March 22, 1927. 1,621,598

J. H. PHILLIPS

EXPANSION ANCHOR SHELL DRILL

Filed Jan. 15, 1923

Fig. 1.

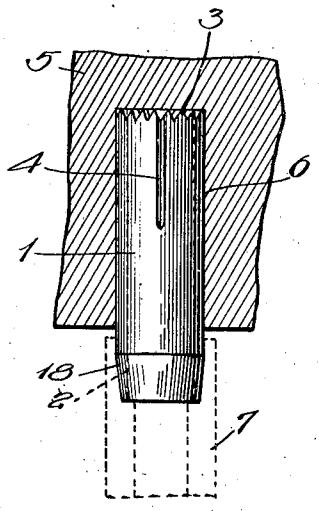


Fig. 2.

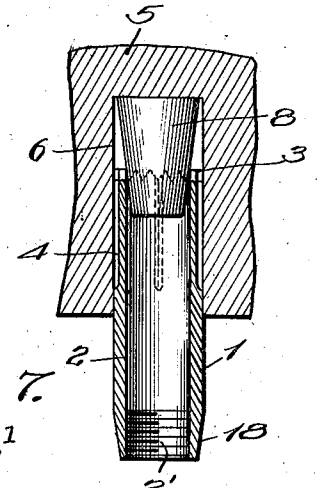


Fig. 7.

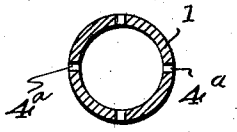


Fig. 3.

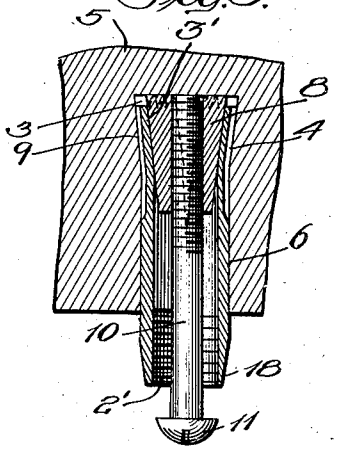


Fig. 6

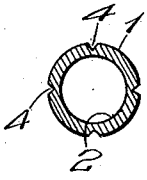


Fig. 4.

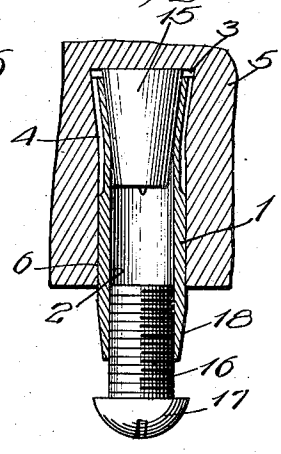
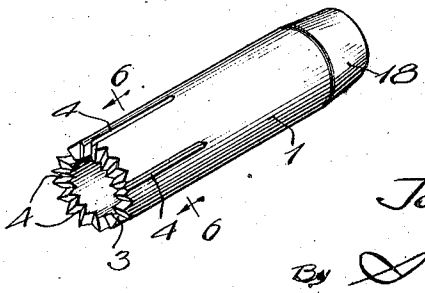


Fig. 5.



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UNITED STATES PATENT OFFICE.

JOHN H. PHILLIPS, OF CHICAGO, ILLINOIS.

EXPANSION-ANCHOR-SHELL DRILL.

Application filed January 15, 1923. Serial No. 612,854.

My invention belongs to that general class of devices known as stone drills or the like, and relates particularly to a hollow shell or core type of drill, so constructed as to drill a bell-shaped hole, and, at the completion of the drilling operation, be locked against withdrawal from the hole.

Anchor or expansion shells are largely used on ceilings, walls, etc., of concrete, brick, stone and like material, for the support of pipe and wire systems and mechanical, electrical and other equipment. With my construction herein described the same is adapted to not only drill the hole, but, at the completion of the drilling operation, the same is positively locked against withdrawal, thereby providing a support for the attachment of any suitable article or apparatus which may be desired.

The invention has among its objects the production of a device of the kind described that is simple, inexpansive, durable, efficient, compact and satisfactory for use wherever found applicable. It has particularly as an object the production of a device which will be positively and rigidly attached to the desired body in which the same is to be seated, and which will drill a hole of the exact size to fit the device with the minimum of effort. It also has as an object the production of a device which will be economical to use and which may be inexpensively manufactured.

