Nov. 4, 1930. E. F. WHITE 1,780,774

SEPARATOR

Filed Nov. 9, 1928

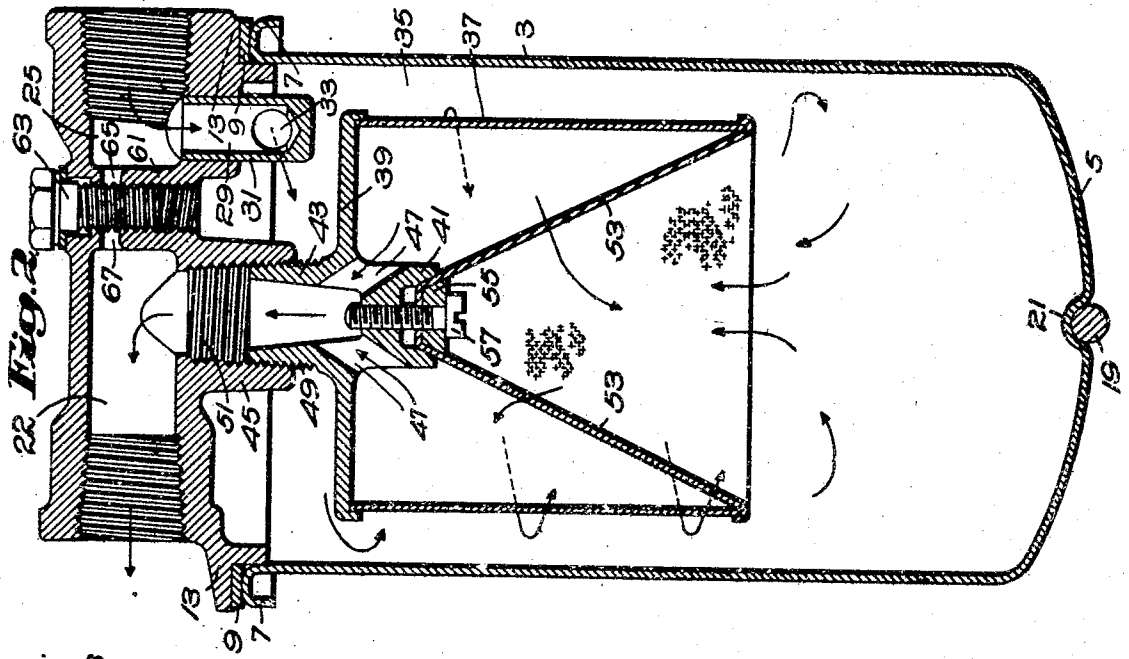


Fig. 2.

