March 30, 1965 D. W. PIEL 3,175,727

CLOSURE FOR CORE HOLES

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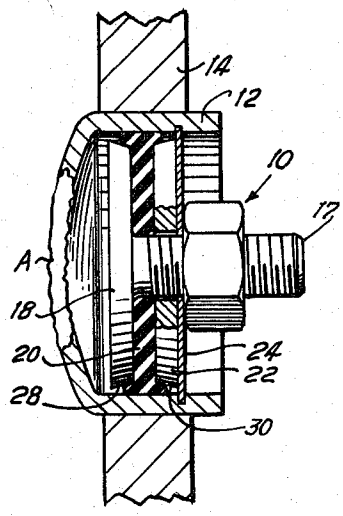


Fig. 1

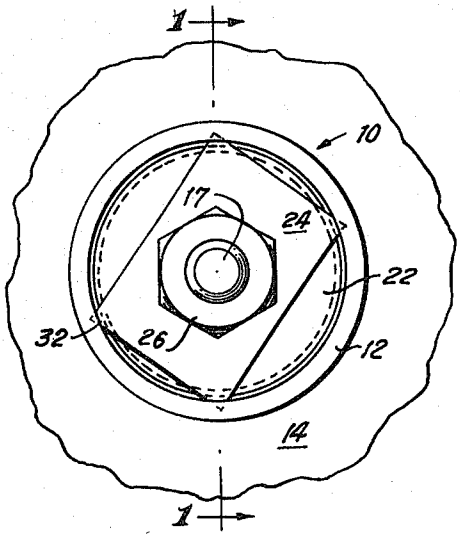


Fig. 2

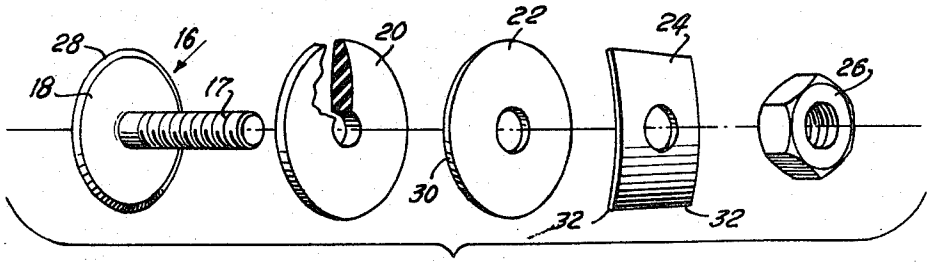


Fig. 3

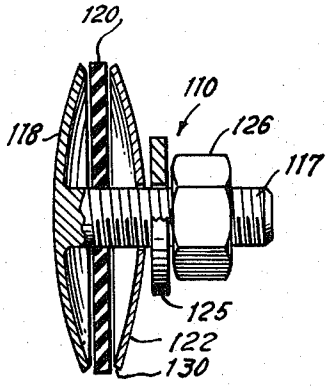


Fig. 4

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CLOSURE FOR CORE HOLES

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Continuation of application Ser. No. 106,396, Apr. 28, 1961. This application Mar. 22, 1963, Ser. No. 268,213
2 Claims. (Cl. 220—24.5)

This application is a continuation of my copending application Serial No. 106,396, filed April 28, 1961, now abandoned.

This invention relates to closures and more particularly to closures for core holes in internal combustion engine blocks.

In the construction of internal combustion engines it is necessary to have a core hole opening from the water chamber within the block to outside the block. These core holes are closed with a plug which is often called either a freeze plug or an expansion plug.

Certain types of water rust this plug until it leaks. This invention is concerned particularly with the repairing of leaks in such situations.

An object of this invention is to provide a closure by which such a leak may be repaired without removing the old plug. Most of these openings are sealed with a cup shaped plug. It is the bottom of the cup which is rusted; therefore, it is possible to place an expansion closure member against the side walls of the cup and avoid removing the old cup. This is important because often these cups are located at almost inaccessible portions of the engine such as behind the exhaust or intake manifold, exhaust pipe, oil filter, starter, or generator. It is difficult to remove the defective plug in such tight working quarters and often these items must be removed before the plug may be removed. Since the old plug is not removed it is not necessary to drain all the water and antifreeze as must be done when the plug is removed and replaced.

Another object of this invention is to provide a closure plug which does not require striking to set in place. The tight working quarters mentioned above often make it difficult or impossible to strike the plug to set it in place.

Another object of this invention is to provide a closure having a rubber sealing device with an increased area for the contact of the rubber seal.

A further object of this invention is to provide a closure which is securely locked in place so that there is no possibility of its unintentional removal.

Still further objects are to achieve the above with a device that is sturdy, compact, durable, simple, versatile, and reliable, yet inexpensive and easy to manufacture.

The specific nature of the invention as well as other objects, uses, and advantages thereof will clearly appear from the following description and from the accompanying drawing, the different views of which are not necessarily to the same scale, in which:

FIG. 1 is a sectional view of the closure in place taken on line 1—1 of FIG. 2.

FIG. 2 is an elevational view of the closure in place.

FIG. 3 is an exploded view of the closure.

FIG. 4 is a sectional view of a modified form of a closure according to this invention.

As may be seen in the accompanying drawings, repair plug or closure 10 is adapted to fit within cup-shaped core plug 12 which itself is within block 14 of an internal combustion engine casting. The repair plug 10 includes bolt 16 which has threaded shaft 17 and large head 18. The head 18 is disc-shaped and only slightly smaller than the inside diameter of the rim of the cup-shaped core plug 12 into which it fits. A rubber washer 20 fits around the shaft 17 of the bolt 16 against the head 18. Metal washer 22 fits around shaft 17 next to the

rubber washer 20. Lock 24 fits next to the metal washer 22. Nut 26 is screwed onto the end of the shaft 17 to firmly compress the entire assembly.

