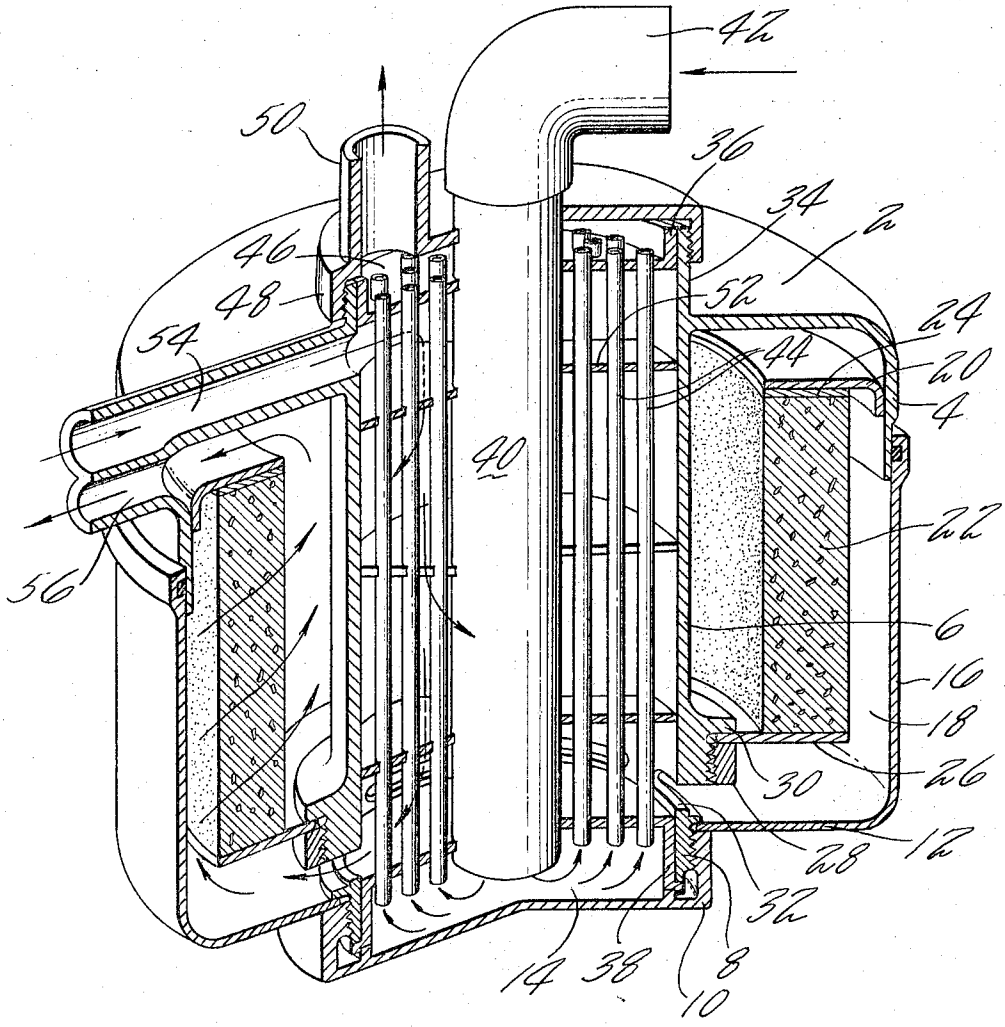
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OIL FILTER AND HEATER

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OIL FILTER AND HEATER

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This invention relates to a fuel filter and heater and is particularly adapted for use in heating the fuel in jet engines.

In many devices which accomplish the filtering and heating or cooling function, the replacement of the filter element necessitates the removal of some of the air or fuel connections in order that the unit may be pulled apart sufficiently for access to the filter. When this is done, impurities may get into the device either in the fuel or air circulating system with possible disastrous results. A feature of the present invention is an arrangement by which the filters may be replaced without severing any of the fuel or air connections to the unit. Another feature is an arrangement by which the device may be readily separated for access to the filter and in which the filter is readily adapted for removal and replacement.

Other features and advantages will be apparent from the specifications and claims, and from the accompanying drawing which illustrates an embodiment of the invention.

The single figure is a perspective view with parts in section of the device.

With reference to the drawing, the device includes a head **2** having a peripheral flange **4** and a concentric smaller diameter sleeve **6**. The sleeve and the flange both project in the same direction and the end of the sleeve remote from the base is threaded as at **8** to receive a cap **10**. This cap serves to clamp a base **12** in position on the sleeve and defines a compartment **14** within the cap at the end of the sleeve **6**.

The base **12** has a peripheral flange **16** extending into overlapping and sliding contact with the peripheral flange **4** so that these two flanges cooperate to form with the sleeve **6**, the head **2** and base **12**, the filter compartment **18**.

