United States Patent

[11] 3,615,872

[72] Inventor **Henry C. Braucksiek**
Buena Park, Calif.

[21] Appl. No. **823,263**
[22] Filed **May 9, 1969**
[45] Patented **Oct. 26, 1971**
[73] Assignee **Robertshaw Controls Company**
Richmond, Va.

[54] **SUPPORTING AND RETAINING MEANS FOR TEMPERATURE SENSING MEANS**
1 Claim, 8 Drawing Figs.

[52] **U.S. Cl.** **136/217,** 136/220
[51] **Int. Cl.** **F23n 5/10**
[50] **Field of Search** ..... 136/217 -220, 230, 242, 228

[56] **References Cited**

UNITED STATES PATENTS

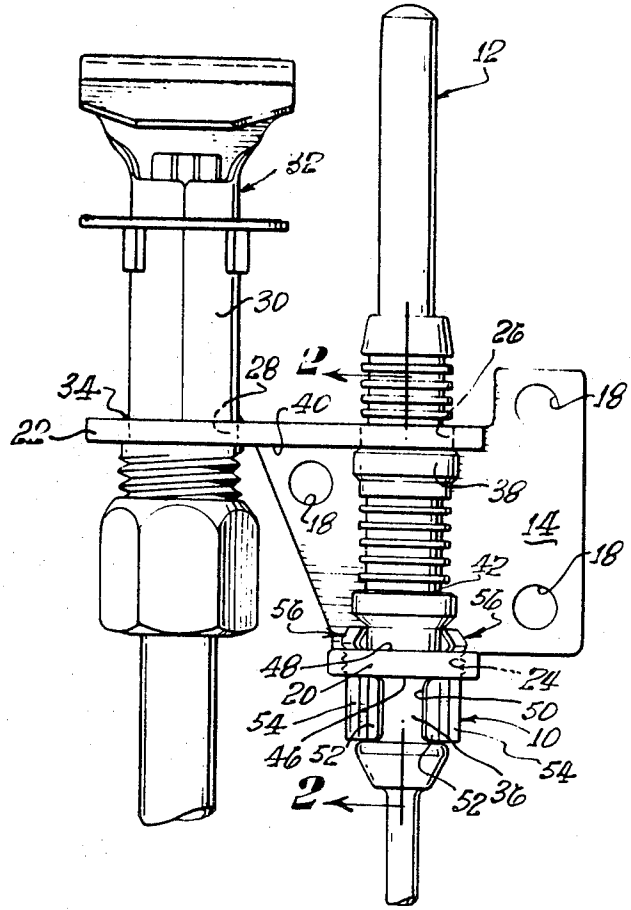
3,290,178 12/1966 Loveland ..... 136/217 X

FOREIGN PATENTS

984,188 2/1965 Great Britain 136/217

Primary Examiner—Carl D. Quarforth
Assistant Examiner—Harvey E. Behrend
Attorney—Fulwider, Patton, Rieber, Lee & Utecht

ABSTRACT: A supporting and retaining clip for placement upon the tubular extremity of a thermocouple or thermopile to mount such extremity within a pilot burner bracket opening, the clip including portions having resilient fingers which flex inwardly to enable the tubular extremity and clip to be inserted into the opening, which fingers thereafter flex outwardly to engage the margin of the opening and constrain the clip against accidental withdrawal from the opening, the clip being characterized by portions separate from said fingers for engagement of spaced abutments on the tubular extremity to thereby constrain the clip against movement relative to said tubular extremity.



PATENTED OCT 26 1971

3,615,872

SHEET 1 OF 2

FIG. 1.

