

Feb. 4, 1969

J. P. VILLO

3,425,313

PROTECTIVE AND LOCKING CAP FOR SOCKET-HEAD CAP SCREWS

Filed Nov. 4, 1966

Fig. 1.

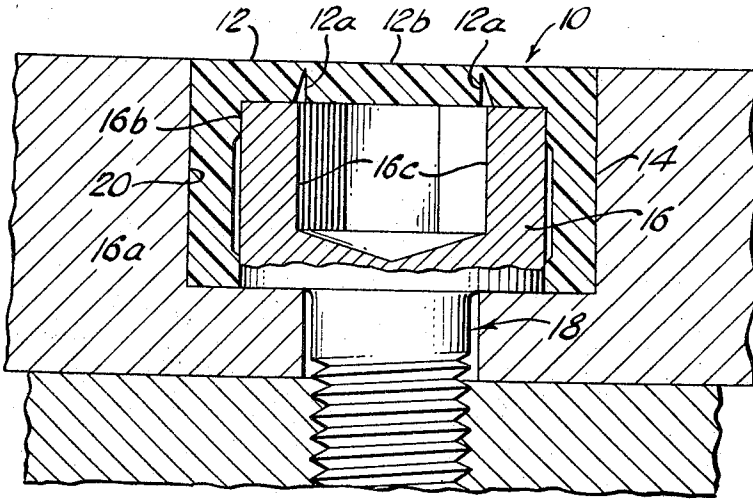
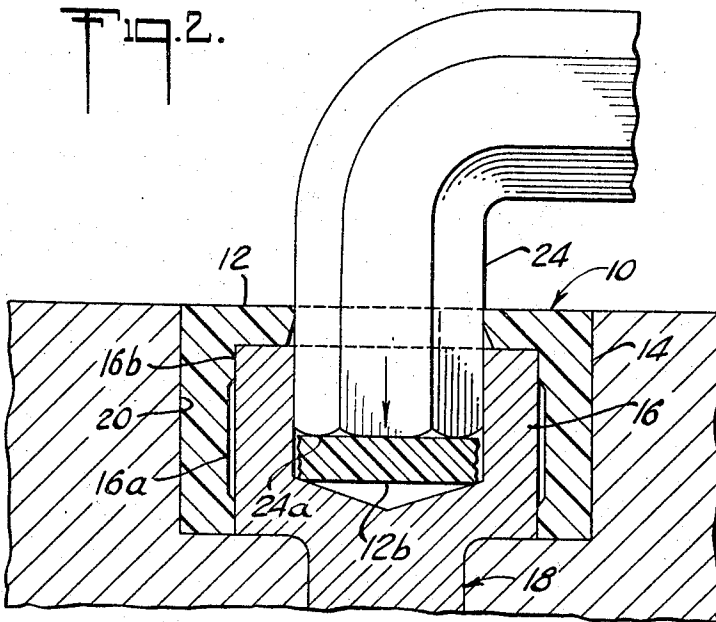


Fig. 2.



INVENTOR:
JOSEPH P. VILLO

BY

Curtis, Morris & Safford
ATTORNEYS.

1

3,425,313

PROTECTIVE AND LOCKING CAP FOR SOCKET-HEAD CAP SCREWS

Joseph P. Villo, Rydal, Pa., assignor to Standard Pressed
Steel Co., Jenkintown, Pa.

Filed Nov. 4, 1966, Ser. No. 592,196

U.S. Cl. 85-53

5 Claims

Int. Cl. F16b 15/02, 39/02

ABSTRACT OF THE DISCLOSURE

A cap to fit over the head of a counterbored socket-head cap screw which frictionally engages the side of the counterbore and the side of the head of the cap screw to provide a lock which resists rotation of the screw and also seals the screw to preclude entry of moisture and foreign matter. A knock-out portion is provided in the cap to allow for removal of the socket head screw.

