

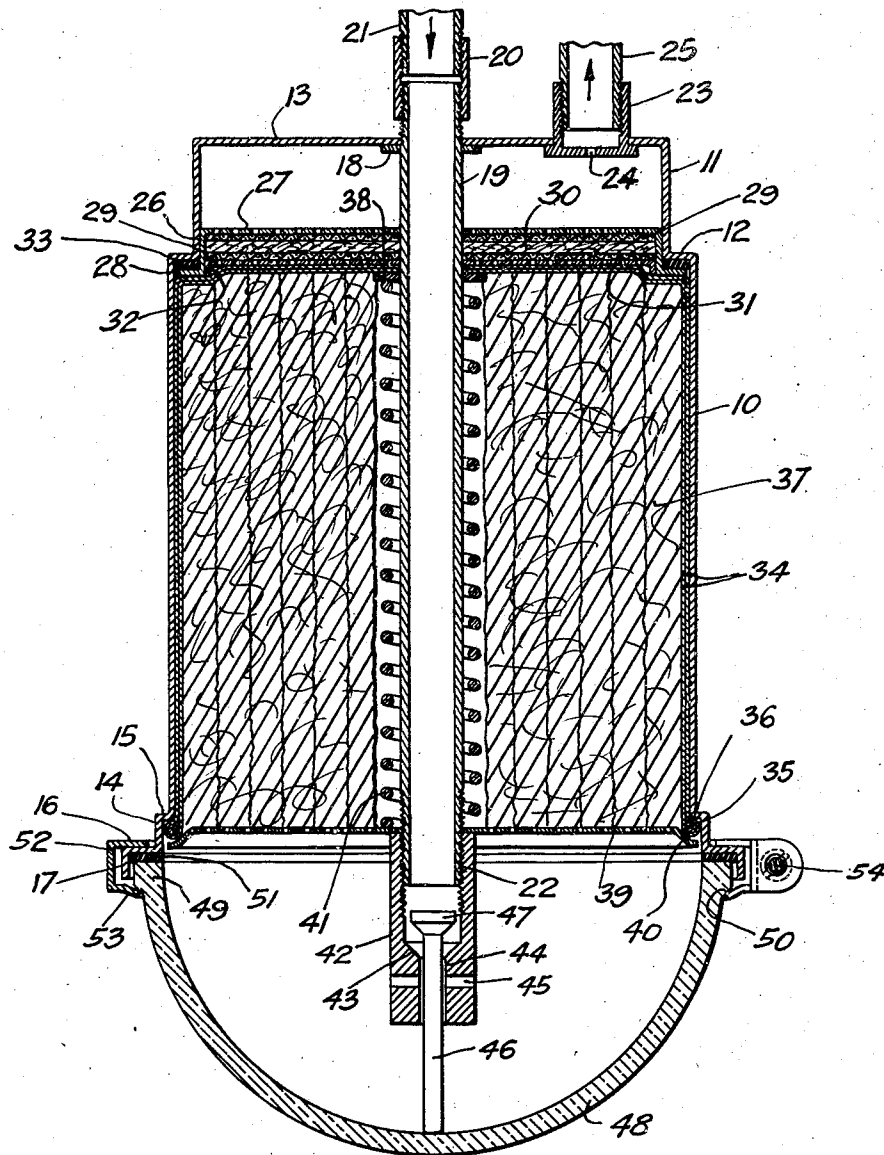
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VISIBLE FILTERING APPARATUS

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VISIBLE FILTERING APPARATUS

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4 Claims. (Cl. 210-140)

This invention relates to improvements in filtering apparatuses, and is especially intended for filtering oil in connection with lubricating systems of internal combustion engines or the like, or with fuel oil lines of Diesel engines, or with supply lines to oil burning systems, or in connection with the filtering of any liquid where the removal of impurities therein is of prime importance.

10 The invention is an improvement of the filtering device disclosed in Patent #2,106,218 issued to me on January 25, 1938.

It is the object of the invention to provide a filter of that kind with means which permit 15 visual inspection of the oil being filtered.

Another object is to provide a fluid tight seat between the various filtering elements whereby the unfiltered oil is compelled to pass through the elements.

20 Still another object is to prevent loss of oil in case of breakage or removal for cleaning of the transparent bottom cup through which the condition of the oil can be observed by means of an automatic safety valve.

25 A further object is to relieve the filtering apparatus automatically of pressure after the motor of the engine has stopped by syphoning and to break the syphoning automatically as soon as the oil has reached a certain level in the observation 30 cup.

A still further object is to provide a device in which the principal filtering element can be replaced with the least possible attending spillage of oil.

35 Other objects will become apparent after a perusal of the following specification and an inspection of the accompanying drawing in which a preferred embodiment of the invention is shown.

The drawing illustrates a vertical sectional 40 view of a filtering apparatus made according to the principles of the invention.

