Dec. 27, 1960 J. L. MORGAN 2,966,339

RADIATOR PROTECTOR DEVICE

Filed Nov. 2, 1954

Fig. 1

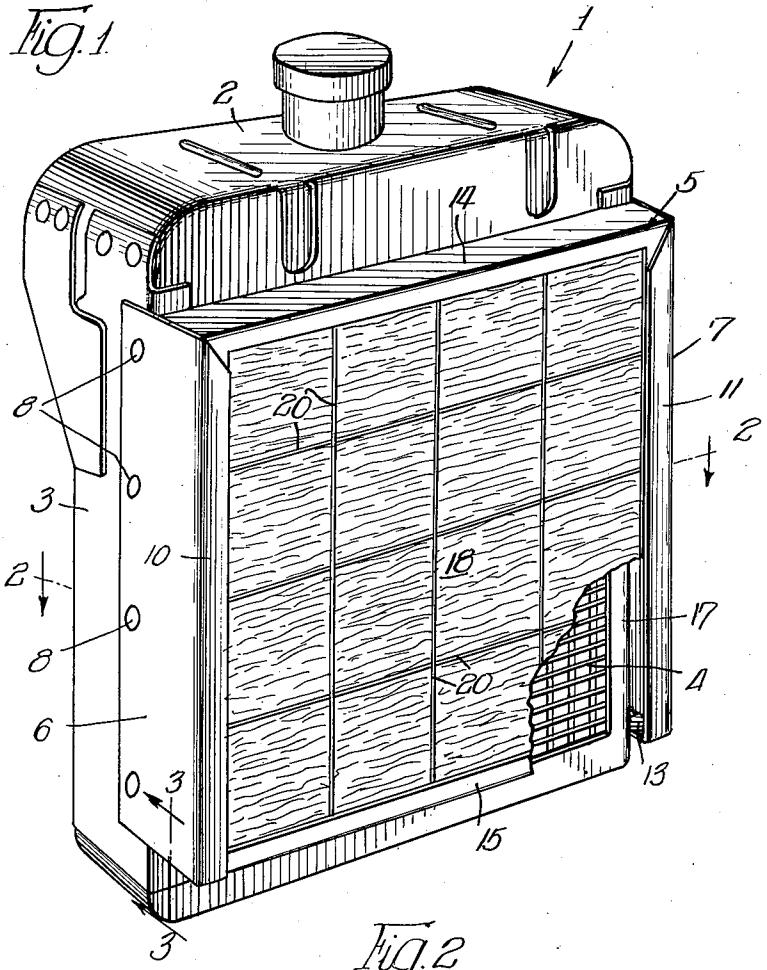


Fig. 2

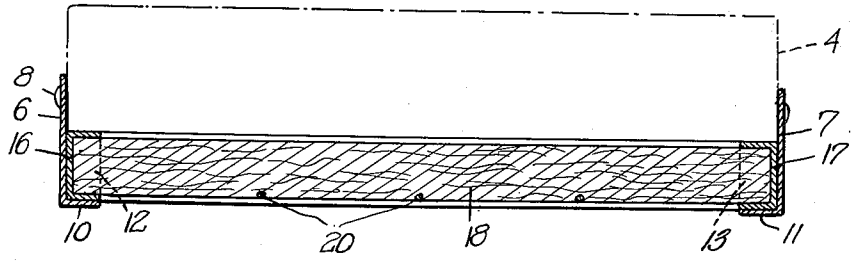
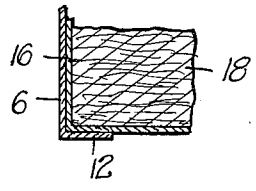


Fig. 3



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RADIATOR PROTECTOR DEVICE

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This invention relates, broadly, to means for protecting air-cooled radiators from corrosion due to gas impurities in the air. More particularly, the invention relates to protective filter units and means for mounting the same so as to protect the cores of air-cooled radiators from the corrosive action of gas impurities in the air passing through the cores.

