BOLT FOR EXPLOSIVE ACTUATED BOLT SETTER

FIG. 1

FIG. 2

FIG. 3

FIG. 4

FIG. 5

INVENTOR
KARL RUDOLF PRATORIUS

By:
ATTORNEYS
BOLT FOR EXPLOSIVE ACTUATED BOLT SETTER

Karl Rudolf Priorius, Gauting, Germany, assignor to Hilti Aktiengesellschaft, Schaan Furstentum, Liechtenstein
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ABSTRACT OF THE DISCLOSURE

A bolt or the like for an explosive actuated bolt setter is disclosed as extending through a close fitting plastic jacket which is a tough, elastic and preferably cold flowing plastic. In one case, the jacket extends to substantially the point area of the bolt and has an annular guiding element engageable with the bolt guiding tube of the setter, the annular guiding element having a larger diameter than the plastic jacket. In another case, the plastic jacket extends primarily around only the central area of the bolt and has an outside diameter corresponding to the inside diameter of the bolt guiding tube of the setter.

The plastic jacket protects that area of the bolt which is primarily subjected to buckling possibilities during driving of the bolt, and the plastic jacket absorbs the forces tending to buckle the bolt.

Background of the invention

Up to the present time, a satisfactory penetration of a bolt driven into target material by explosive actuated setters is assured only when the target material has a compressive strength which does not exceed a certain value. These conditions must be taken into account, for example, in fastening sheet metal to concrete. The present limit of compressive strength is about 500 kg./cm.² (B 500). When the compressive strength of the target material is greater than this, the danger of the bolt buckling increases considerably.

Summary of the invention

This invention relates to bolts for explosive actuated bolt setters and, more particularly, to an improved bolt which can be driven into concrete having a compressive strength of up to about B 750 (750 kg./cm.²) by explosive actuated bolt setters.

In accordance with the invention, the bolt, at least in the central portion of its shaft, carries a plastic jacket to reduce the buckling danger. This plastic jacket must consist of a tough, elastic and preferably cold flowing plastic.

The plastic jacket has the advantage that the area of the bolt primarily subjected to buckling during driving of the bolt is protected by the jacket, and so effectively that no buckling of the bolt occurs. The forces influencing a buckling of the bolt can be absorbed in two ways. In one case, the forces countering the buckling are supplied directly by the applied jacket and, in this case, the jacket expeditiously extends through the point area of the bolt. At the point area of the bolt, the plastic jacket has an annular guiding element engageable against the inner surface of the bolt guiding tube of the explosive actuated setter, and this annular element has a diameter larger than that of the plastic jacket.

In the other case, the plastic jacket surrounds primarily the central area of the shaft of the bolt, and has an outside diameter corresponding to the inside diameter of the bolt guiding tube of the explosive actuated setter. Thereby, the force countering the buckling force is supplied by the bolt guiding tube and transmitted to the shaft of the bolt through the plastic jacket.

The thrust piston of a thrust piston may also serve as a bolt guiding tube if it is bored out to a sufficient depth. Only that part of the bolt which is to be driven in still protrudes from the thrust piston, so that a controllable penetration depth is obtained. This is also of interest when driving bolts into steel.

An object of the present invention is to provide an improved bolt for driving by explosive actuated bolt setters.

Another object of the invention is to provide such a bolt having at least its midportion embraced by a plastic sleeve or jacket, with the plastic consisting of a tough, plastic and preferably cold flowing plastic.

A further object of the invention is to provide such a bolt in which the jacket extends to the point area of the bolt and an annular guiding element is provided on the plastic jacket adjacent the point area of the bolt and has guiding relation with the guiding tube of a bolt setter.

Still another object of the invention is to provide such a bolt in which the annular guiding element has a diameter larger than that of the plastic jacket.

A further object of the invention is to provide such a bolt in which the plastic jacket extends primarily only around the central area of the shaft of the bolt, and has an outside diameter corresponding to the inside diameter of the bolt guiding tube of the setter.

Brief description of the drawings

For an understanding of the principles of the invention, reference is made to the following description of typical embodiments thereof as illustrated in the accompanying drawings.

In the drawings:

FIG. 1 is an axial sectional view of one form of bolt embodying the invention;

FIG. 2 is a partial axial sectional view through a bolt setter and the bolt of FIG. 1 illustrating the bolt while being driven;

FIGS. 3 and 4 are axial sectional views of other forms of bolts embodying the invention; and

FIG. 5 is a view similar to FIG. 2 illustrating yet another form of bolt embodying the invention as being driven by a bolt setter.

Description of the preferred embodiments

Referring to FIG. 1, a commercial nail or bolt 1, to be used with an explosive actuated bolt setter, is illustrated as enclosed by a plastic jacket 2 made of a tough elastic and preferably cold flowing plastic. Adjacent the point end of the bolt, a guide element, ring, or washer 3 is provided.

Referring to FIG. 2, piston 5 of the explosive actuated bolt setter is illustrated as having partly driven in bolt 1 which is centered in setter barrel 6 by means of guide element 3. During the driving by piston 5, plastic jacket 2 is deformed to prevent buckling of the bolt, and is expanded into contact with the bolt guiding tube 6 in the same manner as guide element 3 has the guiding engagement in setter barrel 6.

In the embodiments of the invention shown in FIGS. 3 and 4, the plastic jacket 2 is illustrated as formed with hollow spaces 10 which provide a better compressibility of the bolt without loss of guiding quality by the plastic jacket. In both embodiments shown in FIGS. 3 and 4, the jacket extends nearly the full length of the bolt and is provided with a guiding element 3 adjacent the point area of the bolt.

FIG. 5 illustrates an arrangement in which the forces countering buckling are supplied by the bolt guiding
tube 6 immediately at the start of the driving in process. In this case, a plastic jacket 2' surrounds the central portion only of bolt or nail 1, and is formed with outwardly opening channels or the like providing annular ribs having a guiding engagement with the inner surface of bolt setter tube 6. The forces are transmitted to the shaft of bolt 1 through plastic jacket 2'.

What is claimed is:

1. A fastener for use with an explosive actuated bolt setter, as claimed in claim 1, in which said sleeve encloses said shank to and including the point area of said shank.

2. A fastener for use with an explosive actuated bolt setter, as claimed in claim 1, in which said sleeve encloses said shank and having an outside diameter larger than the outside diameter of said shank.

3. A fastener for use with an explosive actuated bolt setter, as claimed in claim 1, in which the outer diameter of said sleeve is substantially equal to the inner diameter of the bolt guiding tube.

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