The invention relates to air-filters of the type used in air-conditioners.

Servicing air-conditioners which embody fiber-glass, or like filter medium, involves replacement of the parts thereof. In practice, it is desirable to expeditiously make the replacements. Air-conditioners of different capacities, shapes, design or make, have a wide diversity of dimensions for fitting in or extending across the passages in the housing through which the air is forced. This diversity in dimensions necessitates maintaining for prompt servicing an extensive stock of different sizes or rectangular shapes to fit and service filters in the different passages or conditioners.

One object of the invention is to provide a filter which is readily variable so that it will fit into and be usable to replace generally rectangular air-conditioners of many different dimensions.

Another object of the invention is to provide a filter which comprises separable sections of simple construction and which are easily and quickly adapted for installation in structures of different dimensions.

Other objects will appear from the detail description.

The invention consists in the several novel features which are hereinafter set forth and are more particularly defined by claims at the conclusion hereof.

In the drawings:

Fig. 1 is a plan view of an air filter exemplifying the invention;

Fig. 2 is a section taken on line 2—2 of Fig. 1;

Fig. 3 is a perspective view of the end of one of the side-panels;

Fig. 4 is a perspective view of the end of one of the cross-bars;

Fig. 5 is an inner side panel view illustrating the bulges on one end of one of the cross-bars; and

Fig. 6 is a plan view of one end of a cross-bar and a portion of a side-panel.

The invention is exemplified in a frame or structure for retaining or encasing a filter medium, such as a rectangular mass or panel 10 of fiber-glass and of a suitable area for extending across a passage in an air-conditioner. In practice, the dimensions of these passages vary for different capacities or for of different widths or heights for structural purposes in different air-conditioners. The filter-mass or panel must be replaced when deterioration results from use or the accumulation of dirt and dust. The retaining structure also occasionally requires replacement.

On account of the wide diversity of sizes used in air-conditioners of different capacities and in air-conditioners of different structure or designs, in the servicing or maintenance it is advantageous to provide a unit or frame which is readily adapted to be fitted into air-conditioners having passages of different sizes or widths and heights so that it is not necessary to keep in stock a wide range of sizes for prompt servicing or maintenance of the air-conditioner.

The filter-mass or panel 10 is rectangular and is retained encased flatwise in a frame which comprises a pair of mating sections 11 and 12. Each section includes a side-rail 13 of angular cross-section with a transverse outer flange 14 and an inward or face-flange 15.

The rails 13 are disposed at opposite sides of the frame-sections and are provided with the transverse flanges 14 on the outer sides thereof, and face-flanges 15 which are parallel and extend inwardly from the side-flanges 14 at the opposite faces of the frame and in planes spaced apart transversely of the frame to provide a space between the flanges 15 for confining the filter-mass sidewise between the flanges 14 for sidewise confining the mass. Each frame-section also includes a series of spaced parallel cross-bars 16 having one of their ends integral with the rail 13 at one side of one frame-section and extended across the frame for detachable connection to the rail 14 on the other frame-section at the opposite side of the frame.

The cross-bars 16 on the frame-section 11 are fixedly attached to the inner face of the flange 15 of that section and extend across the frame for interfiting detachable connection with flange 14 of the opposite side-rail on section 12. The cross-bars 16 on frame-section 12 are fixedly attached to the inner face of flange 15 of the side-rail 14 of the frame-section 12 and extend across the frame for interfiting detachable connection with the side-flange 14 of the opposite side-rail on section 11. The inner faces of the cross-bars engage the outer faces of the filter-mass 10 and are adapted to confine the mass transversely in the frame. The side-edges of the filter-mass are confined sidewise between the flanges 14 on the opposite side-rails of the frame-sections.