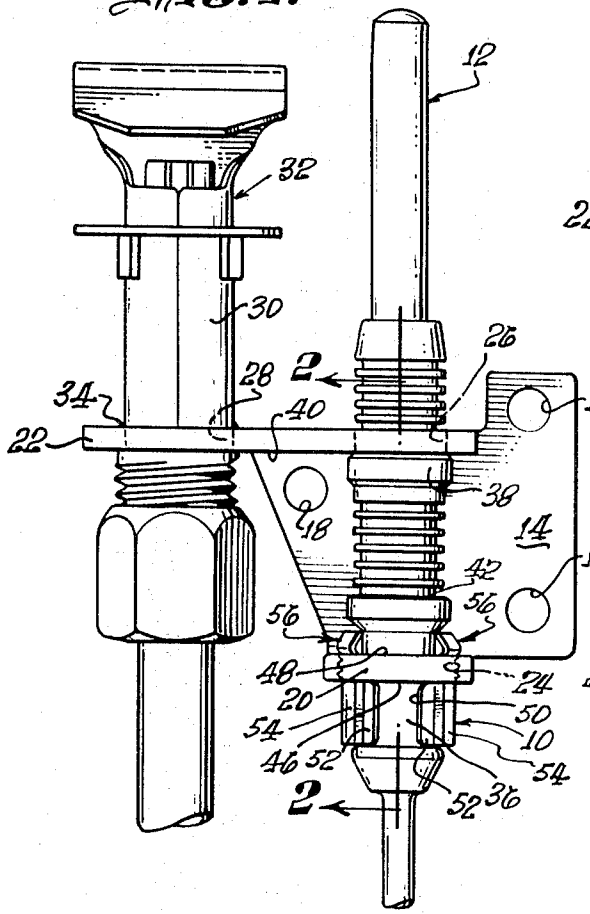


FIG. 2.

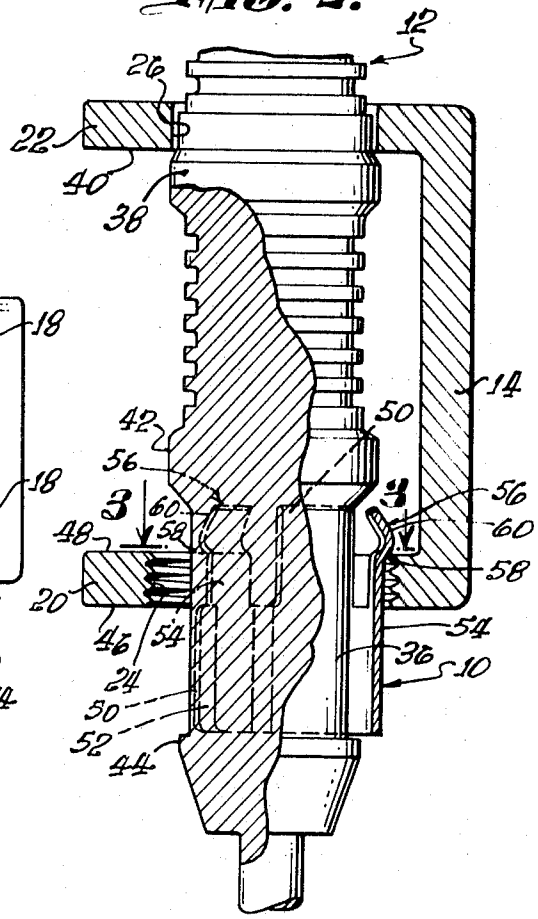


FIG. 4.

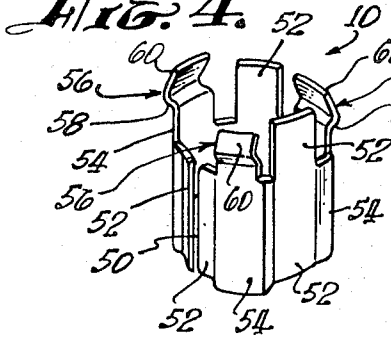
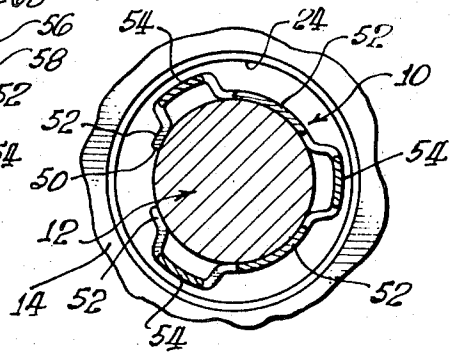


FIG. 3.



