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EXPANSION BOLT

The present invention relates to expansion bolts, and relates more particularly to a new design of expansion bolt which is comprised of a screw bolt, a plurality of expansion shells connected in series and retained between a locating socket and a tightening-up member around the screw bolt.

Figure 1 shows an expansion bolt according to the prior art. This structure of expansion bolt is comprised of a screw bolt 1', an expansion shell 12', and a tightening-up member 13'. The screw bolt 11' has a head 11' at one end, and an outer thread 112' around the periphery. The expansion shell 12' is a split tube having a longitudinal split 121' through the length, two opposite longitudinal slots 122' at one end, and two opposite wedge blocks 123' at an opposite end. The longitudinal split 121' and the longitudinal slots 122' are equiangularly spaced around the periphery. The tightening-up member 13' is a tapered nut having an inner thread 131' threaded onto the outer thread 112' of the screw bolt 11', and three wings 132' equiangularly spaced around the periphery and respectively forced into the longitudinal splits 122' and longitudinal slots 122' of the expansion shell 12'. When the screw bolt 11' is turned inwards, the tightening-up member 13' is forced to compress the expansion shell 12' axially, causing it to expand radially, and therefore the expansion shell

12' is fixed to the hole in the wall, ceiling, or ground. This structure of expansion bolt is not satisfactory in function. One drawback of this structure of expansion bolt is that the tightening-up member only forces the rear end of the expansion shell to expand radially, the expansion shell may be not firmly fixed in place if the structure of the periphery of the hole in which the expansion bolt is installed is bulky. This problem becomes more apparent if the length of the expansion bolt is relatively longer. Another drawback of this structure of expansion bolt is that it fits holes of a particular depth only. Therefore, expansion bolts of different specifications shall be used for installation in holes of different depth.

The present invention has been accomplished to provide an expansion bolt which eliminates the aforesaid drawbacks. According to one aspect of the present invention, the expansion bolt is comprised of a screw bolt, a locating socket sleeved onto the screw bolt and stopped at the head thereof, a plurality of expansion shells respectively sleeved onto the screw bolt and connected in series, and a tightening-up member threaded onto the screw bolt and forced to compress the expansion shells axially upon the forward rotation of the screw bolt, causing the expansion shells to expand radially, wherein the number of the expansion shells is determined subject to the depth of the hole in which the expansion

bolt is to be installed. According to another aspect of the present invention, each of the expansion shells has a tapered locating portion at one end, a receptacle portion at an opposite end, two opposite longitudinal wedge blocks raised from the periphery of the tapered locating portion, and two opposite longitudinal slots made on the receptacle portion. The longitudinal slots of one expansion shell receives the wedge blocks of another so that the expansion shells respectively expand in the radial direction when the tightening-up member is forced to compress the expansion shells. Therefore, the expansion shells can be firmly fixed to the periphery of the hole in which the expansion bolt is installed.

An embodiment of the present invention will be described by way example and with reference to the accompanying drawings. in which:

Fig. 1 is an exploded view of an expansion bolt according to the prior art;

Fig. 2 is an exploded view of an expansion bolt according to the present invention;

Fig. 3 is an elevational assembly view of the expansion bolt shown in Figure 2;

Fig. 4 is an elevational assembly view of an alternate form of the expansion bolt according to the present invention; and

Fig. 5 is a longitudinal view in section of the expansion bolt shown in Figure 4.

Referring to Figure 2, an expansion bolt in accordance with the present invention is generally comprised of a screw bolt 1, a locating socket 2, a plurality of expansion shells 3, and a tightening-up member 4. The screw bolt 1 has a head 11 at one end, and an outer thread 12 around the periphery. The locating socket 2 is a hollow, stub tube having two wings 21 and two longitudinal slots 22 alternatively spaced around the periphery. Each of the expansion shells 3 has a tapered locating portion 31 at one end, a receptacle portion 33 at an opposite end, two longitudinal wedge blocks 32 raised from the periphery of the tapered locating portion 31 at two opposite sides corresponding to the longitudinal slots 22 of the locating socket 2, an outer thread 331 around the periphery of the receptacle portion 33, and two longitudinal slots 34 made on the receptacle portion 33 at two opposite sides corresponding to the wings 21 of the locating socket 2. The tightening-up member 4 is a tapered nut for threading onto the screw bolt 1, having two wedge blocks 41 raised from the peripheral at two opposite sides.

