FILTER RETAINING MECHANISM

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ABSTRACT OF THE DISCLOSURE

A housing having an opening therethrough and a fluid permeable filter element mounted in overlying relationship thereto by a pair of parallel pressure arms at either side of the opening and attached to the housing by a plurality of linking members so that pressure arms move toward and away from the opening while remaining in substantially the same orientation. A handle attached to said pressure arms by means of cam-acting members so that movement of the handle into a first position releases the filter element while movement of the handle into a second position locks said filter element in overlying relationship to the opening in the housing.

This invention pertains to a retaining mechanism for gas filters and the like and more specifically to a retaining mechanism which forces the edges of a filter substantially uniformly against a housing or the like to prevent leakage of gas therethrough.

In prior art retaining mechanism, gas filters and the like are held by a plurality of individually operated clamps, bolts, etc. Thus, a great amount of time and work is expended in replacing filters and the plurality of loose, individual devices are subject to loss, incorrect positioning, jamming, etc., during replacement. In addition these prior devices apply pressure at a plurality of points and allows warping of the filter therewith, which in turn allows leakage of unfiltered gas, etc.

It is an object of the present invention to provide a new and improved retaining mechanism for gas filters and the like.

It is a further object of the present invention to provide a retaining mechanism which produces a substantially even retaining force along the length of the filter to prevent the leakage of gas therethrough.

It is a further object of the present invention to provide a retaining mechanism which is quickly and easily operated to replace the filters retained thereby.

These and other objects of this invention will become apparent to those skilled in the art upon consideration of the accompanying specification, claims, and drawings.

Referring to the drawings, wherein like characters indicate like parts throughout the figures:

FIG. 1 is a view in perspective of the retaining mechanism mounted in the unlocked position;

FIG. 2 is a sectional view as seen from the line 2—2 in FIG. 1;

FIG. 3 is an enlarged sectional view as seen from the line 3—3 in FIG. 2, some parts broken away and some parts shown in section;

FIG. 4 is an enlarged sectional view as seen from the line 4—4 in FIG. 2, some parts broken away and some parts shown in section;

FIG. 5 is an enlarged sectional view as seen from the line 5—5 in FIG. 1.

In the figures the numeral 10 generally designate base means or a housing within which a filter 11 is to be fixedly mounted. The housing 10 is illustrated as a box-like structure with an upper open end 12, left and right sides 21 and 22, a front side 13 having an opening 14 therein for the passage of gas therethrough, and a rear open side 17. The opening 14 has a channel 15 extending completely therearound on the inner surface of the housing 10. The channel 15 is adapted to receive therein a resilient means 16 which is fixedly attached to and surrounds the outlet of the filter 11. It should be understood that the shape of the housing 10 in the present embodiment is simply for illustrative purposes and the size and shape thereof is dictated by the size and use of the filter 11.

A filter retaining mechanism generally designated 20 is fixedly attached to the inner surfaces of opposed sides 21 and 22 of housing 10. The retaining mechanism includes a pair of elongated pressure bars 25 and 26 each rotatably attached by three cam-acting members 27 to elongated metal strips 28 and 29 respectively. The strips 28 and 29 are fixedly attached to the inner surfaces of the sides 21 and 22 respectively of the housing 10 by some means such as welding or the like and are so designed that they lie in a plane parallel to a plane containing the side 13 of the housing 10. The cam-acting members 27 are somewhat elliptical shaped lengths each having one end pivotally attached to a pressure bar 25 or 26 and the other end pivotally attached to a strip 28 or 29 respectively.

The cam-acting members 27 are connected so that the pressure bars 25 and 26 are parallel with the strips 28 and 29 at all times but move a substantial horizontal distance as the cam-acting members 27 pivot about both ends thereof.

