

Aug. 6, 1946.

V. DAHLMAN

2,405,293

OPEN-FACED AIR FILTER FRAME

Filed April 7, 1944

2 Sheets-Sheet 1

Fig. 1

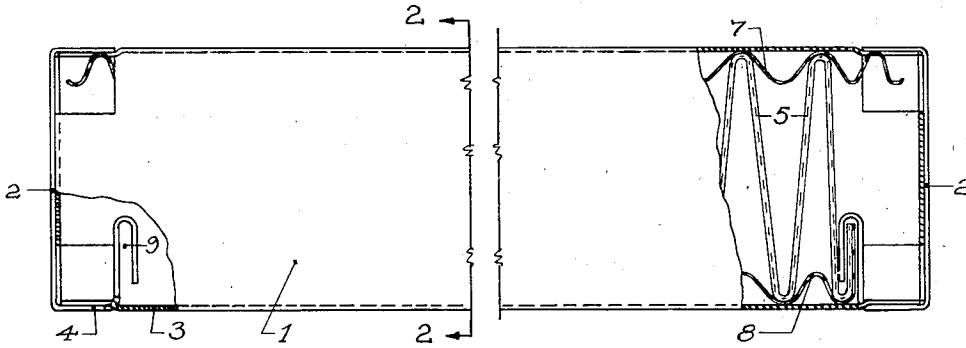


Fig. 2

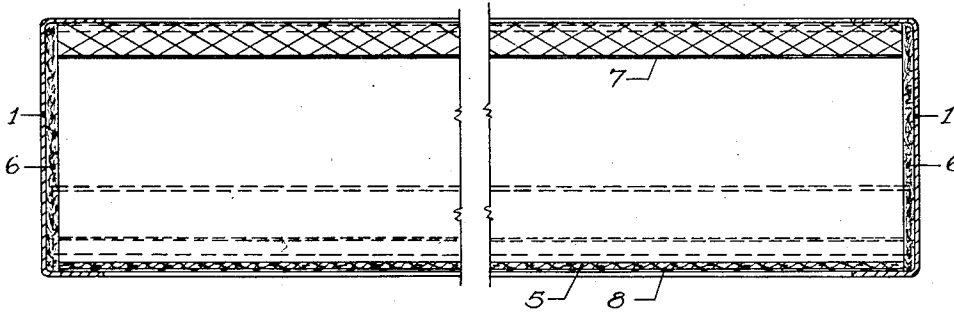
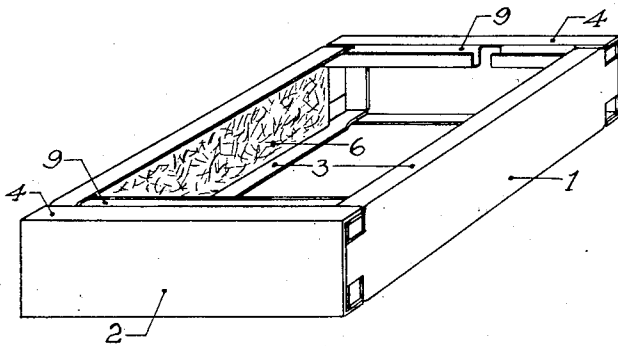


