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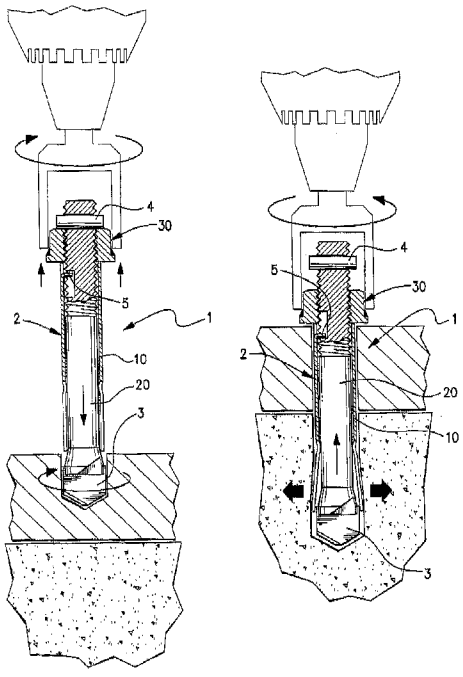
(54) **Title:** A SELF-DRILLING MASONRY BOLT



(57) **Abstract:** A self-drilling masonry bolt including a body portion having a bolt member and an outer sleeve portion, a head portion and a drilling tip whereby, the self-drilling masonry bolt provides a simple and effective means for securing an item to cement, wood or any other suitable material without the requirement of multiple tools.

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SELF-DRILLING MASONRY BOLT

Field of the Invention

This invention relates to building products and accessories, and in particular, to a self-drilling masonry bolt which provides a simple and effective means for securing an item to cement and/or wood without the requirement of multiple tools.

Whilst the invention may be applied to any fastening means for securing a building item to a material/structure such as a screw or the like and/or any suitable building application, for convenience sake it shall be described herein in terms of a self-drilling masonry bolt.

Background to the Invention

Conventionally, the building industry has adopted one of two products for securing materials to a support and/or each other namely, screws or bolts. The type of product adopted is generally dependent on the materials being used. Accordingly, there are also provided numerous styles of screws and bolts which are better suited to particular materials and/or applications to simplify labour and time during construction.

Typically bolts, also referred to as anchors, are utilised in relation to masonry products. The disadvantage with these conventional masonry anchors is that they require pre-drilled holes of a correct depth and diameter prior to insertion of the anchor. Therefore, the procedure is quite time-consuming as it requires more than one step, and often more than one tool, to complete the job.

Accordingly, it is an object of the present invention to overcome or substantially ameliorate the disadvantages of the prior art by providing a self-drilling masonry bolt which provides a simple and effective means for securing an item to cement and/or wood without the requirement of multiple tools.

Summary of the Invention

The present invention provides a self-drilling masonry bolt including:
a body portion having a bolt member and an outer sleeve portion;
a head portion;
and a drilling tip whereby the self-drilling masonry bolt provides a simple and effective means for securing an item to cement, wood or any other suitable material without the requirement of multiple tools or steps.

The self-drilling masonry bolt is preferably adapted to be made of a metal material which is strong, durable and resistant to corrosion.

The sleeve portion is preferably in the form of a hollow circular expansion sleeve which is adapted to expand and secure/anchor the bolt within a drilled hole and/or material. The diameter of the sleeve portion is preferably adapted to be slightly larger than the diameter of the threaded bolt so that the sleeve portion can be positioned over and receive the threaded bolt therethrough.

Preferably, the sleeve portion is provided with at least one split which is adapted to enable the sleeve portion to expand. The split is preferably similar in shape to a keyhole having a circular aperture at the top of the split with split extending downwardly to the bottom edge of the sleeve portion, and the split tapering outwardly at the bottom end of the sleeve portion.

The sleeve portion preferably has at least one helical rotor/radial cut-out portion which is adapted to curve partially around the circumference of the sleeve portion and operate to clean and pull debris out of the hole during drilling.

Preferably, the bolt member includes a shank, a head portion and a drilling tip. The bolt is preferably tapered so that the lower end of the bolt is preferably larger in diameter than the upper end. The upper end of the bolt member is adapted to have a threaded portion wherein the threaded portion has provided a left-handed thread for use with a reverse gear drill.