The connections between the cross-bars 16 and the side-rails are adapted to secure the rails different distances apart to conform the flanges 14 of the side-rails to fit around or for filter-masses or sheets of different widths. Each of these connections comprises a series of convex bulges 18 along the sides of one end of each cross-bar 16 which fit detachably in sockets 17 in the free edge of a flange 14 of an adjacent side-rail. Bulges 18 have convex and tapered sides and sockets 17 have concave and tapered sides conformationally and interfiting with the bulges 18 to form interlocking and wedging engagement between the bars and the rails for securely and inherently detachably and firmly connecting the bars and rails of the frame-sections together. By transposing the bulges of each series in the sockets 17, the bars of the frame-sections will be extended to secure the side-rails in variably spaced relation sidewise of the frame conformably to filter-masses of different widths. By relative transverse movement of the cross-bars 16 and sockets 17 in flanges and reinserting the different bulges in the sockets in the cross-bars, the sidewise spacing of the rails can be readily varied to fit filter-masses of different widths. The tapered bulges 18 have a wedge fit into the sockets 17 and tightly and frictionally secure the cross-bars in the rails and to positively interlock the cross-bars and rails in assigned sidewise spaced relation. The convex bulges permit rather slight adjustment of the cross-bars in the rails. The housing of the air-conditioner usually confines the frame-sections against transverse separation.

The sections of the frame are each integrally formed in entirety of suitable plastic, such as polystyrene, so that each section has integral side-rails, cross-bars and extendable interfitting connections. The ends of the cross-bars which project from the outer sides of the rails when they are contracted to fit around a filter-mass of relatively narrow width, may be readily severed between the bulges.
and from the bars respectively when made of such plastic material. The bars may be calibrated as to guide the worker in placing the cross-bars at the desired side-wise spacing. The bars, being formed of plastic, are also adaptable at the ends of the rails forming side rails for bars of different widths and heights. When the sections are assembled, the cross-bars form a retainer for filter medium. To fit the frame-unit in air-conditioners of narrower width, the bulges at the ends of the cross-bars are interlocked with sockets so that the side rails will space side rails side-wise to conform to the narrow filter-mass and so its edges will fit between flanges.

When the frame-sections are separated transversely the filter-mass can be readily placed between the cross-bars, and side-wise between the flanges of the side-rails. When the frame-sections are then secured together by locking the bulges at the opposite ends of said bars in the adjacent side-rails the projecting ends of the cross-bars may be severed therefrom.

When it is desired to fit the frame to an air-conditioner of less height, the ends of the side-rails may be severed to reduce their height for conformably to the shorter filter-mass, as guided by the calibrations and so severing may include one or more cross-bars if necessary. The rails being of plastic, are easily severable by a suitable cutting tool for this purpose.

The invention exemplifies a frame for an air filter which is formed of sections with integral cross-bars which are readily adapted to secure the rails in different side-wise spacing for filters of different widths and side rails which are severable for filters of different heights. The sections are formed of integral parts and can be produced at a low cost.

The invention is not to be understood as restricted to the details set forth since these may be modified within the scope of the appended claims without departing from the spirit and scope of the invention.

Having thus described the invention what I claim as new and desire to secure by Letters Patent is:

1. A substantially rectangular frame for replaceably retaining a filter mass, comprising: a pair of mating frame-sections including rails at opposite sides, respectively, a series of cross-bars having one end fixedly secured to one of the rails, a second series of cross-bars having one of their ends secured to the opposite side-rail, and detachably interfitting means between the opposite ends of the bars of the series and the adjacent rails, respectively, for securing the rails spaced apart side-wise conformably to masses of different widths, the series of bars being transversely spaced apart and forming a grill for confining the mass between them.

2. A substantially rectangular frame for retaining a filter mass, comprising: a pair of mating frame-sections including rails at opposite sides; respectively, a series of cross-bars having one end integral with one of the rails, a second series of cross-bars having one of their ends integral with the opposite side-rail, the bars forming a grill for the mass, and detachably interfitting means between the opposite ends of the bars of the series and the adjacent rails, respectively, for securing the rails spaced apart side-wise conformably to masses of different widths, the ends of the bars being severable conformably to the side-wise spacing of the rails.

3. A substantially rectangular retaining frame for a filter mass, comprising: a pair of mating frame-sections of plastic material including rails forming opposite frame sides, respectively, a series of cross-bars having one end integral with one of the rails, a second series of cross-bars having one of their ends integral with the opposite side-rail, the bars forming a grill for said medium, and detachably interfitting means between the opposite ends of the bars of each series and the adjacent rails, respectively, for securing the rails spaced apart side-wise conformably to masses of different widths, the series of bars being transversely spaced apart for confining the mass between them, the ends of the bars being severable conformably to the side-wise spacing of the rails.