The protective filters of this invention are useful for protecting the radiators of automobiles, trucks, tractors, industrial engines and water-cooled engines generally. They are useful for protecting oil field engines which may either be water-cooled or used as a steam condenser. In the latter instance, steam enters the bottom tank and flows up into the core tubes wherein it is condensed and the condensate flows back down the tubes into the tank.

The tubes and fins of such radiator cores are made of copper or copper-base alloys, e.g. brass. In order to have adequate heat transfer efficiency, the tubes and fins must be formed of thin stock. It is well known that gas impurities in the air stream passing through a radiator will cause serious damage to the copper or brass in the radiator core over a period of time. This corrosive action is speeded by the presence of moisture and higher temperatures. The gas impurities which are the worst offenders include carbon dioxide, carbon monoxide, sulfur dioxide, sulfur trioxide, chlorine, and hydrogen sulfide. These gases form acids in the presence of moisture which react with, i.e. corrode, the copper and brass in the radiator core.

Obviously, there is a very great range in the severity of the corrosive attack on radiator cores, depending upon the particular conditions involved. Thus, the corrosive attack will be very severe in a warm, humid climate in the immediate vicinity of chemical plants, oil fields and refineries, which emit fumes rich in the corrosive gases such as mentioned or others. On the other extreme, in a cool, dry climate in an open country area away from manufacturing areas and heavy traffic, the corrosive attack will be slight. However, radiators must be designed with the more severe conditions in mind since it is impossible to tell in advance the locale wherein a particular radiator may be used. Accordingly, the details of design of radiator cores, from the standpoint of their ability to withstand corrosive attack from gases in the air, is usually a judicious compromise based primarily upon past experience.

Briefly stated, the object of the present invention is the provision of inexpensive, disposable protective filter units for air-cooled radiator cores or similar heat exchangers and means for conveniently mounting the same thereon so that they may be readily removed and replaced as necessary.

Certain other objects of the invention will, in part, be obvious and will, in part, appear hereinafter.

For a more complete understanding of the nature and scope of the invention, reference may now be had to the following detailed description thereof taken in connection with the accompanying drawings, wherein:

Fig. 1 is a perspective view, partly broken away, showing a protective filter and means for mounting the same in

front of the radiator core of, for example, an automobile, truck or tractor radiator, in accordance with the present invention;

Fig. 2 is a sectional view taken on line 2—2 of Fig. 1, the radiator core being indicated in broken line; and

Fig. 3 is a detail sectional view taken on line 3—3 of Fig. 1.

In the drawings, the reference numeral 1 designates, generally, a radiator of conventional type such as might be found on the modern automobile, tractor or truck. Since the details of construction of such a radiator are well known and do not constitute a part of the present invention, the radiator 1 will not be described in detail. Briefly, it consists of a water tank 2, a frame 3 and a core 4.

A protective filter unit 5 made in accordance with the present invention is mounted in covering relationship over the front of the core 4 of the radiator 1 by means of a pair of side members 6 and 7 which are secured to the opposite sides of the radiator frame 3 as by rivets or screws 8—8.

The side members 6 and 7 are identical except that one is left-handed and the other is right-handed. Each of the supporting side members 6 and 7 has an inwardly turned vertical flange 10 and 11, respectively, extending along the front edge thereof and an inwardly turned horizontal bottom flange 12 and 13, respectively, on the bottom edge. The flanges 12 and 13 serve as bottom stops and supports for the protective filter unit 5, while the vertical flanges 10 and 11 provide guideways and lateral supports in cooperation with the front of the radiator 1 for receiving and retaining the filter 5. Thus, the filter 5 may be readily inserted and removed from its position in front of the radiator.

It will be understood that various other means may be provided for retaining the filter unit 5 in place over the core 4 of the radiator 1.

The protective filter 5 comprises a frame formed by top and bottom channel members 14 and 15, respectively, and side channel members 16 and 17, suitably joined at the four corners. These frame members, as well as the support members 6 and 7 previously mentioned, may be formed of inexpensive metal of suitable gauge, e.g. steel.