Referring to Figure 3, when the screw bolt 1 is inserted through the locating socket 2, the expansion shells 3 are respectively sleeved onto the screw bolt 1 and connected in series by inserting the wedge blocks 32 of one expansion shell 3 into the longitudinal slots 34

of another, and then the tapered tightening-up member 4 is threaded onto the outer thread 12 of the screw bolt 1. When assembled, the wings 21 of the locating socket 2 are stopped at the head 11 of the screw bolt 1, the wedge blocks 32 of the tapered locating portion 31 of the first expansion shell 3 are respectively inserted into the longitudinal slots 22 of the locating socket 2. When the screw bolt 1 is turned inwards, the tapered tightening-up member 4 is forced to move forwards in the direction toward the head 11 of the screw 1 to compress the expansion shells 3 longitudinally, causing the expansion shells 3 to expand radially, and therefore the expansion bolt is firmly fixed in place.

The number of the expansion shells 3 is determined subject to the length of the screw bolt 1 used and the depth of the wall in which the expansion bolt is to be installed. In Figure 3, the screw bolt 1 is matched with five expansion shells 3. In Figure 4, the screw bolt 1 is matched with three expansion shells 3. Furthermore, the outer thread 331 of each expansion shell 33 greatly increasing the coefficient of friction between the respective expansion shell 33 and the periphery of the hole in which the expansion bolt is mounted.

It is to be understood that the drawings are designed for purposes of illustration only, and are not intended as a definition of the limits and scope of the invention disclosed.



CLAIMS

1. An expansion bolt comprising a screw bolt, a locating socket, a plurality of expansion shells, and a tightening-up member, wherein:

5 said screw bolt has a head at one end, and an outer thread around the periphery;

 said locating socket is a hollow, stub tube sleeved onto said screw bolt, having two wings and two longitudinal slots alternatively and equiangularly spaced around the periphery, said wings being stopped at
10 the head of said screw bolt;

 each of said expansion shells has a tapered locating portion at one end which can be fitted into said locating socket, a receptacle portion at an
15 opposite end, two longitudinal wedge blocks raised from the periphery of said tapered locating portion at two opposite sides corresponding to the longitudinal slots of said locating socket, and two longitudinal slots made on said receptacle portion at two opposite sides
20 corresponding to the wings of said locating socket, the longitudinal slots of one expansion shell receiving the wedge blocks of another, the wedge blocks of one expansion shell being respectively inserted into the longitudinal slots of said locating socket;

25 said tightening-up member is a tapered nut threaded onto the outer thread of said screw bolt, having two wedge blocks raised from the peripheral at two opposite



sides and respectively inserted into the longitudinal slots of one expansion shell, said tightening-up member being forced to move toward the head of said screw bolt and to compress said expansion shells axially when said screw bolt is turned inwards, causing said expansion shells to expand radially.

2. The expansion bolt of claim 1 wherein each of said expansion shell has an outer thread around the periphery of the respective receptacle portion.

3. The expansion bolt of claim 1 wherein the wings and longitudinal slots of said locating socket are alternatively and equiangularly spaced around the periphery; the wedge blocks and longitudinal slots of each of said expansion shells are alternatively and equiangularly spaced around the periphery.

