Sept. 1, 1959 F. SKAY 2,902,307

THERMOSTAT CASE CLAMP

Filed Oct. 31, 1955

FIG.1.

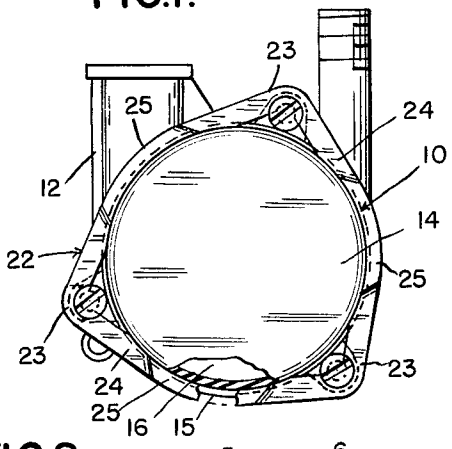


FIG.3.

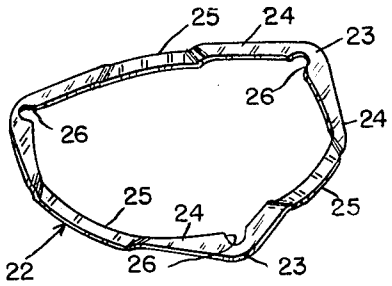
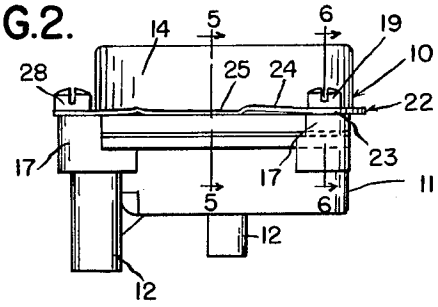


FIG.2.



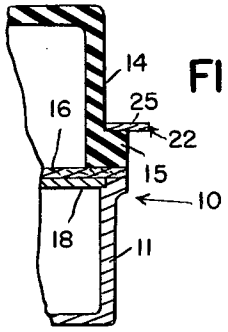
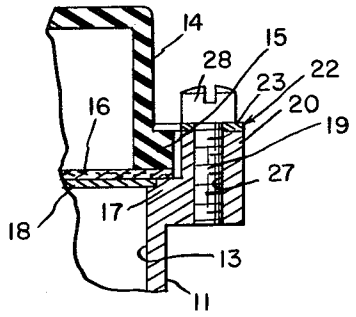


FIG.5.

FIG.6.



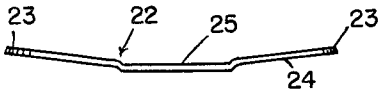


FIG.4.

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THERMOSTAT CASE CLAMP

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6 Claims. (Cl. 292—256.6)

The present invention relates to an improved spring clamp unit to secure together the housing parts of a thermostat case, such as is employed in an automatic choke of an internal combustion engine. It is a general object of the invention to materially simplify and expedite an assembly of the thermostat by the use of a clamp in accordance with the invention.

The conventional thermostat case for an automatic choke, as typically illustrated in the accompanying drawing, ordinarily has a casing part in the form of a die-casting provided with suitable fittings to its hollow interior and a further hollow casing member of molded material applied thereto. In prior units, the two parts have been secured to one another by a plurality of screws threadedly engaging the die-cast part and a plurality of small spring clamp elements which engage the other casing part, for example at a laterally projecting flange thereon, and are drawn up by the screws to hold the casing members in rigidly clamped relation, with a disk-like sealing gasket compressed between the clamped parts.

A substantial factor in the cost of assembly of the thermostat case is the time expended by a workman in assembling the individual spring clamping elements to the case parts and holding same in proper position until the clamping screws are taken up. Likewise the small individual clamping elements are frequently dropped and lost. Moreover, the non-uniformity of pressure transmitted through these independent spring clamps on the gasket and casing parts is undesirable, being usually exerted at only three widely spaced points about the case perimeter. Fracturing of a case part often occurs as a result.

It is therefore an object of the invention to provide an improved case clamp construction in the form of a single one-piece spring clamping annulus or ring which consolidates the action of the plurality of individual clamp elements heretofore employed, and also multiplies the areas at which clamping pressure is applied, with a diminished angular spacing of the pressure points. This occasions greater uniformity of distribution of sealing force and eliminates the source of fracturing referred to above. The cost of manufacture or assembly of the clamp structure is also substantially reduced.

