

Oct. 7, 1969

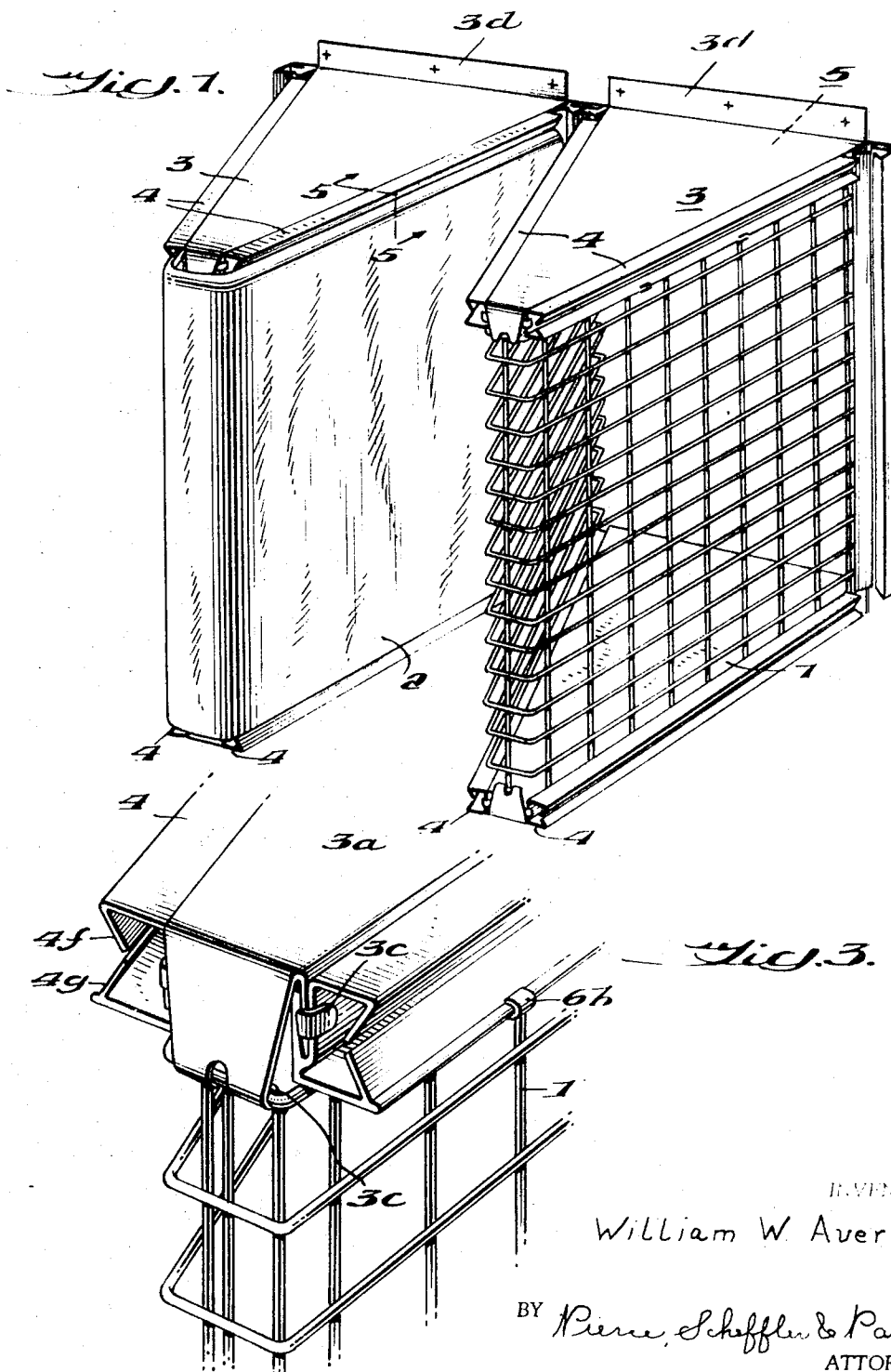
W. W. AVERA

3,470,680

AIR FILTER

Filed June 10, 1966

3 Sheets-Sheet 1



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3 Sheets-Sheet 2