At a point adjacent to and spaced from the head **2**, the peripheral flange **4** carries an inwardly projecting ring **20** which serves as a support for the upper end of the filter **22**. In the arrangement shown, the filter **22** has an end disc **24** thereon engaging with the ring **20**. The filter element is substantially cylindrical and is positioned concentric to the sleeve **6** within the filter space and is of such a radial thickness that it is spaced from both the sleeve **6** and the peripheral flange **16**. The lower end of the filter element carries a disc **26**, the inner edge of which is clamped between a threaded ring **28** and a shoulder **30** on the sleeve **6**. A plurality of passages **32** in the sleeve **6** located between the base **12** and the threaded ring **28** provide for a flow of fluid from within the sleeve **6** into the filter space **18**.

The head **2** has a short sleeve **34** extending from the head in the disc opposite to the sleeve **6** and this sleeve **34** supports a disc **36** adjacent the end thereof. The end of the sleeve **6** remote from the sleeve **34** has positioned therein a similar disc **38** and these two discs serve to support the opposite ends of a centrally located large diameter tube **40** which is located centrally within the sleeve **6** and communicates directly at its upper end with the air inlet **42**, the latter being integral with the tubes. The discs **36** and **38** also support a plurality of smaller diameter tubes **44** which open at one end into the chamber **14** as does the central tube **40** and which open at their other end into a chamber **46** between the disc **36** and a cap **48** on the end of the sleeve **34**. The cap **48** has an air outlet **50** communicating with the chamber **46**. In this way air entering the inlet **42** which is carried by the

head **2** through the medium of the cap **48** and the disc **36** is directed through the tube **40** to the chamber **14** and thence upwardly through the tubes **44** into the chamber **46** to discharge through the outlet **50**. Suitable baffles **52** may be positioned around the tubes to direct the flow of fluid around the tubes from the head **2** toward the cap **10**.

The head **2** has integral therewith a fuel inlet passage **54** which communicates with the space internally of the sleeve **34** and on the inner side of the disc **36**. Fuel entering the inlet **54** thus enters the upper end of the space between the discs **36** and **38** through which the tubes extend so that fuel flows around the tubes to the lower end of the sleeve **6**. At this point the fuel flows through the passages **32** located above the disc **38**, as will be apparent, and into the filter space **18**. The filter **22** is so positioned that fuel entering the lower end of this space will be directed upwardly externally of the filter and into the space between the filter and the peripheral flange **16**, the fuel then flows through the filter into the space between the filter and the sleeve **6** and over the upper surface of the ring **20** to the fuel outlet **56**. As shown, this outlet is also located in and is integral with the head **2**. With this arrangement fuel entering the passage **54** may be heated as desired dependent upon the temperature of the air entering the air inlet **42** and will first be heated and filtered before it discharges through the fuel outlet **56**.

With the arrangement shown, since both of the air connections and both of the fuel connections are carried by the head **2**, it will be apparent that none of these connections need be disturbed when it is necessary to replace the filter element **22**. This replacement is accomplished by removing the cap **10** which then permits withdrawal of the base **12** and its integral peripheral flange **16**. When this has been done, threaded ring **28** may be undone thereby permitting the filter element to be withdrawn and replaced. Reassembly is accomplished by a reverse process, as will be apparent.

It is to be understood that the invention is not limited to the specific embodiment herein illustrated and described, but may be used in other ways without departure from its spirit as defined by the following claims.

I claim:

1. A filter and heating device including a head for a peripheral flange and a concentric inner sleeve, said sleeve being impervious, said flange and sleeve defining between them a filter space, a filter element positioned therein and radially spaced from said impervious sleeve, a base having a projecting peripheral flange in sliding engagement with the peripheral flange on the head and cooperating to close the filter space, said base having a central opening fitting over the inner sleeve, a cap fitting over the end of the sleeve for securing the base in position and defining therein a chamber at the end of the sleeve, an air inlet and an air outlet secured to said head, a plurality of tubes extending longitudinally through said sleeve and communicating with said chamber, at least one of said tubes communicating within the head with the air inlet and the remainder of the tubes communicating within the head with the air outlet thereby to establish a flow of air from the air inlet through the tubes connected therewith to the chamber and thence through the tubes connected with the air outlet and to the outlet, fuel inlet means on the head communicating with the interior of said sleeve, the fuel passing around the shell side of said tubes and being heated thereby, passages through the sleeve adjacent the cap for the flow of said heated fuel from within the sleeve through the passages to the external side of the filter within the filter space and thence through the filter into said radial space between said filter and said impervious sleeve, and into the filter space and a fuel outlet

on the head communicating with said radial space adjacent the head end thereof.

2. A device as in claim 1 in which baffles within the sleeve and around the tubes direct the flow of fuel over the tubes.

3. A device as in claim 1 in which a closure is positioned within the sleeve in surrounding relation to the ends of the tube to form a closure in the sleeve between the passages therein and the chamber at the end of the sleeve.

4. A device as in claim 1 in which the sleeve has a threaded ring thereon adjacent to the passages and on the side thereof remote from the base for supporting the filter element in position.

5. A device as in claim 1 in which the filter element is substantially cylindrical and is positioned within and spaced from the walls of the filter space, means at one

end of the filter engageable with the threaded ring for directing the flow of fuel from the passages in the sleeve to the filter space radially outward of the filter and means engageable with the filter and the peripheral flange on the head for closing the space between the filter and the flange at this point.

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