SELF-LOCKING CAPTIVE SCREW ASSEMBLY

FIG 1

FIG 2

FIG 3

FIG 4

FIG 5

FIG 6

FIG 7

FIG 8

FIG 9

FIG 10

INVENTOR:
THOMAS R. BOYD

BY:

ATTORNEY
SELF-LOCKING CAPTIVE SCREW ASSEMBLY

FIG 5

FIG 6

INVENTOR:
THOMAS R. BOYD

BY:

ATTORNEY
It is another object of my invention to provide a self-locking captive fastener in which the locking features are entirely associated with the screw and which will perform a locking function with any mating threaded hole or nut.

Yet a further object of my invention is to provide a self-locking captive screw that can be used as a self-locking lead screw.

I also desire to provide a captive screw that can be readily and economically manufactured and that can be easily and simply secured in a locked position in a threaded hole or nut.

An additional object of my invention is to furnish a self-locking captive screw that locks against extremes of shock and vibration substantially independently of the torque applied to the stud in applying the fastener.

Another object of my invention is to provide a fastener assembly in which the screw can be removed from its threaded hole or nut and reassembled repeatedly, substantially without wear or change and yet can be assembled with any degree of rotational torque desired, from finger torque to torque loads approaching the strength of the materials used.

Yet another object of my invention is to provide a captive, self-locking screw where the locking torque prevails throughout the entire locking operation of the screw.

These as well as further objects of my invention will become apparent from a consideration of the following specification as related to the drawings in which:

FIG. 1 is an exploded elevation, partly in section, of my fastener illustrating the elements of which it is constructed;

FIGS. 2 and 3 are cross sections taken on lines 2—2 and 3—3 respectively of FIG. 1;

FIG. 4 is a side elevation taken on lines 4—4 of the internal sleeve of my fastener;

FIG. 5 is a side elevation, partly in section, of the captive screw of my invention illustrated in a retracted position;

FIG. 6 is a side elevation, partly in section, of the captive screw of my invention illustrated in installed position;

FIGS. 7 and 8 are sectional views taken on the lines 7—7 and 8—8 respectively of FIG. 5, and

FIGS. 9 and 10 are sectional views respectively taken on the lines 9—9 and 10—10 of FIG. 6.

The fastener of my invention generally comprises a tubular housing which may be secured to a panel or other member in any suitable fashion and which retains a threaded screw having an angular drive shank portion adjacent to the head. The screw is retained in the housing in a retracted position by means of a spring which bears on the head of the screw and on mating ratchet plates; one of which is provided with an angular opening conforming to the shape of the drive portion of the screw and the other of which has a circular opening. The ratchet plate with a circular opening is retained in the housing by means of a slotted press-fit sleeve, and a washer is provided to retain the screw in the housing.

Referring now to the drawings, the bolt or screw 1 has a head 2, an angular drive shank neck 3, which may have a square cross section as illustrated in FIG. 2, an intermediate, cross-sectionally circular segment 4 and a threaded end 4a. The head configuration may take any conventional or desired form, but is shown as a hex, having a hex recess. In the assembled position of the fastener, shown in FIG. 5, a coil spring 5 extends between the angular shoulder 6 defined by the head of the bolt and the flat surface of the ratchet plate 7. As will be seen in FIG. 7, this ratchet plate is provided with an angular drive opening 8, shown as a square opening, which conforms to the shape of the angular drive shank segment of the
The shaft 2 is provided with a flange 7 fitted to a collar 2. The flange 7 is intended to provide an end for the shaft 2, as well as the collar 2, which has a circular opening 12. The circular opening 12 has a threaded segment 3, the threaded segment 3 being provided with an inner rim 13, which in turn has a threaded segment 4. The threaded segment 3 is intended to provide the inner rim 13, which in turn has a threaded segment 4.