INVENTOR.

HENRY C. BRAUCKSIEK,

By

Fulwider, Patton, Rieber, Lee & Utecht

ATTORNEYS.

FIG. 5.

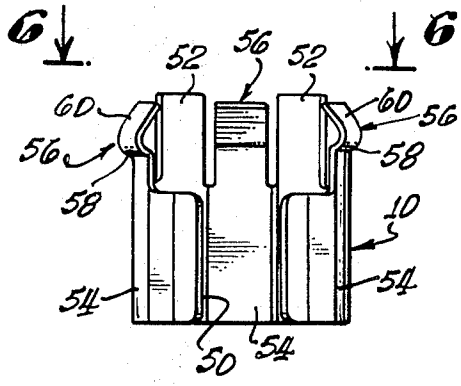


FIG. 6.

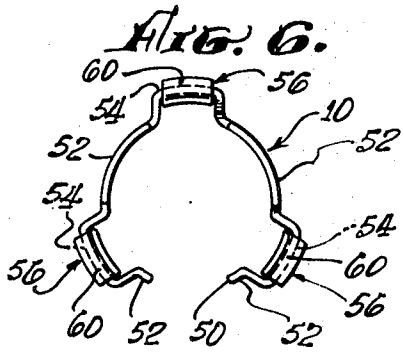


FIG. 8.

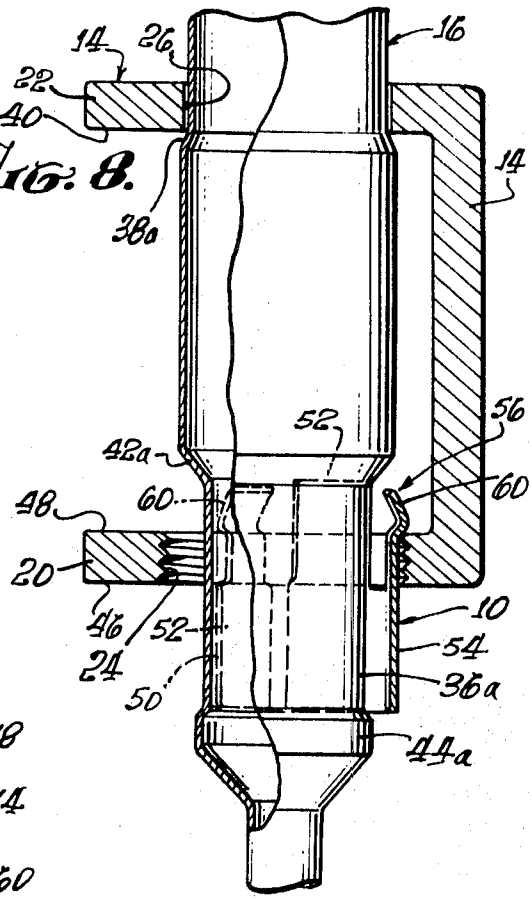
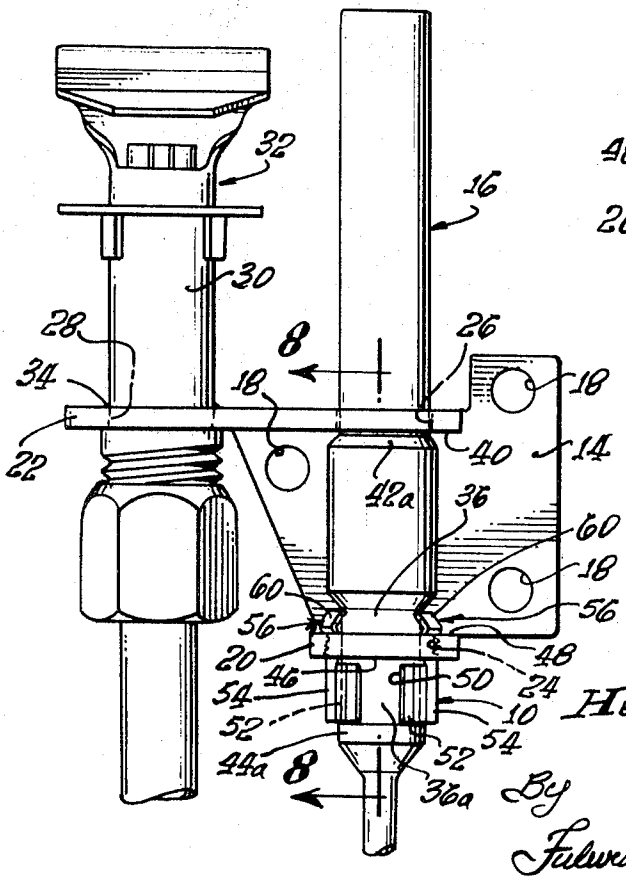


