SELF-DRILLING ANCHOR DEVICE

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ABSTRACT

A tubular anchor device is provided with a cutting head at one end and a bore extending along a portion of the body of the device to a discharge port in the wall thereof. The other end of the anchor is solid and is designed to cooperate with a hammer chuck to permit drilling a hole in a concrete or masonry surface, into which the anchor is set by expansion of the cutting head.

1 Claim, 8 Drawing Figures
SELF-DRILLING ANCHOR DEVICE

This invention relates to anchor devices and more particularly to an improved form of anchor device of the type which is used to drill its own hole in masonry or concrete surfaces and is then wedged in position to form a permanent attachment.

A known type of anchoring device, as exemplified in U.S. Pat. No. 1,996,121, comprises a generally elongated tubular body provided at one end with a cutting head. The body is held in a chuck of a hammer and is used to drill a hole in a concrete or masonry wall, floor or ceiling, the cuttings passing up through the bore of the device and out through a hole in the side of the chuck. Once the hole is drilled, the anchor is removed from the wall and a wedge plug is inserted in the bore of the cutting head of the device. The device is then reinserted in the hole and driven by the action of the hammer, causing the wedge to expand the cutting head into firm engagement with the wall. The anchor body is provided with a circumferential groove which permits the top of the anchor to be broken off by manipulation of the hammer, leaving the anchor flush-mounted in the masonry.

This type of anchor device as heretofore known suffers from a defect which under certain conditions creates substantial problems. The chuck-receiving breakable end of the device is tapered in order to be held by the chuck of the hammer. Because of the taper and the central bore extending through the device, the head of the device terminates in a rim or lip which is thin and easily bent, damaged or chipped. Accordingly, when an attempt is made to remove the broken-off end from the chuck, usually being inserted a bar radially into a hole provided in the chuck of the hammer and prying the head of the device out of the chuck, the thin lip of the anchor device may break or bend, thus leaving the head of the anchor device wedged within the chuck of the hammer with no convenient means for removal thereof.

In accordance with the invention, there is provided an improved form of such anchor devices in which the chuck receiving end of the device is made in solid form. The bore of the anchor does not extend throughout its length, but rather terminates at a point intermediate its ends. The cuttings generated during use of the device do not pass entirely through the length of the anchor, but rather are discharged through one or more ports or openings in the side wall of the device which communicate with the central bore. In this way a full bearing surface for engagement with the chuck hammer is provided which is not easily bent or damaged, thus permitting ready disengagement of the anchor from the chuck of the hammer used in conjunction therewith.

The invention will be better understood from the following detailed description thereof, in which like numerals are used to represent like elements in the several views, and in which:

FIG. 1 is a side view of a typical anchor device embodying the invention;

FIG. 2 shows the device of FIG. 1 being installed in a hole previously drilled in concrete by the device, a hammer being used to wedge the cutting end of the device into position;

FIG. 3 is a side view of another embodiment of the invention in which the anchor has a breakaway head and an internally threaded bore;

FIG. 4 is a side view of still another embodiment of the invention in which the cuttings-discharge opening passing through the anchor is used to hang a wire or rod;

FIG. 5 is a bottom view of the device of FIG. 1, showing a desirable form of cutting head;

FIG. 6 is a view of a completed installation in a concrete ceiling showing a device of the type shown in FIG. 3 used to support a split ring pipe hanger;

FIG. 7 is another embodiment of the invention useful for hanging wires or rods from a concrete ceiling; and

FIG. 8 is a side view of the embodiment of FIG. 7. In FIGS. 1, 2 and 5 there is depicted a typical anchor member 10 in accordance with the invention comprising an elongated generally cylindrical body 11, having at one end thereof a cutting head 12 and at the other end a solid driving head 13. In the embodiment shown, the body 11 is provided with external threads 14 adjacent driving head 13. Extending for a portion of the length of body 11 from cutting head 12 is bored 16 which terminates before reaching driving head 13. Bore 16 defines a wall 17 in the body, which is provided with a port or opening 18 which communicates with bore 16. Cutting head 12 comprises a plurality of identical, generally triangular teeth 19 uniformly spaced about the circumference body 11. Teeth 19, as shown in FIG. 5, are formed by the intersection of radial grooves 21 uniformly angularly spaced around cutting head 12. The bottom of each tooth 19, as shown in FIG. 5, also has a triangular configuration. It will be seen that each of teeth 19 in cutting head 12 has the same structure and accordingly none is more likely than the other to break in use or to fail prematurely.

Adjacent cutting head 12 are a plurality of annular teeth formed in the sidewalk of body 11. There are also provided a plurality of longitudinal grooves 23 extending from cutting head 12 for a portion of the length of body 11. Grooves 23 do not extend through wall 17 into bore 16 of body 11, but are deep enough to permit cutting head 12 to be radially expanded by the insertion in bore 16 of wedge plug 31 to be described below.

Driving head 13 of anchor 10 is adapted to be received in the chuck 32 of an air or electrically driven hammer, not shown. For this purpose, both driving head 13 and chuck 32 are identically tapered in a conventional manner known to those skilled in the art.