The frame of the filter 5 serves to retain the body of protective filter material which is indicated at 18. The filter material 18 is made from a metal which is more reactive (i.e. less noble) with respect to the gaseous impurities found in the air, than is the copper or brass of the radiator core. The following table from General Chemistry-Holmes lists the common metals in their descending order of activity (i.e. increasing order of nobility):

Potassium
Sodium
Barium
Strontium
Calcium
Magnesium
Aluminum
Manganese
Zinc
Cadmium
Iron
Nickel
Tin
Lead
Hydrogen
Copper
Mercury
Silver
Platinum
Gold

The higher up a metal is in this series, the greater its activity and the less noble it is.

From the practical commercial standpoint, zinc and zinc-base alloys constitute a good protective metal for use in making a filter **18**. However, any of the more active metals or more active alloys may also be used, depending upon their economic availiability. Whatever protective metal is used for making the filter **18**, it will be in a form such that large surface areas are exposed per unit weight of metal. Numerous thin edges are particularly effective. Thus, the metal may be in the form of thin strips which have been slit, extruded, bent, folded, gathered, corrugated or otherwise deformed to provide a maximum amount of surface and raw edges with a minimum amount of air resistance.

A number of machines and methods are known for converting metal stock into an opened-up or high surface area condition or form. In fact, it is already known to produce oil filters and other liquid filters from metals so as to have high surface area per unit of weight.

It will be understood that the protective metal need not be in a self-supporting condition but may be supported by means of a series of grids or wires such as indicated at **20—20** in Fig. 1. Such wires or grids do not increase the air flow resistance of the filter and yet serve to support and retain the filter material in place. By way of specific example, the protective filter may be formed of "zinc wool" which corresponds to ordinary steel wool which is sufficiently open to permit the proper air flow. Since iron is more reactive than copper, it would be possible to use steel wool itself as the protective insert or material for the filter **5**.

The shape and area of the protective filter **5** should be such as to at least completely cover the core of the radiator which is to be protected. If desired and practical, the protective filter may be made somewhat larger than the area of the core so as to provide a greater area of the filter with a reduced air velocity therethrough. The filter **5** should have a practical thickness, e.g. 1–3 inches, so as not to have excessive resistance to air flow and not exceed space requirements.

It will be apparent that the protective filters may be installed on either old or new radiators at low cost. Preferably, they should be so inexpensive that they can be disposed of and replaced just as in the case of the glass fiber filters in common use for home hot air heating plants.

In addition to protecting radiator cores from corrosive gases in the atmosphere, it will be seen that they also act as mechanical filters to remove foreign bodies such as insects and dirt from reaching the cores.

Since modifications in design and changes in detail may be made without departing from the spirit and scope of the invention, all matter described above or shown in the accompanying drawings is intended to be interpreted as illustrative and not in a limiting sense.

What is claimed as new is:

1. In combination with an air-cooled radiator having a radiator core formed of a corrodable metal, a protective filter unit therefor having at least approximately the same dimensions and area as the air-intake side of said radiator core so as to at least cover the same, and means for supporting said protective filter over said radiator core whereby the incoming air stream passes through said protective filter before passing through said radiator core, said protective filter comprising a mass of metal substantially more readily corroded than the metal of said radiator core and being in a relatively thick form wherein there is a relatively large surface of metal exposed for the weight of the protective metal and at least most of the incoming air comes into direct contact with the protective metal.

2. In combination with an air-cooled radiator having a radiator core formed of a corrodable metal, a protective filter unit therefor having at least approximately the same dimensions and area as the air-intake side of said radiator core so as to at least cover the same, a filter retention and support member mounted on each side of said radiator and projecting forwardly therefrom, each of said members having an inwardly turned vertical flange on the front edge thereof and an inwardly turned horizontal flange on the bottom thereof, said flanges serving to retain and support said filter unit in covering relationship in front of said radiator core, said protective filter comprising a frame filled with a filter mass of metal substantially more readily corroded than the metal of said radiator core and being in a relatively thick form wherein there is a relatively large surface of metal exposed for the weight of the protective metal and at least most of the incoming air comes into direct contact with the protective metal.

3. The combination called for in claim 1 wherein said radiator core is formed of a copper base metal and said protective filter is formed of zinc-base metal.

4. The combination called for in claim 2 wherein said radiator core is formed of a copper base metal and said protective filter is formed of zinc-base metal.

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