More specifically it is an object of the invention to provide an improved casing clamp ring of special configuration, being of generally triangular, but curved side, outline. The apices of the outline are axially offset uniformly in respect to the general plane of the ring so as to provide 120° spaced spring components at these points; and the portions of the ring at the mildly rounded sides thereof are offset slightly in the opposite direction, thus affording further intermediate spring components to double the number and halve the spacing of the spring areas or zones of the ring. Appropriate formations are provided at the ring apices to accommodate the usual case securing screws and hold the ring from movement in its plane. In assembly the ring is telescoped over a casing part, with its rounded sides abutting a flange on this part and with its apex formations aligned with threaded holes in the other part of the case. Screws threaded in the last named part at these locations place the apex and intermediate spring portions of the ring under

compression and flexure, and the holding force of the screws is transmitted by them to clamp the case parts and gasket rigidly.

The foregoing as well as other objects will be made more apparent as this description proceeds especially when considered in connection with the accompanying drawings, wherein

Fig. 1 is a top plan view, partially broken away and in section, of an automatic choke thermostat case having its parts clamped by a one-piece spring unit in accordance with the invention;

Fig. 2 is a side elevational view of the assembly of Fig. 1;

Figs. 3 and 4 are, respectively, perspective and side elevational views of the improved one-piece clamp ring of the invention; and

Figs. 5 and 6 are, respectively, fragmentary sectional views in enlarged scale along lines 5—5 and 6—6 of Fig. 2.

The case 10 of an automatic choke thermostat as illustrated in Figs. 1, 2, 5 and 6 of the drawings is of a known construction, comprising a lower die-cast housing or casing part 11 having suitable external fittings 12 opening to its hollow interior 13. The upper casing part 14 is in the form of a circular cap provided with a radially outwardly projecting annular flange 15 about its open end, and which part 14 may be fabricated integrally of a non-metallic plastic composition or like moldable material. A disk-like gasket 16 of appropriate fibrous sealing material is compressed between flange 15 and an annular upwardly facing shoulder 17 of the part 11, this disk being in face engagement with metal disk 18 applied across the internal opening of part 11.

A plurality of clamping screws 19 are threadedly engaged in individual, integral gasket centering bosses 20 projecting upwardly from shoulder 17 at three equally spaced points about the perimeter of the latter. It has been the custom in the past to employ an individual spring clamp element of special shape at each of these bosses 20 to hold the casing part 14 fixedly to the other part 11. This practice has the drawbacks referred to above.

In order to correct these disadvantages, and at the same time materially reduce the cost of assembly of the unit 10 as a whole, the invention provides a single, one-piece clamp ring 22 as shown in Figs. 3 and 4 of the drawings which ring is employed in lieu of the indivdual clamp elements mentioned in the preceding paragraph. Ring 22 is, as illustrated best in Fig. 1 in its assembled position, in the outline of an equilateral triangle having its apices 23 connected by mildly rounded side portions 24.

The apex portions 23 are displaced slightly out of the general plane in which lie intermediate portions 25 of the sides 24 of the ring 22, the displacement being provided to form corner spring areas, the displacement being uniform in all instances. These intermediate portions 25 of the length of the sides 24 are flat. The radius of curvature of the ring at the intermediate portions 25 is only slightly greater than the external dimension of casing part 14, so that the ring 22 may be easily and quickly slipped over that part to bring its intermediate portions 25 in flush engagement with the top of the flange 15 of part 14.

The ring 22 is provided at the inner edge of each of its apex spring areas 23 with a notch or bay 26, these notches being located in 120° angular spacing from one another, and so as to be in alignment with the threaded openings 27 of the three bosses 20 of the part 11 to receive the clamping screws 19. The screw heads 28 will then bear on the material of the respective apices 23 outwardly of their notches 26. It is evident that the notches thus act as locks to prevent angular shift of the ring 22 relative to the part 11.

The relationship of the features of the ring 22 is such that the heads 28 of screws 19 will be spaced outwardly

from the wall of casing part 14 when the unit 10 is assembled. There is no direct alignment of the heads 28, the apex material of ring 22 and the flange 15 of part 14, so that the apex 23 as compressed by the screw does not transmit direct compression to the flange, likely to fracture the latter. It is under spring force alone at all of its clamped zones. The assembly is effected by positioning the gasket 16 on the shoulder 17 of part 11, dropping the part 14 onto the gasket, telescoping the ring 22 over the part 14, with intermediate flat portions 22 abutting the flange 15, positioning the notches 26 in axial alignment with the threaded openings 27, and by applying and taking up the respective screws 19.

This causes the spring apices 23 to be placed under substantial flexure and compression, and the intermediate oppositely oriented spring portions 25 are correspondingly stressed. The holding pressure on flange 15 is distributed uniformly over six points of contact, and the gasket is accordingly compressed with substantially greater uniformity than has been possible with the previous clamp spring arrangement. The holding force of the uniformly distributed spring action will follow up and continue to seal the gasket 16 effectively, even after considerable shrinkage over long service. Actually, although it is desirable that the clamp ring 22 be fabricated of a good grade of spring steel, this is not an absolute necessity and a cold-rolled steel, case hardened .003"–.005" deep, is satisfactory.