10 is a substantially cylindrical casing having a somewhat smaller portion 11 at its top forming a shoulder 12 therebetween and having a top 45 wall 13. Its open bottom has a slightly larger portion 14 forming a shoulder 15 with the casing wall 10. 16 is an outwardly extending shoulder having a downwardly projecting flange 17.

The top 13 of the casing is reinforced at its 50 center at 18 and is threaded to adjustably receive an inlet tube 19 projecting outwardly of the casing and being equipped with a coupling. 20 to receive an oil tube 21. The bottom end of the tube 19 is threaded at 22.

55 23 is a sleeve secured to the top wall 13 of

the casing preferably near its periphery, having a small outlet opening 24 in its center and an outlet tube 25 in communication therewith.

Slidably disposed within the walls 11 of the casing 10 is a disc filter having vertical walls 26, 5 a perforated top 27, and a lower outwardly extending flange 28 substantially of the same size as shoulder 12 of the casing. 29 are circular sheets of wire netting holding between them a circular sheet 30 of pure virgin wool. A perforated disc 31 with downwardly projecting flanges 32 presses the sheets 29 and 30 tightly against the perforated top 27 and confines them within the walls 26, thus forming with them a disc filter unit which is slidably fitted over the inlet tube 15 19 and within the walls 11 of the casing. 33 is a resilient gasket between the shoulder 12 and the flange 28.

The principal filter element consists of a bag of preferably double layers 34 of a suitable cotton 20 fabric or the like closely fitting the inside of the casing 10. The open bottom of the bag is looped at 35 to receive and hold a split ring 36, the looped part 35 with the ring resting against the shoulder 15 and the depending wall 14 of the casing. The top of the bag abuts the flange 28 25 and the bottom disc 31 of the disc filter. Fitted tightly within the bag are helically wound layers 37 of cellulose. The bag is centrally cut out to fit tightly over the inlet tube 19, a washer 38 30 reinforcing the central top of the bag around the tube.

39 is a distributor disc at the open bottom of the filter bag having a downwardly and outwardly extending flange 40 resting against the looped, 35 ring containing, portion 35 of the bag.

41 is a compression spring within the bag, loosely wound around the tube 19 and resting against the washer 38 with its one end and against the distributor disc 39 with its other end. 40

Screwed onto the bottom end 22 of inlet tube 19 is a valve casing 42 having a tapered valve seat 43 in its center, a central bore 44 and ducts 45 across it. Loosely guided within the bore 44 is a stem 46 of a valve having a head 47, the bottom of which is adapted to fit fluid tightly the seat 43.

48 is a transparent bowl having a thickened top portion 49 which joins the curved wall of the bowl at an angle at 50. 51 is a resilient gasket 50 between the portion 49 of the bowl and shoulder 16 of the casing 10. 52 is a split clamp ring of substantially U-shape having a slightly downwardly curved bottom leg 53. The clamp is adapted to be tightened upon the casing and 55

bowl by means of a screw 54, as is well-known in the art, so as to engage with its leg 53 the inclined surface 50 of the bowl and thus draw the same tightly against the gasket 51 and the shoulder 16 of the casing making a fluid tight joint therewith.

The operation of the device is as follows: Oil is admitted under pressure through inlet tube 19, past the head 47 of the safety valve through ports 45 and the clearance between stem 46 and bore 44 into the bowl 48 filling the same. The oil is then forced through the perforations in the distributor disc 39 through the filter element 37 in the bag 34, thence through the top of the bag 15 into and through the disc filter bottom 31, sheets of wire netting 29 with the wool disc 30 between them, and top 27 into the upper part 11 of the casing, thence through the restricted outlet 24 into the outlet tube 25.

Thus there are three distinct stages of filtering, namely first the helically wound layers of cellulose, then the double thickness of the filter bag itself, and finally the sheet of virgin wool in the disc filter.

Where more than one stage of filtering is employed in a device of this kind, it is paramount that the joints between the various elements of each stage be fluid tight in order to avoid by-passing any of the stages. I accomplish tight joints between the various filters in a very simple and efficient manner. The casing 42 of the automatic safety valve is adjustably secured to the bottom of the inlet tube 19. When screwed upwardly against the disc 39, it forces the downwardly extending flange 40 of the disc against the looped ring containing portion 35 of the bag which in turn is closely pressed against surfaces 14 and 15 making a fluid tight joint therewith. The central spring 41 within the bag filter at the same time is compressed by the action of the disc 39 against its bottom and transmits a corresponding pressure against the washer 38 at the inside top of the bag. This forces the top of the bag against the bottom 31 of the disc filter, and simultaneously the flange 28 against the resilient gasket 33, thus effecting a tight joint between the top of the bag filter and the disc filter at the top of the casing, by means of screwing the casing 42 of the bottom safety valve upwardly upon the inlet tube 19.