The pressure bars 25 and 26 have a substantially rectangular shaped cross-section with two channels 30 and 31 therein. The channels 30 and 31 extend the length of the pressure bars 25 and 26 and are positioned approximately perpendicularly to each other. The pressure bars 25 and 26 are mounted so that the channels 30 open rearwardly away from the front side 13 of the housing 10 and have one end of each of the cam-acting members 27 inserted therein for pivotal movement with respect to the pressure bars 25 and 26. The other channels 31 in pressure bars 25 and 26 open inwardly away from the inner surface of the sides 21 and 22 respectively and are adapted to receive a pair of flanges 32 of the filter 11 therein. The flanges 32 are fixedly attached to either side of the filter 11 and extend the entire height thereof. The channels 31 are sufficiently wide to allow the flanges 32 on filter 11 to be easily inserted therein but does not allow substantial horizontal movement of the flanges 32 after they are inserted.

A pair of somewhat triangular-shaped cam-acting members 35 and 36 are positioned adjacent the upper ends of the strips 28 and 29 respectively. One corner of the triangular-shaped member 36 is pivotally attached adjacent the upper end of the strip 29 and a second corner is inserted in the channel 30 of the pressure bar 26 and pivotally attached thereto. In a like manner the triangular-shaped member 35 is attached between the strip 28 and the pressure bar 25 with an elongated bar 37 pivotally attached to the upwardly projecting corner.

A handle 40, which is a flat strip of material having a small portion at either end thereof bent at approximately 90° to the longitudinal axis thereof, is slightly shorter than the distance between the sides 21 and 22 of housing 10. A pair of connecting members 41 and 42 each have one end fixedly attached to opposite ends of the handle 40 with the other ends pivotally attached to the pair of mounting pads 44 and 45 respectively. Pads 44 and 45 are fixedly attached to the inner surface of the sides 21 and 22 and are approximately level with the rear ends of strips 28 and 29 respectively but spaced equally therefrom toward the rear side 17. The handle 40 pivots about the pads 44 and 45 on the connecting members 41 and 42 in a relatively wide arc from a position...
adjacent the remotest edge of the top 12 of housing 10 to a position slightly above the strips 28 and 29. The free ends of the elongated bars 37 and 38 are pivotally attached to the connecting members 41 and 42 respectively in the mid-section thereof so that the bars 37 and 38 are substantially horizontal and movement of the handle 40 causes the triangular-shaped members 35 and 36 to rotate in a cam-like fashion about the connecting strips 28 and 29. Thus, as the handle 40 is pivoted clockwise in FIG. 1 to its remotest position the triangular-shaped members 35 and 36 rotate both in a clockwise direction and the pressure bars 25 and 26 move rearwardly. As the handle 40 is pivoted in a counterclockwise direction or toward its forward position immediately over the strips 28 and 29 the triangular-shaped members 35 and 36 rotate in a counterclockwise direction and the pressure bars 25 and 26 move toward the side 13. The linkage in the entire mechanism is adjusted so that the triangular-shaped members 35 and 36 operating in a cam-like fashion are slightly over-center when the handle 40 is in its most forward position. This movement of the triangular-shaped members 35 and 36 to an over-center position locks the handle 40 in the forward position.

A pair of somewhat L-shaped members 50 and 51 each have one end pivotally connected in the lower end of the slots 29. As the pressure bars 25 and 26 move forward and cause the L-shaped members 50 and 51 to rotate counterclockwise to the position shown in dotted lines in FIG. 2. The rotation of the L-shaped members 50 and 51 causes the blocks 59 and 60 to rotate the locking members 57 and 58 counterclockwise or rearwardly to the dotted position illustrated in FIG. 1, in which an upper edge of the projection 65 are angled slightly downwardly toward the front end thereof so that they wedge beneath the locking members 57 and 58 when the filter 11 is moved forward by the movement of the pressure bars 25 and 26 and the locking members 57 and 58 rotate rearwardly. Thus, the filter 11 is held firmly down against the bottom of the housing 10 as well as against the side 13 and any movement of the filter 11 is substantially prevented. It is not necessary for the locking members 57 and 58 to be exactly aligned over the projections 65 to lock the filter 11 firmly in place. Because of the configuration of the various components and the pivotal movement of the locking members 57 and 58, the filter 11 will be locked firmly in place even when only the rear most edges of the locking members 57 and 58 overlie the projections 65. Thus, I have disclosed a retaining mechanism for filters and the like which provides an even force along the entire length of the filter to prevent the leakage of gas therearound and maintains the filter substantially immovable within the housing. Also, the filter is correctly positioned automatically with a single operation rather than tightening a plurality of loose parts and the like.

