July 14, 1959 S. V. LEININGER 2,894,599

OIL SEPARATOR AND MUFFLER

Filed May 18, 1956

Fig. 1

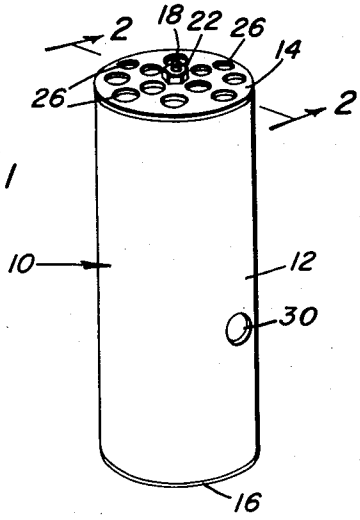


Fig. 2

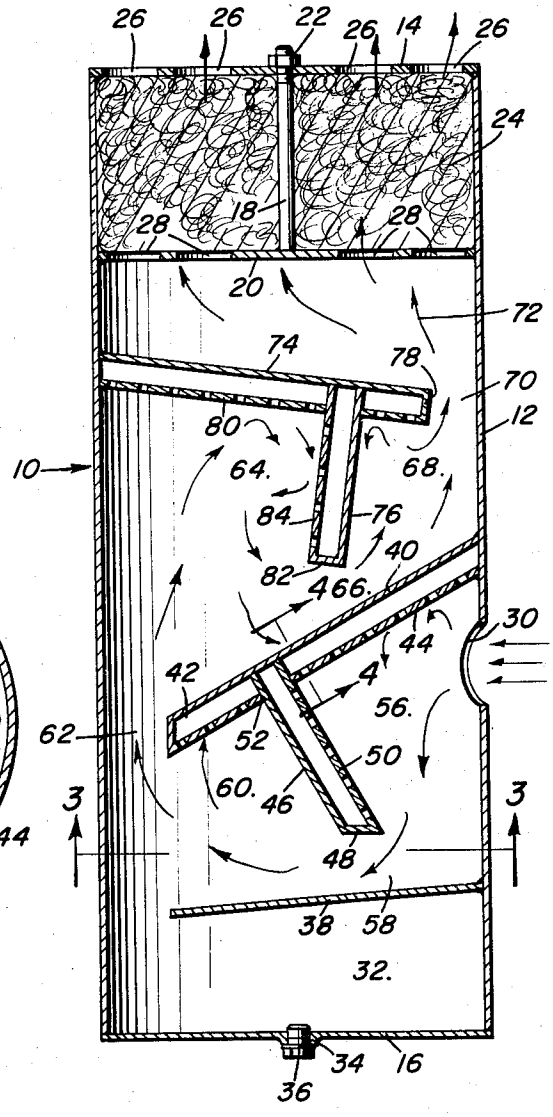
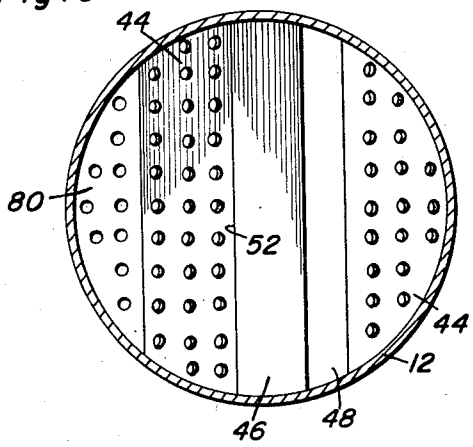


Fig. 3



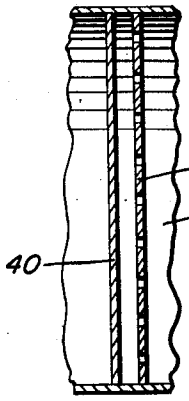


Fig. 4

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OIL SEPARATOR AND MUFFLER

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3 Claims. (Cl. 183—34)

This invention relates to the combination of oil separator and muffler.

An object of the present invention is to provide an inexpensive device to separate atomized oil from the exhaust gases of air motors, air clutches, air brakes, air cylinders or any other device having need for the separation of such oil from the carrier gases and/or for quieter operation. Air motors and clutches are oiled by injecting oil into the working air. The present invention has for one of its primary purposes the provision of such a device which will function as a muffler for quieter operation and which will effectively separate an extremely high percentage of the oil from the exhaust gases (usually air) so that when expelled from the device, the exhaust gases are generally air in almost pure form.

