

[54] **METHOD OF MOUNTING A CONTROL DEVICE TO A FUEL SUPPLY MANIFOLD**

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Related U.S. Application Data

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[52] U.S. Cl. **29/157 R**

[51] Int. Cl. **B21d 53/00**

[58] Field of Search 251/146; 285/197,
285/198; 29/157 R; 138/92

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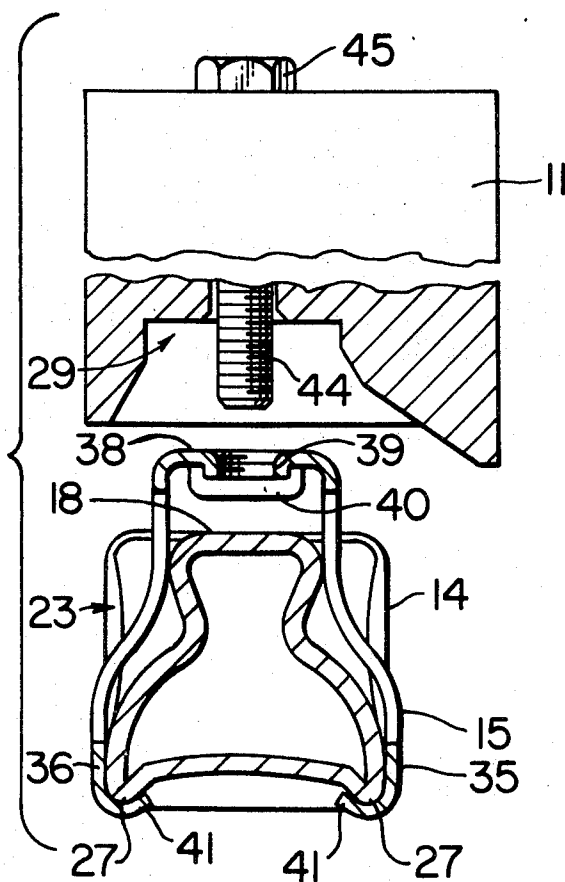
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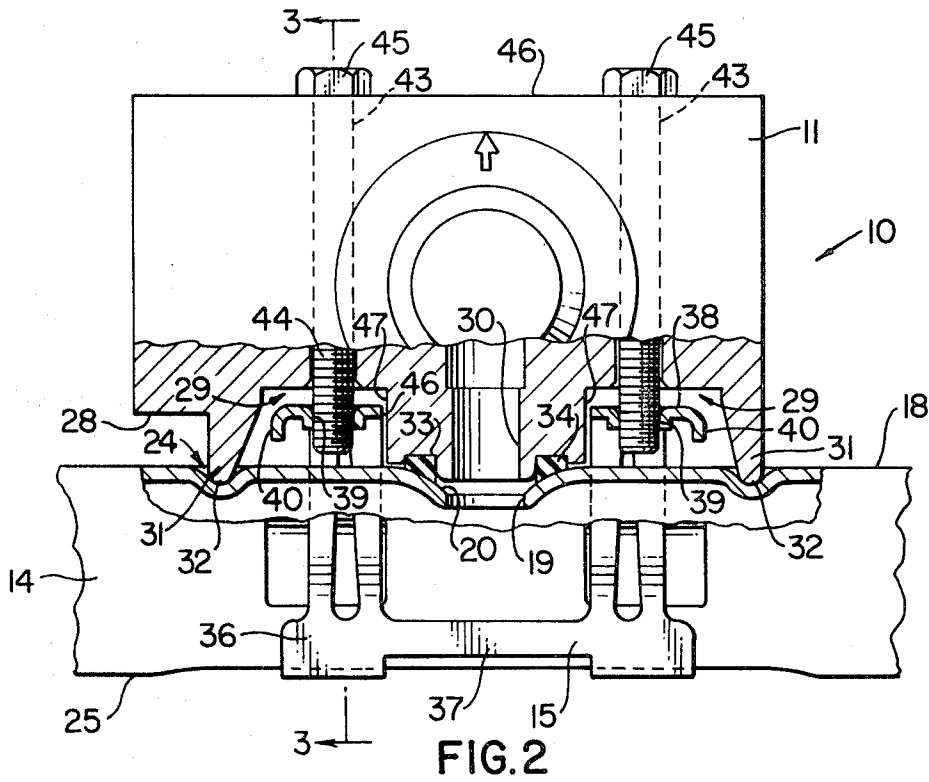
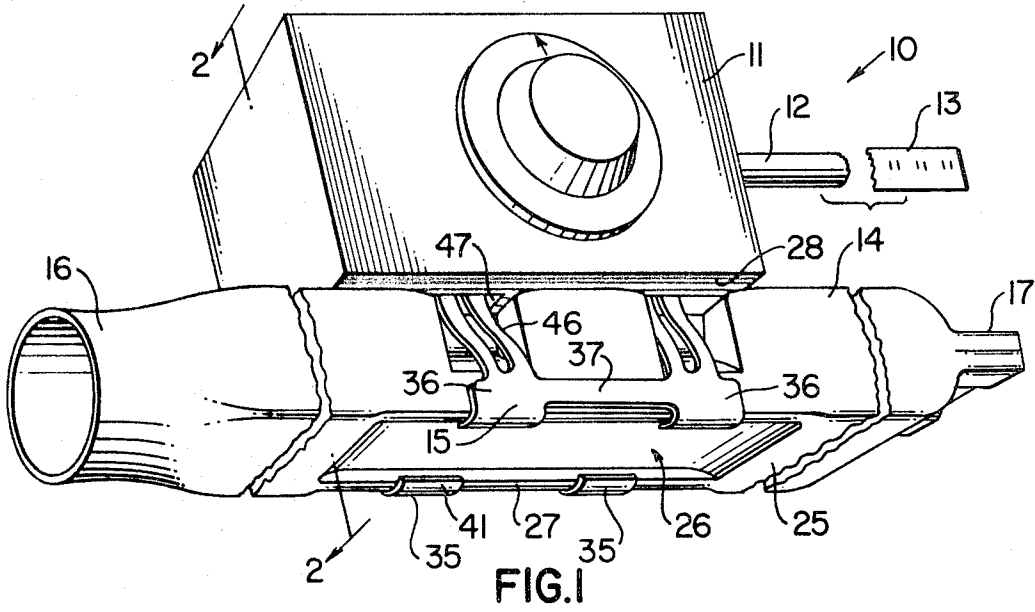
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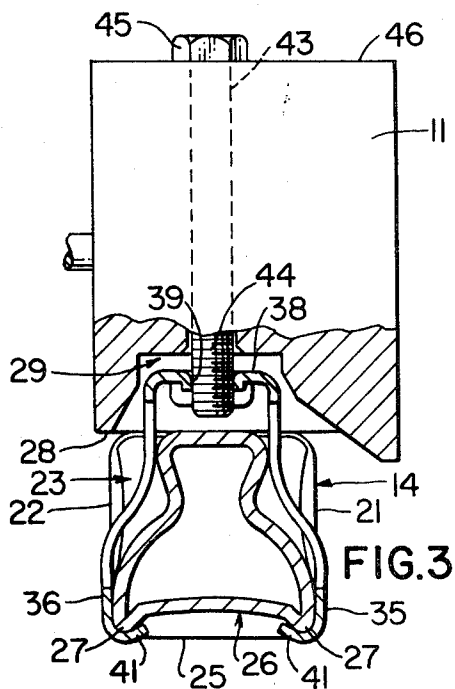
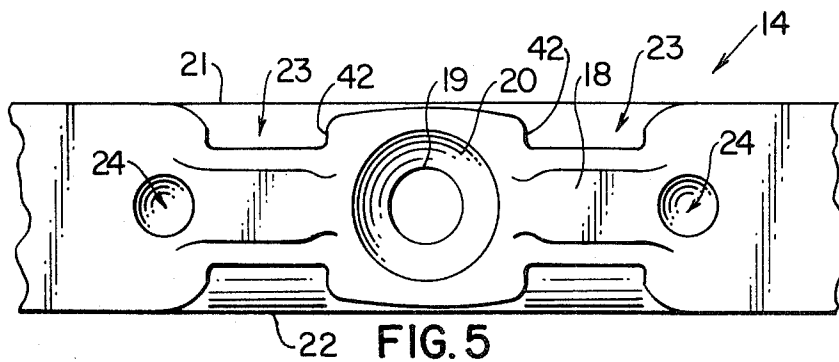
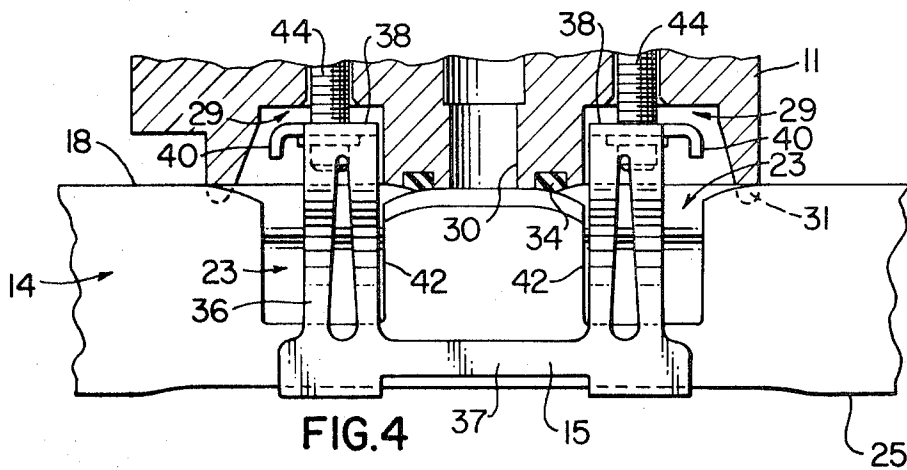
[57] ABSTRACT

