A device for mounting anchors having a mounting end for positioning within pre-drilled apertures formed in concrete or cement and having a threaded end projecting forward of the pre-drilled apertures when positioned therein. The device features a continuous shaft that is adapted to engage with a hammer drill on a first end, and the threaded portion of the anchor on the opposite end to allow the hammer drill to force the anchor into its aperture in the concrete. A nut for the threaded portion is rotatable for engagement by a second component coaxially engaged with the shaft. The device allows for both hammering the anchor into its aperture and tightening the nut, without removing the device from its engagement with the anchor.
CONCRETE ANCHOR INSERTION DEVICE AND METHOD

FIELD OF THE INVENTION

[0001] This application claims priority to U.S. Provisional Patent Application No. 61/021,319 AND 61/021,316 both filed on Jun. 2, 2008 and both of which are incorporated herein in their entirety by reference.

[0002] The disclosed device relates to the setting of concrete anchors. More particularly the disclosed device and method of employment thereof relate to a tool for insertion of concrete anchors which is adapted for operative engagement to a hammer drill to thereby considerably increase the efficiency of workers setting such anchors in concrete and masonry structures.

BACKGROUND OF THE INVENTION

[0003] When mounting structural elements to concrete walls such as in tilt-up concrete structures, it is frequently necessary to provide a means for engagement of a threaded bolt with the concrete wall. The bolt being employed to hold some structural or decorative element must be screwed into the surface of the wall to provide the mounting engagement for the structural element.

[0004] In a conventional insertion of a wall anchor into a concrete wall, a hole is drilled into the surface of the wall to a distance sufficiently deep to provide for insertion of an internally threaded anchor, into the wall. In a second step, the wall anchor is inserted into the leading edge of the hole where it must be sunk into the hole prior to a third anchoring step.

[0005] Such inserts conventionally have an anchor circumference which is very close in size to the interior circumference of the hole in which it engages. Such tight engagements are required by the engineered structure of the insert and the need for the anchor to sufficiently grip the interior of the hole to support the load engaged on the bolt later threaded into the anchor.

[0006] As such, insertion of the anchor into the hole requires that it be forced by impact to a full engagement into the prior drilled hole. This can be a most tedious process since the holes are drilled into hard concrete and there can be dozens if not hundreds of such hole and anchor engagements on a supporting wall. The insertion of the anchors into the pre-drilled holes using a hammer can take an extremely long amount of worker time. Worse yet, the temperatures of the concrete can impact the time and effort required to insert the anchors since a hole drilled on a hot day, will contract on a subsequent cold day, making insertion of the anchor even more time consuming due to the conventional hammering method of insertion of each anchor.

[0007] Once inserted into the hole in a tight fit, each anchor must then be expanded by threading a bolt into the axially located threads of the anchor. The insertion of the bolt, deforms the anchor slightly such that it compresses in the circumferential engagement of the anchor and the sidewall of the hole. This compression fit is required to maintain the anchor in the hole under the anticipated load on the bolt.

[0008] However, just like hammering of the anchor into the hole is a tedious process, the insertion of the threaded bolt into the threaded axial cavity of the bolt is also a time-consuming process. As a consequence, the worker must first drill a hole in the wall. Then, the anchor must be driven into the hole by hand using a hammer. Finally, in a third step, the bolt must be rotated in the threaded engagement with the axial cavity using a wrench to twist it.

[0009] As such there is an unmet need for an improved apparatus and method for insertion of concrete anchors into their mounting holes which saves costly construction worker time. Such a device should allow for the use of the hammer drill that is employed to drill the holes in the wall, to insert the anchors into the hole using the power provided by the hammer drill rather than by the hand of the user on a hammer.

[0010] Further, such a device should also allow for employment of the hammer drill or other powered rotating tool, to rotate the bolt into the threaded axial cavity of the anchor thereby saving more time by eliminating the tedious employment of a conventional wrench to twist the bolt. Finally, such a device, should be easily engageable with conventional hammer drills, and should be a single unit which both allows for insertion of the anchor, and twisting of the bolt, without having to constantly remove the tool from the drill chuck.

