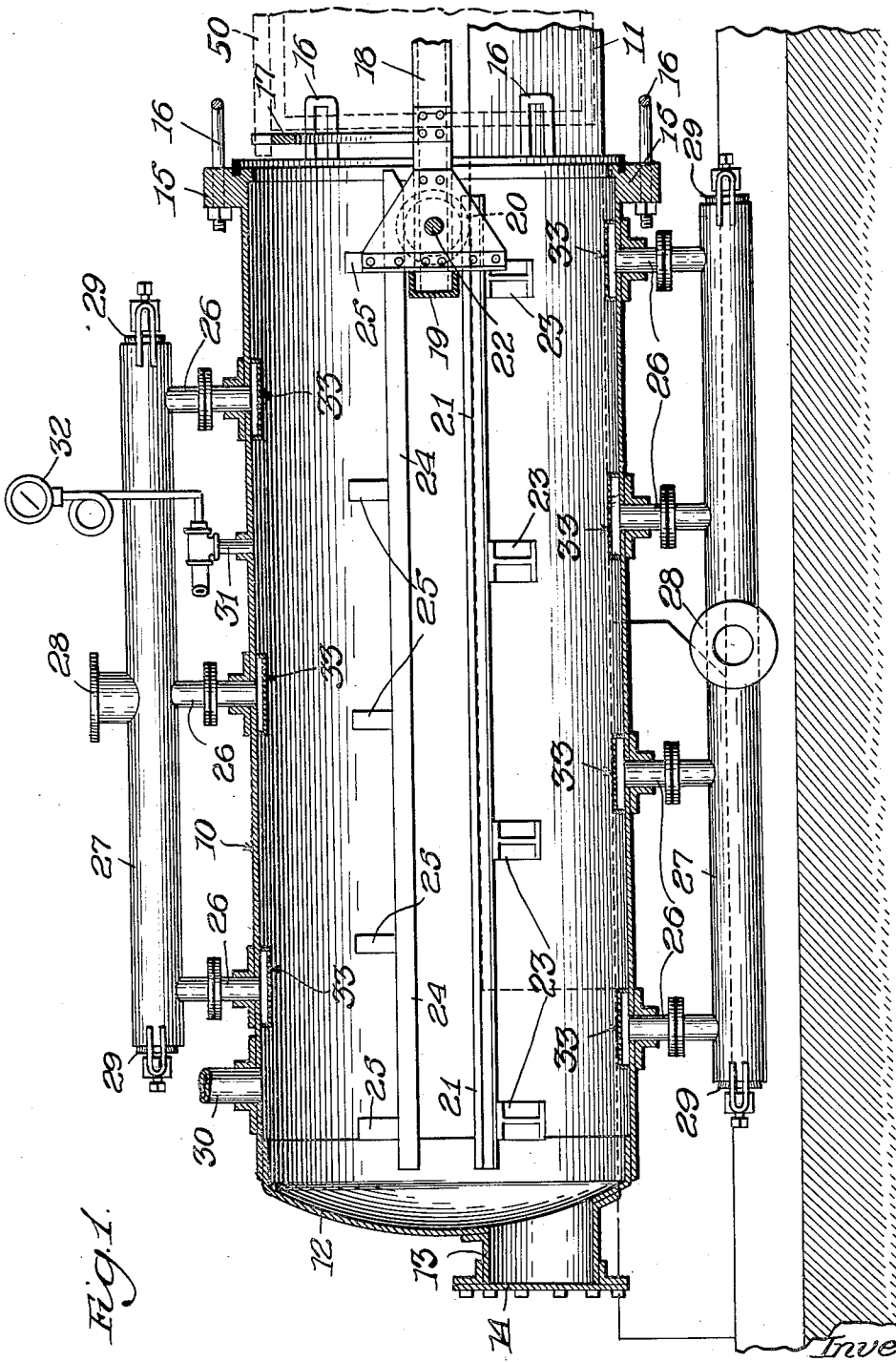


Fig. 1.

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Fig. 2.

