

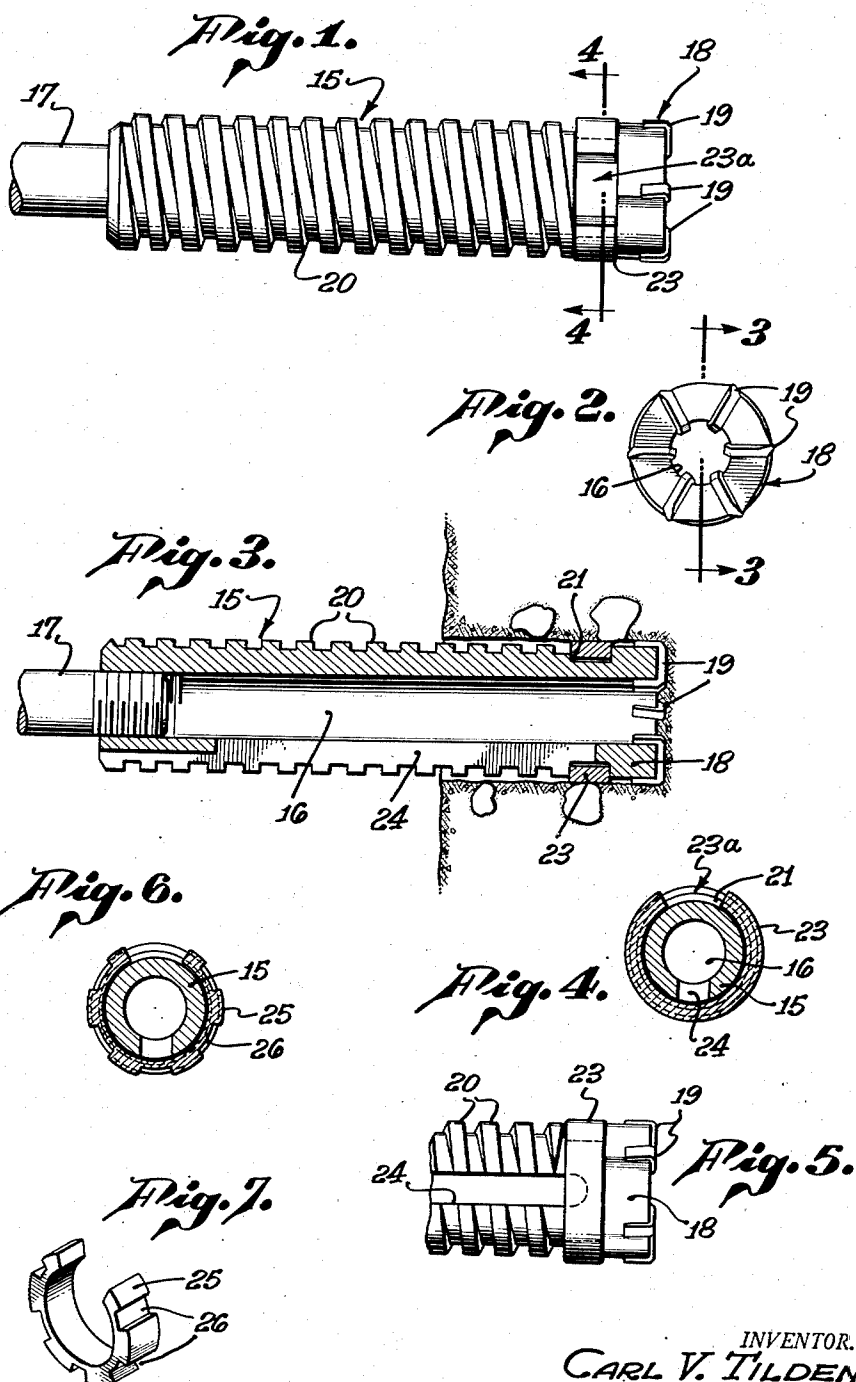
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C. V. TILDEN

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DRILL BIT

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INVENTOR.
CARL V. TILDEN,
BY

Edwin D. Jones
ATTORNEY.

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DRILL BIT

Carl V. Tilden, Pasadena, Calif.

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My invention relates to rotary drill bits particularly, although not necessarily, of the character disclosed in my Patent No. 2,506,474 issued March 24, 1950 and designed for the drilling of holes in structures made of concrete and other similar material.

