Nov. 17, 1942. H. WAGNER 2,302,359

SECURING MEANS

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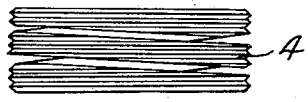


Fig. 1.

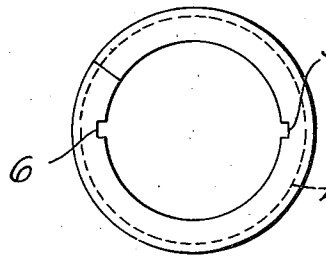


Fig. 2.

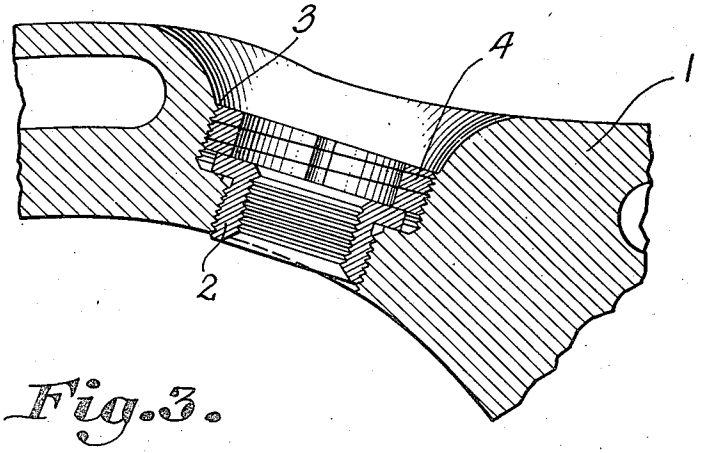


Fig. 3.

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SECURING MEANS

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vested in the Alien Property Custodian

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3 Claims. (Cl. 151—22)

This invention relates to securing means and refers more particularly to a securing element consisting of a winding spring used for holding a distance piece in position. The invention is more particularly concerned with means securing distance pieces which are carried by machine parts subjected to excessive oscillations, varying pressures and great changes in temperature, such as casings of internal combustion engines or the like.

Casings of this type when under the influence of excessive vibrations and pressure or temperature changes cannot hold securely distance pieces which must be screwed or inserted into them. It was found that such distance pieces become loose after a short time and are finally broken.

This is particularly true as far as distance pieces are concerned which are screwed into a casing and the screw threads of which are subject to recurring and strong temperature variations or continuous vibrations or oscillations. It was often found that such distance pieces become loose within a short time and then they can be easily removed from their positions with little force. Observations have shown that this loosening of distance pieces often takes place in various machines, for instance, in internal combustion engines, the spark plugs or similar parts of which are mounted in sleeve-like distance pieces within the cylinder head or another part of the motor block.

Then an exchange of spark plugs will involve undesirable delays and losses in time. The distance sleeve holding a spark plug in the cylinder head may become loose while the spark plug is screwed out, or the sleeve may be even screwed out of the cylinder head together with the spark plug and remains in firm engagement with the threads of the spark plug. Furthermore, the screw threads cut in the cylinder head for the distance piece carrying the spark plug suffer greatly in that case, particularly since the cylinder head is often made of light metal, the screw threads of which are easily broken when subjected to recurrent great strains.

Safety nuts of wound steel cannot be used to hold distance pieces, since these nuts must be screwed into the casing when its securing force, which is a function of the changes in the diameter of the safety nut, should come into being. Securing means consisting of springs having inner and outer screw threads of a different pitch cannot be used for holding distance pieces the position of which in a casing must be secured by an element situated over the distance piece and firmly attached to the said casing.

An object of the present invention is the provision of securing means which will hold a distance piece firmly in a machine part which is subjected to changing pressures, great vibrations and temperature variations.

Another object is to eliminate drawbacks and imperfections of prior art constructions and to provide a securing element which will completely satisfy all the requirements made thereon in modern mechanical engineering.

A further object is the provision of a securing element which is entirely elastic and the elasticity of which is utilized for eliminating the danger of breakage resulting from oscillatory or vibratory movements of the part holding the element, as well as from changes in form caused by temperature variations.

Other objects of the present invention will become apparent in the course of the following specification.

In accomplishing the objects of the present invention it was found advisable to provide a securing element consisting of a winding spring, the outer surfaces of which carry screw threads which are so disposed that when the spring is compressed, these threads can engage corresponding counter-threads formed in the part carrying the distance piece. In accordance with a preferred embodiment of the present invention, the force of the securing element which holds the distancing pieces, consists in the initial axial tension of the slotted winding spring.

This constant spring force comes into being after the securing element has been screwed in its compressed state into the engine part carrying the distance piece and over the latter. This spring force presses the side surfaces of the screw threads provided upon the outer surfaces of the securing element against the side surfaces of the screw threads provided in the engine part, thereby locking the securing element in relation to the engine piece into which it was screwed in. This distance piece situated below the securing element is thus prevented from becoming loose while the machine is in operation.