The threaded portion preferably has provided at least one aperture. A first aperture is adapted to extend horizontally through the entire width of the shank of the bolt

member and a second aperture is adapted to be provided on one side of the threaded bolt and only extend through one side of the threaded bolt.

The head portion preferably comprises a nut and a washer which are adapted to be joined together. The underside of the washer is preferably pleated.

The self-drilling masonry bolt further includes at least one pin member. A first pin member or the like is preferably adapted to be passed through an aperture in the threaded portion of the bolt member so that either end of the pin member protrudes outwardly on either side of the bolt. A second pin-like member is preferably provided on the upper portion of the body portion of the bolt and is adapted to be integrally formed with the sleeve portion and bend inwardly into the centre of the sleeve portion.

Preferably, the drilling tip is adapted to be integrally formed with the lower thicker end of the bolt member wherein the drilling tip has a profile suitable for drilling through masonry materials.

In order that the invention may be more readily understood we will describe by way of non-limiting example of a specific embodiment thereof.

Brief Description of the Drawing Figures

Figure 1 shows perspective views of the self-drilling masonry bolt according to a preferred embodiment of the invention.

Figure 2 shows an exploded view of the self-drilling masonry bolt according to a preferred embodiment of the invention.

Figure 3 shows the self-drilling masonry bolt being drilling into a masonry material in a conventional direction according to a preferred embodiment of the invention.

Figure 4 shows the self-drilling masonry bolt being drilled in reverse according to a preferred embodiment of the invention, to draw the threaded bolt upwardly through the sleeve portion, expanding the sleeve portion to anchor the bolt in place.

Description of a Preferred Embodiment of the Invention

Figures 1 to 4 show the self-drilling masonry bolt according to a preferred embodiment of the invention.

The invention provides a self-drilling masonry bolt 1 which provides a simple and effective means for securing an item to cement and/or wood without the requirement of multiple tools. The self-drilling masonry bolt 1 is adapted for use with masonry materials such as concrete, brickwork, stoneware or rock or the like, and the securing of these materials to concrete, wood or any other suitable material. The self-drilling masonry bolt 1 is adapted to be made of a metal material which is strong, durable and resistant to corrosion. It is envisaged that the shape, style and dimensions of the self-drilling masonry bolt 1 and its components may be varied as required to suit different materials and/or applications.

The self-drilling masonry bolt 1 has provided a body portion 2. The body portion 2 includes an outer sleeve portion 10 and a partially threaded bolt member 20 therein. The sleeve portion 10 is in the form of a hollow circular expansion sleeve which is adapted to expand and secure/anchor the bolt 1 within a drilled hole and/or material. The diameter of the sleeve portion 10 is adapted to be slightly larger than the diameter of the threaded bolt 20 so that the sleeve portion 10 can be positioned over and receive the threaded bolt 20 therethrough. The length of the sleeve portion 10 is adapted to substantially cover the shank 21 of the bolt member 20 positioned therein whereby, an upper end of the sleeve portion 10 is adapted to be connected beneath, or abut against, a head portion 30 of the bolt 1 and a lower end is adapted to end at a prescribed point above a drilling tip 3 of the bolt 1.

The sleeve portion 10 has at least one split 11 which is adapted to enable the sleeve portion 10 to expand. In a preferred embodiment, the sleeve portion 10 preferably has provided four splits 11 which are adapted to extend partially along the length of the lower end of the sleeve portion 10. The split 11 is similar in shape to a keyhole shape having a circular aperture at the top of the split 11 with split extending downwardly to the bottom edge of the sleeve portion 10, and the split tapering outwardly at the bottom end of the sleeve portion 10. The tapering of the split 11 is adapted to allow the sleeve portion 10 to expand.

The sleeve portion 10 has provided at least one helical rotor/radial cut-out portion 12. The helical rotor/radial cut-out portion(s) 12 is/are adapted to be in the form of elongated cut-out portions which curve partially around the circumference of the sleeve portion 10. The helical rotor/radial cut-out portion(s) 12 is/are function to clean and pull debris out of a hole being drilled. It is envisaged that the shape and dimensions of the helical rotor/radial cut-out portion(s) 12 may vary to suit the material being drilled and/or cleaning of the hole.