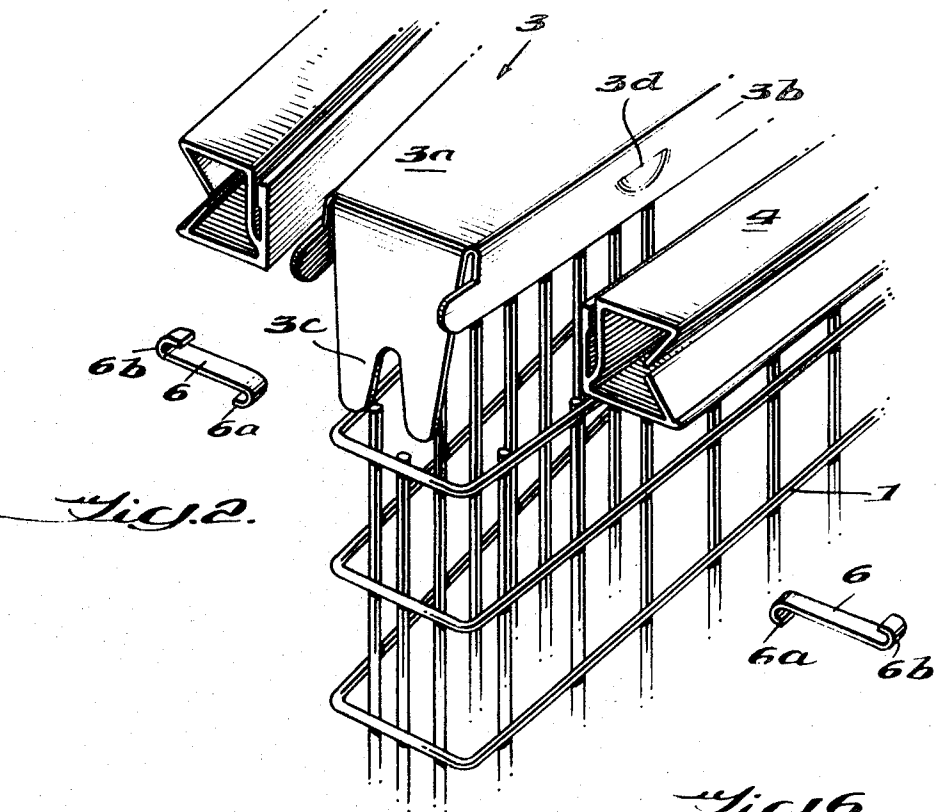
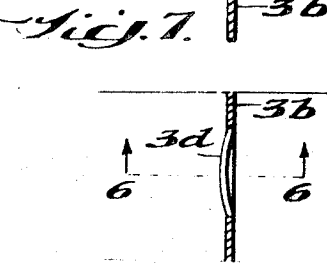
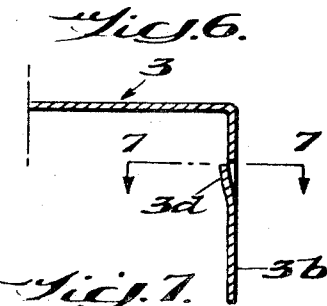
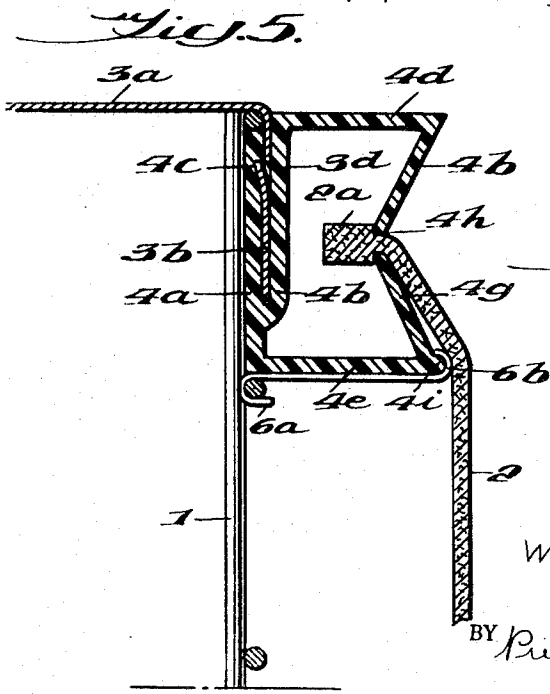


Fig. 2.