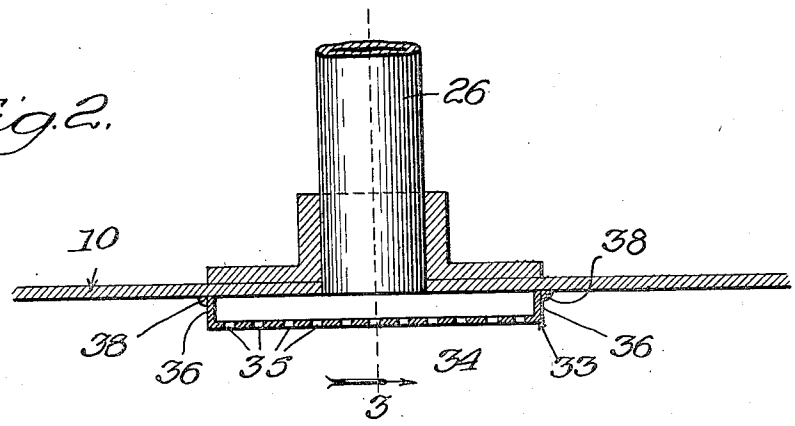


Fig. 3.

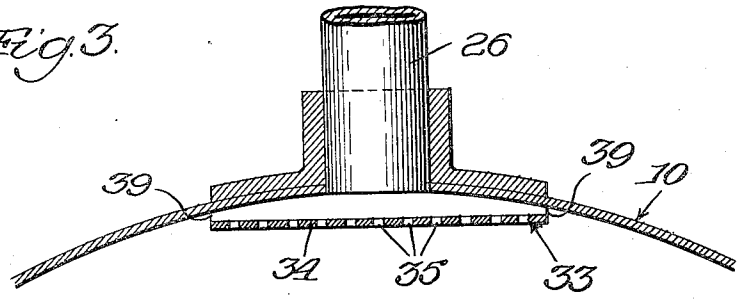
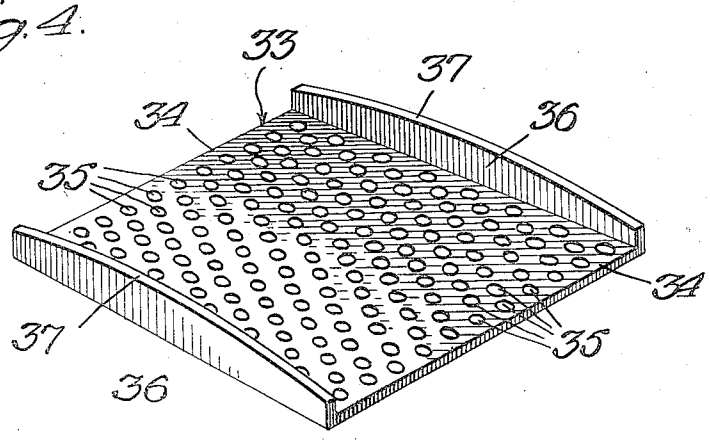


Fig. 4.



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1,871,870

UNITED STATES PATENT OFFICE

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FILTER CONSTRUCTION

Application filed July 26, 1929. Serial No. 381,335.

This invention relates to certain new and useful improvements in connection with leaf type filters which operate under pressure, and is particularly adapted to be used in filters of this type, which are employed for the separation of solids from heavy petroleum oils, hot pressure tars, and the like.

This invention is illustrated in its preferred embodiment in the accompanying drawings, in which

Figure 1 is a medial vertical sectional view of a pressure type filtering device embodying the invention;

Fig. 2 is an enlarged fragmentary view of Fig. 1, showing one of the perforated baffle plates which are disposed over the inlet conduits;

Fig. 3 is a vertical sectional view taken on the line 3 of Fig. 2;

Fig. 4 is a perspective view of one of the perforated baffle plates.

In the embodiment illustrated, 10 designates a cylindrical pressure tank or receptacle horizontally disposed and supported between a pair of horizontal frame members, one of which is shown at 11. The frame member 11 may rest upon any suitable foundation. The frame members 11 extend beyond the front of the tank 10. The extending portions of the frame members 11 are approximately of the same length as the tank 10, and may be supported by any suitable means. These extending portions are not fully shown in the drawings since they are well known in the pressure filter art.

The pressure cylinder or tank 10 is provided with a permanently secured rear end wall 12, the lower portion of which carries an outwardly protruding tubular boss 13 communicating with the interior of the tank 10. The outer end of the tubular boss 13 is closed by means of a cover plate 14 which may be demountably secured thereto in a leak-proof manner by any suitable means. This boss 13 and removable cover 14 provide a convenient means for cleaning out the interior of the tank 10.

