Oct. 6, 1942. R. W. BAILY 2,297,934

AIR CLEANER

Filed Nov. 12, 1940

Fig. 1.

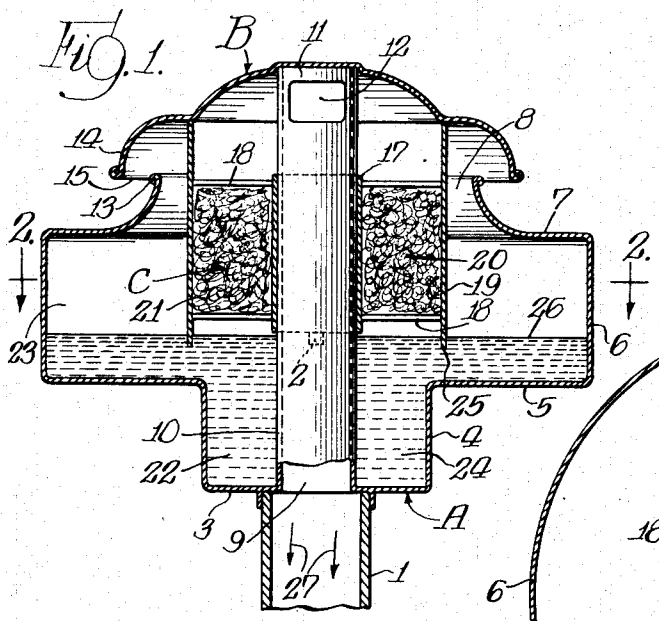


Fig. 2.

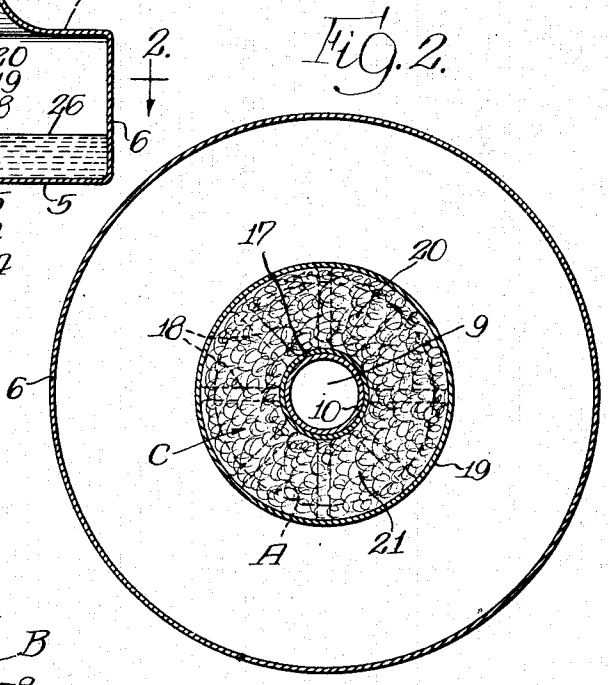


Fig. 3.

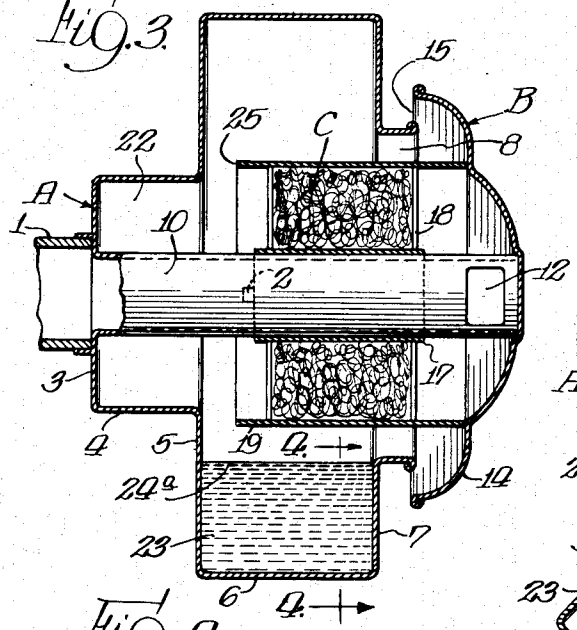


Fig. 4.