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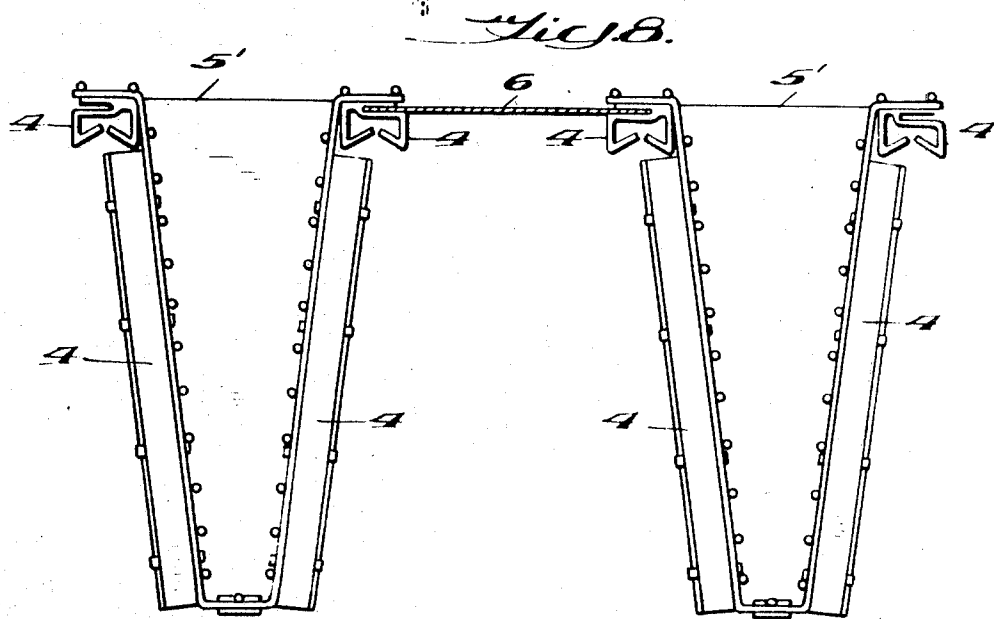
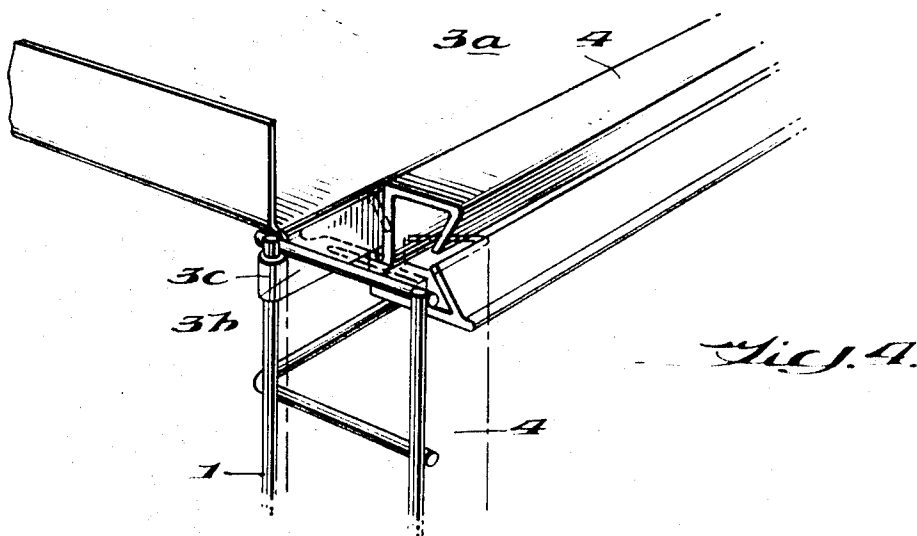
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AIR FILTER

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1 Claim

ABSTRACT OF THE DISCLOSURE

An air filter cell comprises a sheet of hardware cloth having a V-configuration to which is applied a filter mat. The opposite ends of the V are closed off by substantially triangular shaped sheet metal caps having side flanges and the filter mat is held in place on the exterior surface of the hardware cloth by means of retainer strips to which the edges of the mat are secured, the retainer strips being in turn secured to the side flanges of the caps.

