

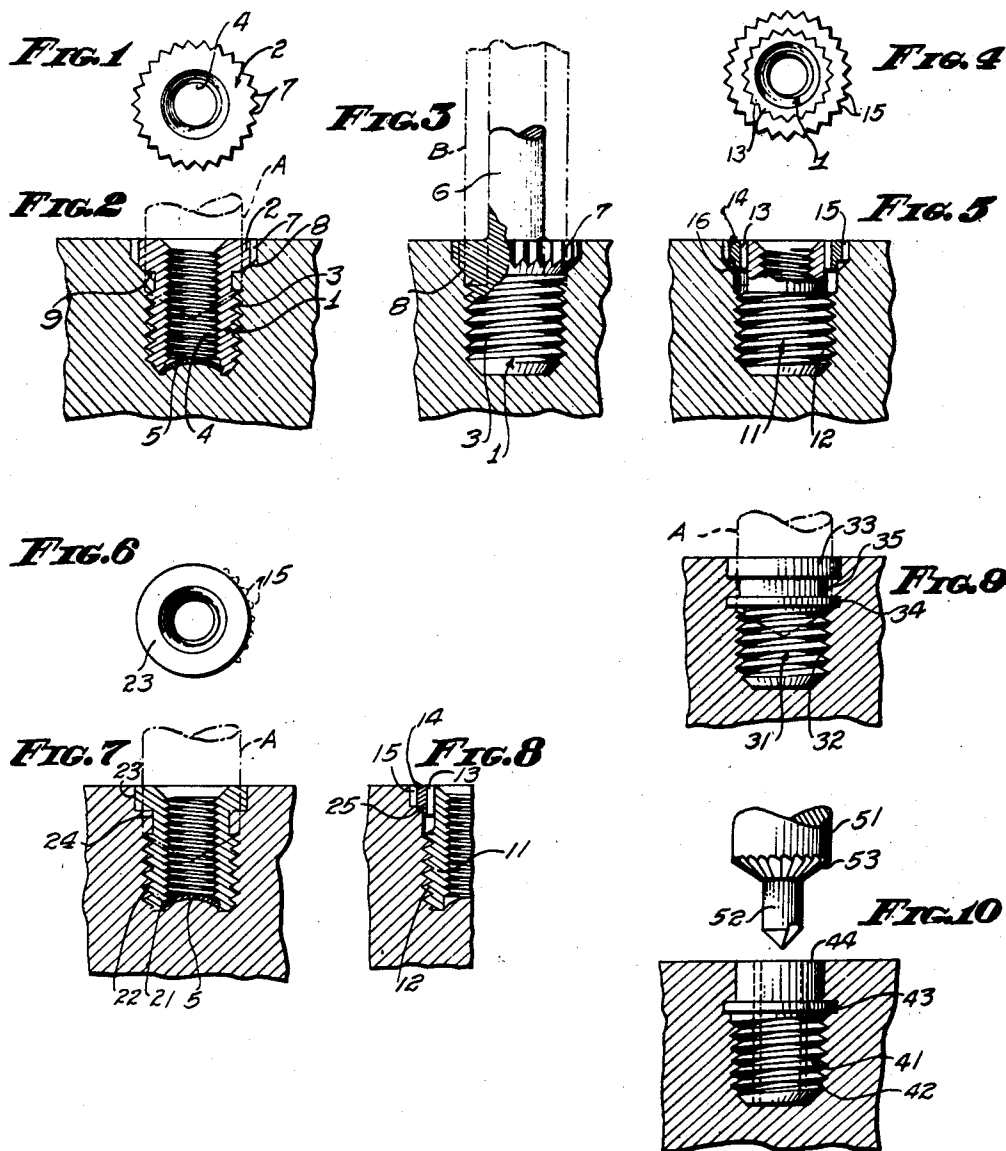
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REPLACEABLE INSERT

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REPLACEABLE INSERT

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7 Claims. (Cl. 189—34)

1

My invention relates to replaceable inserts, the present application being a continuation of my prior application for Replaceable Insert, Serial No. 601,454, filed June 25, 1945, now abandoned, and a continuation in part of my following copending applications:

Insert, Serial No. 466,855, filed November 25, 1942, now Patent No. 2,400,318 issued May 14, 1946;

Insert and Method of Replacing Same, Serial No. 490,200, filed June 9, 1943, now Patent No. 2,407,904 issued September 17, 1946.