A fuel supply manifold having side wall means provided with an opening means therethrough and a control device sealingly disposed against the side wall means of the manifold around the opening means and having an inlet means disposed in fluid communication with the opening means, the control device being sealingly secured to the manifold solely by a bracket means that is detachably interconnected to the manifold about the side wall means thereof and to the control device in such a manner to secure the control device to the manifold in sealed relation solely by the interconnection of the bracket means with the control device and the manifold.

10 Claims, 9 Drawing Figures







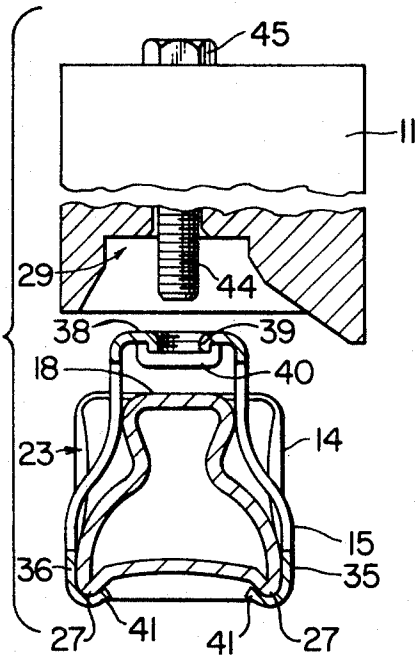


FIG. 6

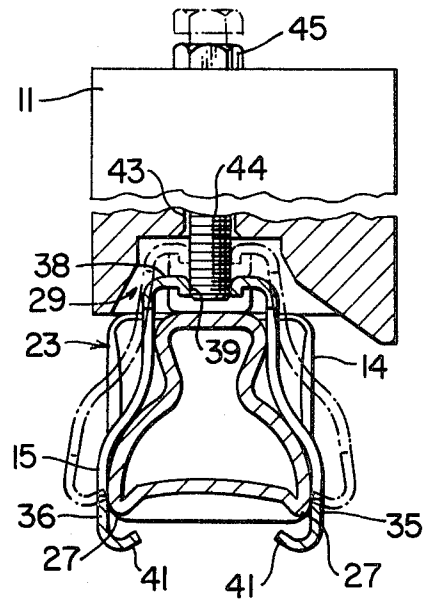


FIG. 7

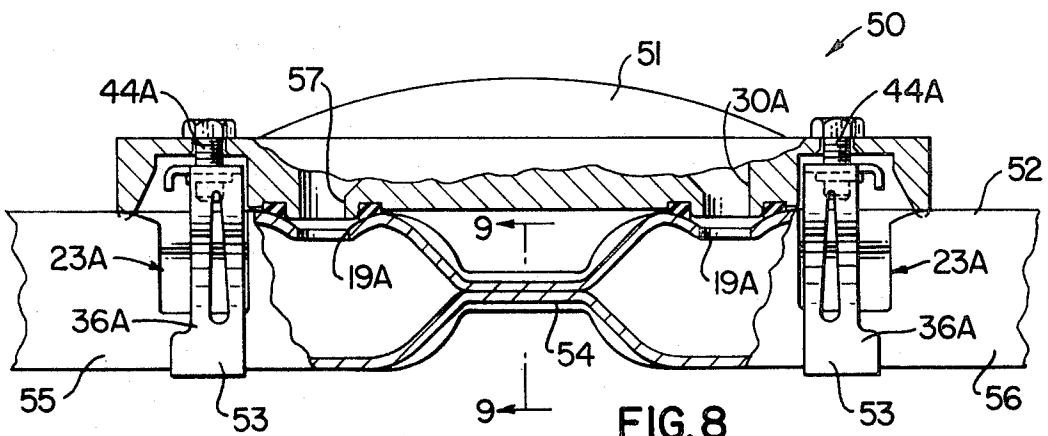


FIG. 8

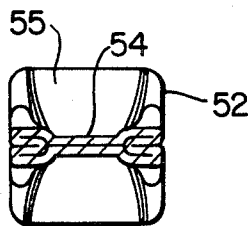


FIG. 9

METHOD OF MOUNTING A CONTROL DEVICE TO A FUEL SUPPLY MANIFOLD

This application is a divisional patent application of its copending parent application, Ser. No. 817,001, filed Apr. 17, 1969, now U.S. Pat. No. 3,602,480 and is assigned to the same assignee to whom the parent application is assigned.

This invention relates to an improved mounting means or method for securing a control device to a fuel supply manifold as well as to improved parts of such an assembly or the like.

It is well known that prior known control devices have been secured to fuel supply manifolds by two conventional methods. In both methods, the manifold is provided with a female thread in an opening at the desired control location and the control device is provided with a threaded stem to mate with that threaded opening of the manifold. In one conventional method, the threaded stem is an integral part of the control device and the assembly operation requires that the control be rotated while being threaded into the threaded opening of the manifold. In the other conventional method, the control is provided with a threaded flange which is first threaded into the manifold and then the control is assembled to the flange with bolts. In the last method, a sealing gasket is used between the flange and the control device to seal the same together.