Fig. 3



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Fig. 4

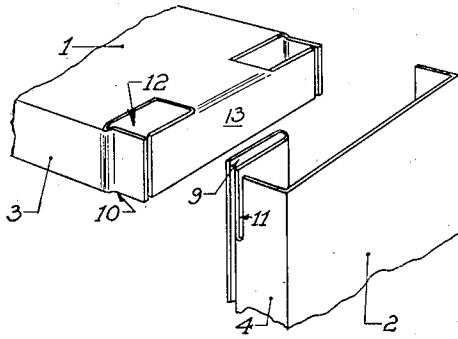


Fig. 5

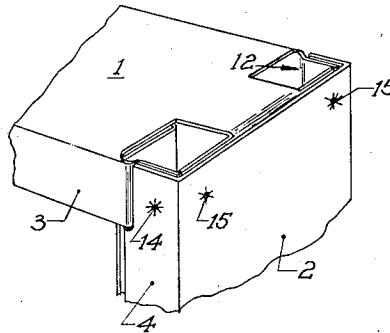


Fig. 6

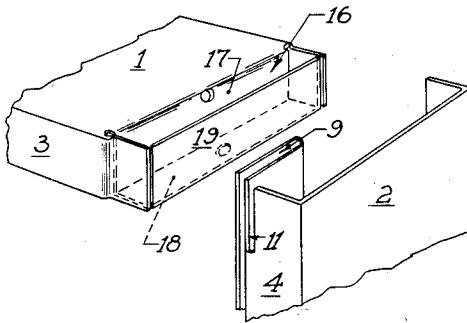


Fig. 7

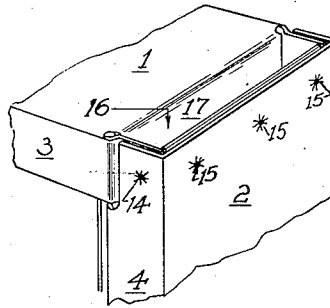


Fig. 8

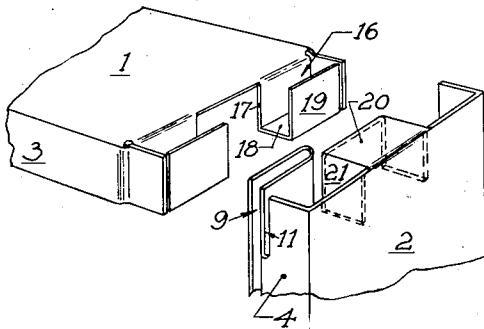
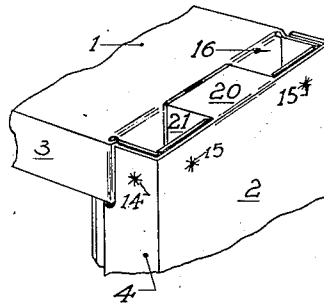


Fig. 9



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UNITED STATES PATENT OFFICE

2,405,293

OPEN-FACED AIR FILTER FRAME

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Application April 7, 1944, Serial No. 529,978

5 Claims. (Cl. 183—71)

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This invention relates to permanent air filter cells of the type wherein a filter medium is housed within an open face frame composed of U-shaped frame members forming peripheral side and end walls and face flanges on each wall. In this type of filter, the frame is more or less assembled around the filter medium and, upon the completion of the assembly, the frame members are united at the corners. In some cases, the face flanges overlap at the corners to form corner face lap joints which are spot welded by compressing the filter medium sufficiently to permit the corner lap joint to be engaged on both sides by the spot welding equipment. Where the filter medium cannot be compressed, without being deformed, the face flanges are mitred at the corners and secured by a brazing operation.

In the present case, the frame houses a deformable and combustible corrugated filter medium. Since this medium is combustible, the corners of the frame cannot be brazed. It is therefore desirable to employ corner lap joints and secure them by spot welding, but this is difficult because the filter medium cannot be compressed without permanent deformation. Hereofore, where the use of a deformable and combustible corrugated filter medium was desired, these difficulties have compelled the use of some special type of frame.

The principal object of the present invention is to provide a frame of the corner lap joint type which may be easily and quickly assembled around a deformable and combustible corrugated filter medium and its corner lap joints readily spot welded.

The invention is illustrated in the accompanying drawings wherein:

Fig. 1 is an elevational view looking at one side of an air filter cell embodying the invention, this side being partly broken to show the interior construction;

Fig. 2 is a section along line 2—2 of Fig. 1;

Fig. 3 is a perspective view of the open faced frame alone with the securing trough at one end broken for the sake of clearness;

Figures 4 and 5 are perspective views of the frame members forming one corner of the frame, these members being shown unassembled and assembled respectively;

Figures 6 and 7 are similar to Figures 3 and 4 but show a modified corner construction; and

Figures 8 and 9 are also similar views of another modification.

The filter cell illustrated includes an open faced frame having peripheral side walls 1 and

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end walls 2 with face flanges 3 and 4 on the side and end walls respectively, the face flanges being bent inwardly across the margins of each face of the unit. In other words, U-shaped channel members for the side and ends of the frame with their bights functioning as peripheral walls and their sides as face flanges.