Among the objects of my invention are:

First, to provide a replaceable threaded insert which is adapted to be molded or cast in a body of material, and in the event of subsequent damage, may be replaced by a replacement insert of the type disclosed in the above identified copending application, Serial No. 466,855, now Patent No. 2,400,318 issued May 14, 1946.

Second, to provide a replaceable insert having a threaded shank, a flanged head and a locking means to prevent unscrewing of the thread, the entire insert being so constructed that it functions as a core to cast in a body of material a threaded and counterbored socket capable of receiving, without further alteration, my above mentioned replacement insert. More specifically, the flanged head of my replaceable insert may define a serrated counterbore adapted to mate the serrations of a locking ring forming a part of my replacement insert, or a smooth counterbore of such diameter that the serrations of the replacement locking ring may broach into the walls of the counterbore.

Third, to provide a replaceable insert which does not require special tools for its removal or preparation of the socket cast by the insert for reception of the replacement insert.

Fourth, to provide a replaceable insert which is particularly economical of manufacture, easily molded in place, and which will not accidentally work loose.

With the above and other objects in view as may appear hereinafter, reference is directed to the accompanying drawings, in which:

Fig. 1 is a plan view of one form of my replaceable insert wherein a threaded counterbore and serrated socket is formed when the insert is cast in a body of material.

Fig. 2 is a longitudinal sectional view of my insert shown cast in a body of material, and indicating by broken lines the dimensions and depth to which the insert is drilled in order to effect its removal.

Fig. 3 is a partial sectional, partial elevational

2

view of my insert molded in a body of material, showing the insert equipped with a stem or integral stud in place of the threaded socket shown in Fig. 2 and indicating by broken lines a tubular end mill for severing the insert to permit its removal.

Fig. 4 is a plan view of my replacement insert, hereinafter referred to as a two-piece insert, distinguished from my single-piece replaceable insert, this view illustrating the type of insert disclosed in my aforementioned copending applications.

Fig. 5 is a partial sectional, partial elevational view of my two-piece insert shown secured in the socket prepared by my single-piece insert.

Fig. 6 is a plan view of a modified form of my single-piece or replaceable insert, wherein the insert flange is smooth.

Fig. 7 is a longitudinal sectional view of the insert in Fig. 6, showing the insert molded in a body of material and indicating by broken lines the drill employed to prepare the insert for removal.

Fig. 8 is a fragmentary longitudinal sectional view of the replacement insert shown in Figs. 4 and 5 as it appears secured in the socket prepared by the form of the single-piece insert shown in Figs. 6 and 7.

Fig. 9 is an elevational view of a further modified form of my single-piece replaceable insert, also indicating by broken lines the depth and position of a drill employed to prepare the insert for removal.

Fig. 10 is another elevational view of a further modified form of my replaceable insert and illustrating a special pilot guided tool employed to effect its removal.

Reference is first directed to Figs. 1, 2 and 3. In this form of my single-piece replaceable insert the insert includes a shank 1 having a locking head or flange 2 at one end. As shown in Figs. 1 and 2, the shank 1 is tubular and provided with external threads 3 and internal threads 4. The external threads 3 are preferably coarser than the internal threads 4. The bore of the shank 1 may be closed by a seal cap 5 in the form of a disc pressed into the end thereof.

The shank 1 need not be tubular, however, but may be solid and provided with an integral stud 6 extending from its upper end as shown in Fig. 3.

The locking head or flange 2 is provided with axially directed peripheral serrations or locking teeth 7. The under side of the locking head is preferably beveled or stepped as indicated by 8.

The external threads 3 may terminate short of the flange or locking head 2, whereby a lock-

3

ing channel 9 is formed. Such channel also facilitates the external threading operation of the shank 1 when certain types of threading tools are employed. When other types of threading tools are employed the locking channel 9 need not be provided, in which case the external appearance of the shank is essentially that shown in Fig. 3. It should be noted that the locking channel may be provided or omitted on either the solid or tubular shank.