It has been found that when using the above described conventional assembly methods, drilling and tapping of the manifold is required whereby metal chips are produced which may damage or cause malfunction of the control device if such chips are not entirely removed. In almost all cases, tapered pipe threads are used which leaves several undesirable conditions. For example, the distance from the center line of the manifold to the center line of the dial of the control device varies with the allowable tolerance which is several threads on each of the tapered threaded parts. Along with this variation, the assembler must stop rotation and tightening at the proper degree of arc so that the control remains square with the manifold and the dial perpendicular to the control panel.

However, according to the teachings of this invention, an improved manifold and control device mounting means is provided wherein all of the disadvantages of the prior conventional mounting methods are eliminated and the mounting means of this invention provides low cost manufacturing, easy and fast snap-on assembly, accurate location, simple sealing requirements, simplified service and clean material and fabrication methods.

In particular, one embodiment of this invention provides a fuel supply manifold having side wall means provided with an opening means passing therethrough and a control device sealingly disposed against the side wall means of the manifold around the opening means so as to have an inlet means thereof disposed in fluid communication with the opening means. A bracket means of this invention is detachably interconnected to the manifold about the side wall means thereof and is detachably interconnected to the control device to secure the control device to the manifold in sealed relation therewith solely by the interconnection of the bracket means with the control device and the manifold.

Accordingly, it is an object of this invention to provide an improved means for mounting a control device to a fuel supply manifold, the mounting means of this invention having one or more of the novel features set forth above or hereinafter shown or described.

Another object of this invention is to provide an improved method of mounting a control device to a fuel supply manifold, the method of this invention having one or more of the novel features set forth above or hereinafter shown or described.

Another object of this invention is to provide an improved bracket means for securing a control device to a fuel supply manifold.

Another object of this invention is to provide an improved control device to be secured to a fuel supply manifold by a bracket means.

Another object of this invention is to provide an improved fuel supply manifold adapted to have a control device secured thereto by a bracket means.