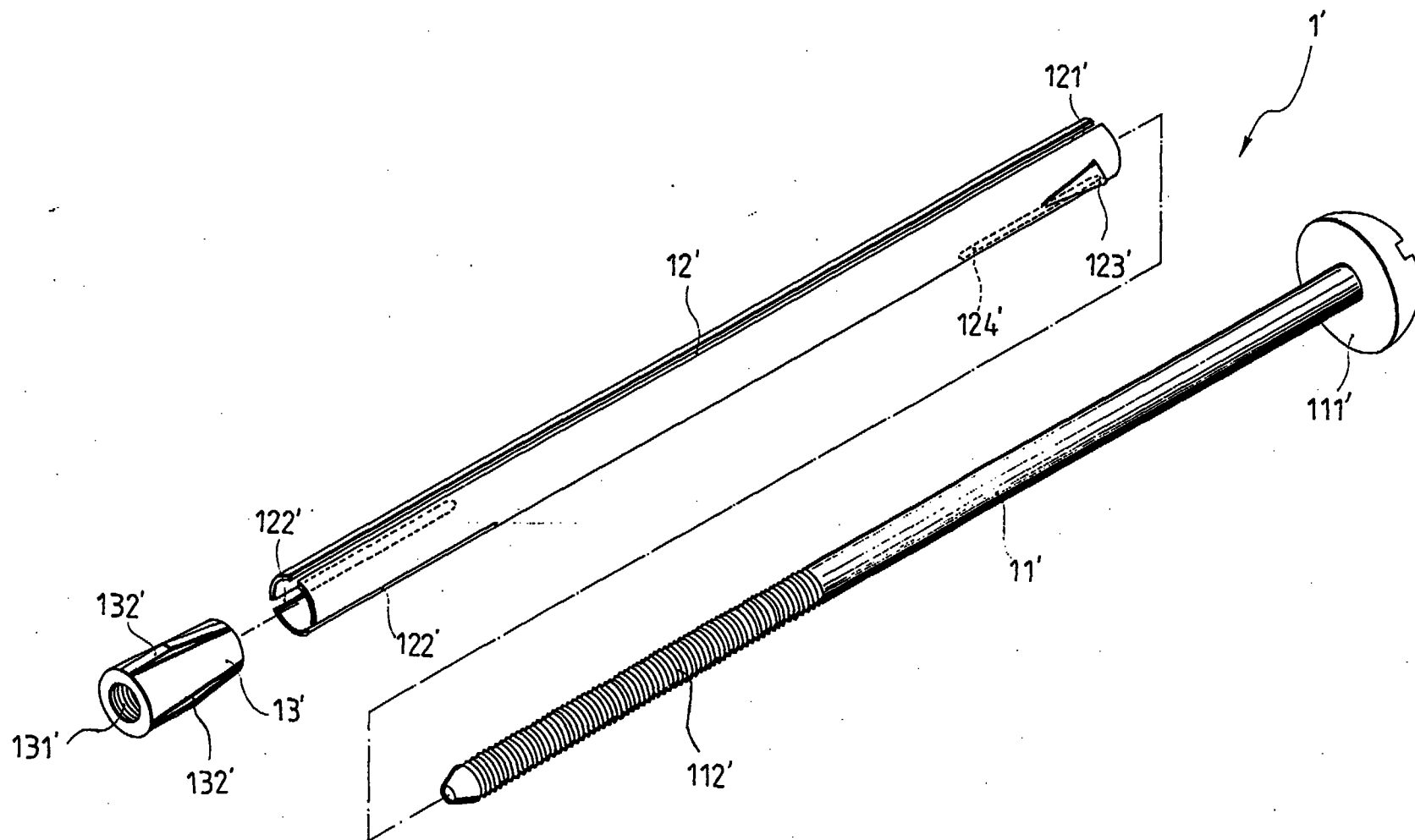
4. The expansion bolt substantially as hereinbefore described and illustrated with reference to the accompanying Figures 2 to 5.