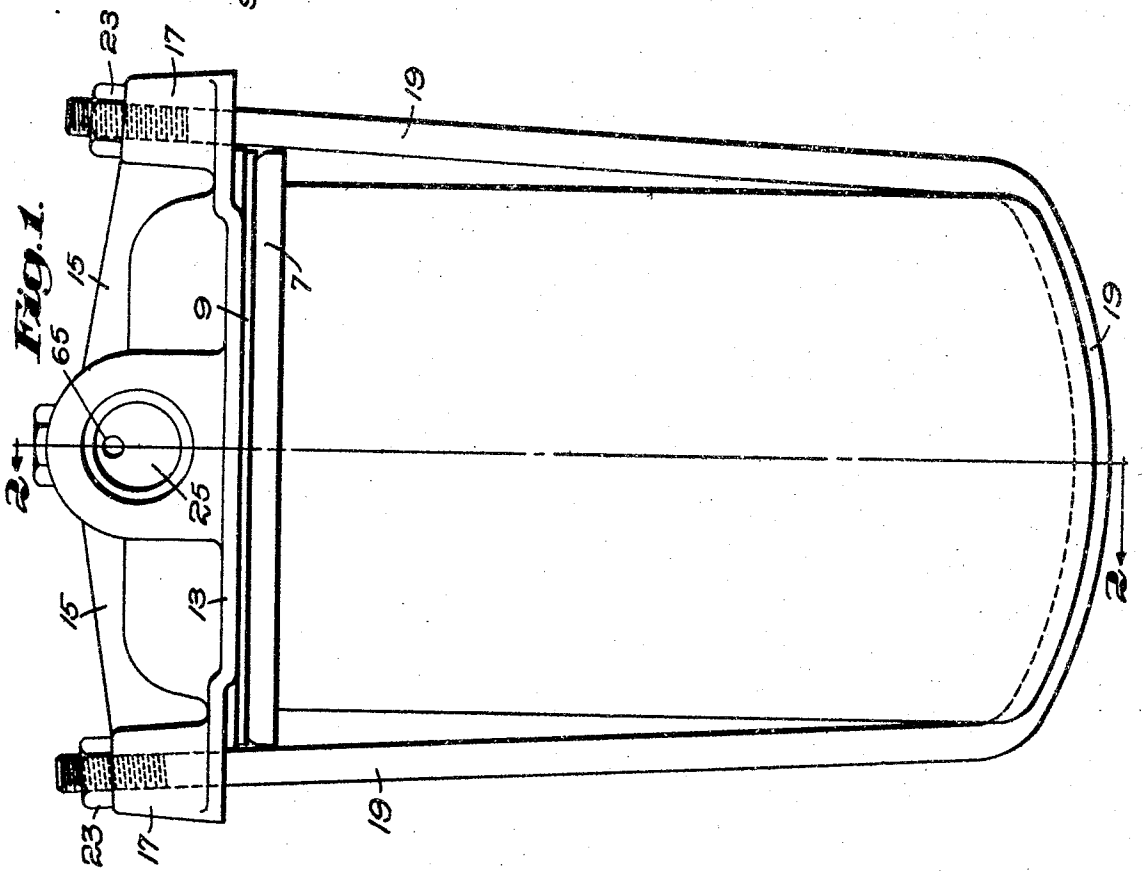


Fig. 1.

Inventor:
Ezekiel F. White
by Emery Booth Janney & Varney
Attys

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UNITED STATES PATENT OFFICE

EZEKIEL F. WHITE, OF HARTFORD, CONNECTICUT, ASSIGNOR TO GROVER V. LASSEN, OF WEST HARTFORD, CONNECTICUT

SEPARATOR

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This invention relates to separators for separating impurities from a stream of liquid, the same being embodied herein, for illustrative purposes, in a separator intended more particularly for purifying oil such as is used for oil burners, internal combustion engines, or the like. The object of the invention is to provide an improved, efficient and durable separator, simple and inexpensive in its mechanical construction.

The invention will be best understood by reference to the following description, when taken in connection with the accompanying illustration of one specific embodiment thereof, while its scope will be more particularly pointed out in the appended claims.

In the drawings:

Fig. 1 is a side elevation of the separator embodying one form of the invention; and

Fig. 2 is a central, sectional elevation taken on the line 2—2 in Fig. 1.

Referring to the drawings and to the form of the invention there shown for illustrative purposes, the same comprises an outer cylindrical, cup-like casing 3 having the bottom closure 5 and open at its upper or opposite end where it is provided with a beaded or turned-over edge 7 to constitute a bearing surface contacting with a gasket 9 of suitable yieldable material, such as prepared paper or other suitable packing.

The open upper end of the outer casing is closed by the cap piece or cover 11 having a shoulder or rim 13 adapted to bear against the gasket 9, the cap being provided on its top with oppositely extending ribs 15 (Fig. 1) terminating in lugs 17 which project beyond the edges 7 of the casing 3. To hold the parts in assembled position, there is provided a generally U-shaped clamp comprising the bent rod 19 extending beneath and bearing in a groove 21 formed in the bottom of the casing. The opposite ends or legs of the clamping rod pass through the lugs 17 and have threaded engagement with the clamping nuts 23.

This provides a cheap and inexpensive but efficient clamping connection by which the parts may be readily assembled in tight fitting relation, but may also be readily disassembled by merely unclamping the cap from the casing so that the latter may be removed for purposes of cleaning the interior parts, or for repairs.