Other objects, uses and advantages of this invention are apparent from a reading of this description which proceeds with reference to the accompanying drawings forming a part thereof and wherein:

FIG. 1 is a perspective view illustrating the control device of this invention secured to a fuel supply manifold of this invention by a bracket means of this invention.

FIG. 2 is a partial, cross-sectional view taken on line 2—2 of FIG. 1 and illustrates the control device and fuel supply manifold partly in elevation and partly in cross section.

FIG. 3 is a partial, cross-sectional view taken on line 3—3 of FIG. 2.

FIG. 4 is a fragmentary view similar to FIG. 2 and illustrates the fuel supply manifold and bracket means in elevation while the control device is illustrated in cross section.

FIG. 5 is a fragmentary top view of the fuel supply manifold of this invention.

FIG. 6 is a fragmentary and partial cross-sectional view illustrating one method of this invention for securing the control device to the fuel supply manifold by the bracket means of this invention.

FIG. 7 is a view similar to FIG. 6 and illustrates another method of this invention.

FIG. 8 is a fragmentary, partial cross-sectional view illustrating the features of this invention mounting a pressure regulator to a fuel supply manifold.

FIG. 9 is a cross-sectional view taken on line 9—9 of FIG. 8.

While the various features of this invention are hereinafter illustrated and described as being particularly adapted to mount temperature and pressure regulating control devices to fuel supply manifolds, it is to be understood that the various features of this invention can be utilized singly or in any combination thereof to provide means for mounting other types of control devices as desired.

Therefore, this invention is not to be limited to only the embodiments illustrated in the drawings, because the drawings are merely utilized to illustrate some of the wide variety of uses of this invention.

Referring now to FIGS. 1 and 2, the improved mounting means and method of this invention is generally indicated by the reference numeral 10 and comprises a temperature responsive control device 11 for directing fuel out of an outlet means 12 thereof to a

fuel burner 13 in a conventional manner, a fuel supply manifold 14, and a bracket means 15 securing the control device 11 to the fuel supply manifold 14 in a manner hereinafter described.

As illustrated in FIGS. 1 and 2 and 5, the fuel supply manifold 14 generally has a substantially rectangular transverse cross-sectional configuration and can have its left hand end 16, FIG. 1, formed in a cylindrical configuration to permit the same to be readily coupled by the necessary connector fitting to the fuel supply pipe 10 that will supply gaseous fuel to the apparatus containing the manifold 14. The right hand end 17 of the manifold 14 is pinched closed in a manner hereinafter described so as to seal off the end 17 of the manifold 14 from the atmosphere.

The surface 18 of the manifold 14 as illustrated in FIG. 5 is provided with an opening 19 passing therethrough and is surrounded by an annular surface 20 having an arcuate transverse cross-sectional configuration as illustrated in FIG. 2 with the convex side thereof facing outwardly. The opposed sides 21 and 22 of the manifold 14, as well as the side 18 of the manifold 14 as illustrated in FIG. 5, are provided with formed recess means 23 for properly locating the bracket means 15 of this invention thereon in a manner hereinafter described. Also, the side 18 of the manifold 14 is provided with a pair of substantially circular recesses or dimples 24 in uniformly spaced relation from the opening 19 to positively locate the control device 11 relative to the opening 19 in a manner hereinafter described.

As illustrated in FIGS. 1 and 3, the remaining flat side 25 of the fuel supply manifold 14 has a substantially rectangularly shaped recess means 26 provided therein to define opposed lip-like corner means 27 at the opposed side edges thereof and about which the bracket means 15 of this invention hooks in the manner hereinafter described.

While the configurations of the control device 11 can be any desired configuration as will be apparent hereinafter, the control device 11 is illustrated as being substantially rectangular in configuration with one surface 28 thereof being provided with a pair of recesses 29 in like configuration and being respectively disposed outboard of an inlet means 30 of the control device 11. A pair of projections 31 extend from the surface 28 of the control device 11 and are respectively provided with rounded ends 32 adapted to be received in the circular recesses or dimples 24 of the fuel supply manifold 14 in the manner illustrated in FIG. 2 so as to positively align the inlet means 30 of the control device 11 with the opening 19 in the fuel supply manifold 14.