FIG. 7.



INVENTOR.

HENRY C. BRAUCKSIEK,

By

Fulwider, Patton, Lieber, Lee & Utecht.

ATTORNEYS.

SUPPORTING AND RETAINING MEANS FOR TEMPERATURE SENSING MEANS

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates to supporting and retaining means for removably mounting a thermocouple, thermopile, or like temperature sensing means in operative disposition through the opening of a support structure such as a pilot burner bracket.

2. Description of the prior Art

Supporting and retaining clips have heretofore been used to mount temperature sensing means in position, for example, upon the support bracket of a pilot burner of a heating system. However, clips which are satisfactorily cheap and reliable generally are incapable of mounting more than one type of sensing means, one clip version being used with a thermocouple and another clip version being used with a thermopile. In addition, clips of the prior art are either relatively difficult to mount and demount, or they are so easy to demount that they permit accidental separation of the temperature sensor from the pilot burner bracket. Another shortcoming of prior art clips is that the means utilized to anchor the temperature sensor in position upon the burner bracket undesirably affect the reliability of the anchorage of the clip to the temperature sensor.

SUMMARY

The present supporting and retaining means includes a resilient, circumferentially discontinuous clip, and further includes spaced abutments on the thermocouple or other temperature sensing means. The clip can be laterally placed over and about the thermocouple and includes elongated portions receivable within a support bracket opening, such portions having fingers which flex radially inwardly for passage through said opening and radially outwardly to constrain said clip against removal from said opening. The clip includes separate portions which include ends engageable with the abutments to constrain the clip against movement relative to the temperature sensing means.

The clip is relatively inexpensive to fabricate and reliably supports and retains in operative position either a thermocouple or a thermopile, being accommodatable to the somewhat different configurations of each. Moreover, the clip means used to hold the clip in position upon the support bracket operate substantially independently of the means used to hold the clip in position upon the temperature sensor. Consequently, one function does not undesirably affect the other.

Other objects and features of the invention will become apparent from consideration of the following description taken in connection with the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a side elevational view of a supporting and retaining clip according to the present invention, the clip being illustrated supporting a thermocouple upon a pilot burner bracket of a heating system;

FIG. 2 is an enlarged view, partially in section, taken along the line 2–2 of FIG. 1;

FIG. 3 is a view taken along the line 3–3 of FIG. 2;

FIG. 4 is a perspective view of the clip of FIG. 1, on an enlarged scale;

FIG. 5 is an enlarged side elevational view of the clip of FIG. 4;

FIG. 6 is a view taken along the line 6–6 of FIG. 5;

FIG. 7 is a view identical to FIG. 1, but illustrating the clip being used to support a thermopile in position upon the pilot burner bracket; and

FIG. 8 is an enlarged view, partially in section, taken along the line 8–8 of FIG. 7.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring now to the drawings, and particularly to FIGS. 1 through 6, there is illustrated a supporting and retaining means which includes a clip 10 for supporting or mounting a temperature sensing means or thermocouple 12 in position upon a pilot burner bracket 14 of a conventional heating system (not shown). FIGS. 7 and 8 illustrate the clip 10 used to support another type of temperature sensing means, namely a thermopile 16.