The front end of the tank 10 is open, and is provided with an annular flange 15 adapted to have secured to it a removable head, not shown. This head may be secured or locked to the flange by any suitable means. One type of such locking means well known in this particular art comprises a series of radial levers carried by the head, the ends of which levers engage suitable fulcrums on the tank 10, such as a plurality of U-bolts 16 carried by the flange 15.

The filter leaves, which may be of any well known type one of which is shown diagrammatically at 50, are mounted within the pressure tank 10 upon a suitable removable carriage. A suitable form of leaf is described in my co-pending application Serial No. 383,635, filed August 5, 1929. This carriage comprises a pair of arcuate frame members, one of which is shown at 17, carried between a pair of metal frame members 18. The front or outer ends of the frame members 18 are ordinarily secured to the removable head for the tank 10. The rear ends of the frame members 18 are secured together by means of a transverse frame member 19. The filter leaves or plates 50 are ordinarily suspended between the frame members 18, the leaves being longitudinally disposed relative to the tank 10. The filter leaves are provided with suitable discharge conduits (not shown) which conduits ordinarily are passed through the removable head plate.

The entire structure, i. e., the filter leaves 50, the frames 17 and 18 and the head are removable as a unit from the tank 10, as it is necessary to periodically clean from the filter leaves the solid matter filtered from the liquid, which matter tends to accumulate upon the leaves in the form of a cake. To expedite the removal of the foregoing assembly, the rear end of the filter leaf carriage is provided with a pair of flanged wheels 20. The wheels 20 engage a pair of rails 21, each of which is secured within the tank 10 on the opposite sides of the same. The wheels 20 are secured to a transverse shaft 22 journaled in the frame members 18, while the rails 21 are secured to the inner side walls of the tank 10, by means of one or more brackets 23. The flanged wheels 20 are positively maintained in engagement with the rails 21 by means of a pair of guide rails 24 secured to

the interior walls of the tank 10. Each of these guide rails 24 is mounted above one of the rails 21, being secured to the tank 10 by means of one or more brackets 25. The guide rails 24 are substantially parallel to the rails 21 and are sufficiently spaced therefrom so that when the tread on the lower side of the wheels 20 is resting upon the rails 21, the tread on the upper side of the wheels 20 will be slightly spaced from the guide rails 24. Thus, the wheels 20 are prevented by the guide rails 24 from becoming disengaged from the rails 21, it being impossible to move either of the wheels 20 toward the adjacent side wall of the tank 10.

The removable head and the front end of the filter leaf carriage are supported by the extending portions of the main frame members 11, while they are removed from the tank 10. Usually suitable wheels are carried by the head, which wheels roll upon the extending portions of the frame members 11, or upon suitable rails mounted thereon.

The upper and lower portions of the side walls of the tank 10 are provided with a plurality of inlet conduits 26 communicating with the interior of the tank. These conduits 26 are connected to one or more manifolds 27 which in turn are connected at 28 to a supply of liquid to be filtered. The ends of the manifolds 27 may be provided with suitable removable clean-out plugs 29. The upper portion of the tank 10 is provided with a steam inlet conduit 30 and an air vent 31. A pressure gage 32 may be connected to the air vent 31.

To prevent streams of the liquid flowing into the tank 10, through the conduits 26, from impinging directly upon or against the filter leaves or plates 50, a perforated baffle is provided over the mouth or outlet of each of the conduits 26. These baffles are designated as a whole at 33 and comprise a main plate-like portion 34 provided with a plurality of apertures 35. Two opposite sides of the plates 34 are imperforate and are turned at right angles relative to the plate 34 to form a pair of flanges 36. The edge 37 of these flanges is arcuate to conform to the curvature of the interior of the side wall of the tank 10. The baffles 33 are suitably mounted upon the walls of the tank by engaging the arcuate edges 37 of the flanges 36 therewith, by means of a weld 38 (Fig. 2). It is to be noted that the flanges 36 are of a width sufficient to provide a space 39 (Fig. 3) between the unflanged edges of the plates 34 and the side walls of the tank 10.

The operation of the device will be readily understood. Since the device illustrated in the drawings is particularly adapted to be employed for the filtering of highly heated heavy oils, tars and the like, a filtering operation involving such material will be described. The filtering leaves 50 are suspended between the arcuate frame members 17. The frame members 17 and 18, and the filtering leaves carried by them are placed in the tank 10. The head plate (not shown) is secured to the front end of the tank 10, and the filter is ready for use.