Contained within the cap piece are suitable passages for the oil or other liquid to be purified, the same comprising an inlet passage 25 and an oppositely disposed outlet passage 27, both being internally threaded to adapt them for connection to suitable inlet and outlet pipes. The inlet passage 25 communicates with a passage 29 formed in a depending thimble 31, the thimble having an outlet 33 communicating with the interior space of the casing 3 and opening into the space in a generally tangential direction so that the fluid delivered therethrough has imparted thereto through contact with the walls of the casing a rotary or swirling motion in a helical path.

The circulation of the fluid after delivery to the casing is caused to be confined to an annular circulating space 35 formed between the inner walls of the casing 3 and the outer walls of an inner cylindrical-cup-like shield 37 of substantially lesser diameter than the casing, the shield extending with its open end down well into the casing, so that the fluid is caused to pass down through the annular circulating space by the aforesaid whirling or rotary movement before it may enter the lower open end of the shield.

The upper end of the shield has an end closure plate 39 secured thereto, the plate having an inner depending central stem 41 and an outwardly or upwardly protruding threaded lug 43 which is pipe-threaded into the depending lug 45 on the cap piece 11. The space within the shield communicates with the delivery passage 27 through lateral passages 47 formed in the depending stem and through the communicating central passages 49 and 51 formed respectively in the protruding lug of the end closure and the depending lug of the cap piece.

Before the oil or other fluid entering the bottom of the shield can reach the discharge passages, it is obliged to pass through the mesh of a fine wire re-entrant screen or

strainer 53. The latter is of a generally conical shape having its edges secured, as by soldering or otherwise, to the lower rim of the shield 37 and its apex secured to the depending stem 41.

Herein the connection of the apex to the screen is had by causing it to seat in a tapered recess in the depending stem 41, being brought into firm contact therewith by the wedge block 55 which is formed with correspondingly tapered sides and is fastened by means of a clamping screw 57. The tip of the screen is flattened to abut against the inside of the clamping block and is perforated to permit the passage of the clamping screw.

In operation the oil or other fluid is caused to pass through the separator under any suitable impelling force, either suction or pressure, and, entering the inlet passage 25, is discharged through the opening 33 into the annular circulating space where it passes toward the bottom of the shield in a helical path. Through the action of centrifugal force and gravity this tends to separate from the fluid the heavier impurities which sink and in the course of time accumulate in the settling chamber formed by the bottom of the casing 3.

The fluid, after reaching the bottom of the shield, then reverses its movement and follows an upward path, entering the open end of the shield, passing through the screen 53, into the screened space between the screen and the walls of the shield, and out through the discharge passages described, the screen serving to separate from the fluid the lighter, solid, foreign particles incapable of passing through the screen and not previously separated by the action of centrifugal force and gravity.

The cap piece is provided with a wall 61 interposed between the inlet and outlet passages, this wall being apertured and threaded to receive a screw 63. The aperture in the wall 61 is open to the top of the oil receiving space below the cap piece and is connected through ports 65 and 67 with the inlet and outlet passages, the screw 63, however, normally closing the aperture to the oil receiving space and to the inlet and outlet passages. By loosening or removing the screw, any air trapped in the strainer when the filter is first put into operation, or at any other time, may be released and the air lock which might otherwise exist may be relieved. After the trapped air has been released, the screw is again turned down to its seat and remains in that position during the normal operation of the filter.

It will be observed that the screen is positioned within the shield with its open end presented to the incoming fluid, the edges of the open end of the screen being fixedly secured to the edges of the shield and the opposite or apex end of the screen being fixedly secured to the stem of the end closure. This provides a firm anchorage for the screen, resisting any tendency to collapse or deform under the force of impact of the moving liquid. The screen is further strengthened in this respect by its method of attachment at the apex through the wedge block 55 by means of which the screen when fastened in position can be drawn taut into a condition of tension.