In the drilling of concrete a bit is subjected to considerable lateral vibration since the gravel or particles of broken stone in the concrete cause the bit to be thrown from side to side. Not only does this produce excessive vibration of the bit, but it renders it extremely difficult for the operator to keep the bit centered in the hole to drill a straight hole.

Accordingly, it is a purpose of my invention to provide a drill bit which avoids the difficulties aforementioned by incorporating therein a means which constantly acts to guide the bit in the hole in such manner as to greatly reduce vibration thereof and to maintain the bit centered in the hole so that the boring of a straight hole is insured regardless of the character of aggregate contained in the concrete being drilled.

While this guiding means may take various embodiments I preferably construct it in the form of a sleeve or band which has an inside diameter such that when applied to the bit the latter has a rotating fit therein to provide a bearing in which the bit is rotatably mounted. The outside diameter of the sleeve is about equal to the maximum diameter of the bit so that in a drilling operation it has an axial sliding and only slight rotative engagement with the wall of the hole to maintain the bit centered therein against the tendency of gravel or stone particles in the concrete to decenter the bit and produce excessive vibration thereof. Moreover, the sleeve greatly reduces wear of the spiral thread on the bit body, and as its outside diameter exceeds that of the thread, it functions to maintain the thread out of contact with the particles of gravel and stone in the wall of the hole.

As the guide sleeve is subject to rather rapid wear in its function of centering and minimizing bit vibration it is desirable that when worn it be readily replaceable with a new sleeve. Accordingly, the sleeve is formed of a suitable resilient metal and it is split to facilitate not only its application to and removal from the bit when worn, but it allows large particles of concrete to be fed into the bit body through a slot with which the latter is formed.

In the accompanying drawings:

Fig. 1 is a view showing in side elevation one

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form of drill bit having incorporated therein one form of guide sleeve embodying my invention.

Fig. 2 is an end view of the drill bit showing the cutting end thereof.

Fig. 3 is a longitudinal sectional view taken on the line 3—3 of Fig. 2 and showing the bit in the process of drilling a hole in concrete.

Fig. 4 is a cross-sectional view taken on the line 4—4 of Fig. 1.

Fig. 5 is a fragmentary elevational view of the drill bit showing the relation of the slot with respect to the guide sleeve.

Fig. 6 is a view similar to Fig. 4 showing another form of guide sleeve embodying my invention.

Fig. 7 is a detail perspective view of the guide sleeve shown in Fig. 6.

Having specific reference to the drawings, and to Figs. 1 to 4, the drill bit here illustrated is of the same general construction as the bit disclosed in my application hereinbefore referred to, but it is to be understood that my invention is not restricted or limited to a bit of this particular construction.

The bit here shown comprises an elongated body 15 circular in cross section to provide an axial bore 16 which is closed at its trailing end by a shank 17 secured thereto and providing a shaft by which the bit is adapted to be driven when connected to a motor. The leading end of the body 15 is enlarged to form a head 18, in which a plurality of teeth 19 are secured in a radial and circumferential arrangement and so that parts thereof are disposed on the face and periphery of the head, as well as in the leading end of the bore 16.

As in the bit of my aforesaid application, the outer surface of the body 15 is provided with a spiral thread 20 which forms an auger for carrying away the cuttings in the form of granules of the concrete being drilled. This thread is of square cross section and extends from the trailing end forwardly toward the head end of the bit. In my present invention, however, the forward end of the thread terminates a sufficient distance from the head 18 to leave between the head and the thread an annular groove 21.

In this groove 21 is mounted the guide means of my invention by which the centering and vibration and wear reducing functions aforescribed are attained. This means, in this instance, comprises a metal sleeve 23 which has smooth outer and inner peripheries, and is rotatably fitted on the body within the groove so that in use the bit can rotate in the sleeve but is con-

fined against movement axially on the body by the confronting walls of the thread 20 and the head 18.

While the sleeve 23 may be in the form of an annulus it is preferably split to provide a gap or space 23a, and the sleeve is constructed of a metal possessing sufficient resiliency to allow, without breaking or cracking, spreading of its ends to the diameter of the body at the point of the groove 21, so that it can be readily mounted on the body. To mount the sleeve on the bit it can be either slipped over the end of the shank 17 and then forced over the thread 20 into the groove 21, or over the head and teeth, since the width of the split 23a and the resiliency of the metal permits of either mode of application. Once mounted the sleeve contracts to its normal inside diameter to be retained on the body against accidental displacement, and yet freely rotatable thereon.