It will be observed that the flat, coplanar portions 25 of the sides 24 are arcuate and concentric and together define a circular clamping zone. The corner portions 23 are engageable by the clamping means 19, and these corner clamp engaging portions are located radially outwardly from the clamping zone so that direct rigid clamping pressure may not be applied in the clamping zone. In addition, the clamp engaging portions are also displaced laterally from the plane occupied by the clamping portions of the ring.

The drawings and foregoing specifications constitute a description of the improved case clamp construction in such full, clear, concise and exact details as to enable any person skilled in the art to practice the invention, the scope of which is indicated by the appended claims.

What I claim as my invention is:

1. A casing structure comprising a body having a continuous flat circular seat and a plurality of fastener receiver portions spaced angularly around and located radially outwardly beyond said seat, a cover having an edge portion of continuous circular shape engaged on said seat and located radially inwardly from said fastener receiver portions, a continuous annular ring of resilient material having arcuate portions overlying the edge portions of said cover intermediate said fastener receiver portions and having radially outwardly extending fastener receiver portions shaped to overlie the fastener receiver portions of said body, and fasteners located outwardly beyond the edge of said cover and extending through said fastener receiver portions and pressing the fastener receiver portions of said ring toward said body to thereby urge the edge portions of said cover between said fasteners against said body.

2. A casing structure comprising a body having a continuous flat circular seat and a plurality of fastener receiver portions spaced angularly around and located radially outwardly beyond said seat, a cover having an edge portion of continuous circular shape engaged on said seat and located radially inwardly from said fastener receiver portions, a continuous annular ring of resilient material having arcuate portions overlying the edge portions of said cover intermediate said fastener receiver portions and having radially outwardly extending fastener receiver portions shaped to overlie the fastener receiver portions of said body, and fasteners located outwardly beyond the edge of said cover and extending through said fastener receiver portions and pressing the fastener receiver portions of said ring toward said body to thereby urge the edge portions of said cover between said fasteners against said body, said ring being formed from flat spring metal the plane of which is substantially parallel to the general plane in which lie the portions of said ring intermediate the fastener receiving portions thereof.

3. A casing structure comprising a body having a continuous flat circular seat and a plurality of fastener receiver portions spaced angularly around and located radially outwardly beyond said seat, a cover having an edge portion of continuous circular shape engaged on said seat and located radially inwardly from said fastener receiver portions, a continuous annular ring of resilient material having arcuate portions overlying the edge portions of said cover intermediate said fastener receiver portions and having radially outwardly extending fastener receiver portions shaped to overlie the fastener receiver portions of said body, and fasteners located outwardly beyond the edge of said cover and extending through said fastener receiver portions and pressing the fastener receiver portions of said ring toward said body to thereby urge the edge portions of said cover between said fasteners against said body, the fastener receiver portions of said ring extending out of the general plane in which lie the portions of said ring intermediate the fastener receiver portions thereof when said ring is unstressed.

4. A casing structure comprising a body having a continuous flat circular seat and a plurality of fastener receiver portions spaced angularly around and located radially outwardly beyond said seat, a cover having an edge portion of continuous circular shape engaged on said seat and located radially inwardly from said fastener receiver portions, a continuous annular ring of resilient material having arcuate portions overlying the edge portions of said cover intermediate said fastener receiver portions and having radially outwardly extending fastener receiver portions shaped to overlie the fastener receiver portions of said body, and fasteners located outwardly beyond the edge of said cover and extending through said fastener receiver portions and pressing the fastener receiver portions of said ring toward said body to thereby urge the edge portions of said cover between said fasteners against said body, the fastener receiver portions of said ring having radially inwardly open fastener receiving slots therein.

5. A one-piece generally annular clamping ring formed of flat spring metal adapted to exert resilient clamping pressure at a plurality of circumferentially spaced areas in an annular clamping zone, said ring having a plurality of circumferentially spaced fastener receiving portions all of which are located radially outwardly of said clamping zone, and clamping portions intermediate said fastener receiving portions, said clamping portions traversing said clamping zone between each pair of adjacent fastener receiving portions, the clamping portions of said ring being flat and occupying a single plane, and the fastener receiving portions thereof being laterally displaced from said plane in the same direction each of said fastener receiving portions being shaped to receive a headed fastener located wholly radially outwardly from said clamping zone.

6. A ring as defined in claim 5 in which said fastener receiving portions have radially inwardly open recesses to receive the fasteners.

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