

Aug. 31, 1926.

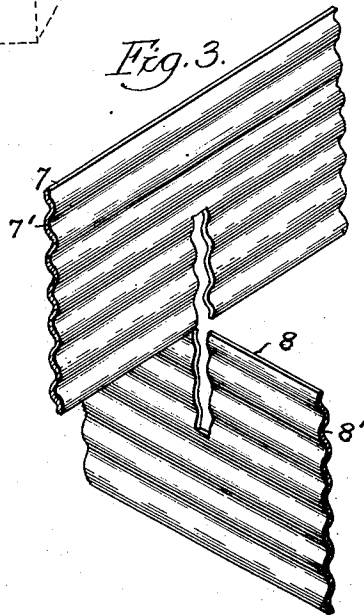
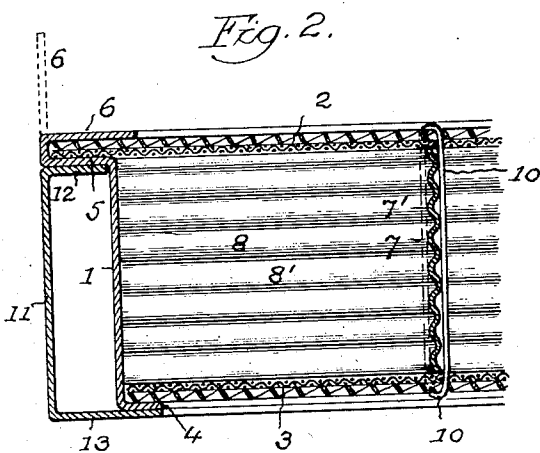
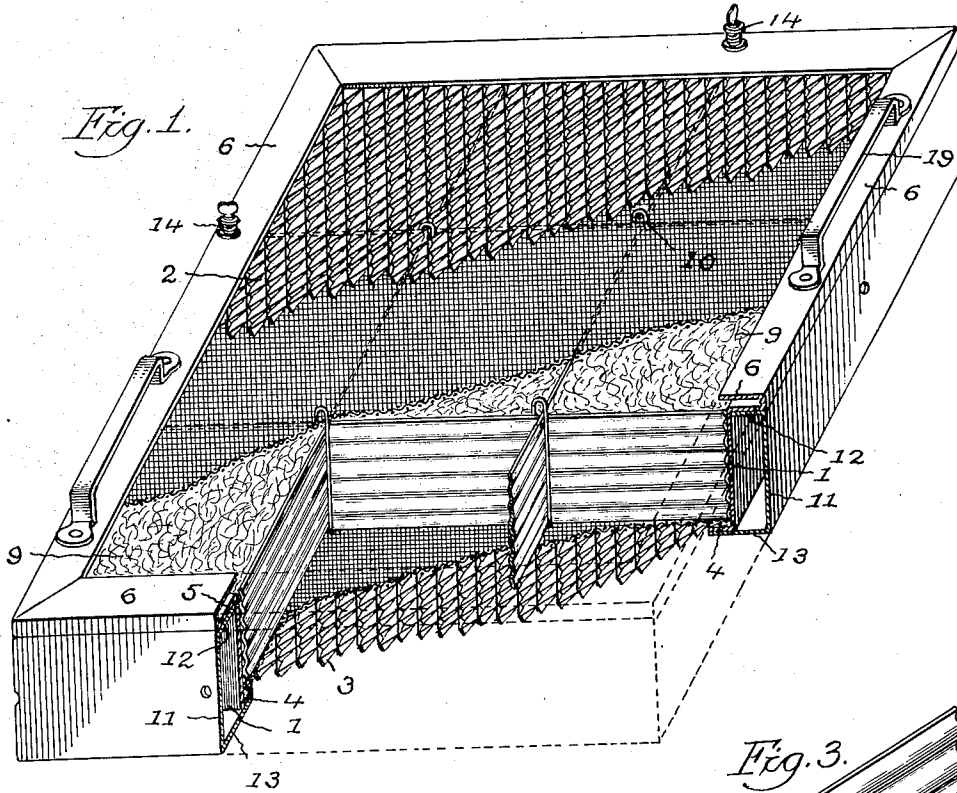
1,598,097

