Aug. 17, 1965 R. T. CATLIN 3,200,692

ANCHORING DEVICE

Filed July 30, 1963

Fig. 1.

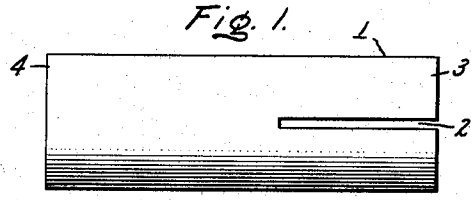


Fig. 2.

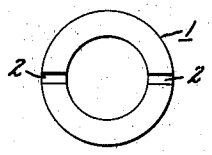


Fig. 3.

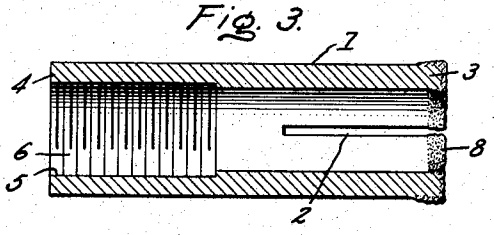
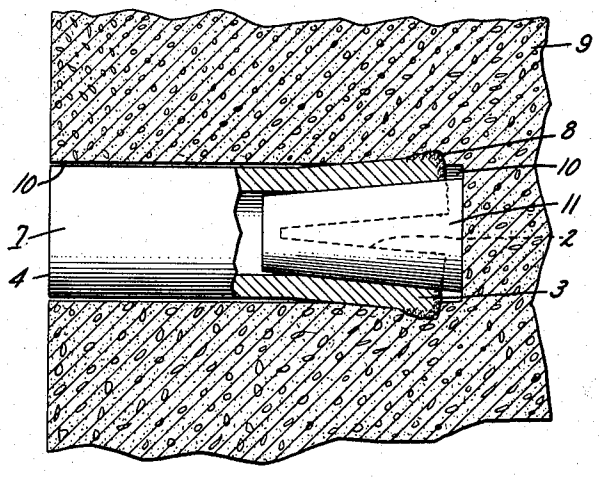


Fig. 4.



Inventor:
Robert T. Catlin,
by John H Lewis Jr.
John W. Phillips
His Attorneys

United States Patent Office

3,200,692

Patented Aug. 17, 1965

3,200,692

ANCHORING DEVICE

Robert T. Catlin, Trumbull, Conn., assignor to Remington Arms Company, Inc., Bridgeport, Conn., a corporation of Delaware

Filed July 30, 1963, Ser. No. 299,686
2 Claims. (Cl. 85—68)

This application is a continuation-in-part of copending application Serial No. 37,347, filed June 20, 1960, and now abandoned.

This invention relates to self-drilling anchor devices generally and in particular to a rotary self-drilling masonry anchor of the type that is utilized for fastening various devices to masonry material.

Numerous anchoring devices have been developed in the past which are specifically for fastening devices to masonry objects or material. These devices have required the use of special and costly tools for installation or when set by hand have required a great deal of time and labor. With the advent of do-it-yourself projects, the need has arisen for an inexpensive anchor that can be installed with the ordinary electric drills now found in most households.

Special and costly drills have been made to drill the holes for masonry anchors. Such drills are shown in Patent No. 1,572,349 issued to J. L. Chamberlin on February 9, 1926, also in Patent No. 1,629,581 issued to A. W. Machlet on May 24, 1927, and in Patent No. 2,833,520 issued to R. G. Owen on May 6, 1958. These very expensive drills are also designed to be used as rock drills and for drilling wells. The cost of such drills exclude their use by the home handyman.

To provide a masonry anchor which cuts its own hole a great many anchors have been made similar to the one exemplified in Patent No. 1,762,349 issued to J. H. Phillips on June 10, 1930. This type of anchor has teeth which cut a hole by impact and must be installed with a hand hammer or costly electric hammer device. Each time the anchor is hit the teeth remove a very small amount of masonry material. Installation is expedited if between impacts the anchor is given a slight turn. Their cutting action is similar to the action of the well-known star drill and requires that the anchor be made from case-hardened steel and have broaching edges along a portion of the body to prevent binding in the hole.

Some masonry anchors intended for installation in a pre-drilled hole have been coated so that they can undercut the hole while being expanded and therefore increase their holding power. Such an anchor is shown in Patent No. 2,707,897 issued to M. L. Beeson on May 10, 1955.

The present invention relates to anchor devices similar to the type described but having a coating on one end thereof to provide cutting without necessitating the forming of special drilling teeth or broaching edges. These anchors will be rotary self-drilling anchors and can be driven by an electric drill to drill the hole they are to be installed in.