This invention relates to a cap which fits over the head of counterbored socket-head cap screws and which serves as a frictional lock between the cap screw and the counterbore and also closes the counterbore and the socket to the entry of moisture and other foreign substances.

The invention provides a solution to two different and troublesome problems. One is the loosening of the screws due to vibration, etc. The other is the fact that moisture and foreign matter can collect in the socket of the screw or in the annular space between the head of the screw and the wall of the counterbore. For example, when the equipment is exposed to the weather, water can collect in the counterbore and be drawn by capillarity into the interface between the threads of the screw and the tapped hole, causing rust or corrosion and obstructing removal of the screw and/or weakening the screw so that its effectiveness is reduced or destroyed or so that it will break off when it is turned. Or, where the screw is used in material handling or processing equipment, for example food mixing machinery, some of the materials being handled can get into the socket or the counterbore, making it difficult to clean the equipment and to prevent contamination of the material being processed.

The invention provides a simple, practical and inexpensive device for solving both these problems. This device, in general terms, consists of a cap including a circular top with a depending, tubular skirt which is force fitted into the annular space between the head of the screw and the wall of the counterbore, preferably but not necessarily with the outer surface of the top flush with the adjacent surface in which the counterbore is formed. The top has a score line which defines a severable central plug which overlies and is generally coextensive with the socket so that it may be removed, for example by pressing the end of the wrench against it, to permit the wrench to enter into and engage the socket for adjusting or removing the screw.

In the drawings:

FIGURE 1 is a transverse sectional view through a cap embodying features of the present invention mounted on a counterbored socket-head cap screw; and

FIGURE 2 is a view similar to FIGURE 1 but showing the end of a wrench inserted through the top of a cap to sever the plug therein and press it into the socket in the screw.

FIGURE 1 shows an illustrative cap, generally designated 10, which includes a circular top 12 with a tubular skirt 14 projecting perpendicularly from the edge of the top 12. The inner surface of the skirt 14 frictionally engages the sides of the head 16 of the socket-head cap screw, generally designated 18, while the outer, generally

2

cylindrical surface of the skirt 14 frictionally engages the side walls of the counterbore 20. Thus the skirt serves as a frictional lock to resist unintentional loosening of the screw 18.

Preferably the outer surface of the skirt 14 has a length not greater than the depth of the counterbore 20, and the inner surface of the skirt 14 has a depth not greater than the length of the head 16 of the screw, so the cap can be pressed into the counterbore 20 to the point where the outer surface of the top 12 is flush with the adjacent surface 22 of the part in which the counterbore is formed. Also preferably, the thickness of the top 12 is substantially equal to the difference between the length of the head 16 of the screw and the depth of the counterbore 20, so that when the inner surface of the top 12 engages the end of the head 16 of the screw, the outer surface of the top 12 is flush with the adjacent surface 22.

After the screw 18 is in place, the cap 10 is readily installed by placing it with the skirt 14 overlying the annular space between the head 16 and the sidewall of the counterbore 20 and forcing it into position, for example, by a hammer blow.

The head 16 of the cap screw 18 is conventionally formed with knurling 16a around its side, and the adjacent edge of this knurling is conventionally spaced a short distance from the end of the head 16 to leave a narrow, unknurled band 16b extending around the sides of the head adjacent its end. This unknurled band 16b conventionally has a slightly smaller diameter than the knurled portion 16a, and this facilitates insertion of the edge of the skirt 14 of the cap into the space between the head 16 of the screw and the sidewall of the counterbore 20.

The inner surface of the skirt 14 may be ribbed to complement and mesh with the knurling 16a, not only to facilitate insertion of the cap 10 but also to enhance its locking function.

The cap 10 closes off both the socket 16c in the head of the screw and the space of the counterbore not occupied by the head 16 of the screw, thus preventing the ingress of moisture and other foreign materials and not only protecting the screw against rust and corrosion but also greatly facilitating cleaning of the equipment and maintenance of sanitary conditions.