An annular recess 33 is formed in the surface 28 of the control device 11 outboard of and surrounding the inlet means 30 thereof. An annular sealing gasket means 34 is disposed in the recess 33 and is adapted to engage the annular surface 20 of the fuel supply manifold 14 to seal the inlet means 30 of the control device 11 to the opening 19 of the fuel supply manifold 14 when the control device 11 is assembled to the manifold 14 by the bracket means 15 of this invention in a manner hereinafter described.

The bracket means 15 comprises a one-piece metallic structure having two pairs of opposed legs 35 and 36 integrally joined together by opposed strap-like spacing portions 37 adjacent the lower ends thereof with each pair of opposed legs 35 and 36 being joined together at the upper ends thereof by a substantially flat portion 38

having a threaded aperture 39 passing therethrough. Each flat portion 38 has a bent over tab 40 adapted to abut against the side 18 of the manifold and still space the threaded aperture 39 thereof above the side 18 of the manifold 14 for a purpose hereinafter described.

The lower free ends 41 of the legs 35 and 36 of the bracket means 14 are inwardly turned to provide hooking ends 41 adapted to respectively hook over the lip-like corner means 27 of the manifold 14 in the manner illustrated in FIGS. 1 and 3.

As illustrated in FIG. 3, the pairs of opposed legs 35 and 36 are arcuately formed between the lower ends 41 and upper ends 38 thereof so as to be received in the respective recess means 23 of the manifold means 14 and are so spaced by the spacing means 37 that adjacent legs 35, 35 and 36, 36 will just clear opposed shoulder means 42 on the manifold means 14 that are defined by the recesses 23 therein so that the bracket means 15 will be properly located in assembled relation to the manifold means 14.

The control device 11 has a pair of opening means 43 passing therethrough in aligned relation with the recesses 29 in the surface 28 thereof and are adapted to respectively receive threaded fastening members 44 therein, each threaded fastening member 44 having an enlarged head 45 on one end thereof adapted to abut against the surface 46 of the control device 11 to mount the control device 11 to the bracket means 15 in a manner hereinafter described.

From the above description of the control device 11, fuel supply manifold 14 and bracket means 15, it can be seen that such parts can be readily formed in the configuration previously described and illustrated in a simple and effective manner to readily permit the control device 11 to be mounted to the fuel supply manifold 14 in a fast, easy and positive location without any of the disadvantages of the prior known threaded stem assembly operations.

In particular, the assembler has a choice of two methods of assembling the control device 11 of this invention to the fuel supply manifold 14 by the bracket means 15.

For example, one method of this invention is illustrated in FIG. 7 wherein the threaded fastening members 44 are disposed in the opening means 43 of the control device 11 and just started by several threads into each threaded aperture 39 of the flat portions 38 of the bracket means 15 to provide a subassembly of the control device 11 and bracket means 15. The thus interconnected bracket means 15 is then located by free hand over the manifold 14 at the recesses 23 thereof so that the legs 35 and 36 of the bracket means 15 can move downwardly over the manifold configuration until the overall width of the manifold 14 interferes with the hooked edges 41 of the legs 35 and 36 since the inside free dimension of the hooked edges 41 of the opposed legs 35 and 36 is less than the overall width of the manifold 14. When this interference takes place, the assembler, by applying a downward force on the enlarged heads 45 of the fastening members 44 will cause the legs 35 and 36 to flex outwardly by the hooked edges 41 thereof camming over the profile of the manifold 14 so that the legs 35 and 36 can be snapped around the manifold 14 in the manner illustrated in full lines in FIG. 7 and the natural resiliency of the legs 35 and 36 will cause the hooked edges 41 of the legs 35 and 36 to be properly aligned with the lip-like corner

means 27 of the manifold 14. Thereafter, the assembler tightens the fastening members 44 so as to draw the bracket means 15 upwardly thereon in the manner illustrated in FIG. 3 and since the annular gasket means 34 is engaging against the surface 20 of the manifold 14 and the projections 31 of the control device 11 are aligned with the recesses 24, such tightening of the threaded fastening members 44 will draw the bracket means 15 upwardly so that the hooked edges 41 thereof will hook around the lip-like corner means 27 of the manifold 14 to positively fasten the bracket means 15 thereto. Such tightening of the threaded fastening members 44 will also cause the control device 11 to be jammed between the enlarged heads 45 of the threaded fastening members 44 and themounting surface 20 of the manifold 14 so that the gasket means 34 will provide a gas tight seal between the opening 19 of the manifold 14 and the inlet means 30 of the control device 11. Simultaneously, the semispherical ends 32 of the projections 31 of the control device 11 are received in the dimples or recesses 24 of the manifold 14 to force the control device 11 into the desired accurate alignment with the manifold 14.