One object of the present invention is to provide a rotary self-drilling masonry anchor.

Another object of this invention is to provide a rotary self-drilling anchor device having a cutting agent fused on one end thereof.

Another object of this invention is to provide a rotary self-drilling masonry anchor in the form of a tube having a cutting surface on one end thereof and having self-cleaning action.

A further object of this invention is to provide an expandable rotary self-drilling anchor device which gives increased holding strength when inserted and expanded in masonry material.

A still further object of this invention is to provide a masonry anchor which can be installed with use of a common electric drill.

Other objects and advantages of this invention will become apparent as the following description proceeds, and the features of novelty which characterize this invention will be pointed out with particularity in the claims annexed to and forming part of the specification.

In the drawings:

FIG. 1 is a view of a blank from which the anchoring device of the subject invention is made;

FIG. 2 is an end view of the steel blank shown in FIG. 1;

FIG. 3 is a sectional view of the completed anchoring device; and

FIG. 4 is a sectional view showing the anchoring device of FIG. 3 in expanded position in a hole drilled by the anchoring device.

Reference is made now to the drawing wherein it can be seen that the anchoring device which is the subject of the present invention can be formed from a blank 1 as shown in FIG. 1. Blank 1 may be cut from any suitable tubing—however, it is preferred to form this blank from a seamless steel tubing. In order to make the device self-anchoring, it is necessary to provide means for it to expand once inserted in masonry material. To provide for such expansion, longitudinal slots 2 are cut in end 3 of the blank by means of a saw.

In order to secure devices to the anchoring device at end 4, opening 5 is provided with suitable securing means. In FIG. 3 it can be seen that it is preferred to cut threads 6 in order to provide means to secure devices to the anchoring device. It should be understood that end 4 may take various forms in order to secure a variety of devices and while the anchor shown is made to be completely inserted in the drilled hole, other securing means may be used which would extend out of the hole.

To make a complete anchoring device 7 as shown in FIG. 3, it is necessary to coat end 3 of blank 1 with a suitable cutting agent 8. It is preferred to use a cutting agent 8 composed of modular tungsten carbide. This layer 8 of cutting material can be applied to the blank from which the anchoring device 7 is made in a number of ways, one of which is exemplified by Patent No. 2,694,647, issued to Norman W. Cole, on November 16, 1954.

This method consists of coating end 3 with a liquid adhesive on the end as well as on the inner and outer sides. Next a powdered mixture of flux, matrix metal and tungsten carbide particles is sprinkled over the adhesive and then the coated blank is heated to the fusion bonding temperature. This process forms an extremely hard abrasive surface on the end and inner and outer sides of blank 1 where it is desired to have a sharp cutting edge. The steel blank should be in a soft anneal state for this treatment, and after treatment they may be heat-treated if desired in the usual well-known manner but it has been found that no such heat treatment is necessary for the proper functioning of the anchor.

Another manner to apply the cutting material is exemplified by Patent No. 3,024,128, issued to Chester H. Dawson on March 6, 1962. In this method end 3 is coated with a previously prepared mixture of shellac and flux. Then a mixture of flux, matrix metal and tungsten carbide particles is sprinkled over the shellac and flux after which the coated blank is heated to the fusion bonding temperature.

A third and preferable manner of applying the cutting material consists in abrading end 3 in any well-known manner prior to applying any coatings. After abrading, a paste mixture of flux and matrix metal is applied and tungsten carbide particles are sprinkled on the paste. The blank is then heated by torch, atmosphere furnace

or induction furnace to the fusion bonding temperature. In any of the methods, the matrix metal and carbide particles are fused to the metal of the blank.

As can be seen in FIG. 3, the tungsten carbide coating 8 completely surrounds end 3 and forms layer on the end as well as on the inner and outer surfaces of blank 1 in the area immediately adjacent end 3. The result is that end 3 has a finished diameter slightly greater than the remainder of anchor 7 and this in turn provides relief behind the cutting area.

In order to prevent binding of anchor 7 in the hole being drilled, some means must be provided to drill a hole slightly larger than anchor 7. In the past this has been accomplished by providing the outside diameter of an expanding anchor with broaching ridges. These ridges are not necessary with the present device because coating 8 slightly increases the diameter of anchor 7 at end 3, causing the hole being drilled to be slightly larger than the anchoring device.