4. A substantially rectangular retaining frame for a filter mass, comprising: a pair of mating frame-sections of plastic material including rails forming opposite frame sides, respectively, a series of cross-bars having one end integral with one of the rails, a second series of cross-bars having one of their ends integral with the opposite side-rail, the bars forming a grill for said medium, and detachably interfitting means between the opposite ends of the bars of each series and the adjacent rails, respectively, for securing the rails spaced apart side-wise conformably to masses of different widths, the series of bars being transversely spaced apart for confining the mass between them, the ends of the bars being severable conformably to the side-wise spacing of the rails.

5. A substantially rectangular frame for retaining an air filter-medium, comprising: a pair of mating frame-sections having rails at opposite sides of the frame, respectively, a series of substantially parallel cross-bars having one of their ends fixedly secured to one of the rails, a second series of substantially parallel cross-bars offset relatively to the other series having one of their ends secured to the opposite side-rail, and means including detachably interfitting elements between the opposite ends of the bars of both said series and the adjacent side-rails for securing the rails variably spaced apart side-wise conformably to media of different widths, said bars being spaced apart transversely and forming a grill for confining the medium between them.

6. A substantially rectangular retaining frame for a filter mass, comprising: a pair of mating frame-sections including rails at opposite sides of the frame, respectively, of angular cross-section and outer side and inward flanges, a series of cross-bars having one end fixedly secured to the inward flange of one of the rails, a second series of cross-bars having one of their ends secured to the inward flange of the opposite side-rail, and detachably interfitting means between the opposite ends of the bars of each series and the outer side flanges of adjacent rails, respectively, for securing the rails spaced apart side-wise conformably to masses of different widths, the bars being transversely spaced apart and forming a grill for confining the mass between them, the ends of the bars being severable conformably to the side-wise spacing of the rails.

7. A substantially rectangular frame for retaining a filter unit, comprising: a pair of mating frame-sections having rails at opposite sides of the frame, respectively, a series of cross-bars having one end fixedly secured to one of the rails, a second series of cross-bars having one of their ends secured to the opposite side-rail, the bars forming a grill for the mass, and detachably interfitting convex and concave elements between the opposite ends of the bars of each series and the adjacent rails for securing the rails variably spaced apart side-wise conformably to media of different widths, said bars being spaced apart transversely and forming a grill for confining the medium between them.

8. A substantially rectangular retaining frame for an air filter-medium, comprising: a pair of mating frame-sections having rails at opposite sides of the frame, respectively, a series of cross-bars having one end fixedly secured to one of the rails, a second series of cross-bars having one of their ends secured to the opposite side-rail, the bars forming a grill for the mass, and detachably interfitting means between the opposite ends of the bars of each series and the adjacent rails for securing the rails variably spaced apart side-wise conformably to media of different widths, said bars being spaced apart transversely and forming a grill for confining the medium between them.
sections including rails at opposite sides of the frame, respectively, having sockets therein, a series of cross-bars having one end fixedly secured to one of the rails, a second series of cross-bars having one of their ends secured to the opposite side-rail, and means including integral bulges between opposite ends of the bars of each series and said sockets, in the adjacent rails, for detachably and extensively connecting the rails spaced apart sidewise conformably to media of different widths, the bars being transversely spaced apart and forming a grill for confining the medium between them.

9. A substantially rectangular retaining frame for an air filter-medium, comprising: a pair of mating frame-sections including rails at opposite sides of the frame, respectively, having sockets therein, a series of cross-bars having one end fixedly secured to one of the rails, a second series of cross-bars having one of their ends secured to the opposite side-rail, and means including integral bulges between opposite ends of the bars of each series and said sockets, in the adjacent rails, said bulges and sockets having wedge-engagement for detachably and extensively connecting the rails spaced apart sidewise conformably to media of different widths, the bars being transversely spaced apart and forming a grill for confining the medium between them.

10. A substantially rectangular frame for retaining a filter-unit, comprising: a pair of mating frame-sections having rails at opposite sides of the frame, respectively, a series of cross-bars having one end fixedly secured to one of the rails, a second series of cross-bars having one of their ends secured to the opposite side-rail, and means including detachably interfitting wedge-elements between the opposite ends of the bars of each series and the adjacent rails for securing the rails variably spaced apart sidewise conformably to media of different widths, said bars being spaced apart and forming a grill for transversely confining the medium between them.