Use of the clip 10 provides a relatively inexpensive and reliable means for quickly mounting the thermocouple 12 or thermopile 16 to the bracket 14. Moreover, as will be seen, the clip 10 also enables rapid and deliberate demounting of the temperature sensor, but prevents accidental demounting. Consequently, the clip 10 obviates any need for special clamps, nut and bolt assemblies or the like, and greatly simplifies the task of the serviceman who must install or replace the thermocouple or thermopile of a heating system or the like.

The pilot burner bracket 14 includes a plurality of openings 18 which are adapted to receive bolts or the like (not shown) for mounting the bracket 14 in position adjacent the main burner (not shown) of the heating system. The bracket 14 includes a pair of spaced-apart bracket portions 20 and 22 having aligned openings 24 and 26, respectively. Bracket portion 22 is longer than portion 20 and includes an additional opening 28 adjacent the extremity thereof which is opposite the opening 26. The opening 28 accepts the tubular body 30 of a pilot burner 32, the body 30 being secured in this position by means of a weld 34. The positioning and configuration of deflector elements carried by the pilot burner 32 direct the pilot flame transversely and in the direction of the thermocouple 12 so that the thermocouple is effective to sense when the burner 32 is in operation. In some instances a thermocouple 12 is used to provide this temperature sensing function, while in certain other applications a sensor such as the thermopile 16 is used.

The thermocouple 12 is generally conventional in construction and includes tubular extremity 36 having an annular flange or abutment 38 for engagement with the lower surface or face 40 of the bracket portion 22. The diameter of the abutment 38 is greater than the diameter of the opening 26, so that the abutment 38 forms a stop which prevents further upward travel or passage of the tubular extremity 36 through the opening 26 beyond the point illustrated in FIG. 2. However, the diameter of the abutment 38 is less than the diameter of the opening 24 so as to enable the tubular extremity 36 to be disposed through the opening 24 and into the position shown in FIG. 2.

The tubular extremity 36 of the thermocouple 12 also includes a pair of longitudinally spaced abutments 42 and 44 located below the abutment 38, as viewed in FIGS. 1 and 2. These abutments 42 and 44 form a part of the supporting and retaining means of the present invention in that they cooperate with the clip 10 to mount the thermocouple 12 in position upon the bracket 14.

In the operative position of the thermocouple 12 upon the bracket 14, the abutments 42 and 44 are located on opposite sides of the opening 24, it being noted that the opening 24 extends through the opposite faces 46 and 48 of the bracket portion 20. The diameter of the abutment 42 is less than the diameter of the opening 24, and the lesser diameter portion of the tubular extremity 36 between the abutments 42 and 44 is of substantially uniform diameter in a longitudinal direction.

The clip 10 is generally cylindrical and made of resilient material such as relatively thin stainless steel sheet material. It is circumferentially discontinuous, being characterized by a longitudinally oriented opening or slot 50, as best viewed in FIGS. 3 and 4. The slot 50 enables the clip 10 to be sprung open for lateral placement upon the lowermost portion of the tubular extremity 36 which is illustrated in FIG. 2, for upward axial slidable movement upon the extremity 36 to its operative position between the abutments 42 and 44.

The clip 10 is deformed axially or longitudinally to provide a plurality of circumferentially arranged, longitudinally extending first or inner portions 52 and second or outer portions 54, the inner portions being located between the outer portions and in comformable engagement with the adjacent tubular extremity 36. In addition, the inner portions are generally arcuate in conformation and include opposite extremities engageable with the spaced abutments 42 and 44 to generally fix the clip 10 in longitudinal position relative to the thermocouple 12. The inner portions 52 are preferably undeformed along their lengths so as to better withstand compression forces at its opposite ends without buckling or collapse of the portions intermediate such ends.