The present invention relates to air filters and more particularly to such filters as include a mat of filter material through which the air is passed for cleaning.

In accordance with a principal object of the invention, the improved filter construction features a frame made to the desired configuration from hardware cloth of fairly coarse mesh. Caps made from sheet metal and which are secured to the frame by means of bent-over tabs extend along boundaries of the frame to establish longitudinally spaced points of attachment for specially configured strips, and the mats of filter material are secured all along their edge portions within these strips by force insertion of the edge portions of the mats into gaps formed between the edges of confronting flanges which extend along the strips. These flanges preferably have a backward slope so as to establish a better grip on the filter mat and thereby hold the same more securely in place. In accordance with another feature of the invention, the filter mat retaining strips are attached along the length of the sheet metal caps in a novel and simple manner by an interlocking connection between a side flange on the cap and an especially configured slot in the mat retainer strip.

The foregoing as well as other objects and advantages inherent in the invention will become more apparent from the following detailed description of suitable embodiments of the improved filter and from the accompanying drawings wherein:

FIG. 1 is a view in perspective of the filter, this being a dual V-shaped filter cell arrangement;

FIG. 2 is an exploded view at a larger scale of the apex portion of one of the V-shaped filter cells showing structural details of various parts of the filter prior to assembly;

FIG. 3 is a view similar to FIG. 2 but showing the filter parts after assembly;

FIG. 4 is a perspective view of a part of one of the filter cells showing structural details;

FIG. 5 illustrates in section at an enlarged scale the principal structural details of one of the filter caps and the means by which the retaining strip for a border portion of the filter mat is secured in place on a side flange of the cap;

FIGS. 6 and 7 are sectional views on lines 6-6 and 7-7 showing the configuration of the longitudinally spaced slits provided along the side flanges of the cap which serve to secure in place the retaining strip for the filter mat; and

FIG. 8 is a top plan view showing a somewhat modified dual V-cell filter construction wherein the two cells are

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spaced somewhat apart and each is associated with a separate air pass-through opening in a wall as distinguished from the arrangement shown in FIG. 1 wherein both V-cells are located in side-by-side relation and a single opening provided in the wall serves both filter cells.

With reference now to the drawings, the improved filter structure is comprised of one or more V-cells, there being two of such cells in the illustrated embodiments of the invention, and each cell consists principally of a foraminous supporting frame 1 upon which is mounted a filter mat 2. The supporting frame 1 is preferably made from a sheet of hardware cloth having a suitably large mesh size such as, for example, 1" x 1". The gauge of the wire should be large enough to establish suitable stability against accidental deformation and a wire size of from 1/16" to 1/8" is suitable.

After the hardware cloth has been bent to the desired V-shaped configuration, a substantially triangular sheet metal cap 3 is then located between the legs of the "V" formed by the hardware cloth at the top and bottom ends of the frame 1 for the purpose of closing off these ends against passage of air through them. Each cap includes a top wall 3a and side flanges 3b which extend along each side of the frame. Each of the sheet metal caps 3 when stamped out is provided with a plurality of tabs 3c which are used to secure the caps in place on the frame. Those tabs 3c at the apex ends of the V-shaped frames are shown in FIGS. 2 and 3, FIG. 2 showing the tabs prior to bending around adjacent wires of frame 1, and FIG. 3 showing the tabs after bending. Similar tabs, shown in FIG. 4 are provided at the opposite end of the caps 3.

Spaced along each of the flanges 3b are a plurality of slits, the upper edges 3d of which are depressed inwardly and arcuately as shown in FIGS. 6 and 7 to establish an interlocking engagement with a retainer strip 4 which serves to hold the filter mat 2 in place on the hardware cloth frame 1. The end of each strip 4 is also secured by a bent-over tab 3c on cap 3. The retainer strip 4 which is preferably made by extrusion of a plastic material includes a back wall constituted by two wall members 4a, 4b joined at the bottom but separated at the top to establish therebetween a longitudinally extending open groove. The divided back wall 4a, 4b of the retainer strip is pushed onto the side flange 3b until the position shown in FIG. 5 is reached, whereupon a shoulder portion 4c on the back wall 4a snaps into place over the upper edges 3d of the slits spaced along the side flange thus locking the retainer strip 4 in its proper position on frame 1.