The use of the anchor member of FIG. 1 in forming a connection to a concrete wall, ceiling or floor is illustrated in FIG. 2. With member 10 inserted in hammer chuck 32, cutting head 12 is used to drill a hole 33 in the concrete 34 under the repeated blows of the hammer. The cuttings from the drilling pass up the bore 16 of the anchor and are discharged through port 18. When the hole has been drilled to the desired depth, the anchor member is removed from the hole and wedge plug 31 is inserted in the bore 16 of cutting head 12. The cutting head is then replaced in the hole and under the action of the hammer, wedge plug 31 is driven into the bore of the cutting head, causing wall 17 adjacent cutting head 12 to fracture along grooves 21 and to expand radially into tight engagement with hole 33 to complete the assembly. An anchor member of the type shown in FIG. 2 can be then used, for example, to fasten machinery to the concrete surface by passing the upstanding anchor through a suitable hole in the base of the machinery and completing the installation by means of a threaded nut (not shown) engag-
In a different embodiment of the invention shown in FIG. 3, the upper end of anchor member 41 in the vicinity of head 42 is provided with an annular groove 43 defined in part by a tapering surface 44 adjacent head 42 which intersects another surface 46 in a plane perpendicular to the longitudinal axis of the member. It will be seen that anchor member 41 has a plane of weakness defined by groove 43. Although the sidewalks of member 41 are sufficiently strong to permit its use in drilling a hole as in FIG. 2 and the subsequent wedging of the cutting head to form a rigid attachment to a concrete or masonry surface, driving head 42 may be snapped off along the plane of groove 43 by bending the hammer used to drive member 41 in a back and forth manner, causing head 42 to snap off along the plane of weakness. Head 42 is then removed together with the chuck and is disengaged from the chuck by passing a rod through a radial hole in the chuck (e.g., 47 in chuck 32, FIG. 2) in a manner known to those skilled in the art. The bore 47 of the embodiment of FIG. 3 is internally threaded and when head 42 thereof is snapped off, as described, an attachment to the assembled anchor can be made by inserting a threaded rod to engage the threaded bore.

In another embodiment of the invention shown in FIG. 4, driving head 13 is not intended to be snapped off and bore 16 is not threaded. Discharge port 18a extends entirely through body 11 rather than through only one wall. This embodiment is intended for use in supporting wires from a ceiling, the wires being passed through discharge port 18a after the anchor is attached to the ceiling as described above. In this usage, the solid head of the anchor is advantageous in facilitating removal from the chuck after the installation has been completed.

In FIG. 6, there is shown a completed installation of an anchor member of the type shown in FIG. 3. After the anchor 41 is installed in ceiling 51 and the head thereof is snapped off by manipulation of the chuck of the hammer, threaded rod 52 is engaged with the threaded bore of anchor 41 and there is attached thereof threaded cap 53 to which is connected a splitting ring 54 for supporting a pipe or the like. A decorative sheet metal cap 56 may be engaged on the threaded rod 52 in order to improve the appearance of the installation.

Still another embodiment of the invention is shown in FIGS. 7 and 8, in which a circular hanger 61 is provided on the end of anchor member 62, which is otherwise similar to the embodiment of FIG. 4. An anchor of this type is intended for use with a specially designed chuck 63 having a suitable opening for accepting the hanger. The hole for the installation of this member is drilled as previously described and the final installation is made using an anchor plug as previously described.

It will be noted that the anchor members of the invention are characterized by having a solid head, which is possible because the internal bore provided for discharge of the cuttings does not extend the entire length of the member. The solid head facilitates installation by resisting breaking or chipping damage and also facilitates use of the head itself as a structural support member, as in the embodiment shown in FIG. 4. Further, by providing a discharge port in the wall of the member at a point relatively close to the drilling head, the total discharge route taken by the chips is reduced, thus permitting the chips to be discharged faster during operation, in effect therefore permitting the drilling to proceed at a faster rate.

The foregoing detailed description has been given for clearness of understanding only, and no unnecessary limitations should be understood therefrom, as modifications will be obvious to those skilled in the art.

I claim:

1. An anchor device comprising in combination a member having an elongated generally cylindrical body,
a cutting head at one end of said body, said cutting head comprising a plurality of identical teeth uniformly spaced about the circumference of said body, said teeth being partially defined by a plurality of identical V-shaped radial grooves symmetrically spaced about the circumference of said cutting head, each tooth having a triangular planar end surface, all of said planar end surfaces lying in the same plane perpendicular to the longitudinal axis of said body member,
said cutting head being provided with a plurality of longitudinal grooves in the wall of said body, permitting radial expansion of said head,
a longitudinal bore defining a wall in said body extending from said cutting head along a portion of the length of said body, said wall being provided with a plurality of external annular teeth adjacent said cutting head,
a solid conically tapered head at the other end of said body adapted to be received in the chuck of a hammer,
a cylindrical opening in the wall of said body communicating with the bore thereof, said opening being located between said solid head and said external annular teeth, and
tapered plug adapted to be driven into the bore of said cutting head to cause radial expansion thereof.

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