Heretofore, it has been the custom to either expel the atomized oil together with the air that carries it into the building enclosure or piping into the outside air or to a drain. The former method forms explosion and health hazards, while the latter method is expensive and is not feasible in many instances where certain equipment must be portable. Accordingly, a further object of this invention is to overcome these difficulties by providing a device which is adapted to be installed on the equipment so as to become a part thereof without interfering with the portability of the equipment.

A more specific object of the invention is to provide a combined air purifying device and muffler which is constructed with a number of baffles arranged in a particular way so that a number of pockets are formed in which the exhaust gases, such as air laden with oil vapors, are free to swirl and flow through the various stages of the device until they finally are discharged through a filter, whereby during each of the flow changes made by the baffles and perforated panels on the baffles, the oil is separated and the machine quieted.

These together with other objects and advantages which will become subsequently apparent reside in the details of construction and operation as more fully hereinafter described and claimed, reference being had to the accompanying drawing forming a part hereof, wherein like numerals refer to like parts throughout, and in which:

Figure 1 is a perspective view of a device which is constructed in accordance with the principles of the invention;

Figure 2 is an enlarged longitudinal sectional view taken on a line 2—2 of Figure 1;

Figure 3 is a transverse sectional view taken on the line 3—3 of Figure 2; and,

Figure 4 is a fragmentary sectional view taken on a line 4—4 of Figure 2.

In the accompanying drawing there is a combined oil separator and muffler 10 that is constructed in accordance with the principles of the invention. The device comprises a cylindrical casing having a side wall 12 together with a top wall 14 and a bottom wall 16 which are fixed in place. The bottom wall 16 is fixed as by being

soldered or welded, while the top wall 14 is fixed by seating on the upper edge of the side wall 12 and being bolted in place. A stud 18 is coaxially arranged in the casing 12 and is fixed at its lower end to a partition 20 which is secured on the inside of the casing below the upper edge thereof. Stud 18 protrudes through an opening in top wall 14 when the latter is in place, and nut 22 is threaded on the upper end of the stud in order to hold the cover fastened releasably in place. A filter 24 made of filtering material, as steel wool or Fiberglas, is packed on the partition 20 and is held separably in place by means of the top wall 14. A number of discharge outlet openings 26 are in wall 14 while there are openings 28 in the partition 20.

Side wall 12 has an opening which constitutes an inlet 30 for the exhaust gases from the equipment to which the device 10 is attached. Any type of standard coupling may be used for this purpose. Sediment chamber 32 is formed in the bottom of the casing by a part of the side wall 12 below inlet 30 and by the bottom wall 16. The latter has a drain opening 34 which may be provided with a valve or a plug as at 36 in order to drain the sediment chamber 32. A liquid drain plate 38 is fixed to a part of the side wall 12 below inlet opening 30 and is spaced from the opposite part of side wall 12. This drain plate slopes downwardly toward the opposite side of the side wall of the casing for the liquid that is condensed in the casing or that is otherwise extracted from the gases passing through muffler 10. Plate 38 materially reduces surface evaporation by preventing the gases that enter inlet 30 from being swept across the top surface of the liquid in chamber 32.

A first baffle plate 40 is fixed, as by being soldered or otherwise connected, to the interior of the casing and specifically, to the side wall 12 thereof above the inlet 30. Baffle plate 40 is imperforate and slopes downwardly toward and through the central, longitudinal axis of the casing. A support in the form of a downwardly extending peripheral flange 42 is fixed with first baffle plate 40 and it accommodates a perforated panel 44 held parallel to the general plane of the first baffle plate 40. The edges of the plate or panel 44 are fixed to the support 42 and to the side wall 12 above inlet 30. A second baffle plate 46 is fixed to the lower surface of first plate 40 and is arranged at right angles to it. Second plate 46 has a support flange 48 along its edges on which perforated plate or panel 50 is fixed, plates 46 and 50 passing through passage 52 in perforated plate 44. Baffle plates 40 and 46 together with their perforated plates 44 and 50 form a forwardly opening pocket 56 which confronts the gases as they pass through the inlet 30. These gases are swirled in pocket 56 and are forced downwardly through passage 58 formed by the upper surface of plate 38 and the lower edges of plate 46, panel 50 and support flange 48. Thereafter, the gases flow into pocket 60 that is formed by a part of first baffle plate 40 and the second baffle plate 46. After the gases swirl in pocket 60, they pass through passage 62 that is formed between the outer edges of plate 40, panel 44 and support 42. Thereafter, the gases progress upwardly through passage 62 and into pocket 64 wherein they swirl and move through passage 66 which intercommunicates pocket 64 with pocket 68 and the passage 70. The latter opens into a chamber 72 that is between the partition 20 and the top surface of a third baffle plate 74. From here, the gases pass through the openings on opposite sides of the filter 24 and are discharged in a clean condition to the atmosphere.