Many other objects and advantages of the construction herein shown and described will be obvious to those skilled in the art from the disclosures herein given.

To this end my invention consists in the novel construction, arrangement and combination of parts herein shown and described, and more particularly pointed out in the claims.

In the drawings, wherein like reference characters indicate like or corresponding parts—

Fig. 1 is a view in elevation of a drill with the body to be drilled shown in section and illustrating a step in the drilling operation;

Fig. 2 is a sectional view through the drill, showing the expander and locking member in elevation illustrating a further step in the operation;

Fig. 3 is a sectional view of the same, showing the drill substantially seated and serving as an anchoring device;

Fig. 4 is a similar view illustrating a slightly different arrangement of fastener;

Fig. 5 is a perspective view of the shell;

Fig. 6 is a section therethrough, taken substantially on line 6—6 of Fig. 5; and

Fig. 7 is a transverse section illustrating a slightly modified form of drill.

Referring to the drawings, in which several embodiments of the invention are shown, 1 represents a shell of suitable size, shape and material, which may be constructed or formed in any suitable manner. The same is provided with a tubular bore or opening 2 through the same, with cutting edges, teeth or faces 3 of the desired style at one end, which may be termed the drilling end. The opposite end is constructed in the desired manner to fit a suitable chuck, the particular construction depending upon the type of chuck to be used. As shown in the drawings, the same is tapered as at 18 so as to seat in a chuck 7 (shown in dotted lines in Fig. 1), which chuck may be operated in any suitable manner, as for example by a percussion hammer or drill device or the rotary type of drill device, or in the case of small work, by hand drill or by a brace. The same is constructed to bore a hole 6 in the material 5, which may be of stone, brick, concrete or the like.

The drilling end of the shell is preferably arranged for expansion, and this may be constructed by cutting slots or weakening the same by grooving, or by making the drill in a plurality of parts. In the particular type illustrated in the drawings, the drill is provided with grooves 4 adjacent the drilling end, so that the same may be easily fractured thereat when expanded, but will not expand during a drilling operation without providing expanding means at a further step in the operation.

After the hole 6 has been drilled to the desired depth, the drill is preferably removed from the hole, and an expanding or locking member 8 inserted in the drilling end of the same, and the drill, with the expanding member in place, reinserted in the hole. The expanding member is preferably suitably hardened so as to be harder than the shell or the material to be drilled and of a size to closely fit the hole and may be tapered, substantially as shown in the drawings, so that the same has a tendency to be self-centering in case the drill and expander

should become separated during the insertion or drilling operation, as might be the case where percussion hammer or drill is employed for drilling purposes.

The hole is then re-drilled as before, or the drill may be forced into place or struck home with a hammer. When, however, the hole is redrilled with the expander in place, and the drill forced into place, the cutting end is fractured along the predetermined lines and is expanded on the hardened expanding member, thereby cutting a bell-shaped hole, that is, a hole with the bottom enlarged. Not only is the shell held in place by an even frictional engagement around its circumference with the wall of the hole, but the end of the shell is offset or flared, as indicated at 3′ in Fig. 3, thereby affording a positive grip on the wall of the hole where it is enlarged. The extent to which the hole may be enlarged and the shell expanded depends of course, upon the preference of the user and the construction of the parts.

The shell may be made in one or more parts and slotted as illustrated in Fig. 7, or, as shown, in Figs. 1 to 6, the shell may be grooved to provide for the expansion. Ordinarily the grooving is preferred in a drill of the type shown, as the unfractured material tends to prevent expansion or contraction during the first drilling operation, as illustrated in Fig. 1, but permits uniform fracturing of the parts when expanded by the hardened plug or expander, as shown in Fig. 3.

In the device shown in Fig. 3, the expanding member 8 is provided with an internally threaded bore arranged to cooperate with the threads of a bolt or screw 10 having a head 11 for engagement with the work or article to be supported or held in place. I have shown in Figs. 2 and 3 an internal thread 2′ on the interior of the shell. This, however, is unnecessary where a bolt similar to that shown in Fig. 3 is employed. Obviously in the construction in Fig. 3 securing the work in place tends to also hold the expander in close engagement with the shell.

