July 23, 1968 D. W. SCHOEN 3,393,498

FILTER RETAINING MECHANISM

Filed Dec. 15, 1965 2 Sheets-Sheet 1

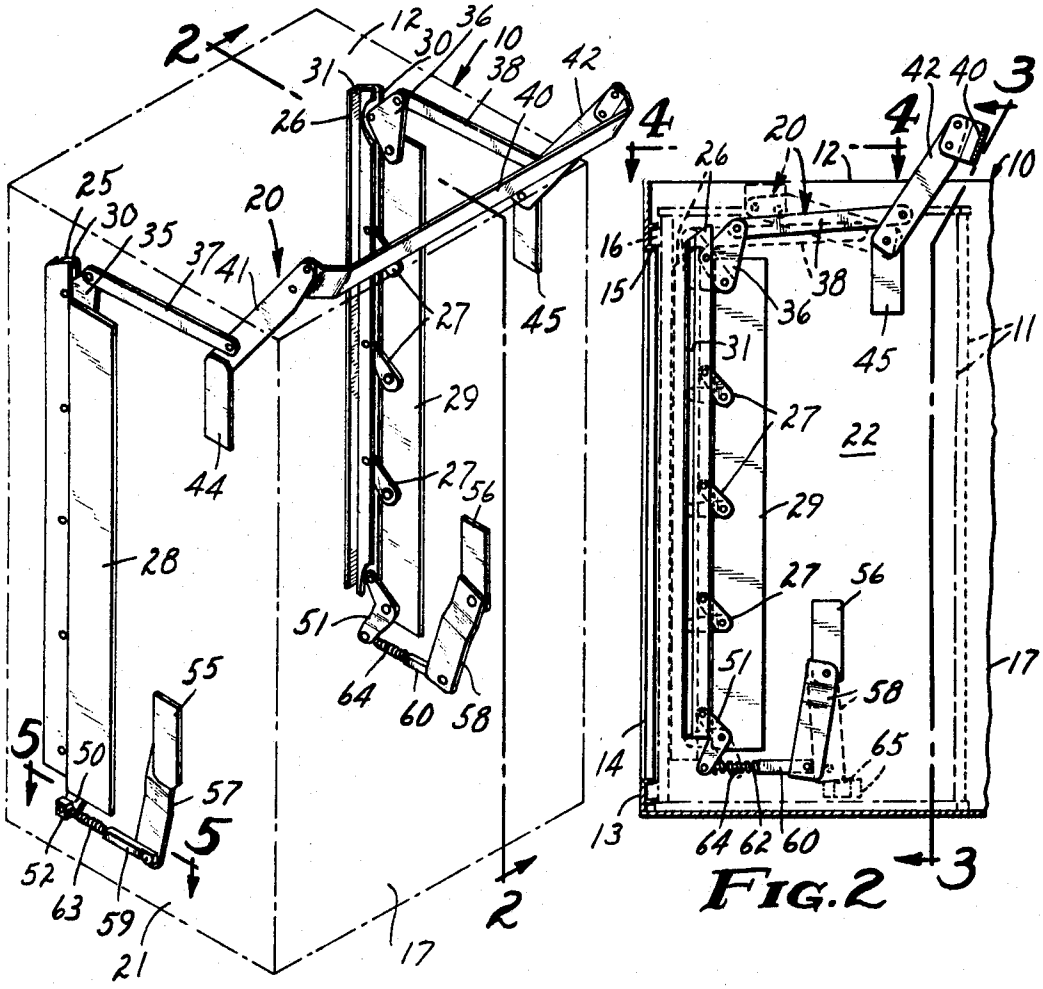


FIG. 1

FIG. 2

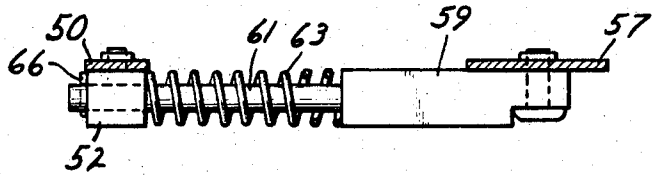


FIG. 5

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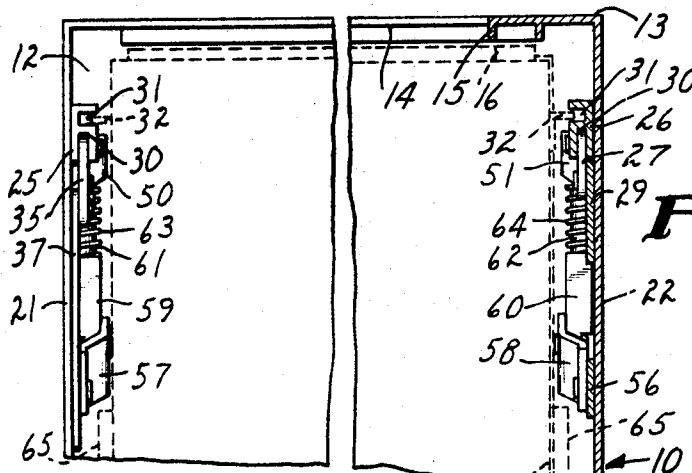