E. MATHIS

AIR FILTER

Filed July 27, 1925

2 Sheets-Sheet 1



Inventor:  
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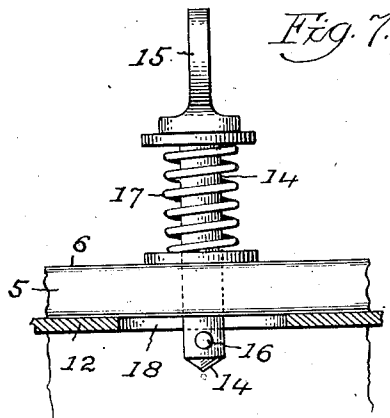
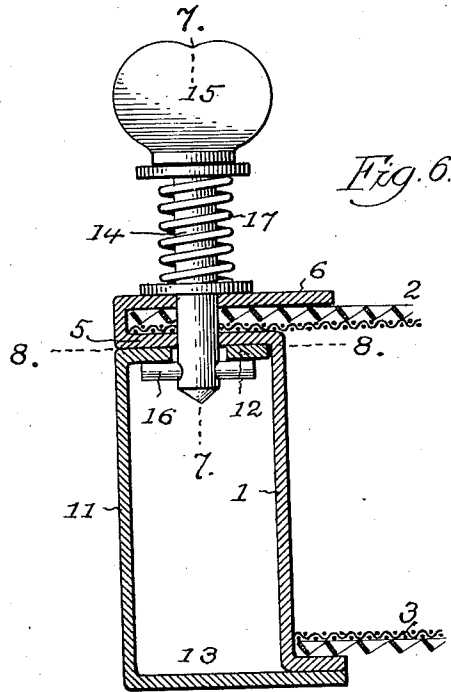
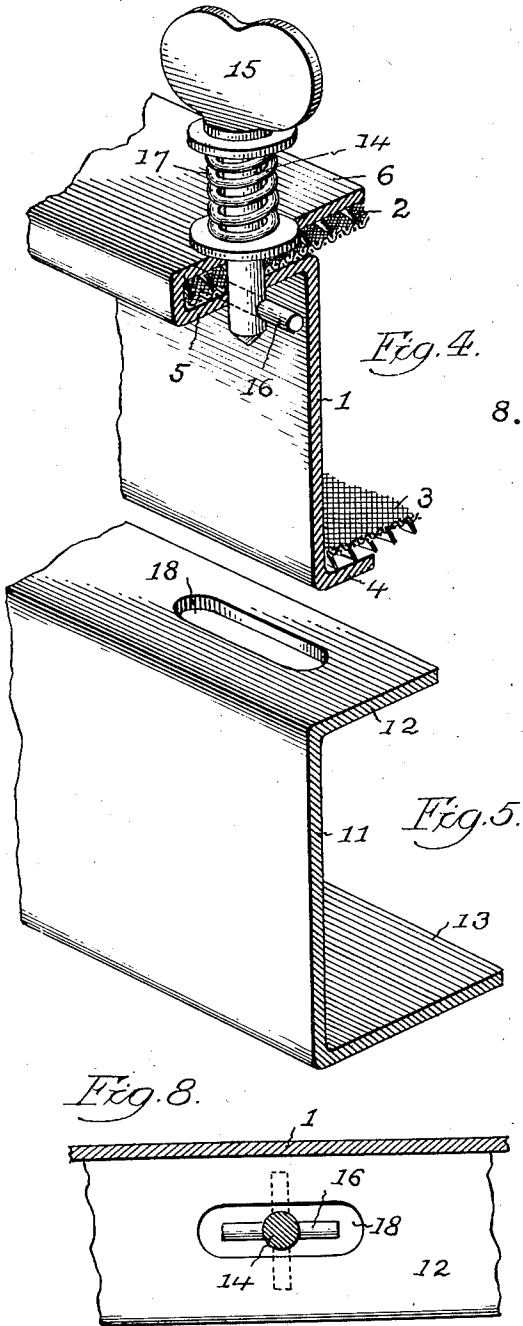
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AIR FILTER

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2 Sheets-Sheet 2



Inventor:  
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Patented Aug. 31, 1926.

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# UNITED STATES PATENT OFFICE.

EUGENE MATHIS, OF CHICAGO, ILLINOIS.

## AIR FILTER.

Application filed July 27, 1925. Serial No. 46,483.

This invention relates to that class of air filters in which the air to be cleaned is passed through a porous grid, formed by a shell or container having reticulated front and rear walls and filled with a fibrous mass, usually metal wool or like mineral fibre, which in turn carries a coating of dust intercepting viscous material, and the present improvement has for its various objects:

To provide a structural formation and association of parts in a filter grid or member, providing a cellular division thereof, with the cell forming walls having a formation adapted to hold the filtering filling of loose fibrous material in proper condition, with an avoidance of unfilled passages at the corners or other edge portions of said fillings through which air could pass in an unfiltered condition.

To provide means for effectually anchoring the inner parts of the reticulated gratings which form the front and rear walls of the filter grid or member to the cell forming walls of the same to prevent buckling, etc., of said gratings during the actual operation of the filter.