The single-piece or replaceable insert is adapted to be molded in a body of material, for example, the insert may be formed of steel or other comparatively hard material and molded in a body of softer material such as aluminum, various die casting alloys, plastics, or the like. Such material, of course, must not be such that it welds to the surface of the insert. It will thus be seen that the insert functions as a core for casting in the body of material a threaded and counterbored socket, and that the counterbored socket is provided with axial serrations. The dimensions of such socket may be identical or approximately identical to the external dimensions of my two-piece or replacement insert disclosed more fully in my copending applications. To facilitate and explain the use and function of my single-piece insert, my two-piece insert is illustrated in Figs. 4 and 5.

The two-piece insert comprises a shank 11 which may be tubular and internally threaded or solid, and provided with a stud as in the case of the single-piece insert. The shank 11 is provided with external threads 12 corresponding to the external threads 3. The upper portion of the shank 11 is provided with longitudinally extending serrations 13 preferably within the annulus defined by the root and extreme diameters of the external threads 12.

A locking ring 14 fits over the upper end of the shank 11. The locking ring is provided with internal serrations which mate with the serrations 13 and with external serrations 15 which fit in the serrated cavity or counterbore cast by the locking head 2 of the single piece or replaceable insert. The under side of the locking ring 14 is preferably provided with a pilot portion 16 so that the internal serrations of the ring are slightly longer than the external serrations 15.

The single-piece insert when molded or cast within a body of material, is locked against removal by reason of the serrations 7, and in the case of the construction shown in Fig. 2, by the locking channel 9. Should the insert be damaged in a manner to require its removal, it is merely necessary to drill into the shank 1 to the depth indicated by broken lines A in Fig. 2 or B in Fig. 3, that is, into intersection with the uppermost of the external threads 3, and at a diameter approximating the outside diameter of said threads 3. When this is done, it is a simple matter to force a tool into the lower threaded end of the shank 1 and unscrew it. The annular extended portion of the locking head or flange can be readily removed by prying. It will be noted that the diameter of the drill required to separate the flange and shank for piecemeal removal, is smaller than the diameter of the flange. As a consequence, the drill does not overlap into the softer material in which the insert is molded, but is entirely guided by the socket within the insert, or the stud 6 as the case may be. As a consequence, a concentric hole may be easily drilled even when this operation must be performed "in the field" or under conditions in which hand

4

tools or imperfect tools are available. This is important for the reason that in order to employ the two-piece insert shown in Figs. 4 and 5, it is highly desirable that the counterbore have the correct diameter and be concentric with respect to the threaded socket cast by the shank 1. With ordinary care it is virtually impossible to damage the body of material in which the single-piece insert is cast in the course of removing the insert and replacing it with my two-piece insert.

In many cases, both the locking means afforded by the peripheral serrations 7 and the locking channel 9 are desirable. This is particularly true when the insert is used in relatively soft material. In some cases either one of the locking means, namely, the serrations or locking channel may be omitted. Thus, in Fig. 3, the locking channel is omitted. In Figs. 6 and 7 a one-piece insert is shown in which the locking serrations 7 are omitted.

In the construction shown in Figs. 6 and 7, a shank 21 is provided which may be identical to the shank 1, that is, at may be tubular or solid, similar to the construction shown in Figs. 2 and 3. The shank is provided with external threads 22. The upper end of the shank is provided with a flange 23. Between the flange 23 and the threads 22 is a locking channel 24 corresponding to the locking channel 9. The flange 23 has a diameter approximately the root diameter of the external serrations 15 of my two-piece insert, or may have a diameter intermediate the root and peak diameters of these serrations. The thickness of the flange 23 is equal to or slightly greater than the thickness of the locking ring 14 of my two-piece insert.