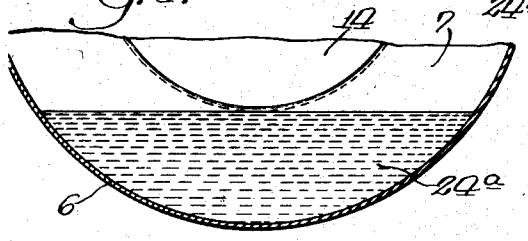
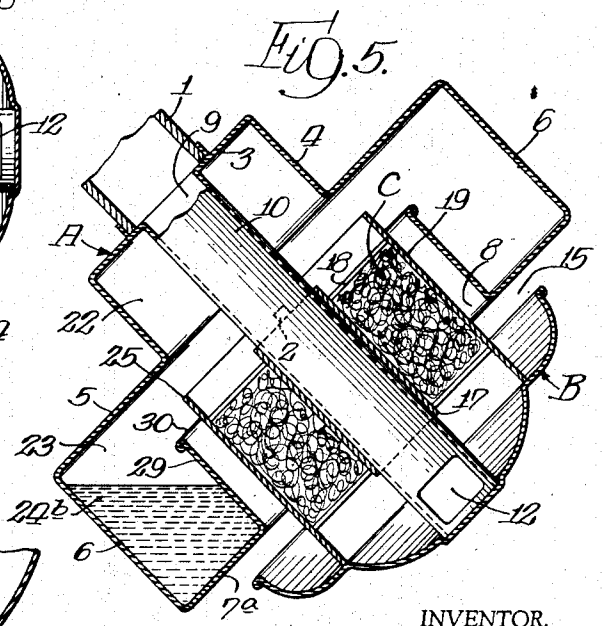


Fig. 5.



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UNITED STATES PATENT OFFICE

2,297,934

AIR CLEANER

Robert William Baily, Narberth, Pa.

Application November 12, 1940, Serial No. 365,310

1 Claim. (Cl. 183—15)

My invention comprises a new and useful improvement in oil-impregnated filters for cleaning the air supplied to the air-intakes of internal combustion motors, gas compressors, and other apparatus.

Heretofore such filters have been arranged for operation only in normal upright positions. They depend upon a continuous supply of oil for impregnation of the filtering fibers. If operated in any but the desired upright position, the oil escapes from the container and thereafter oil is no longer supplied to the fibers or other filter materials, and consequently dust and dirt are drawn into the working parts of the motor or compressor and quickly injure or destroy those parts by grinding and abrasion.

My invention comprises a srtucture of the oil container, such that no matter what position the filter may assume, the oil cannot escape, and when the filter is restored to normal position, it continues to perform its designed function of cleaning the intake air of dust and other foreign particles.

The motors or other apparatus with which such devices are used are assumed by the maker of those motors to be operated always in an upright position, but I have found that especially when such motors are used as prime movers for small portable pumps, concrete vibrators, and the like, the motors or other apparatus are frequently tilted or upset until they assume positions on their sides, or even upside down, i. e., may be accidentally tipped over, for short intervals, and when such situations arise, the oil escapes from the conventional type of filter and when the apparatus is re-established in its normal upright position, the filters lack the oil necessary to continue to supply the filter material and the result is a prompt injury or destruction of the working parts of the apparatus due to abrasive materials such as dust being drawn into the working parts.

With these and other objects in view, my invention consists in the construction, arrangement and combination of the various parts of my device whereby the objects contemplated are attained, as hereinafter more fully set forth, pointed out in my claim and illustrated in the accompanying drawing, wherein:

Figure 1 is a vertical cross-sectional view of one form of my apparatus, on line 1—1 of Figure 2.

Figure 2 is a horizontal cross-section taken on the line 2—2 of Figure 1;

Figure 3 is a cross-sectional view similar to that of Figure 1, in which the apparatus has assumed a horizontal position, turned on its side.

Figure 4 is a sectional view taken on the line 4—4 of Figure 3, illustrating part of the apparatus.

Figure 5 is a cross-sectional view of another form of my apparatus, in which the vertical axis has been revolved approximately 135 degrees from the normal upright position.

In the figures, similar parts are shown carrying identical reference numbers.

In Figure 1 the air cleaner is mounted on the air-intake tube 1 of a motor or compressor. The filter has the oil cup A having the lower wall 3, the outer cylindrical vertical wall 4, having at its upper edge the horizontal outwardly extending secondary bottom wall 5, from the outer edge of which the secondary vertical cylindrical wall 6 extends upwardly and terminates in the upper cover wall 7, terminating in the upturned inner edge 13 and providing the central annular opening 8.

Extending upwardly, in line with the bore 9 of the intake tube 1, I provide the tubular member 10 extending through the cup which projects upwardly to its top 11 above the level of the top wall 7 of cup A. Immediately below the top 11 I provide the air-passage 12 in the wall of the tube 10. The top 11 of the tube 10 is sealed by the cover B which flares laterally and downwardly beyond the pipe 10 and has the peripheral skirt 14. The lower edge of the skirt 14 is spaced outwardly from the edge 13 of cover wall 7, and is above the main part of the cover wall 7, thus providing the circumferential air-passage 15, above the cover wall 7.