The body portion 2 of the self-drilling masonry bolt 1 preferably has provided a partially threaded bolt member 20 which is adapted to be received within the outer sleeve 10 of the body portion 2. The bolt member includes a shank 21, a head portion 30 and a drilling tip 3. The bolt member 20 preferably has provided an upper end and a lower end. The bolt member 20 is preferably tapered so that the lower end of the bolt member 20 is preferably larger in diameter than the upper end. This is designed to ensure that the outer sleeve 10 will be able to fit within the hole that the drilling tip 3 has created. The upper end of the bolt member 20 is adapted to have a threaded portion 22 so that a nut and/or washer can be received and tightened thereon in order to draw the bolt back up through the outer sleeve 10. The threaded portion 22 preferably has provided a left-handed thread for use with a reverse gear drill.

The threaded portion 22 has provided at least one aperture. The aperture(s) is/are preferably adapted to be circular in shape. However, it is envisaged that any other suitable shape may also be employed. A first aperture 23 is preferably adapted to extend horizontally through the entire width of the shank 21 of the bolt member 20. A second aperture 24 is adapted to be provided on one side of the threaded bolt 20 and only extend through said side of the threaded bolt 20.

Provided at the upper end of the self-drilling masonry bolt 1 is a head portion 30. The head portion 30 preferably comprises a nut 31 and a washer 32. However, it is envisaged that any other type of head type such as countersunk, flat head, round head, flanged head or flush head or the like may also be adopted. It is further envisaged that these other head types may be relevant to other building applications such as hook bolts, eye bolts or the like and consequently, be adopted as a preferred option. In a preferred embodiment, the nut 31 and washer 32 are adapted to be connected to each other via welding or any other suitable means. In a further embodiment, it is envisaged that the nut 31 and washer 32 could be integrally formed

with each other. The nut 31 is in the form of a hexagonal nut or any other suitable shaped nut. The washer 32 is in the form of a flat circular-shaped disc. The underside of the washer 32 is preferably pleated so that the washer 32 can brush away the debris as it comes up to the surface during drilling of the hole.

In an alternate embodiment of the invention, the nut 31 and washer 32 may be provided as separate components. In this embodiment, a stopper (not shown) may be provided at the upper end of the bolt member 20 as an alternative to the pin member 4 which is adapted to pass through the threaded portion 22 of the bolt member 20. The stopper preferably comprises a flat washer having a half-pin member moulded to the underside of the washer. The moulded half-pin member may be adapted to be passed through the bolt member 20 so that either side of the half-pin member protrudes from either side of the bolt member 20. The stopper is preferably secured to the top end of the self-drilling masonry bolt 1 via welding and/or any other suitable securing means.

The self-drilling masonry bolt 1 has provided at least one pin member. A first pin member 4 or the like is adapted to be passed through the aperture 23 in the threaded portion 22 of the bolt member 20 so that either end of the pin member 4 protrudes outwardly on either side of the bolt 1 in order to secure a head portion 30 located therebeneath and prevent the head portion 30 coming away from the bolt 20. A second pin-like member 5 is provided on the upper portion of the body portion 2 of the bolt. The second pin member 5 is preferably adapted to be integrally formed with the sleeve portion 10 and is adapted to bend inwardly into the centre of the sleeve portion 10. When the sleeve portion 10 is located over the threaded bolt 20 the pin member 5 is adapted to be received within the aperture 24 in the threaded bolt 20 such that, it holds the sleeve portion 10 in place as the bolt member 20 is drawn back up through the sleeve portion 20 to move the bent portion of the pin, and expand the splits 11 of the sleeve portion 10, so that the bolt 1 is locked into place within the hole.

The lower end of the self-drilling masonry bolt 1 comprises a drilling tip 3 which is adapted to be integrally formed with the lower thicker end of the threaded bolt member 20 of the bolt. The drilling tip 3 may preferably have any profile suitable for drilling through masonry materials. It is envisaged that the drilling tip 3 can be made from the same or different material to the shank 21 of the threaded bolt 20 of the self-drilling masonry bolt 1. In a further embodiment of the invention, the lower end of the

bolt is preferably provided with a small cam (not shown) or the like which is adapted to engage with the sleeve portion 10 in order to rotate the sleeve portion 10 in synchronisation with the rotation of the bolt 1 during drilling in order to extract the debris, created as a result of the drilling process, via the helical rotor/radial cut-out portions.