While I have described and illustrated the invention in specific embodiments thereof, it is to be understood that various other determinations may be hereafter made and variations and modifications may be introduced thereto without departing from the spirit and scope of the invention. Further embodiments will occur to those skilled in the art.

What is claimed is:

1. Filter retaining mechanism for mounting a filter element having a generally flat side with a fluid permeable opening through said side and having flanges extending outwardly generally transverse to the direction of fluid flow through said fluid permeable opening, said mechanism comprising:

(a) base means defining an opening to be overlaid with said filter element, said fluid permeable opening therethrough is in communication with the opening through said base means to allow a fluid flow therethrough;

(b) a plurality of elongated pressure bars each having a channel therein for receiving the flanges of said filter element therein;

(c) means mounting said pressure bars adjacent the sides of the opening through said base means with each bar substantially parallel to a side thereof and further mounting said pressure bars for limited movement longitudinally generally parallel with the direction of fluid flow through the fluid permeable opening in said filter element;

(d) a handle;

(e) means pivotally mounting said handle on said base means for movement between a first and a second position; and

(f) connecting means mechanically linking said handle to said pressure bars for moving said pressure bars generally toward the opening through said base means into a filter element locking position when said handle is moved into said first position and moving said pressure bars generally away from the opening through said base means into a filter element releasing position when said handle is moved into said second position.

2. Filter retaining mechanism substantially as set forth in claim 1 having in addition pivotal means operatively attached to said pressure bars for pivotal movement into engagement with an outwardly projecting member attached to the filter when said handle is moved to the first position to prevent movement of the filter in a direction parallel with the longitudinal axis of said pressure bars.

3. Filter retaining mechanism for mounting a filter element having a generally flat side with a fluid permeable opening through said side and having flanges extending outwardly generally transverse to the direction of fluid flow through said fluid permeable opening, said mechanism comprising:

(a) base means defining an opening to be overlaid with said filter element, said fluid permeable opening therethrough is in communication with the opening through said base means to allow a fluid flow therethrough;

(b) a plurality of elongated pressure bars each having a channel therein for receiving the flanges of said filter element therein;

(c) means mounting said pressure bars adjacent the sides of the opening through said base means with each bar substantially parallel to a side thereof and further mounting said pressure bars for limited movement longitudinally generally parallel with the direction of fluid flow through the fluid permeable opening in said filter element;

(d) a handle;

(e) means pivotally mounting said handle on said base means for movement between a first and a second position; and

(f) connecting means mechanically linking said handle to said pressure bars for moving said pressure bars generally toward the opening through said base means into a filter element locking position when said handle is moved into said first position and moving said pressure bars generally away from the opening through said base means into a filter element releasing position when said handle is moved into said second position.
opening through said flat side, said mechanism comprising:

(a) base means defining an opening to be overlayed with said filter element so that the fluid permeable opening therethrough is in communication with the opening through said base means to allow a fluid flow therethrough;

(b) a plurality of elongated pressure bars;

(c) a plurality of linking members each pivotally attached to one of said pressure bars at a first point on said member and each pivotally attached to said base means at a second point on said member spaced from said first point thereby mounting said pressure bars adjacent the sides of the opening through said base means and further mounting said pressure bars for limited movement in a direction generally parallel with the direction of fluid flow through the fluid permeable opening in said filter element;

(d) a handle;

(e) means pivotally mounting said handle on said base means for movement between a first and a second position; and

(f) connecting means mechanically linking said handle to said pressure bars for moving said pressure bars generally toward the opening through said base means into a filter element locking position when said handle is moved into said first position and moving said pressure bars generally away from the opening through said base means into a filter element releasing position when said handle is moved into said second position.

4. Filter retaining means as set forth in claim 3 wherein the connecting means includes at least one plate having three spaced apart points thereof one of which is pivotally attached to a pressure bar, another of which is pivotally attached to the base means and the third of which is pivotally attached to the handle thereby providing movement of said pressure bar toward and away from the opening through said base means as said handle is moved between the first and second positions.

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