ABSTRACT

EXPANSION BOLT

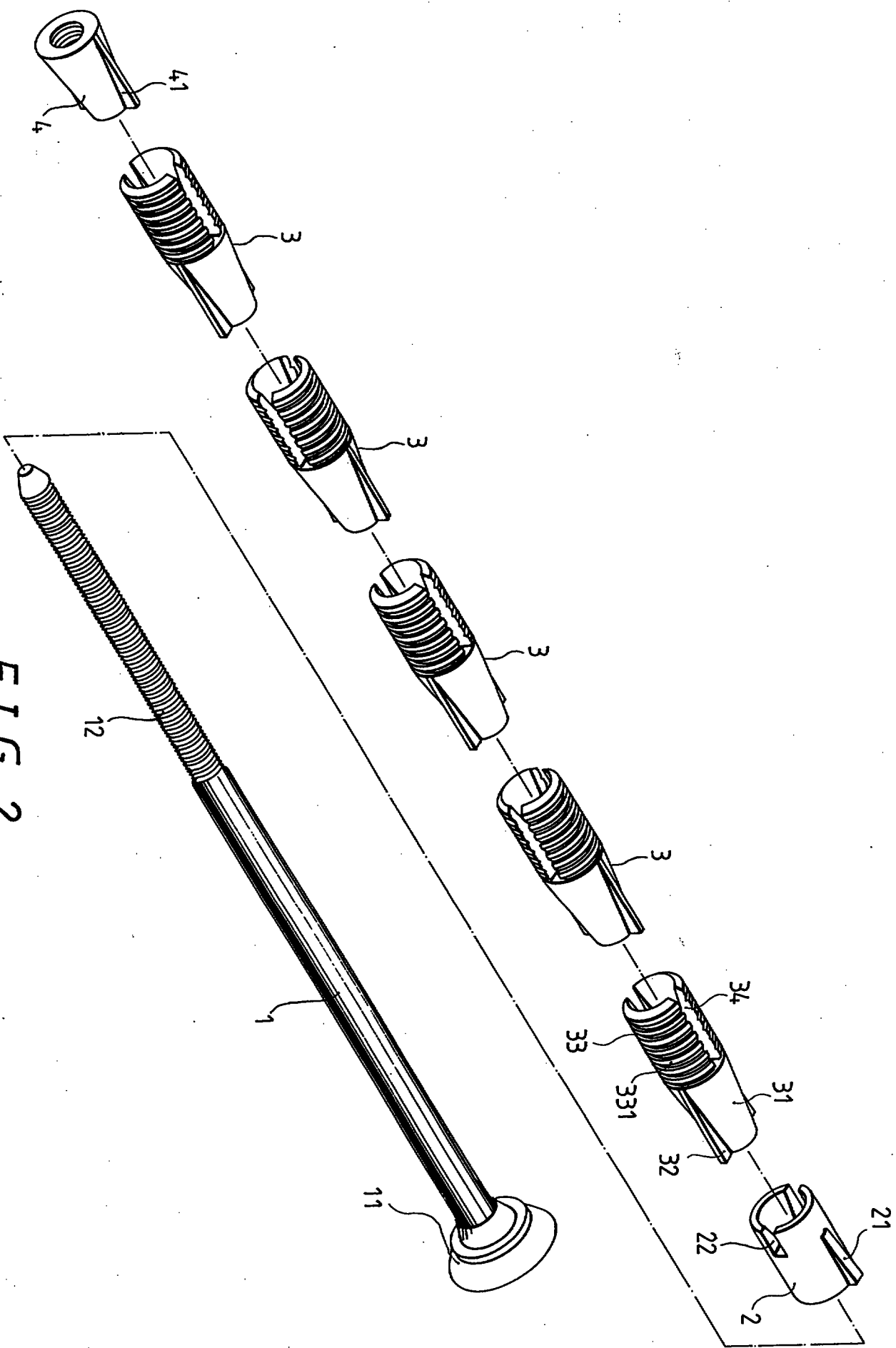
An expansion bolt which includes a screw bolt (1) having a head (11) at one end, and an outer thread (12) around the periphery; a locating socket (2) sleeved onto the screw bolt (1), having two opposite wings (21) stopped at the head (11) of the screw bolt (1) and two opposite longitudinal slots (22) bilaterally spaced between the wings (21); a plurality of expansion shells (3) respectively sleeved onto the screw bolt (1), each having a tapered locating portion (31) at one end, a receptacle portion (33) at an opposite end, two opposite longitudinal wedge blocks (32) raised from the periphery of the tapered locating portion (31), and two opposite longitudinal slots (34) made on the receptacle portion (33), the longitudinal slots (34) of one expansion shell (3) receiving the wedge blocks (32) of another, the wedge blocks (32) of one expansion shell (3) being respectively inserted into the longitudinal slots (22) of the locating socket (2); and a tightening-up member (4) threaded onto the outer thread (21) of the screw bolt (1), having two opposite wedge blocks 41 respectively inserted into the longitudinal slots (34) of one expansion shell (3), wherein the tightening-up member (4) is forced to compress the expansion shells (3) axially, causing them to expand radially when the screw bolt (1) is turned inwards.