The outer portions 54 are larger in diameter than the inner portions 52 and throughout the major portion of their lengths are generally arcuate to fit conformably within the opening 24 of the bracket 14. The upper extremity of each outer portion 54 includes a finger 56 which is characterized by a radially offset or outwardly extending portion defining a detent shoulder 58, as best viewed in FIG. 5, and further characterized by a continuation of the detent shoulder 58 which slopes radially inwardly to define an inclined seating ramp 60.

As will be apparent from an examination of FIG. 2, the seating ramps 60 are engageable with the underface 46 of the bracket portion 20 for inward deflection of the fingers 56 upon movement of the tubular extremity 36 through the opening 24 in an upward direction. Once the fingers 56 are located on the opposite side of the bracket portion 20, the springlike character of the fingers 56 deflects the fingers outwardly so that the detent shoulders 58 engage upon the opposite or upper face 48 of the bracket element 20. This constrains the clip 10 against downward movement out of the opening 24. Moreover, the abutment of the ends of the clip inner portions 52 against the abutments 42 and 44 prevents the thermocouple 12 from moving axially or longitudinally relative to the clip 10. Consequently, the thermocouple 12 is securely mounted in position by the clip 10 upon the bracket 14.

The operation of the clip in the overall arrangement illustrated in FIGS. 7 and 8 is substantially identical to that above described in connection with FIGS. 1 through 6. However, in FIGS. 7 and 8, the thermopile 16 includes a larger diameter tubular extremity 36*a*, and is characterized by a substantially uniform diameter between its corresponding abutments 38*a* and 42*a*. In all other important respects the operation of the clip 10 is identical to the operation of the clip in the first embodiment.

The showing in FIGS. 7 and 8 demonstrates the adaptability of the present clip 10 for securement of either the thermocouple 12 or the thermopile 16 upon the usual pilot burner bracket 14.

From the foregoing it will be apparent that the present supporting and retaining clip 10 provides a relatively inexpensive and reliable means for removably mounting a temperature sensing means in operative position through the opening of a support structure such as the pilot burner bracket 14, The resilient nature of clip 10 enables the clip to be easily deformed by engagement of the seating ramps 60 upon the margins of the opening 24 during insertion of the temperature sensing means, but a significantly higher force or greater effort is required to remove the temperature sensing means from the support bracket because of the constraining engagement of the detent shoulders 58 upon the margins of the opening 24. It is also significant that the inner portions 52 of the clip 10 engage the abutments 42 and 44 independently of the action of the fingers 56 so that the constraint against longitudinal movement afforded by the interengagement between the ends of the inner portions 52 and the abutments 42 and 44 does not undesirably deform the body of the clip 10 and possibly jam it in the opening 24.

Various modifications and changes may be made with regard to the foregoing detailed description without departing from the spirit of the invention.

What is claimed is:

1. The combination with a pilot burner of a temperature sensing means and supporting and retaining means for the latter, wherein said temperature sensing means has an elongated tubular extremity and is formed with a pair of longitudinally spaced, annular abutments and said pilot burner is provided with a bracket formed with an opening that receives said elongated annular extremity, with the abutments thereof spaced on opposite sides of said opening, said supporting and retaining means comprising:

a generally cylindrical clip made of resilient, circumferentially discontinuous sheet material whereby said clip may be sprung open for lateral placement upon said extremity for location between said abutments, said clip including circumferentially, alternately arranged, longitudinally extending, parallel, arcuate first portions and arcuate second portions defining portions of first and second circles, respectively, and extending the length of said clip, said first portions being located between said second portions and in engagement with said tubular extremity, and having ends engageable with said abutments to constrain said clip against longitudinal movement relative to said extremity, said second portions being spaced radially outwardly of said first portions and receivable within said bracket opening, one extremity of each of said second portions each including a finger having a radially outwardly extending portion defining a detent shoulder and a portion sloping radially inwardly from said detent shoulder to define an inclined seating ramp, said ramps being engageable with the lower edge of said opening for inward deflection of said fingers upon movement of said extremity through said opening in one direction, whereby upon outward deflection of said fingers on the opposite side of said opening said detent shoulders engage upon the opposite side of said opening to constrain said clip against movement in a direction opposite said one direction.

* * * * *