In addition to the dual back walls 4a, 4b, each retainer strip includes parallel spaced side walls 4d and 4e and front flanges 4f, 4g which extend towards each other at an obtuse angle raked rearwardly. These front walls or flanges 4f, 4g terminate in spaced relation to establish a small gap 4h through which is inserted the marginal portion 2a of the filter mat 2. The width of gap 4h is less than the thickness of the mat so as to force the front flanges apart as the mat is inserted thus producing a pinching effect on the mat following insertion, due to the resilient and flexible characteristic of the plastic from which the retainer strip is formed. Since the filter mat 1 is essentially a felted fibrous product, these marginal portions of the mat become self-locking in the strips 4 following insertion due to the backwardly i.e. inwardly inclined attitude of the front flanges 4f, 4g, it being obvious that any forces exerted on the mat tending to withdraw the marginal portions will be accompanied by a forward pull on the front flanges 4f, 4g tending to move the confronting edges of these flanges even closer together thus further narrowing the gap therebetween and thereby increasing the pinching effect on the mat.

As shown in FIG. 1, retainer strips 4 for the filter mat 2 extend along the base of the V-shaped hardware cloth frame 1 which in the illustrated application, stands vertically since the wall opening 5 through which the air passes after filtering also vertical, and they also extend along the top and bottom edges of the frame. Since the filter mat 2 is wrapped around the apex end of the frame, the three strips 4 at each side of the V-frame furnish all the support necessary to hold the filter mat in place on its frame.

As an added security for the filter mat retainer strips, one may employ a plurality of metal clips 6 with reverse bends 6a, 6b at the opposite ends and which are spaced along the strip 4. Bend 6a is clamped over one of the wires of frame 1 and the opposite bend 6b is snapped into place over a ledge 4i extending along the bottom of the strip.

As is evident from an inspection of FIG. 1, each of the two filter mats 2 is secured to its supporting V-frame by three retainer strips 4 at each side thereof, and the mat is continuous around the apex of the frame. In the FIG. 1 embodiment, the two V-frames are arranged in side-by-side relation and the cap of each frame is provided with a flange 3d along the base edge so as to enable the frame to be secured in place to the wall having the air pass-through opening 5. Since the two V-frames are located side by side, the wall opening 5 is continuous for the combined width of the two filter frames.

The embodiment illustrated in FIG. 8 differs from that of FIG. 1 only by the fact that the two V-type filter frames are spaced laterally from one another to establish laterally separated air pass-through openings 5' separated by a partition 6, the sides of which are received in the confronting grooves formed between the double back walls 4a, 4b of the vertically extending retainer strips 4 located at the base part of each frame.

I claim:

1. In an air filter, the combination comprising a sheet of hardware cloth having a V-configuration, a pair of substantially triangular sheet metal caps provided with side flanges, said sheet metal caps being located respectively between the sides of the V formed by the hardware cloth at each end thereof and which close off those ends against passage of air therethrough, said side flanges extending over and adjacent the sides of the V-shaped sheet along the edge portions of the latter and being provided with a plurality of longitudinally spaced slits establishing laterally offset edges, filter mat retaining strips extending along said side flanges of said end caps said retaining

strips being made from a yieldable plastic material and each said retaining strip being constituted by a channel member having back, side and front walls, said back wall being constituted by two spaced wall members establishing a narrow groove therebetween and in which one of said side flanges is received, one of said two wall members of said back wall being provided with a longitudinally extending shouldered portion which snaps into place over said laterally offset edges of said longitudinally spaced slits in said side flange when said side flange is fully inserted in said groove thereby to secure said retaining strip in place on said side flange, said front wall of each said retaining strip including a longitudinally extending gap established between the edges of two rearwardly raked flanges, and a filter mat covering the exterior surface of said hardware cloth sheet, the border portions of said mat being inserted into said longitudinally extending gaps provided in said front walls of said retaining strips and being retained therein by said rearwardly raked flanges.

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