METHOD OF REPAIRING STRIPPED SPARK PLUG THREADS IN ENGINE HEADS

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ABSTRACT

A stripped spark plug aperture in an engine head of soft metal such as magnesium or aluminum is repaired by the use of a slightly externally tapered sleeve having continuous internal and external threads. The sleeve is threaded onto a threaded shank similar in size to the threaded end of the spark plug. A nut on the shank holds the sleeve from rotation while the sleeve is threaded into the aperture, forcing the metal outwardly about the aperture.

1 Claim, 4 Drawing Figures
METHOD OF REPAIRING STRIPPED SPARK PLUG THREADS IN ENGINE HEADS

This application is a continuation of application Ser. No. 196,357, filed Nov. 8, 1971, now abandoned.

This invention relates to an improvement in a tool for use in repairing automobiles, and deals particularly with a means of repairing the spark plug apertures of engine heads without the removal of the engine head or the engine.

BACKGROUND OF THE INVENTION

One of the problems which has been experienced with the servicing of automobiles, and particularly foreign rear engine cars, has been in the fact that the engine head made of soft material such as magnesium or steel, and the spark plugs tend to destroy the threads in the spark plug apertures if tightened a little too securely. This difficulty can be cured in several ways, such as by removing the engine head, boring out the spark plug apertures, retreading the apertures, and replacing the spark plugs with either larger diameter plugs or the necessary bushings to reduce the threaded opening to the proper size. Under present day conditions, this is quite a major operation from a financial standpoint, as it includes either removing the entire engine or at least the engine head. The purchasers of small rear engine cars often buy them for the purpose of economy and because a larger car is impractical for them to pay for. As a result, when it becomes necessary to make a major repair such as to remove the engine head or the engine, a financial problem is often created.

In explanation, it should be said that the spark plugs could be removed, apertures redrilled or reamed and retreaded if accurate drilling was available. However, such a procedure would leave bits of metal within the cylinder which would be likely to become caught between the valves and the valve seats, resulting in burned valves. Furthermore, metal shavings in the cylinders of an internal combustion engine could readily result in numerous other problems if such particles became wedged between the pistons and cylinders during their reciprocation. Screw fastening sleeves have been previously used for anchoring screws or bolts in plastic, wood, and castings of magnesium and aluminum. U.S. Pat. No. 2,455,885 issued Dec. 7, 1948 to Theurer shows a sleeve having self-tapping grooves for this purpose. However, such sleeves cut into the wood, plastic or metal forming shaving which drop into the aperture. Such sleeves are subject to the above mentioned objections.

SUMMARY OF THE INVENTION

It has been found that the problem can be solved by the use of a bushing and a suitable supporting tool. In other words, a generally cylindrical sleeve including an exterior and interior thread can usually be threaded into the spark plug aperture in an engine head made of aluminum or magnesium and will thread itself into the aperture by merely spreading the metal apart to accommodate the sleeve with no drilling or tapping. In order to repair the damage done to an automobile head of soft material such as aluminum or magnesium, a metal sleeve formed of steel or other material which is relatively hard compared with aluminum or magnesium can be placed upon a threaded mandrel, and the sleeve of relatively hard material may be threaded into the spark plug opening compressing the material encircling the aperture, and providing a bushing into which the spark plug may be threaded. In other words, due to the comparative hardness of a material such as steel as compared to aluminum or magnesium, the sleeve, when properly supported, may be threaded into the spark plug hole, merely displacing the softer metal without cutting or threading the softer metal in a manner to produce loose particles. The center portion of the tool may then be removed from the sleeve and replaced with a spark plug of conventional form.

The tool in question includes a shank which has threads comparable to those of the spark plug to be inserted. A sleeve of hard metal such as steel or the like is threaded onto the shank above the sleeve. The sleeve is slightly tapered, and the smallest diameter end is inserted into the spark plug hole which has been stripped of its threads. By rotation of the compression nut, the internally and externally threaded sleeve may be forced into the hole in which the spark plug was previously located. The harder metal of the sleeve will thread its way into the spark plug aperture without the necessity of the use of a drill or tap which would leave particles of metal inside of the cylinder. When the sleeve is inserted, it is of proper diameter to accommodate the spark plug and the difficulty can be remedied without the requirement of removing the engine head, removing the engine, or any such procedures which are relatively expensive and time consuming.