My single-piece insert shown in Figs. 6 and 7 is removed in the same manner as the first described structure, namely, by drilling as indicated by broken lines A into the shank until the lower end of the drill intersects the external threads 22. The drill, of course, has approximately the same diameter as the extreme diameter of the threads 22. In so drilling, the material which has been cast into the locking channel 24 is destroyed so that the remaining portion of the shank 21 may be unscrewed from its socket. The remaining annulus of the flange 23 may be readily pried from the counterbore which it has formed.

The two-piece insert is substituted by screwing the shank 11 into the threaded bore cast by the shank 21 and forcing the locking ring 14 downwardly thereover. The external serrations 15 broach their way into the walls of the counterbore molded by the flange 23 so that a firm locking connection is provided. It will be noted that the socket which it is necessary to drill into the single-piece insert, may have a diameter sufficient to accommodate the pilot portion 16 of the two-piece insert. This minimizes the required depth of the flange 23. By reason of the broaching action into the walls of the counterbore formed by the flange 23, a very tight, firm connection between the locking ring and the body of the material is afforded, and the need to turn the shank of the two-piece insert until the serrations of the locking ring align with previously formed serrations, as is the case with the arrangement shown in Figs. 2 and 3, is avoided. It should be pointed out, however, that because of the relatively large number of serrations, such adjustment of the shank of the two-piece insert is not difficult.

In some instances, it is desirable to provide space for chips cut from the body of material as

5

the locking ring is forced in place. In such cases it is merely necessary to provide a flange 23 in the single-piece insert which has a depth slightly in excess of the locking ring 14 of the two-piece insert, so as to form a clearance space designated 25 in Fig. 8.

If it is desired to have a locking channel deeper than the annulus between the root and extreme diameters of the external threads 3 or 12, or to provide a larger shear area, a circumferentially ribbed construction such as shown in Fig. 9 may be employed. Here a shank 31 is provided, having external threads 32 as in the other described structures. The upper portion of the shank is provided with an outer flange 33 corresponding to the flange 23 and an inner flange 34. Between the two flanges is formed a locking channel 35. The root diameter of the locking channel may be slightly less than the maximum diameter of the external threads 32 so that when a drill having the diameter of the external threads 32 as indicated by A in Fig. 9 is drilled into the insert, the shank between the flanges 33 and 34 is entirely removed.

The insert shown in Fig. 9 is replaced in the same manner as the previously described inserts, that is, the shank is drilled out until the external threads are intersected, the remaining portion of the shank is unscrewed, and the outer flange 33 is removed from the counterbore which it has formed. In this case the inner flange 34 is left in place as it clears the parts of the two-piece replacement insert.

In some instances, it is possible to omit the outer flange 33 of the construction shown in Fig. 9, with the result shown in Fig. 10. In this case, the shank 41 is provided with external threads 42 at the upper extremity of which is a flange 43. Above the flange 43 the shank 41 forms a reduced portion 44. The advantage of this construction lies in the fact that the material molded into the reduced portion 44 may have a greater axial extent than is possible in the construction shown in Figs. 7 and 9, and consequently, offers greater resistance to any force tending to unscrew the insert.

This construction requires, however, that a special tool be employed to remove the insert, namely, a drill 51 having a pilot portion 52 adapted to fit rather closely in the bore of the shank, and a mill portion 53 sufficiently large to form the counterbore for the locking ring 14 of my two-piece insert. This is made necessary for the fact that the material in which the insert is cast is almost invariably softer than the insert so that an ordinary drill, unless properly sharpened and adequately guided, would tend to cut or drill an oversize or eccentric hole that would destroy the counterbore in which it is desired to employ the locking ring of the two-piece insert.

It should be noted that the drill employed to effect removal of the single-piece insert, may be slightly smaller than the maximum diameter of the external threads. If this is done, the remaining portion of the shank 1, 21 or 31 may be unscrewed even though the threads cut a slight mating thread in the material as the shank is unscrewed. The advantage in so doing, lies in the fact that the shank may thus be caused to engage the flange 2, 23 or 33 as the case may be, and force the flange from the body of material as the shank is unscrewed. The inner end of the shank, in each instance, is circumferentially substantially smooth so as not to interfere with the subsequent removal of the shank. For

6

a similar reason, the underside of the head is sufficiently smooth to permit its removal on severance from the shank.