The filter medium 5 is in the form of a combustible, deformable sheet which extends in corrugated fashion between the end walls of the frame so that its straight end edges extend adjacent the ends of the frame while its corrugated side edges extend along the side walls of the frame, these side edges being sealed in any suitable way as, for example, by their engagement with side felts 6 secured to the inner face of the side walls 1. By deformable, is meant a sheet which can be bent to corrugated form and when bent will retain such form. Any of the well known deformable media may be employed, the medium 5 shown consisting of a fourteen mesh wire screen covered on both sides by cotton or rayon fibers or flock which is adhesively secured to the screen in the manner indicated in U. S. Patent No. 1,886,927, or otherwise.

The corrugations of the filter medium may be held in proper space relationship, along each face of the cell, by means of corrugated coarse wire screens 7 and 8. The corrugations of the wire screens shown have the same pitch as the filter medium corrugations but a much shallower amplitude. Each screen is positioned so that the successive crests of the filter medium, adjacent one face of the cell, nest within successive valleys on the inner face of the screen but the crest-receiving valleys of one screen are offset from the corresponding valleys of the other screen. The screens may be fixed in position in any suitable manner as by placing their corrugated side edges in firm contact with the side sealing felts 6.

In accordance with my invention, the straight end edges of the filter medium are inwardly spaced from opposite end walls of the cell and sealed along the transverse edges of opposite face flanges 4 lying along one face of the cell so that each end wall and its face flanges define, within the frame, an end space communicating with the space on one side only of the filter medium, and, at least one wall, and preferably each wall of either pair of opposed peripheral walls, is arranged to provide, at the end space, one or more corner openings exposing the inner face of the corner lap joints sufficiently to permit a spot welding electrode to be placed into engagement with such inner faces for spot welding purposes.

In other words, the end spaces permit the use of spot welding access openings at the corners of the frame without permitting air to by-pass the filter medium, it being understood, of course, that the frame of the filter cell will be held against appropriate sealing means when placed in service.

Any suitable arrangement may be employed for sealing the straight end edges of the filter medium along the transverse edges of opposed end wall face flanges 4 lying along one face of the cell. For example, in the arrangement illustrated the transverse edges of such opposed flanges 4 are provided with reversely bent members extending from the transverse edge of the flanges 4 inwardly into and thence outwardly from the interior of the cell to form U-shaped sealing and securing troughs 9 at opposite ends of the adjacent face of the cell, the inwardly and outwardly extending portions of these troughs being more or less parallel to the end walls. The straight end edges of the filter medium 5 will, of course, be sealed by their securement in the troughs. In addition, the ends of the adjacent corrugated face screen 8 may be arranged to extend in and be clamped by the troughs 9. With the filter medium thus secured, it will be seen that each end wall defines an end space, which has open communication with that face of the cell protected by the screen 7 and thus is in open communication only with the space along one side of the filter medium.

The corner openings are formed at opposite ends of each wall of one pair of opposed peripheral walls and, while these may be end walls, they preferably are side walls. Since the manner in which the openings are formed at one corner will demonstrate how they may be formed at the other corners, only one corner construction is herein described.

Figures 4 and 5 conventionally illustrate one corner of the frame wherein: the end portions of the side wall flanges 3 are offset inwardly at 10; and a slot 11 is formed between the end portion of the end wall flange 4 and the trough 9 secured to it. When the corner is assembled, the offset ends of flanges 3 fit within the ends of flanges 4 and overlap such flanges to form corner lap joints at opposite faces of the cell, one of the side wall flanges 3 passing through the slot 11. In this way, the adjacent ends of the flanges 3 and 4, along both faces of the cell, overlap to form the corner lap joint.