It is to be understood that because of the arcuate shapes in the opposed legs 35 and 36 of the bracket means 15, the tightening of the threaded fastening members 44 causes a deflection of a high rate of the legs 35 and 36 so that the legs 35 and 36 are placed in tension. This inherent condition serves to keep elastic tension between the threaded fastening members 44 and the mating parts of the assembly to prevent the threaded fastening members 44 from loosening so that lock washers can be eliminated from the assembly of this invention.

The dimensions of the bracket means 15, manifold 14 and control device 11 are such that the flat portions 38 of the bracket means 15 will never abut against the control device 11 at the bottom of the recess 29 thereof and the threaded fastening members 44 will never make contact with the manifold 14 in the assembled relation as illustrated in FIG. 2.

Further, it can be seen that the spacing between the recesses 23 and the spacing means 37 of the legs 35, 35 and 36, 36 of the bracket means 15 will positively locate the bracket means 15 relative to the manifold 14 so that the control device 11 will be positively located with its inlet means 30 in aligned relation with the opening 19 in the manifold 14.

Another method of this invention which the assembler can utilize to interconnect the control device 11 to the manifold 14 is illustrated in FIG. 6. In this method, the assembler merely forces the bracket means 15 over the configuration of the manifold 14 with the legs 35 and 36 being respectively received in the recesses 23 so that the hooked ends 41 of the legs 35 and 36 are snapped around the lip-like corner means 27 of the manifold 14. If desired, the bracket means 15 can be so assembled that the bent over tab means 40 can come to rest against the surface 18 of the manifold 14 whereby the threaded apertures 39 are still spaced above the side 18 of the manifold 14. Thereafter, the control device 11 is placed over the bracket means 15 and the inner edges 46 of the legs 35 and 36 of the bracket means 15 guide against the inner edges 47 of the recesses 29 of the control device 11 to locate the control device 11 relative to the bracket means 15 and, thus, to the manifold 14. The threaded fastening mem-

bers 44 can then be received in the threaded apertures 39 of the bracket portions 38 and as the bolts 44 are tightened, the bolts 44 will accurately secure the control device 11 to the manifold 14 in the manner previously described.

Therefore, it can be seen that by utilizing either of the two described methods for assembling the control device 11 of this invention to the manifold 14 of this invention by the bracket means 15 of this invention, the control device 11 not only is accurately located relative to the manifold 14 in a simple and effective manner, but also positive sealing relationship is provided between the opening means 19 of the manifold 14 and the inlet means 30 of the control device 11 without requiring the prior known threaded stem arrangement that has many disadvantages as previously described.

Also, the mounting method or means of this invention offers quick and easy repair should a customer or a service man strip a mounting bolt thread on the apparatus containing the manifold 14. In particular, the damaged bracket means 15 of this invention can be pried off the manifold 14 and a new one snapped on in a minute. Otherwise, it would have meant replacement of a complete manifold when the mounting bolts are integral therewith as they are on the prior described threaded stem mounting arrangements.

While the bracket means 15 has been previously described and illustrated as mounting a temperature responsive control device 11 to the manifold 14, it is to be understood that the various features of this invention can be utilized to secure other types of control devices to the manifold 14.

For example, another mounting means or method of this invention is generally indicated by the reference numeral 50 in FIG. 8 and comprises a pressure regulator means 51 mounted to a fuel supply manifold 52 by a pair of bracket means 53, the various parts of the control device 51, manifold 52 and bracket means 53 of FIG. 8 that are similar to like parts of the control device 11, manifold 14 and bracket means 15 of FIG. 1 are indicated by like reference numerals followed by the reference letter "A".