PRIOR ART
FIG. 1

FIG. 2



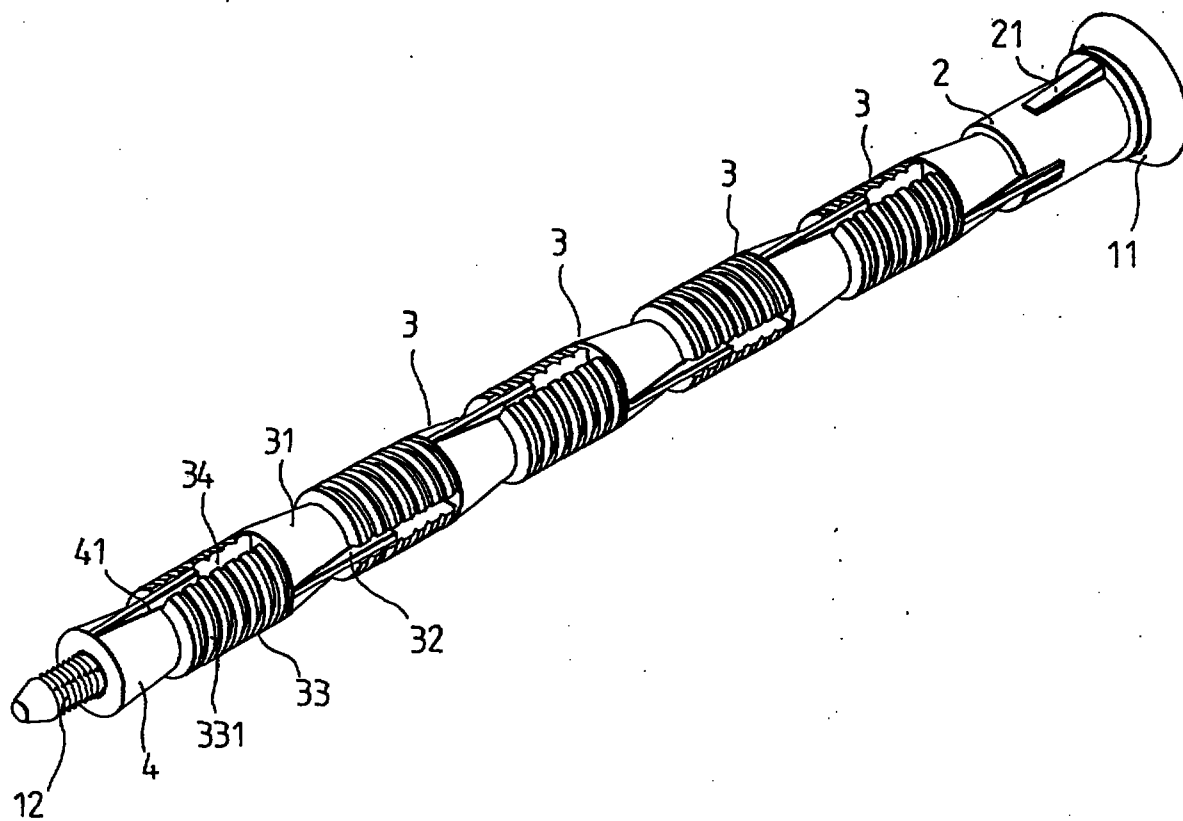


FIG. 3

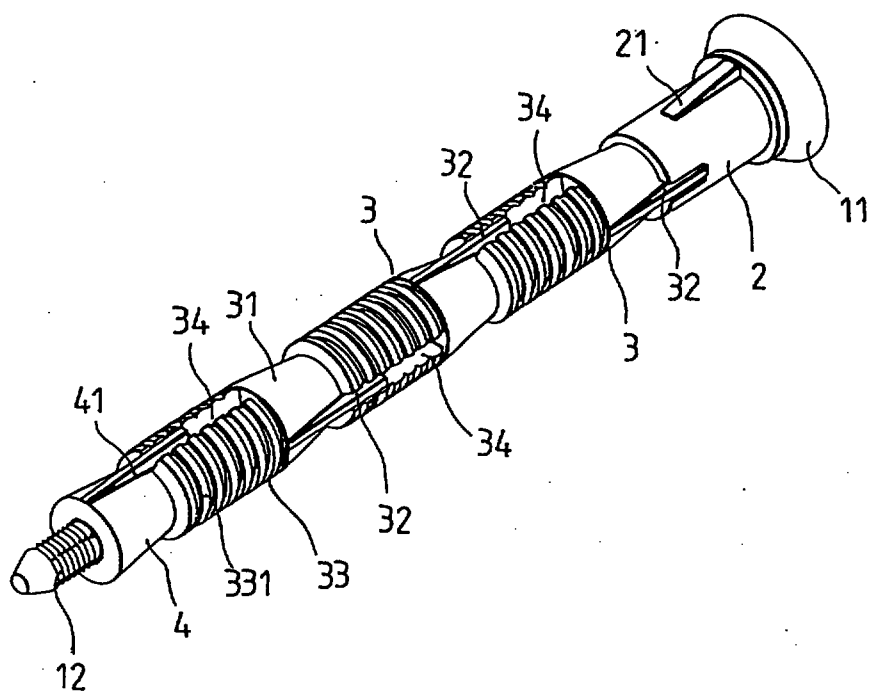


FIG. 4

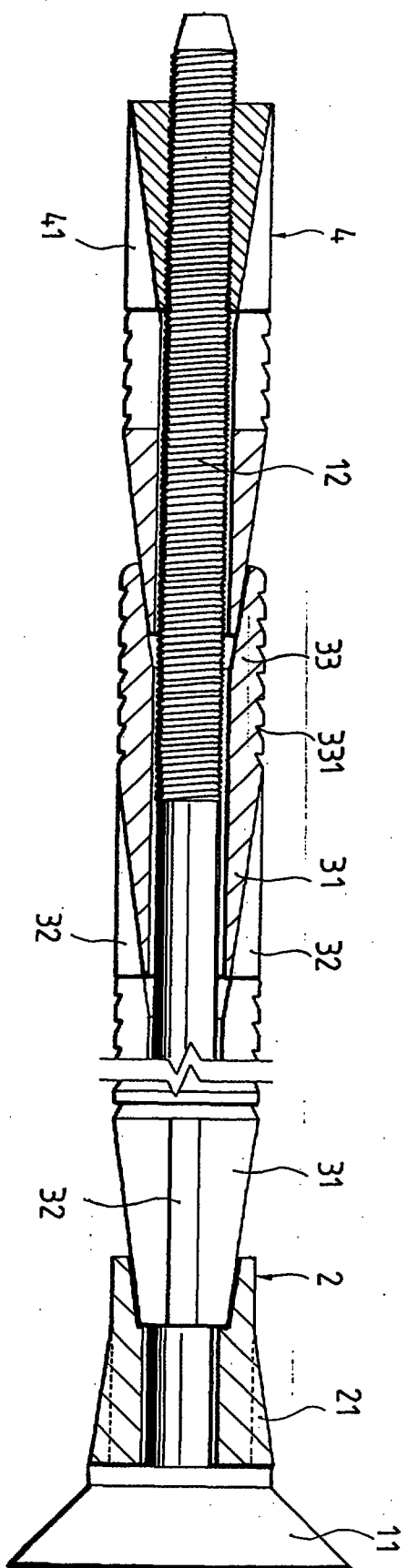


FIG. 5



TEXT OF THE ABSTRACT

EXPANSION BOLT

An expansion bolt which includes a screw bolt (1) having a head (11) at one end, and on an outer thread (12) around the periphery, a locating socket (2) sleeved onto the screw bolt (1), having two opposite wings (21) stopped at the head (11) of the screw bolt (1) and two opposite longitudinal slots (22) bilaterally spaced between the wings (21), a plurality of expansion shells (3) respectively sleeved onto the screw bolt (1), each having a tapered locating portion (31) at one end, a receptacle portion (33) at an opposite end, two opposite longitudinal wedge blocks (32) raised from the periphery of the tapered locating portion (31), and two opposite longitudinal slots (34) made on the receptacle portion (33); and a tightening-up member (4) threaded onto the outer thread (12) of the screw bolt (1), having two opposite wedge blocks (41) respectively inserted into the longitudinal slots (34) of one expansion shell (3), wherein the tightening-up member (4) is forced to compress the expansion shells (3) axially, causing them to expand radially when the screw bolt (1) is turned inwards.

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REPLACEMENT SHEET