Air is forced out of the tank 10 by admitting steam through the steam conduit 30, the air being forced out from the tank 10 through the vent pipe 31. The steam not only functions to force out any air in the tank 10, but functions as well to warm the filter preparatory to its receiving the hot oils to be filtered. After the air has been removed from the tank 10 the flow of steam is shut off, the air vent 31 closed, and the hot oils to be filtered are permitted to flow through the manifolds 27 and the inlet conduits 26, into the tank 10. The hot oils are forced under a predetermined pressure so that sufficient pressure will be built up within the tank 10 to cause the oil to flow through the filtering media upon the filter leaves and into the interior of the leaves 50. Any solid matter in the oils is separated from the latter by the filtering media upon the leaves and accumulates upon the leaves in the form of a cake. The filtrate within the leaves is discharged through suitable conduits which may pass out through the removable head for the tank.

It will be seen that the perforated baffles 33 function to disperse the stream of heavy oils flowing into the tank, into a large number of finely divided individual streams. Thus, there will be no heavy stream of oils impinging against the filter leaves 50, which stream might cause the cake of filtered solids thereon to be separated from the leaf, which event would affect the capacity and the efficiency of the filter. It will also be seen that the space 39 between the unflanged edges of the perforated plate 34 of the baffle 33, and the side wall of the tank 10, permits a portion of the oil flowing from the conduits 26 to flow in a circular path along the wall of the tank. Such flow tends to cause a mild agitation of the hot oils within the tank 10 so that the solid matter, entrained in the liquid, will be equally distributed.

By employing a plurality of inlet conduits 26 the ingress of liquid to be filtered is so evenly distributed that the filter may be operated at a comparatively high rate.

The foregoing detailed description has been given for clearness of understanding only, and no unnecessary limitations should be understood therefrom, but the appended claims should be construed as broadly as permissible, in view of the prior art.

What we regard as new, and desire to secure by Letters Patent, is:

1. In a pressure leaf filter, the combination of, a closed horizontally disposed receptacle having a plurality of filter leaves mounted

therein, said leaves being adapted to retain the filtered material upon their filtering surfaces in the form of a cake-like layer, an inlet conduit communicating with the interior of said receptacle for supplying liquid to be filtered, the mouth of said conduit terminating adjacent a side wall of said receptacle, and a perforated baffle plate secured to said side wall and disposed over the mouth of said inlet conduit, said baffle plate being provided on opposite sides with a pair of spaced imperforate protruding flanges, said flanges being secured to said side wall and being of a height sufficient to substantially space the unflanged sides of said plate from said side wall.

2. In a pressure leaf filter the combination of a closed horizontally disposed cylindrical receptacle having a plurality of filter leaves mounted therein, said leaves being adapted to retain the filtered material upon their filtering surfaces in the form of a cake-like layer, a pair of inlet conduits communicating with the interior of said receptacle for supplying liquid to be filtered, each of said inlet conduits being disposed on substantially opposite sides of said receptacle, the mouths of said conduits being substantially flush with the interior of the side walls of said chamber, and a perforated baffle plate spaced from the mouth of each conduit, each plate being provided on a pair of opposite sides with protruding imperforate flanges, said flanges being secured to the side wall of said receptacle on opposite sides of the mouths of said inlet conduits and extending transversely to the length of said receptacle, whereby the remaining unflanged sides of said baffle are spaced from the side walls of said receptacle to provide an outlet for discharging streams of liquid to be filtered along the side walls of said receptacle.

3. In apparatus of the class described, a filter casing having a cylindrical wall, a filter element in said casing spaced from said wall, means for withdrawing filtrate through said element whereby a cake is built up on said filter element, an inlet conduit communicating with the interior of said casing and extending through said cylindrical wall adjacent said filter element, a baffle plate interposed between said conduit and said filter element, flanges on said baffle plate, and means for securing said flanges against said cylindrical casing in a circumferential direction whereby fluid from the inlet conduit is directed by said flanges and said baffle plate circumferentially around said cylinder wall of said casing instead of against said filter element.

In testimony whereof, we have hereunto set our hands, this 29th day of June, 1929.

WILLIAM E. WOOD.
WILLIAM H. BACHELDOR.