In each of the constructions illustrated, including the Figs. 1, 2 and 3, the flange 2, 23 or 33 as the case may be, is essentially circular in plan, so that the replacement ring may be accommodated irrespective of the orientation of the insert. With regard to the construction shown in Figs. 1, 2 and 3 a sufficient number of serrations are provided so that no appreciable turning movement of the shank of the two piece insert is required to accomplish registry between the replacement ring and the serrations in the walls of the counterbores.

The several species of the invention illustrated in Figs. 6, 7, 9 and 10 are disclosed and claimed in my copending application Serial No. 285,739, filed on May 2, 1952.

In the various forms of single-piece inserts shown, the internal threaded bores of the shanks or the studs, as the case may be, perform the dual function of guiding the severing tool and affording means for the attachment, or reception of a tool employed to remove the severed threaded portion of the shank.

Many other embodiments of the invention may be resorted to without departing from the spirit of the invention.

I claim:

1. In combination, a body of material and an insert, said insert comprising: a substantially cylindrical shank having exterior screw threads formed on at least a portion thereof and terminating in a circumferentially substantially smooth inner end; a rigid non-circular head portion having a circumferentially substantially smooth undersurface, said head portion being non-rotatably secured to the outer end of said shank and having a minimum diameter greater than that of said screw threads, said shank and head portion being molded in said body of material with the outer end of said non-circular head portion substantially flush with a surface of said body and its outer periphery interlocked with said body; and means on said insert for receiving a fastening element for securing said body to an object, said insert being normally restrained against axial movement and rotation relative to said body by said screw threads and the non-circular head, respectively, and being capable of removal by drilling through said head and intersecting said threads to disconnect said head from said shank so that said head and shank can be separately removed from said body.

2. In combination, a body of material and an insert, said insert comprising: a substantially cylindrical shank having exterior screw threads formed on at least a portion thereof and terminating in a circumferentially substantially smooth inner end; a rigid head portion having a circumferentially substantially smooth undersurface, said head portion being non-rotatably secured to the outer end of said shank and having axially extending serrations on its outer periphery of a minimum diameter greater than that of said screw threads, said shank and head portion being molded in said body of material with the outer end of said head portion substantially flush with a surface of said body and its serrations interlocked with said body; and means on said insert for receiving a fastening element for securing said body to an object, said insert being normally restrained against axial movement and rotation relative to said body by said

7

screw threads and the serrations, respectively, and being capable of removal by drilling through said head and intersecting said threads to disconnect said head from said shank so that said head and shank can be separately removed from said body.

3. In combination, a body of material and an insert, said insert comprising: a substantially cylindrical shank having exterior screw threads formed on at least a portion thereof and terminating in a circumferentially substantially smooth inner end; a rigid laterally enlarged non-circular head portion at the outer end of said insert, said shank having a connecting portion between said screw threads and head reduced to substantially the root diameter of the screw threads on the shank, said head portion having a circumferentially substantially smooth undersurface, said head portion being non-rotatably secured to the outer end of said shank and having a minimum diameter greater than that of said screw threads, said shank and head portion being molded in said body of material with the outer end of said non-circular head portion substantially flush with a surface of said body and its outer periphery interlocked with said body, and means on said insert for receiving a fastening element for securing said body to an object, said insert being normally restrained against axial movement and rotation relative to said body by said screw threads and the non-circular head, respectively, and being capable of removal by drilling through said head and in-

8

tersecting said threads to disconnect said head from said shank so that said head and shank can be separately removed from said body.

4. A combination as set forth in claim 1, in which the non-circular head portion is integral with the shank.

5. A combination as set forth in claim 1, wherein: said means on said insert for securing a fastening element is an internally screw-threaded socket, said insert being closed at its axially inner end.

6. A combination as set forth in claim 1, wherein: said means on said insert for receiving a fastening element is an internally screw-threaded bore.

7. A combination as set forth in claim 1, wherein: said means on said insert for receiving a fastening element is an integral outwardly extending stud.

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REFERENCES CITED

The following references are of record in the file of this patent:

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