To provide a structural arrangement of parts by which the front and rear gratings, cell forming walls, etc., are substantially attached to the border member of the filter grid or unit, and in proper relation one to the other.

To provide an interengaging structural formation and combination of a removable filter unit and its stationary holding frame, providing a close fit between the adjoining surfaces of the parts to prevent passage of unfiltered air at such points.

To provide a simple and effective means for securing the grid member and its fixed holding frame in substantial and close relation, and at the same time providing ready means for the detachment and removal of the grid member for cleaning, replacement, etc. All as will hereinafter more fully appear.

In the accompanying drawings:

Fig. 1 is a perspective view of a filter unit and its holding frame, embodying the present invention, with parts broken away and in section to illustrate the detail construction of the parts.

Fig. 2 is a detail horizontal section of a side portion of the filter unit and its holding frame in assembled relation.

Fig. 3 is a detail perspective view of intersecting portions of the cell forming walls of the filter unit, said portions being shown in separated relation.

Fig. 4 is a detail sectional perspective view of a portion of the filter unit, with one of its fastening appliances mounted thereon.

Fig. 5 is a similar view of a complementary or aligned portion of the fixed unit holding frame.

Fig. 6 is a detail horizontal section of the parts shown in Figs. 4 and 5.

Fig. 7 is a detail sectional elevation on line 7-7, of Fig. 6.

Fig. 8 is a detail end elevation with parts in section 8-8, Fig. 6.

Like reference numerals indicate like parts in the several views.

The air filtering grid or unit in the present invention is preferably of the usual flat rectangular cell form, comprising a marginal of border portion 1 of imperforate plate metal, and front and rear walls 2 and 3 of reticulated material, and usually of a composite type with each wall comprising an inner sheet or layer of fine woven wire and an outer protecting sheet of coarse reticulated metal usually the expanded sheet metal of commerce.

In the present improvement, the marginal or border portion 1 is formed at its rear end with an inturned flange 4, adapted to provide a marginal support for the reticulated rear wall 3 aforesaid, while at its front end the border portion 1 is formed with an out turned flange 5, which provides a marginal support for the reticulated front wall 2 aforesaid, with said flange 5 having a rebent flange or web 6, which is folded upon the wall 2 to secure the same in place in a substantial manner.

In connection with the above described parts, intersecting vertical and horizontal partition plates or walls 7 and 8 are arranged in the cavity of the unit to divide the same into a plurality of cells or sub-chambers for the reception of loose masses of fibrous or like air filtering material, to more effectively provide against the usual settling or matting down action to which larger masses of such material would be liable. The described cellular formation, in a broad sense, is old in the present and allied arts, the feature of novelty in the construction shown involving the formation of the

partition plates or walls 7, 8, aforesaid, with a series of corrugations 7' and 8' extending lengthwise of the respective plates or walls and adapted to provide a sinuous surface formation into which the fibrous fillings 9 settles, to retard or prevent air leakage along such surfaces, which is liable to take place with the usual plane surface partitions, and especially at the points of intersection of the partitions and the corners of the sub-chambers or cells formed by said partitions.

Another feature of the present improvement in connection with the aforesaid cellular construction, consists in the provision of a series of tie members or loops 10 in associated relation to the points of intersection of the partitions 7, 8, with said loops adapted to embrace and tie the front and rear walls 2, 3, in close relation to said partitions with a view to prevent movement of the central portions of said walls away from said partitions.

In the practical application of the filter grid or unit, the same is removably supported in a holding frame fixedly secured to and forming a part of an induction duct of the ventilating apparatus of school and like buildings. In its preferred form, said holding frame is of rectangular shape, complementary to the filter grid or unit, and comprising main plates or webs 11 of plate metal, with such webs formed with inturned flanges 12 and 13 at their respective front and rear sides, and with each rear flange 13 having a greater width than the front flange 12, in order that the excess width will provide an abutment face for the inner face of the filter grid or unit, when the same is in place, as illustrated in Figs. 1, 2 and 6.

Another part of this improvement involves in connection with a holding frame and filter grid or unit of substantially the same construction as above described, of a fastening means for detachably securing the filter grid in said holding frame, the same comprising a detail construction as follows:—

A cylindrical stem 14 carrying an operating head 15 at one end and a transverse latching pin 16 at its other end is revolubly mounted in an orifice formed therefor in the out turned marginal portion or flange 5 of the filter grid, and in a manner permitting longitudinal turning movement of said stem by the operator.