The self-drilling masonry bolt 1 is preferably adapted to be used with an electric drill that is fitted with a reverse gear. In practice, the self-drilling masonry bolt 1 is drilled in a conventional direction to a full depth where the bottom of the head portion 30 is in contact with the surface of the material. The drill in then engaged into reverse. This action tightens the nut 31 on the bolt 1 and expands the splits 11 on the lower end of the sleeve portion 10, by pulling the internal bolt 20 upwardly through the sleeve portion 10, in order to secure the self-drilling masonry bolt 1 within the hole. Accordingly, the self-drilling masonry bolt 1 of the invention eradicates the need for multiple tools. However, it is envisaged that the invention may also be used with an electric drill which is not fitted with a reverse gear, in which case the nut/head portion 30 may be tightened by hand or with a spanner or other suitable tool.

While we have described herein a particular embodiment of a self-drilling masonry bolt 1, it is further envisaged that other embodiments of the invention could exhibit any number and combination of any one of the features previously described. However, it is to be understood that any variations and modifications can be made without departing from the spirit and scope thereof.

We claim:

1. A self-drilling masonry bolt including:
   a body portion having a bolt member and an outer sleeve portion;
   a head portion;
   and a drilling tip whereby the self-drilling masonry bolt provides a simple and effective means for securing an item to cement, wood or any other suitable material without the requirement of multiple tools.

2. A self-drilling masonry bolt as claimed in claim 1 wherein the self-drilling masonry bolt is adapted to be made of a metal material which is strong, durable and resistant to corrosion.

3. A self-drilling masonry bolt as claimed in claim 1 or claim 2 wherein the sleeve portion is in the form of a hollow circular expansion sleeve which is adapted to expand and secure/anchor the bolt within a drilled hole and/or material.

4. A self-drilling masonry bolt as claimed in claim 3 wherein the diameter of the sleeve portion is adapted to be slightly larger than the diameter of the threaded bolt so that the sleeve portion can be positioned over and receive the threaded bolt therethrough.

5. A self-drilling masonry bolt as claimed in claim 4 wherein the sleeve portion is provided with at least one split which is adapted to enable the sleeve portion to expand.

6. A self-drilling masonry bolt as claimed in claim 5 wherein the split is similar in shape to a keyhole having a circular aperture at the top of the split with split extending downwardly to the bottom edge of the sleeve portion, and the split tapering outwardly at the bottom end of the sleeve portion.

7. A self-drilling masonry bolt as claimed in any one of the above claims wherein the sleeve portion has at least one helical rotor/radial cut-out portion which is adapted to curve partially around the circumference of the sleeve portion and operate to clean and pull debris out of the hole during drilling.

8. A self-drilling masonry bolt as claimed in claim 1 wherein the bolt member includes a shank, a head portion and a drilling tip.

9. A self-drilling masonry bolt as claimed in claim 8 wherein the bolt is tapered so that the lower end of the bolt is preferably larger in diameter than the upper end.

10. A self-drilling masonry bolt as claimed in claim 8 or claim 9 wherein the upper end of the bolt member is adapted to have a threaded portion.

11. A self-drilling masonry bolt as claimed in claim 10 wherein the threaded portion has provided a left-handed thread for use with a reverse gear drill.

12. A self-drilling masonry bolt as claimed in claim 10 or claim 11 wherein the threaded portion has provided at least one aperture.

13. A self-drilling masonry bolt as claimed in claim 12 wherein a first aperture is adapted to extend horizontally through the entire width of the shank of the bolt member and a second aperture is adapted to be provided on one side of the threaded bolt and only extend through said side of the threaded bolt.

14. A self-drilling masonry bolt as claimed in claim 1 wherein the head portion comprises a nut and a washer.

15. A self-drilling masonry bolt as claimed in claim 14 wherein the nut and the washer are joined together.

16. A self-drilling masonry bolt as claimed in claim 14 or claim 15 wherein the underside of the washer is pleated.

17. A self-drilling masonry bolt as claimed in claim 1 which further includes at least one pin member.

18. A self-drilling masonry bolt as claimed in claim 17 wherein a first pin member or the like is adapted to be passed through an aperture in the threaded portion of the bolt member so that either end of the pin member protrudes outwardly on either side of the bolt.

19. A self-drilling masonry bolt as claimed in claim 17 wherein a second pin-like member is provided on the upper portion of the body portion of the bolt and is adapted to be integrally formed with the sleeve portion and bend inwardly into the centre of the sleeve portion.