In the type of device illustrated in Fig. 4, the shell is similar to that previously described and the expander 15 is similar to the expander 8, except that it need not have a threaded bore therethrough. In this case, however, a threaded screw 16, provided with a head 17, or the equivalent, threads directly into the shell and supports the work. This construction is particularly desirable for light work and has been found especially adapted for use where the shell is to be seated in marble or the like.

The shells shown may be constructed of an integral tube or pipe, or the same may be constructed of a blank of metal, the same being punched or cut with the cutting teeth and with the grooves or slots as previously described, and then rolled in the form of a tube, and thence case-hardened or treated to make the same more efficient. The same, however, may be formed in any other suitable manner by punching and case-hardening or the like, this method being merely suggestive of how the same may be accomplished.

It will be noted that in all of the devices shown, the bell-shaped hole is cut or drilled and the drill expanded in the hole during the operation, thereby forming a permanently-set anchor shell which will have great strength and rigidity and will carry any load up to the strength of the material of the body.

Having thus described my invention, it is obvious that various immaterial modifications may be made in the same without departing from the spirit of my invention; hence I do not wish to be understood as limiting myself to the exact form, construction, arrangement and combination of parts herein shown and described, or uses mentioned.

What I claim as new and desire to secure by Letters Patent is:

1. A self-drilling expansion anchor shell consisting of a shell body-part constructed for expansion at its cutting end, and means for expanding the same thereat during a drilling operation and maintaining the same expanded, whereby said shell is locked against withdrawal in the drilled hole.

2. An anchoring device comprising a combined drilling and anchoring shell and a tapering expander and locking member therefor, said expander and locking member operative to control the drill during a drilling operation to increase the size of the hole at the bottom and operative at the completion of the drilling operation to positively lock the shell against withdrawal from within the hole.

3. In an anchoring device and in combination, a tubular combined drilling and anchoring member expansible at its cutting end, and means insertable into said member at said cutting end for expanding the same thereat during a drilling operation therewith and locking the same in the hole.

4. In an anchoring device and in combination, a tubular combined drilling and anchoring member expansible along predetermined lines at its cutting end, and means insertable into said member at said cutting end for expanding the same thereat during a drilling operation therewith and locking the same in the hole.

5. In a device of the kind described and in combination, a drill shell having cutting teeth at one end, said cutting end being weakened so as to be expansible, and means insertable into said weakened end for fracturing and expanding the same thereat

simultaneously with the drilling operation thereof.

6. In a device of the kind described and in combination, a drill shell having cutting teeth at one end, said cutting end being weakened along a plurality of circumferentially spaced longitudinally extending lines so as to be expansible, and means insertable into said weakened end for fracturing and expanding the same thereat simultaneously with the drilling operation thereof.

7. In a device of the kind described and in combination, a drill shell having a cutting edge at one end, a longitudinal recess in said shell at its cutting end to weaken it so as to be radially expansible thereat, and means insertable into said weakened end for fracturing and expanding it thereat during the drilling operation.

8. In a device of the kind described and in combination, a drill shell having a longitudinally externally grooved expansible cutting end, and tapered means extending into said shell and insertable into the bottom of the hole into which the shell is to be inserted and bearing outwardly against said grooved cutting end for fracturing and expanding said shell thereat during the drilling operation thereof.

9. In an anchoring device and in combination, a combined drilling and anchoring shell having a weakened expansible cutting end, and a tapered expander and locking member insertable thereinto, said expander and locking member having a maximum diameter substantially equal to the diameter of the hole into which the shell is inserted for fracturing the weakened end of the shell and gradually expanding it thereat during the drilling operation.

10. A method of seating anchoring devices in concrete and like bodies, consisting in drilling a straight sided hole in the body and thence redrilling the hole at the bottom to increase the diameter thereat and simultaneously deforming the drill to conform to the hole and preventing its withdrawal.

11. A method of seating anchoring devices in concrete and like bodies, consisting in drilling a straight sided hole in the body, positioning an expander in the bottom of said hole, and thence redrilling the hole at the bottom to increase the diameter of the hole and the drill thereat and simultaneously locking the drill in the hole against withdrawal from the body.

In testimony whereof, I have hereunto signed my name.

JOHN H. PHILLIPS.