[0011] In this respect, before explaining at least one embodiment of the invention in detail it is to be understood that the invention is not limited in its application to the details of construction and to the arrangement of the components set forth in the following description or illustrated in the drawings. The invention is capable of other embodiments and of being practiced and carried out in various ways. Also, it is to be understood that the phraseology and terminology employed herein are for the purpose of description and should not be regarded as limiting. As such, those skilled in the art will appreciate that the conception, upon which this disclosure is based, may readily be utilized as a basis for designing other concrete anchor setting methods and systems for carrying out the several purposes of the present invention. It is important, therefore, that the claims be regarded as including such equivalent construction insofar as they do not depart from the spirit and scope of the present invention.

[0012] An object of this invention is the provision of a device for engagement with concrete wall anchors and with a conventional hammer drill, to thereby provide a powered impact for driving the anchors into the pre-drilled holes.

[0013] An additional object of this invention is the provision of such an anchor driving device, which will also engage the bolt that must be threaded into the anchor, and provide a powered rotation thereof.

[0014] It is a further object of the invention herein, to provide such an anchor driving device and bolt rotating device, in a single unit to thereby eliminate the need to constantly remove and replace tools with the hammer drill chuck.

[0015] These together with other objects and advantages which will become subsequently apparent reside in the details of the construction and operation as more fully hereinafter described and claimed, reference being had to the accompanying drawings forming a part thereof, wherein like numerals refer to like parts throughout.

SUMMARY OF THE INVENTION

[0016] The device and method of operation herein described and disclosed substantially increases the speed of the tedious process of insertion of anchors and studs conventionally set into concrete and block walls and greatly reduces the number of tools, labor, and hence people required. Using a hammer drill in combination with the engageable two component device, a first component is adapted to engage in the jaws of a hammer drill on a proximal end and with a second
component on the opposite end adapted for both the insertion of studs and the subsequent engagement of nuts upon the studs so inserted.

[0017] The distal end of the first component may be adapted with a threaded axial passage adapted to engage the threads of a concrete anchor for a hammering of the anchor without damaging the threads. Or it may be adapted which a passage for coaxial engagement of the stud while a socket adapted to engage a nut surrounding the passage engages the nut to both hammer the stud and rotate the nut onto the threads of the inserted stud.

[0018] The second component of the pair, engaged to the first component through a clutch, has a socket shaped and sized to engage the nuts of the anchor studs and to rotate them to a mount or bracket once the stud has been properly inserted and hammered into place. The second component may either be removably engageable to cooperate engage with the clutch and surround the axial passage on the distal end of the shaft of the first component, or it may actually be a unitary structure and part of the clutch in its coaxial engagement surrounding the axial passage in the shaft.

[0019] Thus, in either the permanent mode or the removably engagement mode of the second component in a manner similar to a socket wrench, the combination of the two components allows for the employment of the hammer drill for both tasks without the need to change tools. In a first step the insert may be properly hammered into the aperture in the concrete by the engagement with either the threads of the stud insert or with a nut engaged upon the threads. Once hammered into proper position, the nut itself may be rotated by the socket type wrench formed in the distal end of the second component surrounding the axial cavity on the distal end of the shaft. Labor and time is greatly saved by employing the device instead of the conventional manner using hammers and wrenches in multiple steps.

[0020] These and further objectives of this invention will be brought out in the following part of the specification, wherein detailed description is provided for the purpose of fully disclosing the invention without placing limitations thereon.

[0021] With respect to the description provided herein, it is to be realized that the optimum dimensional relationships for the parts of the invention, to include variations in size, materials, shape, form, function and manner of operation, assembly and use, are deemed readily apparent and obvious to one skilled in the art, and all equivalent relationships to those illustrated in the drawings and described in the specification are intended to be encompassed by the present invention. Therefore, the descriptions provided herein are considered as illustrative only of the principles of the invention.