The threaded segment 3 is intended to provide the inner rim 13, which in turn has a threaded segment 4. The threaded segment 3 is intended to provide the inner rim 13, which in turn has a threaded segment 4.
lations, adaptations, and uses thereof which come within the practice of those skilled in the art to which my invention relates, and the scope of the appended claims.

I claim:

1. A fastener usable with various kinds of nuts comprising:
   a. a screw having a head, a threaded end portion, and a neck intermediate said head and said threaded end portion, said neck having drive means thereon;
   b. a housing for at least partially receiving said screw;
   c. first and second ratchet plates within said housing, said ratchet plates having engaging teeth thereon;
   d. said first ratchet plate having an opening therein generally conforming to the cross sectional shape of said drive means for drivingly receiving said drive means to thereby drivingly interconnect said first ratchet plate and said screw;
   e. said second ratchet plate having an opening therein of sufficient size to permit rotation of said drive means when said drive means of said screw is received therein, said screw extending through said openings in said ratchet plates;
   f. means for fixing said second ratchet plate against rotation and for at least substantially preventing movement of said second ratchet plate axially away from said head of said screw;
   g. spring means for urging said ratchet plates into engagement with each other and for urging said head of said screw away from said ratchet plates; and
   h. means for restraining said screw against withdrawal from said housing.

2. The fastener of claim 1 that further comprises means for securing said housing to a panel.

3. The fastener of claim 1 wherein said spring means comprises a coil spring in telescopic relationship with said screw and having one end thereof in engagement with the head of said screw and the other end in engagement with said first ratchet plate.

4. The fastener of claim 1 that further comprises an internal bore within said housing, a sleeve member in press-fit engagement with the internal bore of said housing, said second ratchet plate having a plurality of circumferential tabs thereon and said sleeve having a corresponding plurality of slots therein, said tabs extending within said slots and restraining said second ratchet plate against rotation.

5. The fastener of claim 4 wherein said screw has a cross-sectionally circular segment intermediately of said neck and said threaded end portion and wherein said means for restraining said screw comprises a washer which slidably engages said intermediate segment and abuts against said threaded end portion adjacent to said second ratchet plate.

6. A self-locking captive screw comprising:
   a. a screw having a threaded end and a neck segment having a noncircular cross-sectional shape, said threaded end terminating inwardly in a first shoulder;
   b. a coil spring retained on said screw in telescopic engagement therewith;
   c. a first ratchet plate having an opening generally corresponding to the noncircular cross-sectional shape of said neck segment and being retained on said screw in telescopic engagement therewith, said ratchet plate having an annular face with a plurality of ratchet teeth thereon;
   d. a second ratchet plate having a circular opening and being retained on said screw in telescopic engagement therewith, said second ratchet plate having an annular face with a plurality of ratchet teeth thereon in engagement with the teeth of said first ratchet plate and having a plurality of tabs extending circumferentially therefrom;
   e. a housing having an internal annular shoulder intermediately of the ends thereof,
   f. a sleeve mounted within said housing and engaging said tabs adjacent said annular shoulder, and
   g. a retaining washer slidably engaging said screw and being engageable with the first shoulder, said coil spring engaging the head of said screw at one end thereof and engaging said first ratchet plate to urge said ratchet plates into mutual engagement and to urge said screw head away from said ratchet plate.

References Cited

UNITED STATES PATENTS

1,246,353 11/1917 Thiagen ............... 151—13
1,646,805 10/1927 Bell .................. 151—39
2,737,222 3/1956 Becker ................. 151—41.5
2,756,796 7/1956 Murphy ................. 151—41.5
3,037,542 6/1962 Boyd .................. 151—41.5
3,204,680 9/1965 Barry .................. 151—69
3,294,140 12/1966 Cosenza ............... 151—69
3,250,559 5/1966 Sommerfeld ............ 151—69

FOREIGN PATENTS

720,884 12/1954 Great Britain.
1,026,339 2/1953 France.

MARIION PARSONS, JR., Primary Examiner.