As illustrated in FIG. 8, the manifold 52 has an intermediate portion 54 pinched closed in the manner illustrated in FIG. 9 so as to prevent fluid communication between the left hand part 55 thereof and the right hand part 56 thereof. However, the right hand part 56 is provided with an opening means 19A and the left hand part 55 is also provided with an opening means 19A, the opening means 19A respectively being disposed in fluid communication with an inlet means 30A of the pressure regulator 51 and an outlet means 57 of the regulator 51 so as fuel is directed into the right hand part 56 of the manifold 52, the same must pass through the opening means 19A thereof into the inlet means 30A of the pressure regulator 51 which directs the fuel at the regulated pressure out through the outlet means 57 thereof and into the opening means 19A of the left hand part 55 of the manifold 52 to be delivered to the desired device.

Each bracket means 53 comprises only a single pair of opposed legs 35A and 36A respectively received in cooperating recesses 32A in the particular manifold part 55 or 56 in the manner previously described and being attached to the control device 51 by the threaded fastening members 44A in the manner previously described whereby it can be seen that the bracket means

53 effectively seal the control device 51 to the opening means 19A of the parts 55 and 56 of the manifold 52 in the manner previously described without requiring the prior known threaded stem arrangement.

In particular, the prior known methods of providing a pressure regulator in a fuel supply manifold required the connecting of two pipe ends to the pressure regulator whereas this invention merely pinches closed the manifold between the desired sections thereof and fastens the pressure regulator thereto by the unique bracket means 53 of this invention without threaded connections and the like.

While the manifold configurations of this invention can be formed of any suitable material, it has been found that the manifold can be made from square, welded steel tubing that can be mechanically reformed in the various configurations previously described.

Therefore, it can be seen that this invention not only provides novel and unique control device mounting means having many advantages over the prior known mounting means, but also this invention provides improved parts for creating such unique mounting means.

What is claimed is:

1. A method for interconnecting a control device that has an inlet means and abutment means to a fuel supply manifold that has sidewall means and an opening means in said sidewall means comprising the steps of detachably interconnecting a resilient bracket means to said control device, disposing an annular sealing gasket means between said control device and said manifold outboard of said opening means and said inlet means for sealing said opening means to said inlet means, disposing said abutment means of said control device in pivotal abutment with said manifold outboard of said opening means thereof, detachably interconnecting said bracket means to said manifold about said sidewall means of said manifold so that said control device is secured in sealing relation with said sidewall means of said manifold solely by the interconnection of said bracket means with said control device and said manifold so that said inlet means of said control device is disposed in fluid communication with said opening means of said manifold and said resilient bracket means, said gasket means and said abutment means provide a flexible mounting of said control device to said manifold.

2. A method as set forth in claim 1 wherein said step of disposing said abutment means comprises the step of disposing said abutment means into engagement with said manifold in a manner to provide a relatively small area of contact therebetween.

3. A method as set forth in claim 1 and including the steps of providing recess means in said sidewall means of said manifold, and disposing said abutment means of said control device in said recess means in said sidewall means of said manifold to locate said control device relative to said manifold.

4. A method as set forth in claim 1 wherein said step of detachably interconnecting said bracket means to said control device comprises the step of threadedly interconnecting said control device to said bracket means with threaded fastening means.

5. A method as set forth in claim 1 wherein said step of detachably interconnecting said bracket means to said manifold comprises the step of hooking said bracket means around said sidewall means of said manifold.

6. A method as set forth in claim 5 and including the step of placing said hooked bracket means under tension between said manifold and said control device by said step of detachably interconnecting said bracket means to said control device.

7. A method as set forth in claim 1 wherein said step of detachably interconnecting said bracket means to said manifold comprises the steps of providing recess means in said sidewall means of said manifold, and disposing part of said bracket means in said recess means of said manifold to locate said bracket means relative to said manifold.

8. A method as set forth in claim 1 wherein said manifold has lip-like corner means at opposite side edges thereof that are on a side thereof opposite to the side engaged by said control device and wherein said bracket means has two opposed legs, said step of detachably interconnecting said bracket means to said manifold comprising the step of respectively hooking said two opposed legs of said bracket means around said lip-like corner means of said manifold at said opposed side edges thereof on said side of said manifold that is opposite to said side thereof engaged by said control device.

9. A method as set forth in claim 1 wherein said bracket means is detachably interconnected to said control device before said bracket means is detachably interconnected to said manifold.

10. A method as set forth in claim 1 wherein said bracket means is detachably interconnected to said manifold before said bracket means is detachably interconnected to said control device.

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