The outlet 24 is of a size much smaller than the inlet. This causes a slight back pressure to build up at the outlet end of the filter resulting in a partial balancing of the pressure at the inlet and outlet ends of the filter elements and a slowing up of the velocity of the liquid. This helps to maintain a fairly uniform pressure at the outlet end and prevents a too rapid discharge therefrom with a corresponding drop in oil pressure.

Normally with the glass bowl 48 in place as shown in the drawing, the stem 46 rests upon the inside bottom of the bowl and keeps the head 47 of the safety valve away from its seat 43. Should the glass bowl be broken or should it be necessary to remove it, the head 47 of the valve will be immediately seated and prevent any escape of oil through the bottom of the device so that, in case of a motor engine for instance, the engine may continue to function without fear of excessive loss of oil.

The bowl, being made of glass, enables one to ascertain at a glance the color of the oil and whether clean or dirty. Because the dirt accumulates in the bowl, the bowl can readily

be removed from the device for cleaning purposes and with the least amount of waste of oil.

Attention is drawn to the fact that the bottom outlet of the inlet tube projects into the bowl 48 considerably below its top. When the motor to which the device is connected is stopped, a syphoning effect is established and oil is drawn backwardly through the inlet tube 19 and the pump to the crankcase. This syphoning continues until the level of the oil drops to that of the ports 45 when the syphoning is broken. When syphoning has stopped, pressure is relieved within the device and the oil settles in the bowl. Should water be present it will then become immediately noticeable. Because the bowl is only partially filled then, no oil will be slopped over its sides when disconnecting it from the casing 10, making replacing of filter bags an especially easy matter. While in the drawing, transverse ports 45 are shown in the bore 44, the bottom of the casing 42 may obviously be in a plane where the ports 45 are now located and the ports eliminated entirely.

It is obvious that various changes of form, proportion and minor details may be resorted to and the construction modified to suit many other purposes without departing from the principle or sacrificing any of the advantages of the invention as defined in the appended claims.

What I claim as new, is:

1. In an apparatus of the kind described, a casing, a transparent bowl removably secured to the bottom of the casing, an inlet tube at the top of the casing extending downwardly into the said bowl, filter elements around the said tube and confined within walls of the said casing, the casing having an outlet at its top above the said elements, a valve housing at the bottom of the said inlet tube adapted to hold the said filter elements, tube and casing tightly together, and a valve within the housing having a stem resting normally upon the bottom of the said bowl to keep the said valve open, the valve being adapted to close the said inlet tube automatically upon removal of the said bowl.

2. In an apparatus of the kind described, a casing, a transparent bowl removably secured to the bottom of the casing, an inlet tube at the top of the casing extending downwardly into the said bowl, a bag filter, a disc filter and a distributor disc around the said tube and confined within walls of the said casing, the casing having a restricted outlet at its top above the said filters, a valve housing adjustably secured to the bottom of the said inlet tube adapted to hold the said filters and disc tightly against each other and the tube and casing, and a valve within the housing having a stem resting normally upon the bottom of the said bowl to keep the said valve open, the valve being adapted to close the said inlet tube automatically upon removal of the said bowl.

3. In a device of the kind described, a casing, a removable transparent bowl clamped to its bottom, an inlet tube at the top of the casing extending downwardly into the said bowl, a bag filter and a disc filter around the said tube and confined within walls of the said casing, a helical spring around the said tube and within the said bag filter, a distributor disc at the bottom of the said bag filter, means at the bottom of the said inlet tube to force the said distributor disc against edges of the filter bag to hold them tightly against the walls of the casing and the said spring against the top of the bag to push the said bag

against the said disc filter and the said disc filter tightly against the said walls, the said casing having an outlet at its top above the said filters, and a valve at the bottom of the said inlet tube having a stem resting normally upon the said bowl to keep the said valve open, the said valve being adapted to close the inlet tube automatically upon removal of the said bowl.

4. In a device of the kind described, a casing having abutments within its walls near its top and its bottom, a removable transparent bowl clamped to its bottom, an inlet tube at the top of the casing extending downwardly into the said bowl, a filter bag around the inlet tube and confined within walls of the said casing having its open bottom folded over to seat against the said abutment near the bottom of the casing, a filter unit within the bag, a distributor disc at the bottom of the bag, a helical spring around

the said tube and within the said bag, a disc filter at the top of the bag around the said tube having flanges engaging the said abutment near the top of the said casing, the casing having an outlet above the said disc filter, means at the bottom of the inlet tube to force the distributor disc against the edges of the filter bag and the spring against the top of the bag and the said top of the bag against the disc filter for the purpose of holding the said filter bag and the disc filter tightly against each other and against the walls of the casing, and a valve at the bottom of the said inlet tube having a stem resting normally upon the said bowl to keep the said valve open, the said valve being adapted to close the inlet tube automatically upon removal of the said bowl.

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