Since the cap piece, shield and screen are connected together, they may be readily disconnected from the casing by disconnecting the yoke piece and, when disconnected, the cap, inner casing or shield and screen may be removed as a single piece and both the casing and screen may be readily cleaned of any accumulation of foreign material. The yoke clamp provides a simple, inexpensive connection by which the chamber may be readily clamped to the cap-shield-strainer element without danger of breakage, while providing a fluid tight joint or seal.

While I have herein shown and described for the purposes of illustration one specific embodiment of the invention, it is to be understood that extensive changes and deviations may be made from the illustrated form and relative arrangement of parts, all without departing from the spirit thereof.

Claims:

1. A separator comprising an outer cylindrical casing having a closed bottom, a cap closing the top thereof, a cylindrical cup-like shield having an upper closed end secured to the cap, extending with its open end down into the casing providing an annular circulating space between the shield and the casing, a generally conical screen having its edges secured to the cup, a wedge block for securing the apex of the screen to the closed end of the cap in fixed tensioned relation, inlet passages for imparting a swirling motion to the entering fluid in the circulating space, and outlet passages communicating with the screen space of the shield.

2. A separator comprising an outer casing with a closed lower end and an open upper end, a cap for closing the upper end and providing inlet and outlet passages, a member projecting downwardly from said cap and having a passage therethrough connected to the outlet passage of the cap, an inner casing located within said outer casing and providing an annular circulating space between the inner and outer casings, said space being connected to the inlet passage of the cap, the inner casing having a lower end open to the circulating space and an upper end closed thereto, a connection for the upper closed end of the casing adapted to fasten the same to the member projecting downwardly from said cap, there being provided a passage through said connection leading

from the screened space within said inner casing to the outlet passage of the cap, a screen having its peripheral edges secured to the edges of the open end of the inner casing, and a rigid fastening for the central portion of said screen to the connection of the closed end of the casing.

3. A separator having an outer casing with a closed lower end and an open upper end, a cap for closing the upper end, providing inlet and outlet passages and having secured thereto an inner casing having an open lower end adapted to extend into the outer casing but to be spaced therefrom to provide a circulating space thereat, means for imparting to the entering fluid a swirling path downwardly through said circulating space, screening means for screening fluid entering the open end of the casing comprising a conical wire screen having its peripheral edges secured to the lower open end of the inner casing, said screen entering within the inner casing and having a rigid central connection to the upper end or apex thereof and holding said screen in fixed tensioned relation and said inner casing being provided with passages leading from the screened space within said inner casing to the outlet passage of the cap, and means for clamping the cap piece in position over the open end of the outer casing whereby when unclamped the cap, inner casing and screen may be removed as a single piece.

4. A separator comprising an outer casing having a closed bottom, an inner casing having an open lower end and a closed upper end and providing a circulating space between the outer casing and the inner casing, means for imparting to the entering fluid a swirling path downwardly through said circulating space, and a cone shaped wire screen having its peripheral edges secured to the open end of the inner casing and its apex rigidly secured to the upper end thereof in fixed tensioned relation, said separator having outlet passages communicating with the screened space between the screen and the walls of the inner casing.

5. A separator comprising an outer casing and an inner casing spaced therefrom and open at its lower end only to the space within the outer casing, a screen entering within the inner casing and having its peripheral edges secured to the lower edges of the inner casing and fastened centrally and rigidly to the upper closed end of the inner casing and held in fixed tensioned relation, and outlet and inlet passages to direct entering fluid in a swirling path downwardly about the inner casing, to the inner casing and through the screen.

6. A separator comprising an outer casing and an inner casing spaced therefrom and open at its lower end only to the space within the outer casing, a generally conical screen secured at its peripheral edges to the edges of the lower open end of the inner casing, a connection for the apex of the screen presented by the upper end of the inner casing, a wedge block for clamping the apex of the screen thereto in fixed tensioned relation, and inlet and outlet passages to direct the entering fluid in a swirling path downwardly about the outer casing, to the inner casing and through the screen.

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

EZEKIEL F. WHITE.