When drilling, it is desirable to have a self-cleaning device so that continuous operating can be performed. This self-cleaning action is accomplished by means of slot 2 whereby bits and chips of drilled material are allowed to pass through slot 2 to the center of anchor 7 and out opening 5. While for small diameter anchors this self-cleaning action is sometimes complete, negating the need for removing the anchor and cleaning the hole during drilling, for larger diameter anchors this action is not one hundred percent efficient and some cleaning of the hole during drilling is helpful. Slot 2 provides a double function in that it also provides means to expand anchor 7 when drilling complete.

When the anchoring device 7 is completely finished, it can then be inserted in masonry material in the following manner. To drill the hole to accommodate anchoring device 7, it is necessary to suitably mount device 7 in a rotary drilling device and proceed to drill until the entire device 7 is within the masonry material 9. Once the hole 10 has been completely drilled, the device 7 is removed and tapered, expander plug 11 is inserted in cutting end 3 thereof, and the complete assembly then driven back into hole 10.

Driving of complete assembly into hole 10 expands device 7 as shown in FIG. 4, so that the end portion 3 is forced away from the center and actually cuts into masonary material 9 as shown. The tungsten carbide tip 8 cuts into the masonry material 9 when the device 7 is expanded and tests have proven that this anchors the device more strongly than any of the presently known anchoring devices.

Tests have proven that anchors made in accordance with this invention are more satisfactory than any others. Because the carbide performs the cutting, the blank does not have to be made of any special steel nor does it have to be case-hardened. No other anchor can be driven by an electric drill to cut its own hole.

Cutting tests of this anchor versus the so-called Phillips anchor give the following results:

Size of Anchor	Drilling Time, Self-Drilling Anchor, seconds	Cutting Time, Phillips Anchor, seconds
¼"	15	40
⅜"	30	50
½"	45	60

All drilling and cutting was conducted in the same test pad of concrete. The self-drilling anchors were driven by a common electric drill and the so-called Phillips anchors were driven by an electric tool specifically designed for this purpose. The tool drives the anchor in a very rapid impacting motion and also turns the anchor slightly between each impact.

Tungsten carbide is available in irregular shapes and nodular shape. The irregular tungsten carbide is commonly shaped like splinters. It has been found that both the shape of the tungsten carbide and the size of the individual particles determine whether or not a satisfactory anchor can be made.

It has been found that only nodular shaped particles will give a cutting surface suitable for drilling in masonry material. The irregular shaped particles tend to lie flat and not present the necessary cutting surfaces to drill through masonry materials, and in particular, through material having any amount of aggregate which is normally present in the form of relatively small stones.

As previously mentioned, the size of the carbide particles also have a great deal of bearing on the drilling ability of the anchor. It has been found that particles in the size range of .020 to .080 inch provide a suitable cutting surface. The cutting speeds previously listed were obtained with various anchors having cutting surfaces formed with particle sizes in this size range.

Particles over .080 of an inch will also give satisfactory performance, however, fusion of particles over .100 of an inch is extremely difficult. Also it has been determined that the anchor size to some extent governs the particle size. If the particles are too large the hole will be too large to obtain proper anchoring even after expansion.

While there has been shown and described a preferred embodiment of the invention, it is not desired that this invention be limited to the particular construction shown and described, and it is intended by the appended claims to cover all modifications coming within the true spirit and scope of this invention.

I claim:

1. A masonry expansion anchor comprising a tubular body member having expansion means at one end and securing means at the opposite end thereof, cutting means fused to the end having said expansion means, said cutting means being a layer of nodular tungsten carbide particles no small than .020 inch and no larger than .080 inch in size arranged so as to cover the end and the inner and outer side walls of said body adjacent said end providing a cutting surface having a greater inner and outer diameter than said body, whereby said anchor performs drilling by rotary motion only without impact motion, said cutting means being free of sharp points.

2. A self-drilling expansion anchor comprising a tubular body member having a central bore therethrough, means on said body member for cutting a hole by rotary drilling motion only, said cutting means being a layer of nodular tungsten carbide particles of from .020 inch to .080 inch in size fused to said body and covering one end and the inner and outer side walls of said body member adjacent said end thereby having greater lateral dimension than said body, means to allow expansion adjacent said end, said means being a longitudinal slot in said body, said slot also conducts drilled material to said bore and means for fastening cooperating devices at the opposite end of said body.

References Cited by the Examiner

UNITED STATES PATENTS

1,762,349	6/30	Phillips.	
2,694,647	11/54	Cole	117—22
2,707,897	5/55	Beeson.	
2,833,520	5/58	Owen	175—409
3,024,128	3/62	Dawson	117—22

EDWARD C. ALLEN, *Primary Examiner.*