FIG. 4

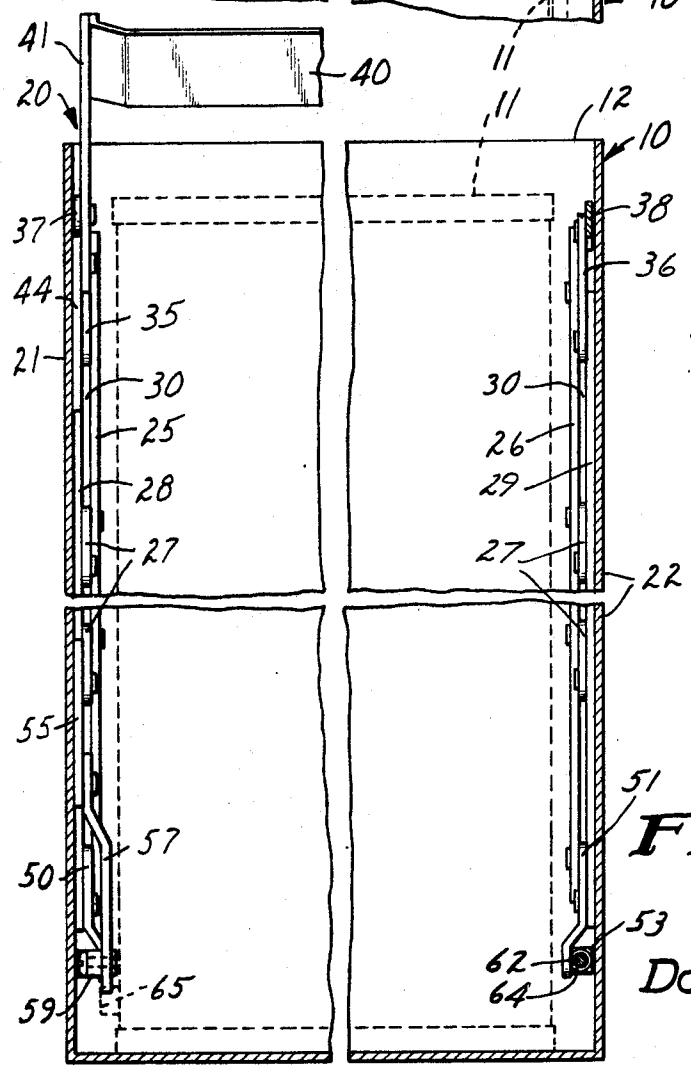


FIG. 3

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FILTER RETAINING MECHANISM

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4 Claims. (Cl. 55—493)

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 ether 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 therebetween.

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 therebetween, 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 retaining mechanism which produces a substantially even retaining force along the length of the filter to prevent the leakage of gas therearound.

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; and

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

In the figures the numeral **10** generally designates 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 will be 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 positioned so 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 perpendicular 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 therein. The triangular-shaped member **36** is mounted so that a third corner projects upwardly and has an elongated bar **38** 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 a 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** approximately level with the upper end 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 rearmost 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 connections on the strips 28 and 29. Thus, as the handle 40 is pivoted clockwise in FIG. 1 to its rearmost position the triangular-shaped members 35 and 36 both rotate 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 30 in the pressure bars 25 and 26 respectively. The angle or corner of each of the L-shaped members 50 and 51 is pivotally attached to the lower end of the strips 28 and 29 respectively and the remaining or free ends of the L-shaped members 50 and 51 have a small block 52 and 53 respectively pivotally attached thereto. The blocks 52 and 53 each have a hole therethrough which is positioned approximately horizontally. A pair of mounting pads 55 and 56 are fixedly attached to the inner surface of the sides 21 and 22 adjacent the lower end of the strips 28 and 29 but on the side opposite the pressure bars 25 and 26. A pair of locking members 57 and 58, which are substantially rectangular-shaped pieces of metal, are bent so that one end thereof lies in a plane substantially parallel with the plane of the other end but spaced therefrom. The locking members 57 and 58 have one end pivotally attached to the mounting pads 55 and 56 respectively so the free ends extend outwardly from the inner surfaces of the sides 21 and 22 and downwardly from the mounting pads 55 and 56. A pair of elongated blocks 59 and 60 have one end pivotally attached adjacent the lower or free end of the locking members 57 and 58 respectively. The other end of each of the blocks 59 and 60 is machined to a cylindrical or rod-like configuration 61 and 62. The free ends of the rod-like portions 61 and 62 extend through the holes in the blocks 52 and 53 and cotter pins 66 are engaged therethrough so they cannot be drawn through the holes. Compression springs 63 and 64 are concentrically mounted on the rod-like portions 61 and 62 and provide a bias which maintain the locking members 57 and 58 as far from the strips 28 and 29 as the rod-like portions 61 and 62 will allow. The compression springs 63 and 64 on the rod-like portions 61 and 62 provide for tolerance variations between the various components and insure a positive lock, as will be described presently.

The filter 11 has a small metal projection 65 fixedly attached to either side thereof adjacent the bottom surface. The projections 65 on the filter 11 are positioned so that they slide past the locking members 57 and 58 when the handle 40 is in the open position, illustrated in FIG. 1, but the lower edges of the locking members 57 and 58 butt against the upper edges of the projection 65 on either side of the filter 11 when the handle 40 is moved forward to the locked position. When the handle 40 moves forward to the locked position 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. 2. The upper edges 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 shown and described a specific embodiment of this invention, further modifications and improvements 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 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 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 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.

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 the pressure bars.

3. Filter retaining mechanism for mounting a filter element having a generally flat side with a fluid permeable

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 thereon 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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