In accordance with said preferred embodiment of the inventive idea, the inner surface of the resilient securing element is provided with tool engaging portions which are situated axially one over the other when the windings of the resilient securing element are compressed.

These tool engaging elements may consist for instance, of grooves extending parallel to the

central axis of the resilient securing element when the latter is compressed.

It is advisable to employ a special tool for screwing the securing element constructed in accordance with the present invention into its proper position in the engine part. This tool compresses the resilient securing element before the latter is screwed in and, in this compressed state, the screw threads provided upon the outer surfaces of the resilient securing element constitute an uninterrupted continuous helical winding which is not interrupted by the spring force tending to spread the individual windings of the resilient securing element.

According to a preferred embodiment of the inventive idea, the direction of the screw threads provided upon the outer surfaces of the resilient securing element should be opposed to that of the windings of the resilient element. By these means, the loosening of the securing element is made much more difficult.

The invention will appear more clearly from the following detailed description when taken in connection with the accompanying drawing showing, by way of example, a preferred embodiment of the inventive idea, namely, the securing of a distance piece for a spark plug in the casing of an internal combustion engine.

In the drawing:

Figure 1 shows in side elevation a securing element constructed in accordance with the principles of the present invention.

Figure 2 is a top view of the securing element shown in Figure 1.

Figure 3 is a section through the cylinder head of an internal combustion engine and illustrates the use of the securing element.

The cylinder head 1 of an internal combustion engine is provided with a threaded opening 3 which communicates with a threaded passage of a smaller diameter.

A distance piece 2 which is screwed into this passage is provided with inner and outer screw threads. The inner diameter of the distance piece 2 corresponds to the diameter of a spark plug (not shown) which is screwed into the distance piece 2.

The inner screw threads of the opening 3 formed in the head 1 are used for holding the elastic securing element 4.

The securing element 4 has the form of a ring consisting of several windings which are rectangular or square in cross section. The outer surfaces of the ring 4 are provided with screw threads which have been cut while the windings of the ring 4 were compressed, and which correspond to the inner screw threads provided in the opening 3. The screw threads upon the outer surfaces of the ring 4 extend in a direction opposed to that in which the windings of the ring 4 extend.

The inner diameter of the resilient ring 4 is greater than the inner diameter of the distance piece 2, so that a spark plug can be conveniently screwed into the piece 2.

As shown in Figure 2, the resilient ring 4 is provided with diametrically opposed recesses 5 and 6 which are so milled into the windings of the ring 4, that when these windings are compressed the recesses 5 and 6 form two grooves which are adapted to receive a key or tool built specially for that purpose (not shown). This tool has projections which fit into the grooves 5 and 6 and which press together the windings of the ring 4 before it is screwed into the opening 3 of the cylinder head.

The resilient ring 4 screwed into the opening 3 (Fig. 3), presses against the distance sleeve 2 and its spring force presses the side surfaces of its screw threads against those of the screw threads in the cylinder head. Thus, the ring 4 secures the distance sleeve 2 in its proper position. The pressure of the ring 4 increases the frictional resistance between the side surfaces of the threads provided in the ring 4 and of those in the cylinder head 2 to such an extent that the distance sleeve 2 cannot be unscrewed by accident as a result of oscillations, vibrations continuing for a long time, or the like. Variations in the temperature of the cylinder head also have no effect as far as the resilient ring 4 is concerned, since the ring will follow these variations due to its elasticity and thus make them ineffective.

Even when the screw threads provided in the passage of the cylinder head 1 and adapted to engage those of the distance piece 2 are damaged or destroyed while the piece 2 is screwed in, the resilient ring 4 continues to hold the sleeve 2 so tightly, that the sleeve 2 and the spark plug carried thereby are securely locked and any danger that the ring 2 with the spark plug may become loose or fall out is eliminated.

It is apparent that the illustration shown above has been given by way of illustration and not by way of limitation and that the structures above described are subject to wide variation and modification without departing from the scope or intent of the present invention; all of such variations and modifications have to be included within the scope of the present invention.

What is claimed is:

1. A securing element for a distance piece carried by a threaded machine part subjected to high vibrations and alternating pressures, said securing element comprising a winding spring having outer surfaces and screw threads formed in said outer surfaces, said screw threads being adapted to mesh with screw threads formed in said threaded machine part when said winding spring is axially compressed.

2. A securing element for a distance piece carried by a threaded machine part subjected to high vibrations and alternating pressures, said securing element comprising a winding spring having outer surfaces and inner surfaces, screw threads formed in said outer surfaces, said screw threads being adapted to mesh with screw threads formed in said threaded machine part when said winding spring is axially compressed, and at least one groove formed in said inner surfaces in different windings of said winding spring, said groove being straight and extending parallel to the central axis of the winding spring when the latter is axially compressed.

3. A securing element for a distance piece carried by a threaded machine part subjected to high vibrations and alternating pressures, said securing element comprising a winding spring having outer surfaces and screw threads formed in said outer surfaces, said screw threads being adapted to mesh with screw threads formed in said threaded machine part when said winding spring is compressed, said screw threads extending in a direction opposed to that in which the windings of said winding spring extend.

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