The top 12 of the cap is provided with a scribed circle 12a which defines around, centrally located, severable plug 12b which overlies and is generally coextensive with the socket 16c in the head 16 of the screw. As shown in FIGURE 2, when it is desired to remove the screw 18, the end 24a of a wrench 24 can be forcibly pressed against the plug 12b to sever it from the remainder of the top 12 and push it into the bottom of the socket 16c, thus permitting the wrench to enter into and engage the socket 16c to turn the screw. This, of course, reduces the depth of the socket 16c which is available for engagement by the wrench 24 and limits to some extent the torque which can be applied. Alternatively, where higher torque is required, the plug 12b may be completely removed, for example by pressing inwardly at one side of the plug and causing the other side to pivot outwardly where it can be gripped and the plug pulled away from the cap to expose the socket 16c.

The cap 10 may suitably be made of any material having at least a slight degree of resiliency to furnish the desired locking and sealing action while accommodating a certain tolerance in the shape or dimensions of the screw 18 and counterbore 20. For example, the cap may be made of metal, preferably a metal which is softer than that of the screw 18 and the part of the equipment on which it is mounted, so that neither the screw nor the equipment will be scored or otherwise damaged as the cap is forced into position. Alternatively, the cap may

be made of a synthetic polymer, for example, such as nylon, polyethylene, polystyrene, vinyl chloride, vinylidene chloride, suitably plasticized copolymers of vinyl chloride and vinyl acetate, and other materials of similar mechanical properties.

It will thus be appreciated that the present invention provides a simple, practical and inexpensive device by which the aforementioned and other apparent desirable objective have been achieved. However it should be emphasized that the particular embodiment of the invention which is described herein and shown in the accompanying drawings is intended as merely illustrative of the principles of the invention rather than as restrictive of the scope thereof, which is defined and limited only by the appended claims.

What is claimed is:

1. A fastening element comprising:

a cap screw having a wrench receiving socket therein; said cap screw being seated in a member having a cylindrical counterbore therein, the internal diameter of said counterbore being greater than the outside diameter of the head of said cap screw and the depth of said counterbore being greater than the axial extent of said head;

a protective and locking cap of deformable material comprising a circular top with a tubular skirt extending perpendicularly from the edge of said top, said circular top overlying the upper surface of said head and said skirt overlying at least a portion of the axial extent of said head, said skirt having a generally cylindrical outer surface frictionally engaging the inner surface of said counterbore and an inner surface frictionally engaging the sides of the head of said cap screw and a scored line generally coextensive with the socket in the head of said cap screw defining in the center of said top a severable plug overlying said socket.

2. A fastening element as claimed in claim 1 in which said skirt has an internal depth not greater than the length of the head of said cap screw and an external length not greater than the depth of said counterbore, whereby said cap can be mounted with said top substantially flush with the adjacent surface in which said counterbore is formed.

3. A fastening element as claimed in claim 2 in which said skirt has a depth approximately equal to the length of the head of said cap screw and an external length approximately equal to the depth of said counterbore, whereby, when said cap is mounted flush with the surface of the object in which said counterbore is formed, the inner surface of said top substantially engages the top of said cap screw and the free edge of said skirt substantially engages the bottom of said counterbore.

4. A fastening element as claimed in claim 1 in which the inner surface of said skirt is shaped to complement the shape of the sides of the head of said cap screw.

5. A fastening element as claimed in claim 4 in which the inner surface of said skirt is ribbed to mesh with a knurled surface on the sides of the head of said cap screw.

References Cited

UNITED STATES PATENTS

3,044,584	7/1962	Thompson	85—45
3,156,369	11/1964	Bowes et al.	215—42
3,298,272	1/1967	Henderson	85—53

CARL W. TOMLIN, *Primary Examiner*.

R. S. BRITTS, *Assistant Examiner*.

U.S. Cl. X.R.

151—54