[0022] Further, since numerous modifications and changes will readily occur to those skilled in the art, upon reading this disclosure, it is not desired to limit the invention to the exact construction and operation shown and described, and accordingly, all suitable modifications and equivalents which may be resorted to, are considered to be within the scope of this invention.

**BRIEF DESCRIPTION OF THE DRAWINGS**

[0023] FIG. 1 depicts the device herein having a removably engageable wrench component adapted for coaxial engagement over the central shaft to a mount on the clutch.

[0024] FIG. 2 depicts the central shaft of the device of FIGS. 1-3 adapted at a proximal end for engagement to a hammer drill and at the distal end for engagement with a threaded cement insert.

[0025] FIG. 3 is a perspective view of the device of FIG. 1 showing the second component cooperatively engaged with the clutch and surrounding the distal end of the shaft.

[0026] FIG. 4 is an end view of the device in the engaged configuration of FIG. 3.

[0027] FIG. 5 shows and exploded view another mode of the device wherein the second component is permanently engaged on a first end to the clutch.

[0028] FIG. 6 depicts a perspective view of the device shown in FIG. 5 and assembled for use to both drive threaded wall anchors or studs, and rotatably engaged nuts thereon.

[0029] FIG. 7 is an end view of the device in FIG. 6.

[0030] FIG. 8 depicts the prior art showing the conventional labor intensive manner currently employed to sink anchors or studs and subsequently engaged nuts thereon.

**DETAILED DESCRIPTION OF THE INVENTION**

[0031] Referring now to the drawings in FIGS. 1-8, wherein similar parts are identified by like reference numerals, as noted in FIG. 8, it shows the conventional manner of engagement of concrete wall anchors into a pre-drilled hole. As shown, in the conventional method, a hole 12 is drilled into the concrete 14 to a predetermined depth using a hammer drill. The hole 12 is sized to be adapted for engagement to the insert or anchor 16. Once the hole 12 is properly drilled to the correct depth and diameter, the anchor 16 is inserted into the hole 12 and its protruding threaded portion is communicated through an aperture in the supported structure 20.

[0032] At this point in the process, the anchor 16 is in a tight fit with the sidewall of the hole 12 and will not just slide into engagement. Consequently, brute force in the form of a hammer 22 driven by the worker's hand, is employed to drive the anchor 16 to its mounting depth in the hole 12.

[0033] In a third step of the conventional process, a nut 24 is engaged on the threaded end of the anchor 16. The anchor 16 is designed in a conventional fashion for such anchors in that the engagement end which anchors in the hole 12 will expand when pulled upon by the rotating nut 24. Different engagement ends exist for such purposes but all use the same basic premise of rotating the nut 24, or the bolt 26, with a wrench 28, which will cause an outward expansion of the anchoring end of the bolt 26, or of an insert engaging the anchoring end of the bolt 26. This permanently seats the bolt 26 into the concrete.

[0034] As can be seen, this process is tedious and requires a constant changing of hand power tools to first drive the anchor 16 into the tight engagement with the hole 12, and then expand the engagement end of the anchor 16 using rotation of the nut 24 or the bolt 26 with a second tool in the form of a wrench 28.

[0035] The device 10 as shown in FIGS. 1-7 may be formed as a single unit or in a structure where the second component 32 which acts as a wrench, is removably engageable to a clutch 40. In all modes of the device a shaft 29 is adapted at a first or proximal end 30 adapted to engage in the jaws or chuck of a conventional hammer drill. Such hammer drills are well known in the art and have both a hammering translating movement and also a rotational movement in the mode of a regular drill.
The second component 32 is adapted to coaxially engage around the shaft 29 on the distal or opposite end from the proximal end 30 of the shaft. In the removable mode of the device 10 of FIGS. 1-3, a first end 34 of the second component 32 is shaped to cooperatively engage a cooperating cavity 36 on the clutch 40. The distal end 33 of the second component 32 shown in FIGS. 1 and 4, is adapted to engage the nuts 24 of the conventionally employed anchors noted above.