As stated otherwise, the present invention resides in the provision of an internally and externally fitted sleeve which may be forced into the spark plug opening of an engine in which the head is made of aluminum, magnesium or similar soft material. In doing so, the sleeve must be supported upon a threaded tool which maintains the interior diameter of the sleeve intact during the insertion process. Once the tool is removed, the sleeve is open to accommodate the spark plug and the resulting structure is probably considerably lighter than in its original form where the spark plug opening was formed in the engine head of soft material.

These and other objects and novel features of the invention will be more clearly and fully set forth in the following specification and claims.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a view, partly in section, showing a sleeve of relatively hard material inserted into an engine head of relatively soft material.

FIG. 2 is an elevational view of the tool with the sleeve removed therefrom.

FIG. 3 is a vertical sectional view of the engine head showing the spark plug inserted therein.

FIG. 4 is a perspective view of the internally and externally threaded sleeve which is used in the repair operation.

DESCRIPTION OF THE PREFERRED EMBODIMENT

FIG. 1 illustrates a shank 10 having a threaded end 11 which extends a considerable portion of its length. A nut 12 is threaded upon the shank 10 and includes a substantially cylindrical sleeve 13, the lower end of which forms an abutment normal to the shank axis. This arrangement is illustrated in FIG. 2 of the drawings.
A sleeve 14 forms a major portion of the repair structure and includes an internal thread 15 and an external thread 16. The external thread is not interrupted as would be the case if the sleeve was designed to cut its thread into the engine head. The external thread, as well as the internal thread, are both continuous and unbroken and the purpose of this arrangement is to prevent any chance of metal particles being deposited into the engine cylinders during the repair operation. The sleeve 14 is threaded onto the shank end 11 against the abutment 9.

It has been found that engines, particularly of the type used in the rear of foreign import cars have engine heads of soft materials such as aluminum or magnesium, and are extremely sensitive to difficulty if the spark plugs are tightened. If the spark plugs remain loose, loss of compression will occur and if the spark plugs are tightened slightly too much, the threads in the soft metal will strip. As previously stated, this problem can be corrected by removing the engine or the engine head, drilling out the spark plug openings, and inserting bushings or inserting spark plugs of a larger diameter. However, this involves a considerable expense which owners of small import cars cannot afford.

The present tool has worked very effectively on a great number of engines of the type described, and it has been found that the sleeves 14 may be threaded into the apertures in which the threads have been previously stripped. Once in place, the sleeves function effectively to accommodate the spark plug indicated at 17 in FIG. 3 of the drawings.

In operation, the sleeve 14 is applied to the threaded end 11 of the shank 10, and the entire tool is rotated, forcing the sleeve into the stripped aperture 19. When in place, the tool is removed from the sleeve 14 and replaced with the spark plug 17.

I have described the principles of construction and operation of my TOOL, and while I have endeavored to set forth the best embodiment thereof, I desire to have it understood that changes may be made within the scope of the following claims without departing from the spirit of my invention.

We claim:

1. The method of repairing spark plug apertures in engine head made of resilient soft metal which have stripped threads, the method consisting in threading a slightly externally tapered and internally threaded imperforate and unnotched sleeve of hard metal free of cutting edges onto a supporting shank against an abutment, said externally threaded surface having unbroken and uninterrupted threads through its length, the peripheries of said threads being on said externally tapered surface, applying the smaller diameter end of said sleeve to an end of said stripped aperture, rotating the sleeve to thread the sleeve into the aperture, the hard metal of said sleeve acting to displace the soft metal during the formation of the new threads so that no loose particles are formed, said threading action acting to compact the soft metal outwardly of the aperture, removing the shank and threadably inserting a spark plug into said sleeve.

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