20. A self-drilling masonry bolt as claimed in claim 1 wherein the drilling tip is adapted to be integrally formed with the lower thicker end of the bolt member.

21. A self-drilling masonry bolt as claimed in claim 20 wherein the drilling tip has a profile suitable for drilling through masonry materials.

22. A self-drilling masonry bolt as claimed in claim 1 wherein head portion is in the form of a stopper.

23. A self-drilling masonry bolt as substantially described herein with reference to the above examples and drawing figures.

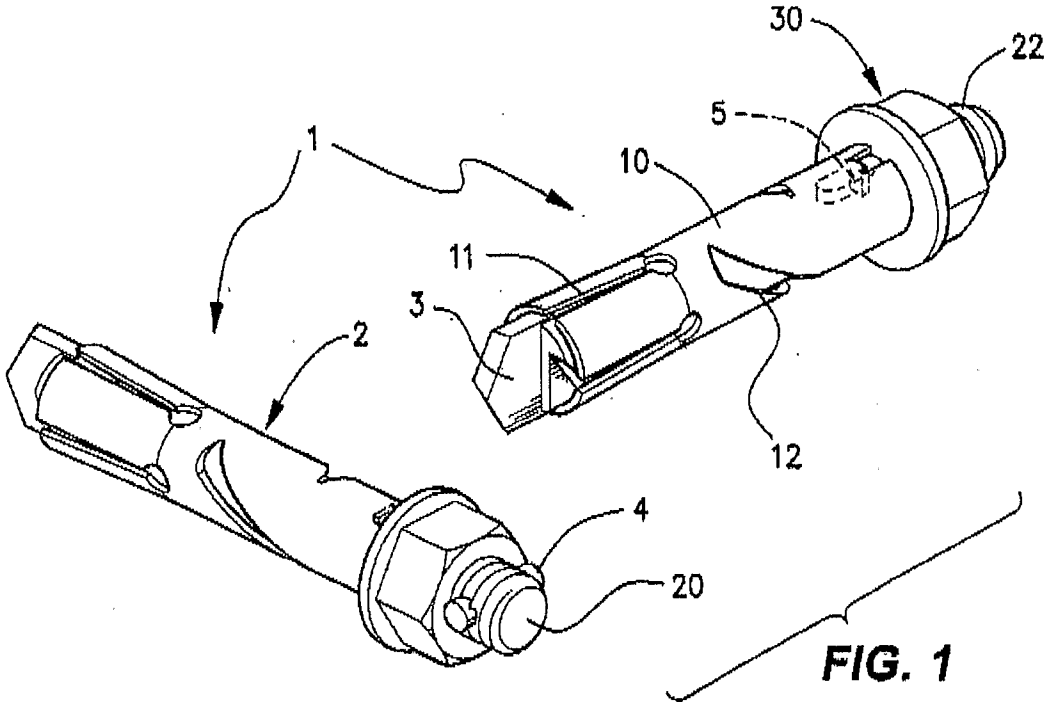

FIG. 1

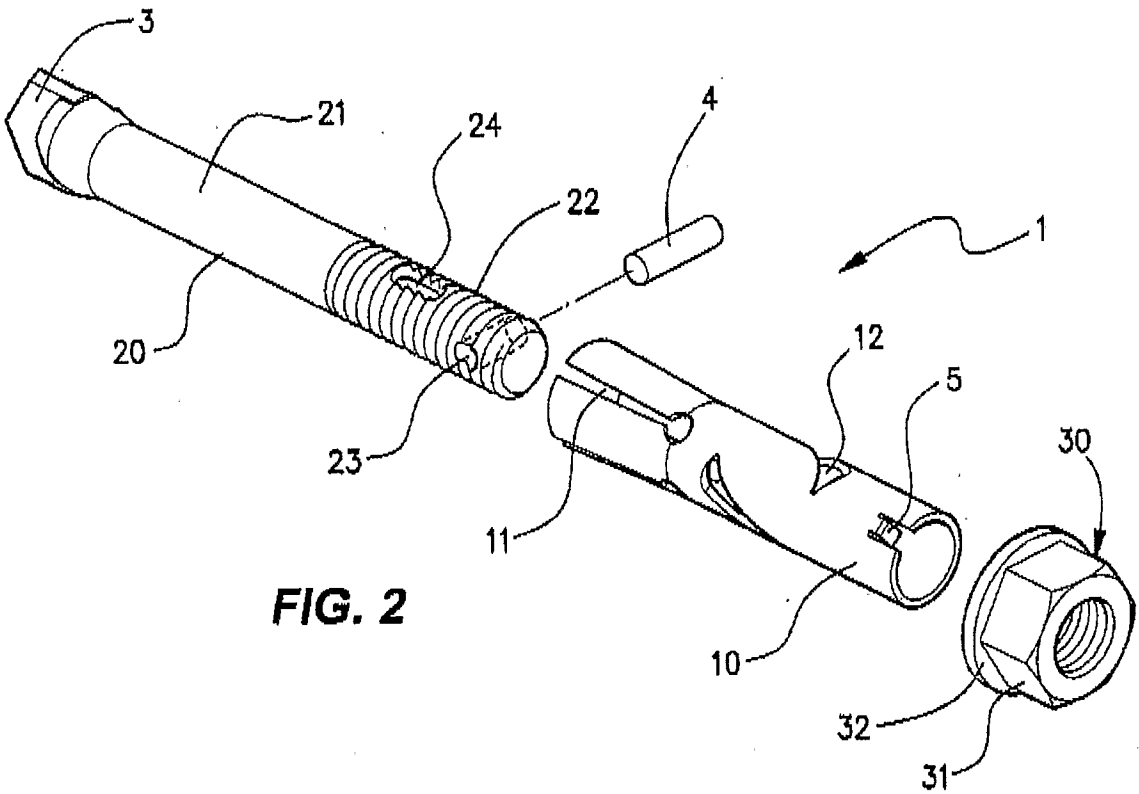

FIG. 2

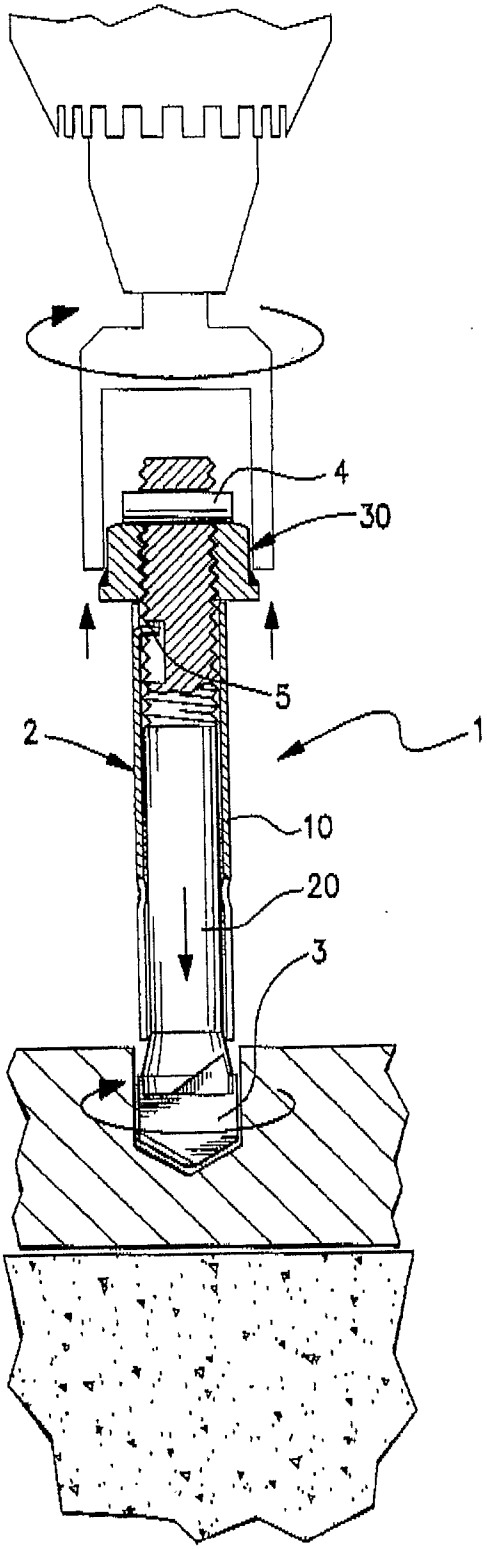

FIG. 3

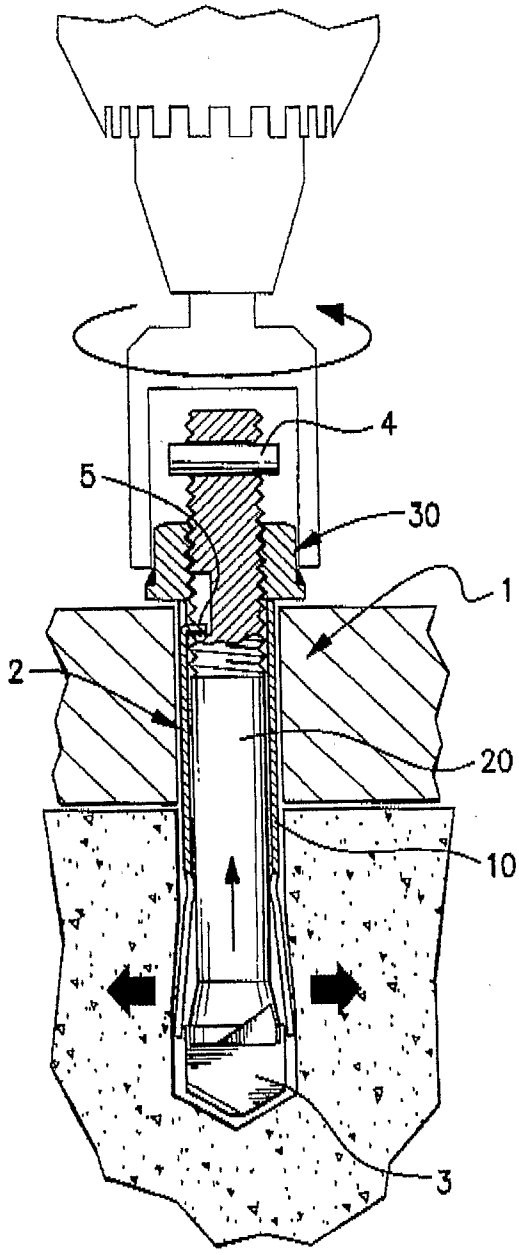

FIG. 4

INTERNATIONAL SEARCH REPORT

International application No.
PCT/AU2007/000304

A. CLASSIFICATION OF SUBJECT MATTER

Int. Cl.

F16B 13/06 (2006.01)

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched
AU: PAIS: IPC: F16B 13/06, 13/08, E04B 1/41