When I use the term rubber to describe the washer 20 it will be understood that this is not necessarily natural rubber. Any of several materials (either natural or synthetic) may be used provided they are sufficiently plastic to flow outward upon pressure and press against the inside walls of the rim of the core plug 12.

Peripheral edge 28 of the head 18 is beveled from inside. This provides a space for the rubber 20 to flow upon pressure. By permitting the rubber 20 to flow at the edges of the head 18, more contact between the rubber 20 and the inside walls of the rim of the core plug 12 is obtained. Likewise, the edge 30 of the metal washer 22 is beveled on that side facing the rubber 20 so that the rubber may flow between it and the side wall; therefore increasing the contact surface. This results in a better seal between the core plug 12 and the rubber washer 20.

The lock 24 is rectangular and the corners 32 are sharp. The lock 24 is a thin sheet of spring steel which is cylindrically bowed so that it is higher at the center than on the edge. The corners 32 are sharp and not round. The lock is slightly larger in a flattened condition than the inside diameter of the rim of the core plug 12 in which it fits. However, it is bowed sufficiently in its natural relaxed condition so that the distance between the diagonal corners is smaller than the inside of the rim. Therefore, when the repair plug 10 is assembled, the nut 26 flattens the lock 24 against the washer 22 forcing the corners 32 into the relatively soft metal of the core plug 12. This results in more than a frictional grip to hold the closure plug 10 in place.

It will be understood that the internal combustion engine comes from the factory with inner and outer walls 14 forming a passage for liquid coolant and a core hold in the outer wall 14 of the passage with the core plug 12 in the core hole rim side out as the closure. After use with impure water, if core plug 12 rusts out (as illustrated at A in FIG. 1) the repair plug 10 is inserted and the nut 26 tightened and the job is completed. The repair plug 10 is inserted within the core plug 12 which was the original closure. The rubber 20 is about the same diameter or slightly larger than the inside diameter of the rim of the cup-shaped core plug 12 and therefore, it forms sufficient frictional contact with it so that the shaft 17 of the bolt 16 does not rotate while the nut 26 is being rotated down on the shaft 17 pressing the rubber 20 and flattening the lock 24.

FIG. 4 shows another embodiment of the invention. In this embodiment the lock is integral with the containing washer.

More specifically the repair plug 110 includes a bolt with shaft 117 and the large diameter disc head 118 which is only slightly smaller than the inside diameter of the hole which is to be closed. Likewise, rubber washer 120 would be about the same diameter as the hole to be closed so that it will form a frictional fit. The shape of the metal washer 122 is arcuate or conical. It would be curved so that it is convex toward nut 126. The metal washer 122 would be slightly smaller diameter than the hole which is to be closed. Therefore, when the nut 126 was screwed down against the washer 122 it flattens the washer which bites into the walls of the surrounding material. A plain washer 125 may be inserted between nut 126 and washer 122 if desired.

The perimeter 130 of the metal washer 122 would be beveled for the dual purpose of permitting the flow of rubber into this area and also to cause it to be more biting.

In both embodiments, the rubber washer 20 (or 120) is a deformable sealing washer between parts 18 and 30

(or 118 and 130) which are more rigid than the washer 20, and the washer 20 is exposed around the outer periphery.

Thus it may be seen that I have provided a simple repair plug which is readily adapted to close the core holes of internal combustion engines quickly and easily. It is not necessary to remove any of the old core plugs if they are of the cup type and the job is quickly, easily, and permanently performed.

It will be apparent that the embodiments shown are only exemplary and that various modifications can be made in construction, materials, and arrangement within the scope of the invention as defined in the appended claims.

I claim as my invention:

1. The combination with an engine casting having inner and outer walls forming a passage for a liquid coolant, a core hole in an outer wall of said passage, said core hole being located at a position of limited accessibility which prevents the use of plug replacing tools, and a cup-shaped core plug having a rim wedged in said core hole rim-side out; of means for repairing a leak at said core plug comprising a repair plug with a plurality of parts adapted to be inserted within the rim of said cup-shaped core plug, a deformable sealing washer between said parts of said repair plug, said washer having its outer periphery exposed around and adjacent to the outer periphery of said rigid parts and said parts being substantially more rigid than said washer, and means to clamp said more rigid parts on opposite sides of said sealing washer to deform said sealing washer and expand it radially against the inside of the rim on said cup-shaped core plug to retain the repair plug within the rim of the cup-shaped plug and prevent leakage therebetween.

2. In an internal combustion engine block having at least one cylindrical core hole, the improvement comprising:

(*a*) a cup having peripheral edge sealed within the core hole,

(*b*) said cup having the bottom perforated due to the corrosive action of water within the block,

(*c*) a bolt extending into said cup,

(*d*) said bolt having a large disc-shaped head thereon which is located within the cup,

(*e*) the bolt having a threaded shaft extending outside the cup,

(*f*) a rubber washer surrounding the threaded shaft and contacting the head,

(*g*) a metal washer surrounding the threaded shaft and contacting the rubber washer,

(*h*) a nut screwed down on said threaded shaft,

(*i*) thus squeezing the rubber between the head and washer and expanding it outward to tightly lock against the inside wall of the cup; thus providing a closure to seal the perforation in the bottom of the cup without the necessity of removing the cup from the engine block.

References Cited by the Examiner

UNITED STATES PATENTS

2,462,445	2/49	Weiss	215—54
2,579,845	12/51	McWherter	220—24.5
2,825,482	3/58	Evans	220—25
2,993,616	7/61	Carlile	220—24.5

FOREIGN PATENTS

1,197,881	1/59	France.

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