11. A substantially rectangular frame for retaining a filter-unit, comprising: a pair of mating frame-sections having rails at opposite sides of the frame, respectively, a series of cross-bars having one end fixedly secured to one of the rails, a second series of cross-bars having one of their ends secured to the opposite side-rail, and means including detachably interfitting wedge-elements between the opposite ends of the bars of each series and the adjacent rails for securing the rails variably spaced apart sidewise conformably to media of different widths, said bars being spaced apart and forming a grill for transversely confining the medium between them, the bars being formed of plastic material and severable at the wedges to remove ends thereof projecting from the side-rails.

12. A rectangular frame for retaining a filter-mass, comprising: a pair of mating frame-sections including rails at opposite sides of the frame, respectively, of angular cross-section with outer side and cross-sectional flanges, a series of cross-bars having one end fixedly secured to the inward flange of one of the rails, a second series of cross-bars having one of their ends secured to the inward flange of the opposite side-rail, the cross-flanges being on opposite faces of the frame and the outer side flanges extending in opposite directions transversely, and detachably interfitting means between the opposite ends of the bars of each series and the opposite edges of the outer side flanges of adjacent rails, respectively, for securing the rails spaced apart sidewise conformably to masses of different widths, the bars being transversely spaced apart to form a grill for confining the mass between them, the ends of the bars being severable to conform to the sidewise spacing of the rails.

13. A rectangular retaining-frame for an air filter-medium, comprising: a pair of mating frame-sections having side-rails of angular cross-section with outer side and inward flanges at opposite sides of the frame, a series of cross-bars having one end fixedly secured to one of the rails, a second series of cross-bars having one of their ends secured to the opposite side-rail, and interfitting means between the opposite ends of the cross-bars of each series and the outer side flanges of adjacent rails, respectively, for variably securing the rails spaced apart sidewise to encase media of different widths, the bars being transversely spaced apart to form a grill for retaining the medium between them.

14. A rectangular retaining-frame for an air filter-medium, comprising: a pair of mating frame-sections having side-rails of angular cross-section with outer side and inward flanges at opposite sides of the frame, a series of cross-bars having one end fixedly secured to one of the rails, a second series of cross-bars having one of their ends secured to the opposite side-rail, and interfitting means between the opposite ends of the cross-bars of each series and the outer side flanges of adjacent rails, respectively, for variably securing the rails spaced apart sidewise to encase media of different widths, the bars being transversely spaced apart to form a grill for retaining the medium between them, the sections being formed of plastic material, the ends of the rails being severable to conform the sections for frames of different lengths.

15. A substantially rectangular retaining-frame for an air filter-medium, comprising: a pair of mating frame-sections having side-rails of angular cross-section with outer side and inward flanges at opposite sides of the frames, a series of cross-bars having one end fixedly secured to one of the rails, a second series of cross-bars having one of their ends secured to the opposite side-rail, and interfitting means between the opposite ends of the cross-bars of each series and the outer side flanges of adjacent rails, respectively, for variably securing the rails spaced apart sidewise to encase media of different widths, the bars being transversely spaced apart to form a grill for retaining the medium between them, the sections being formed of plastic material, the ends of the rails and the cross-bars being severable to conform to frames of different length and width.

References Cited in the file of this patent

UNITED STATES PATENTS

<table>
<thead>
<tr>
<th>Patent Number</th>
<th>Inventor</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>2,118,271</td>
<td>Slayer</td>
<td>May 24, 1938</td>
</tr>
<tr>
<td>2,175,903</td>
<td>Lichtman</td>
<td>Oct. 10, 1939</td>
</tr>
<tr>
<td>2,393,419</td>
<td>Schaff</td>
<td>Jan. 22, 1946</td>
</tr>
<tr>
<td>2,664,172</td>
<td>Butterfield</td>
<td>Dec. 29, 1953</td>
</tr>
<tr>
<td>2,789,663</td>
<td>Camp</td>
<td>Apr. 23, 1957</td>
</tr>
</tbody>
</table>