The distal end 31 of the shaft 29 as shown in FIGS. 1, 2, and 5, may have a threaded cavity 38 which is adapted to engage the threaded portion of the anchor 16 during insertion noted above. Optionally, the cavity 38 may be sized to surround the threads on the studs or anchors if preferred and the nut engaging cavity 39 employed to engage upon the anchor-engaged nut 24 to drive the anchor 16 into the hole 12.

A clutch 40 may be provided, and is preferred in all modes of the device 10. While the device 10 may be employed without the clutch 40 and still improve upon the state of the art by providing one tool to provide a mechanized solution to the current art of multiple tools and steps, the clutch 40 is particularly preferred. This is because it provides a means to prevent over-torque of the nut 24 on the projecting threaded portion of the anchor. This is most important as over-torque of the nut 24 will snap the anchor 16 in half. If the anchor 16 is mounted into the concrete by the force imparted, and the anchor 16 breaks off, it is extremely hard to remove from the concrete, and can take many hours if indeed it can be removed. The clutch 40 thereby provides a means to prevent excessive force from being imparted to the nut 24 and the anchor 16 to prevent this occurrence.

The clutch 40 as shown in FIG. 5 in one preferred mode of a clutch 40 employs a collar 51 which is threaded upon the center portion 53 of the shaft 29 which has been coaxially engaged through the front clutch plate 55. A shoulder 56 on the shaft 29 is sized to contact a ridge 57 on the axial aperture 58 of the front clutch plate 55. The collar 51 is then rotated on the threads of the shaft 29 to a point where springs 59 bias the balls 60 into the detents 62 of the front clutch plate 55. The clutch 40 may be adjusted to slip under more or less torque from the shaft 29 by moving the collar 55 closer or further from the front clutch plate 55. Thus the clutch 40 is adjustable for a maximum amount of torque allowed to prevent breakage of the anchor 16 or similar insert. Of course those skilled in the art will realize other clutch designs may be employed and such are anticipated in the scope of this application. However, because the device 10 is employed to impart a hammer force from the hammer drill, the current design provides a one piece continuous shaft 29, to impart that hammering force directly to the anchor 16 and in no manner effect the workings of the clutch 40. Any other clutch design should take this into consideration to avoid having the hard hammering forces imparted to clutch parts as it would cause wear problems over time.

The device 10, in use engaged to a conventional hammer drill will as noted above remarkably decrease the time and effort involved in setting anchors 16 and the like, and attaching the nuts 24 to hold whatever is being mounted. In such use, the threaded portion of the insert or anchor 16 would be engaged with the threaded cavity 38 on the distal end of the shaft 29 with the proximal end 37 engaged to a hammer drill. Using the hammer function of the drill, the anchor 16 is forced in a pre-drilled hole. Alternatively, as noted, if the cavity 38 is not threaded but simply of a larger diameter than the anchor 16, a nut 24 is engaged upon the anchor 16 and the nut-engage cavity 39 will contact the nut 24 in its engagement to the anchor 16 and the drill may hammer the anchor into the concrete.

In the second step, either the threaded cavity 38 if present or the nut engaging cavity 39 are disengaged from the anchor 16. The bracket 20 (FIG. 8) is slid upon the threaded portion of the anchor 16, and the nut 24 can then be re-engaged on the threads of the anchor 16 and with the nut-engage cavity 39 thereafter using the rotation mode of the hammer drill or another drill, the nut 24 is rotated engaged to threads of the insert or anchor 16 and tightened against the bracket 49 or other item being mounted. In this step, it is preferred that the clutch 40 is present and set to slip before the hammer drill exerts excessive force to the anchor 16 which could break it off.