The pockets 64 and 68 together with passages 66 and 70 are formed by the third baffle plate 74 and fourth baffle plate 76 that is fixed to the third baffle plate at right angles thereto and arranged in a manner quite simi-

lar to the arrangement of the first and second baffle plates. Third baffle plate 74 is secured to the inner surface of the side wall 12 at a place opposite to the side wall portion having inlet 30. In addition, it has a support 78 secured to it, the latter accommodating and holding panel 80 that is perforated and arranged parallel to the plane of baffle plate 74. The fourth baffle plate has a support in the form of flange 82 accommodating the perforated panel 84, the latter being parallel to the fourth baffle plate 76 and like the fourth plate is fixed to the undersurface of plate 74. Pocket 64 is formed between the third and fourth plates, with pocket 68 being formed between a part of the third plate and the fourth plate. Passage 66 is formed between the fourth plate and the top surface of the first plate 70, while the outer edge of the third baffle plate and a part of support 78 together with a part of side wall 12 constitutes passage 70 that opens into the chamber 72.

In use, as the gases pass through the casing in a manner described previously and shown by the arrows on Figure 2, the oil in the gases accumulates on the many surfaces presented to them as they pass therethrough in the devious travel required by the arrangement of baffles, passages, pockets, and parts. The sediment including the oil settles to the sediment chamber 32 for periodic draining through the opening 34. The gases pass through the filter 24 and the discharge outlets 26 for venting to the atmosphere in a clean condition.

From the foregoing, the construction and operation of the device will be readily understood and further explanation is believed to be unnecessary. However, since numerous modifications and changes will readily occur to those skilled in the art, it is not desired to limit the invention to the exact construction shown and described, and accordingly all suitable modifications and equivalents may be resorted to, falling within the scope of the invention as claimed.

What is claimed as new is as follows:

1. An oil separator and muffler for exhaust gases comprising a casing having a top wall, a bottom wall and a side wall, said casing having a longitudinal central axis, said side wall having a gas inlet between said top and bottom walls with the lower part of said side wall and said bottom wall constituting a sediment chamber, a downwardly inclined first baffle plate secured to said side wall within said casing and located above said inlet and sloped downwardly toward the central axis of said casing, a support fixed to said first baffle plate, a perforated panel secured to said support and to said side wall and located parallel to and beneath said first baffle plate, said perforated panel and first baffle plate being spaced from each other, a second baffle plate fixed to said first baffle plate and normal to said first baffle plate and forming with said first baffle plate a forwardly opening pocket for the gases, a second perforated panel spaced slightly from and secured to said second baffle plate, said second perforated panel also secured to said first baffle plate, the space between the outer edge of said first baffle plate and the opposing part of said casing side wall forming a gas passage, a third baffle plate secured to the side wall of said casing and located above said first and second baffle plates and said passage, a third perforated panel, a support secured to said third baffle plate, said third perforated panel secured to the support on said third baffle plate of said casing, a fourth baffle plate secured to said third baffle plate and normal to said third baffle plate, a support attached to said fourth baffle plate, a perforated panel parallel to said fourth baffle plate and secured to said third baffle plate and the support on said fourth baffle plate respectively, said third and fourth baffle plates forming therebetween a pocket which faces said passage, and the outer edges of said fourth baffle plate being spaced from the surface of said first baffle plate to form a second passage, and the outer edge of said third baffle plate being spaced from the opposite part of said side wall to form a third passage.

2. The oil separator and muffler of claim 1 wherein there is a drain in the lower part of said casing for the sediment chamber, a liquid drain plate located below said first baffle plate and above said drain and in spaced relationship to said first and second baffle plates and panels attached thereto.

3. The separator and muffler of claim 2 wherein there is a filter above all of said baffle plates in said casing, and a gas discharge outlet in said casing and in registry with said filter.

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