Associated with the middle portion of the stem 14 is a coiled spring 17, the tendency of which is to force the headed end of said stem away from the flange of the filter unit in which the stem is mounted as above set forth. In connection with the described construction the front flange 12 of the unit holding frame is formed with an elongated orifice 18 for the passage of the transverse latching pin 16 of the stem 14, so that with

the filter unit in place in its holding frame, the workman can press the stem 14 inwardly against the stress of the spring 17 and cause the latching pin 16 to pass entirely through the elongated orifice 18 of the holding frame. With the parts in such relation by a turning movement of the stem 14, the transverse latching pin 16 is moved crosswise of the elongated orifice 18, as shown in Figs. 6, 7, and 8, to lock the parts together, with the spring 17 acting to hold the same tightly and firmly in close contact.

The filter grid or unit will be provided with the usual handles 19 for convenience in handling in an assembly, removal or repair of the filter unit parts.

The preferred material used as the fibrous filling mass 9 of the filter unit consists of a knitted fabric, preferably tubular, of thin flat filaments or threads of metallic copper, with such knitted fabric crumpled upon itself to form a filtering mass of the required size and shape, and with the filaments or threads of the mass coated with an oleaginous or other suitable viscous fluid to aid in the interception and retention of dust and other impurities from the body of air passing through the filter grid.

Having thus fully described my invention what I claim and desire to secure by Letters Patent is:—

1. An air filter unit of the type described, comprising a border member of imperforate metal, front and rear walls of perforate material, partitions in angular relation in said border member to provide a plurality of sub-chambers, fillings of fibrous material in said sub-chambers, said partitions being formed with corrugations along their length.

2. An air filter unit of the type described, comprising a border member of imperforate metal, front and rear walls of perforate material, partitions in angular relation in said border member to provide a plurality of sub-chambers, fillings of fibrous material in said sub-chambers, and a series of confining loops embracing intersecting portions of said partitions and the front and rear walls of the unit.

3. An air filter unit of the type described, comprising a border member of imperforate material and having an inturned flange at its rear end and an out turned flange at its front end, said out turned flange having an extension adapted for rebending, a rear wall of reticulated material having bearing on the rear inturned flange of the border member, a front wall of reticulated material resting on the aforesaid out turned flange of the border member and held in place by the rebent portion of said flange.

4. An air filter unit of the type described, comprising a border member of imperforate material and having an inturned flange at its

rear end and an out turned flange at its front end, said out turned flange having an extension adapted for rebending, a rear wall of reticulated material having bearing on the rear inturned flange of the border member, a front wall of reticulated material resting on the aforesaid out turned flange of the border member and held in place by the re- bent portions of said flange, and a series of partitions arranged in angular relation and dividing the interior of the unit into sub- chambers for the reception of fibrous filter- ing masses.

5. An air filter unit of the type described, comprising a border member of imperforate material and having an inturned flange at its rear end, and an out turned flange at its front end, a rear wall of reticulated ma- terial having bearing on the rear inturned flange of the border member, a front wall of reticulated material resting on the front out turned flange of the border member, a fixed frame for holding the filter unit formed with an imperforate wall having lateral flanges at its front and rear edges, the rear flange being of greater extent than the front flange to provide a marginal bearing for the inner side of the unit, with the front flange of the fixed frame and the out turned flange of the filter unit having associated relation for the reception of fasten- ing means between the parts.

6. An air filter unit of the type described, comprising a border member of imperforate material and having an inturned flange at its rear end, and an out turned flange at its front end, a rear wall of reticulated material having bearing on the rear inturned flange of the border member, a front wall of re- ticulated material resting on the front out turned flange of the border member, a fixed

frame for holding the filter unit formed with an imperforate wall having lateral flanges at its front and rear edges, the rear flange being of greater extent than the front flange to provide a marginal bearing for the inner side of the unit with the front flange of the fixed frame and the out turned flange of the filter unit having associated relation for the reception of fastening means between the parts, said fastening means comprising a headed and spring impelled stem having a transverse pin at its inner end and revolubly and slidingly mounted in the out turned flange of the filter unit, the front flange of the holding frame having an elongated slot in aligned relation to said stem for the pas- sage and engagement thereof.

7. An air filter unit of the type described, comprising a border member of imperforate material having an out turned flange at its front end, front and rear walls of reticulated material attached to said border member, and a fixed frame providing a support for the filter unit and having an imperforate wall and a lateral flange providing an abut- ment for the filter unit, said lateral flange and the out-turned flange of the filter unit having associated relation for the reception of fastening means between the parts, said fastening means comprising a headed and spring impelled stem having a transverse pin at its inner end and revolubly and slid- ingly mounted in a marginal flange of the filter unit, the lateral flange of the fixed frame having an elongated slot in aligned relation to said stem for the passage and en- gagement thereof.

Signed at Chicago, Illinois, this 23rd day of July, 1925.

EUGENE MATHIS.