In further accordance with the invention, the side wall 1 is arranged to provide, at the corner of the frame, one or more openings 12, two being shown, exposing the inner face or faces of the corner lap joint sufficiently to permit opposed inner and outer faces of that joint to be engaged by the spot welding equipment. With two openings, the side wall may be extended around the openings and the extension turned inwardly to form a terminal flange 13 positioned to overlap the end wall 2 and thereby extend the corner lap joint along the periphery of the cell. In welding the corner lap joint, its face and peripheral portions, which are exposed by opening 12 adjacent one face of the cell are successively engaged by the spot welding equipment to form the spot welds indicated at 14 and 15 respectively, whereupon the other portions of the same joint, which are exposed by the other opening 12, may be similarly welded.

In the modification shown in Figures 6 and 7, a single opening 16 exposing all portions of the corner lap joint, is provided by bending the end of the side wall 1 to form an outwardly open

channel also designated by the numeral 16 which fits within the end space between trough 9 and the end wall 2. This channel has a laterally extending wall 17 adjacent the trough, a bight wall 18, and a terminal wall 19 adjacent the end wall. If desired, the opening 16 of the channel may be provided with a block of sealing material completely filling the opening to facilitate the sealing of the frame along its periphery when the cell is placed in service.

In the modification shown in Figures 8 and 9, a channel 16 having lateral, bight and terminal walls 17, 18, and 19, as in Figures 6 and 7, is provided, but the central portion of this channel is removed. The openings formed by the removal of the central portion of such channel may be closed by a channel member formed on the end wall to provide a bight 20 along the peripheral face of the side wall and lateral walls 21 extending inwardly through the opening 16 sufficiently to close the central portion of that opening. In this way the bight 20 provides a surface which facilitates the sealing of the periphery of the frame at the corner.

Having described my invention, I claim:

1. An open-faced air filter frame for a filter medium having opposite end edges comprising: U-shaped frame members forming peripheral side and end walls and face flanges on each wall, the flanges at each face of the frame overlapping at the corners to provide corner lap joints; and means for sealing the opposed end edges of the filter medium along opposed transverse edges of the face flanges adjacent one face of the cell so that each end space, defined within the frame by each end wall and its flanges, communicates with the space on one side of a secured filter medium; at least one peripheral wall being arranged to provide an opening at one end, exposing the inner face of the adjacent corner lap joint sufficiently to permit opposed inner and outer face portions of the lap joint to be engaged by spot welding equipment.

2. The frame of claim 1 wherein the peripheral wall providing the opening extends around the opening and overlaps the adjoining peripheral wall adjacent the opening to extend the exposed corner lap joint across the periphery of the cell.

3. An open-faced air filter frame for a filter medium having opposite end edges comprising: U-shaped frame members forming peripheral side and end walls and face flanges on each wall, the flanges at each face of the frame overlapping at the corners to provide corner lap joints; and means for sealing the opposed end edges of the filter medium along opposed transverse edges of the face flanges adjacent one face of the cell so that each end space, defined within the frame by each end wall and its flanges, communicates with the space on one side of a secured filter medium; at least one peripheral wall being arranged at one end to form an outwardly open channel which fits within the end space adjacent the corner, the opening of the channel exposing the inner faces of the adjacent corner lap joint sufficiently to permit opposed inner and outer faces of the lap joint to be engaged by spot welding equipment.

4. The frame of claim 3 wherein the channel forming portion of said wall extends inwardly across its face flanges and thence along its face flanges to the adjacent peripheral wall and thence outwardly along said adjacent peripheral wall not only to form said channel but also to extend

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the exposed corner lap joint across the periphery of the cell.

5. An open-faced air filter frame for a filter medium having opposite end edges, comprising: U-shaped frame members forming peripheral side and end walls and face flanges on each wall, the flanges at each face of the frame overlapping at the corners to provide corner lap joints and the opposed transverse edges of the end wall face flanges adjacent one face of the frame forming sealing edges; and a reversely bent member secured to each sealing edge to extend inwardly into and thence outwardly from the interior of the frame to form, along said one face of the frame,

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U-shaped sealing and securing troughs for the end edges of a secured filter medium so that each end space, defined within the frame by each end wall and its flanges, communicates with the space on one side of a filter medium secured in said troughs; one pair of opposed peripheral walls being arranged to provide one or more openings at each of its ends exposing the inner face of each adjacent corner lap joint sufficiently to permit opposed inner and outer face portions of the lap joint to be engaged by spot welding equipment.

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