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
DWPI: IPC: F16B/-, E04B 1/- & keywords: bolt, anchor, screw, fastener, sleeve, tubular, casing, cylinder, drill, bore, self- and like terms

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 1997/049929 A (IRSAJ, JR et al) 31 December 1997 Whole document	1-10, 14, 15, 20-23
X	GB 2254392 A (TU, HSIUE-TE ALBERT) 7 October 1992 Page 4 lines 24 – page 5 line 1	1-11, 14, 15, 20-23
P,X	AU 2005204302 A1 (ALLIANCE METAL CORPORATION) 13 April 2006 Whole document	1-5, 8, 9
X	EP 1072802 A1 (YAMAHIRO CO., LTD) 31 January 2001 Whole document	1-5, 9, 10, 14

[X] Further documents are listed in the continuation of Box C [X] See patent family annex

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Date of the actual completion of the international search	Date of mailing of the international search report
30 April 2007	9 MAY 2007

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INTERNATIONAL SEARCH REPORT

International application No.
PCT/AU2007/000304

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 4026186 A (WILLIAMS, JR et al) 31 May 1977 Whole document	1-10, 20-23

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.
PCT/AU2007/000304

This Annex lists the known "A" publication level patent family members relating to the patent documents cited in the above-mentioned international search report. The Australian Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

Patent Document Cited in Search Report		Patent Family Member					
US	4026186	CA	1041326	DE	2656676	FR	2341773
		GB	1529534	JP	52103806	SE	7613113
		ZA	7607085				
WO	1997/049929	AU	10088/97	AU	30844/97		
GB	2254392	NONE					
AU	2005204302	US	2006228188	JP	2006097890	US	2006067803
EP	1072802	AU	24608/00	CA	2325945	JP	2000230520
		WO	2000/047905				

Due to data integration issues this family listing may not include 10 digit Australian applications filed since May 2001.

END OF ANNEX