As such, the process of setting the anchors 16 or similarly hole-engaged mounting components is significantly enhanced by the employment of the hammer drill on hammer-action with the first component 30, to set the anchors 16, and the employment of the easily engaged cavity 39 of the second component 32 with the subsequent use of the rotation motion of the drill to install the nuts 24.

The method and components shown in the drawings and described in detail herein disclose arrangements of elements of particular construction, and configuration for illustrating preferred embodiments of structure of the presently disclosed concrete anchor insertion system in cooperation with a hammer drill having two modes of operation. It is to be understood, however, that elements of different construction and configuration, and using different steps and process procedures, and other arrangements thereof, other than those illustrated and described, may be employed in accordance with the spirit of this invention.

As such, while the present invention has been described herein with reference to particular embodiments thereof, a latitude of modifications, various changes and substitutions are intended in the foregoing disclosure, and will be appreciated that in some instance some features of the invention could be employed without a corresponding use of other features, without departing from the scope of the invention as set forth in the following claims. All such changes, alterations and modifications as would occur to those skilled in the art are considered to be within the scope of this invention as broadly defined in the appended claims.

What is claimed is:

1. An apparatus for mounting anchors having a mounting end for positioning within pre-drilled apertures formed in concrete or cement, and having a threaded end projecting forward of said pred-formed apertures, comprising:
   a shaft, said shaft having a proximal end and a distal end opposite said proximal end, and a central portion therebetween;
   said proximal end adapted for engagement with the chuck of a hammer drill;
   said distal end having an axial cavity;
   said axial cavity adapted to engage around said threaded end of said anchors;
   a second member having an axial passage running therethrough, said second member having a first end and a second end opposite said engagement end;
said second member coaxially engaged with said shaft communicating within said axial passage;
said first end of said second member connected to a mount at said central portion of said shaft;
said second end having an engagement cavity therein, said engagement cavity adapted to engage with a nut which is adapted for threaded engagement upon said threaded end of said anchor; and
said threaded end of said mounting anchor engageable within said axial cavity by communicating through said engagement cavity, whereby said mounting anchor may be hammered into said pre-drilled apertures by a hammering force of said hammer drill engaged to said shaft and said nut may be subsequently turned onto said threaded end by a rotation of said shaft communicated thereto by rotational force of said hammer drill while said engagement end connected upon said nut.

2. The apparatus for mounting anchors of claim 1 additionally comprising:
said mount being a clutch;
said clutch configured to cause slippage of said rotation of said shaft should said rotational force exceed a pre-set maximum; and
said hammering force being unaffected by said slippage of said clutch, whereby said hammering force is directly communicated to said mounting anchor and said rotational force is always communicated through said clutch at or below said pre-set maximum.

3. The apparatus for mounting anchors of claim 1 additionally comprising:
said first end of said second member being in a removable engagement with said mount whereby said second member may be removed from said shaft.

4. The apparatus for mounting anchors of claim 3 additionally comprising:
said first end of said second member being in a removable engagement with a side surface of said clutch, whereby said second member may be removed from said shaft.

5. The apparatus for mounting anchors of claim 3 additionally comprising:
said axial cavity being threaded to threadably engage with said threaded end of said anchors.

6. The apparatus for mounting anchors of claim 4 additionally comprising:
said axial cavity being threaded to threadably engage with said threaded end of said anchors.

7. The apparatus for mounting anchors of claim 2 additionally comprising:
said clutch being adjustable to thereby provide means for adjustment of said pre-set maximum.

8. The apparatus for mounting anchors of claim 3 additionally comprising:
said clutch being adjustable to thereby provide means for adjustment of said pre-set maximum.

9. The apparatus for mounting anchors of claim 4 additionally comprising:
said clutch being adjustable to thereby provide means for adjustment of said pre-set maximum.

10. The apparatus for mounting anchors of claim 5 additionally comprising:
said clutch being adjustable to thereby provide means for adjustment of said pre-set maximum.

11. The apparatus for mounting anchors of claim 6 additionally comprising:
said clutch being adjustable to thereby provide means for adjustment of said pre-set maximum.

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