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This Sheet Has Been Replaced



24 SEP 1999

ABSTRACTEXPANSION BOLT

An expansion bolt which includes a screw bolt (1) having a head (11) at one end, and an outer thread (12) around the periphery; a locating socket (2) sleeved onto the screw bolt (1), having two opposite wings (21) stopped at the head (11) of the screw bolt (1) and two opposite longitudinal slots (22) bilaterally spaced between the wings (21); a plurality of expansion shells (3) respectively sleeved onto the screw bolt (1), each having a tapered locating portion (31) at one end, a receptacle portion (33) at an opposite end, two opposite longitudinal wedge blocks (32) raised from the periphery of the tapered locating portion (31), and two opposite longitudinal slots (34) made on the receptacle portion (33), the longitudinal slots (34) of one expansion shell (3) receiving the wedge blocks (32) of another, the wedge blocks (32) of one expansion shell (3) being respectively inserted into the longitudinal slots (22) of the locating socket (2); and a tightening-up member (4) threaded onto the outer thread (21) of the screw bolt (1), having two opposite wedge blocks 41 respectively inserted into the longitudinal slots (34) of one expansion shell (3), wherein the tightening-up member (4) is forced to compress the expansion shells (3) axially, causing them to expand radially when the screw bolt (1) is turned inwards.

Figure 2