Surrounding the tubular member 10 I provide the filter cartridge C having the inner tubular member 17 tightly engaging the tubular member 10, and the spaced outer tubular member 19. The cartridge members 17 and 19 are connected by spaced upper and lower spiders 18. Into the space 20 between the tubular members 17 and 19, and between the upper and lower struts 18, I pack a suitable fibrous or other filter material 21.

A lug 2 on tube 10 may be provided to limit downward movement of cartridge C on tube 10. The lower wall 3, the vertical wall 4 and the tube 10 form the container chamber 22, and the wall 5 combined with the vertical wall 6 and the tube 10 form a continuation of chamber 22 into upper chamber 23.

The wall 19 of cartridge C extends above wall 17 to cover B and extends below wall 17, but terminates above wall 5 of cup A.

Cover B may be held in assembled position

on tube 10 and cup A by any suitable means, not shown.

Chambers 22 and 23 are filled with suitable oil or other moistening fluid 24 up to a level 26 higher than the lower end 25 of the cartridge tube 19, but below the level of the filter material 21.

Operation

With the motor in operation, air for combustion is drawn through the opening 15, down through the annular passage 8, thence down through the oil or fluid 24, around the lower end 25 of the tube 19, thence vertically upward through the filter material 21 and through the openings 12 in the upper wall of the tube 10, thence down through tube 10 and through air intake tube 1 to the carburetor of the motor, as indicated by the arrows 27. Air passing through fluid 24 draws some of the fluid 24 up into the filter material 21, enabling that material to catch and hold dust and other foreign matter and to restrain such dust and other foreign matter from passing through to the openings 12.

In Figure 3 I show the apparatus of Figure 1 when the vertical axis of the apparatus has been revolved approximately 90 degrees from the vertical, as though the motor were lying on its side. In this position, the fluid 24 now occupies the position 24—*a*, entirely in the chamber 23. Escape of the fluid 24—*a* from the chamber 23 is prevented by the upper wall 7. When the motor is righted to normal upright position, the fluid 24—*a* flows back to its original position at 24, and the apparatus resumes its normal functions.

It is obvious that in the absence of the wall 7, the oil would escape from the cleaner, should the motor be tipped to lie on its side.

In Figure 4 I show a vertical sectional view taken on the line 4—4 of Figure 3, but in the position assumed by the apparatus at Figure 3. The fluid 24—*a* is restrained by the wall 6, and by the walls 5 and 7 of Figure 3.

In Figure 5 I show another arrangement of my apparatus in which the wall 7*a*, corresponding to wall 7, has at its upper edge the tubular wall 29 extending toward the bottom wall 5 but terminating at the lower edge 30 at a greater distance, if desired, from the wall 5 than the edge 25 of tube 19. In Figure 5 I show the apparatus in a position where the normal vertical axis has been revolved about 135 degrees from the vertical, to an inverted position. The fluid 24—*b* formerly occupying the chambers 22 and 23 has now flowed entirely into chamber 23 and is restrained from escaping from chamber 23 by the wall 6, the upper wall 7—*a* and the inner annular wall 29. Figure 5 indicates a position of the motor in which the motor is approximately upside down, and I may select a series of dimensions for the wall 29 which will enable the chamber 23 to contain all of the fluid 24 formerly occupying chambers 22 and 23 of Figure 1. Upon the motor being righted to normal upright position, the fluid 24—*b* will return to its initial position at 24. With this form of device, the oil will not spill out even if the motor is turned upside down.

The cover 13 may be separable from the tube 10 to permit the removal of the cartridge, and to permit the renewal of the fluid 24. Likewise, the tubular member 29 may be separable from the wall 7 to provide for removal and renewal of the fluid 24.

My invention prevents the fluid 24 from escaping from the apparatus regardless of any abnormal position that may be assumed by the motor or prime mover.

I intend to cover by my claim any changes in structure or material which are within their scope and my invention.

I claim:

In cleaner apparatus of the kind described, for removing entrained particles from a gas, a duct for conveying the gas, a first container operatively associated with said duct, adapted to hold a viscous fluid, a second container operatively associated with said duct, filtering material in said second container, said second container being arranged in the first container to provide a passageway for gas below said filtering material, the lower end of said second container when in normal operating position being positioned to be partially immersed in the fluid in the first container, said apparatus having a passageway for gas at the upper portion of said second container communicating with said duct above the normal surface of said fluid, said duct being otherwise closed against admission of gas, said first container being so arranged that gas entering said duct through said second container initially enters said first container and passes through said fluid, thence through said second container to said duct, said first container having a conserving chamber formed with a top and an inner downturned wall of such extent that when the apparatus assumes any position other than normal, said chamber receives and conserves said fluid, and when said apparatus is restored to normal position, said fluid returns to its original position partially immersing said lower end of said second container.

ROBERT WILLIAM BAILY.