The sleeve 23 is of such thickness that its outside diameter is about equal to the maximum diameter of the bit as defined by the outer ends of the teeth 19 but greater than the diameter of the thread 20, since in use the sleeve must function to keep the thread 20 out of contact with the wall of the hole. Because the sleeve is split and of resilient metal, and its outside diameter exceeds that of the thread after the head has moved into a hole in a drilling operation, the wall of the hole as the sleeve passes into the hole causes the sleeve to be constricted and thus placed under tension which reacts to maintain it pressed against the wall of hole with sufficient force to hold it against appreciable rotation on the bit. Holding the sleeve against appreciable rotation is highly desirable since it is then subjected only to axial movement, and thus wear thereof is greatly reduced.

A slot 24 is formed in and extends longitudinally of the body 15 from a point spaced from the trailing end to a point spaced from the head 18 but extending into the groove 21 so that it projects beneath the sleeve 23 but not completely across the latter. This slot 24 communicates with the bore 16 and interrupts the thread 20 at the points of intersection, to provide an outlet passage for the concrete cuttings in the same manner as the slot of the bit in my aforesaid application.

In the operation of drilling a hole in a concrete structure, the teeth 19, the thread 20, and the slot 24, function in the same manner as the corresponding elements of the bit of my aforesaid application, the teeth performing the cutting, the thread the feeding of the cutting exteriorly along the bit and out of the hole, and the slot 24 constantly relieving the bore 16 of the cuttings under the centrifugal force created by rotation of the bit.

As illustrated in Fig. 3, the sleeve 23 provides a pilot guide and a bearing for the bit, the latter rotating in the sleeve, and the sleeve remaining substantially stationary as to rotative movement, but moving forwardly with the bit as the latter proceeds into the hole. Since the diameter of the sleeve exceeds that of the thread it maintains the thread spaced from the wall of the hole and thus the particles of gravel and broken stones in the hole wall are prevented from striking and throwing the bit to one side or the other to decenter and set up excessive lateral vibration of the bit. Thus the bit can be easily maintained centered to drill a straight hole, and at the same time reduce vibration of the bit to a minimum to

facilitate drilling and reduce wear particularly of the thread 20.

As previously described herein the leading end of the slot 24 extends beneath the sleeve 23, and since the sleeve is split any large cuttings which may lodge between the sleeve and the bit are free to pass therefrom into the bore 16 and finally out of the same through the slot 24.

In practice, the sleeve is purposely loosely fitted on the bit as this allows the fine or powder-like cuttings to pack between the bit and the sleeve and provide an actual lubricant to reduce wear of both the sleeve and the bit, as well as to take up wear of the sleeve as the cuttings continue to pack beneath the sleeve. This accumulation of fine cuttings beneath the sleeve eliminates radial play of the sleeve on the bit further reducing vibration of the drill.

When the sleeve becomes worn to the point of failing to perform its piloting function it can easily be removed by virtue of its split construction, and a new one substituted.

Referring now to Figs. 6 and 7, I have shown another form of sleeve 25 which is of the same construction as the sleeve 24 except that its outer periphery is formed at circumferential spaced intervals with grooves 26 which extend axially of the sleeve. In use of this sleeve on the bit, as shown in Fig. 6, the grooves 26 allow the cuttings after passing the exterior of the head to travel into the leading end of the thread 20, and thus the sleeve does not interfere with the required passage of the cuttings exteriorly along the bit as intended.

What I claim is:

1. A drill bit having a body of tubular form; a spiral thread on the outer surface of the body; a boring head at one end of the body spaced from said thread; and a one piece transversely split resilient sleeve rotatable on the body between the thread and the head and having an outside diameter exceeding that of the thread.

2. A drill bit having a body; a boring head at one end of the body; a spiral thread on the body spaced from said head; said body having an annular groove therein between the thread and the head; and a one piece transversely resilient split sleeve rotatably fitted in said groove and having an outside diameter exceeding that of the thread; the body having a slot longitudinally therein which extends through the thread and communicates with said groove.

3. A rotary bit for drilling concrete and the like, including: an elongated cylindrical body; a spiral thread exteriorly on said body; a boring head at one end of said body spaced from said thread; and a transversely split sleeve rotatable on said body between said thread and said head and having an outside diameter exceeding that of said thread.

4. A rotary bit for drilling concrete and the like, including: an elongated cylindrical body; a boring head on one end of said body; a spiral thread exteriorly on said body spaced from said head to form an annular groove in the body; said body having a slot longitudinally therein intersecting said thread and communicating with the bottom of said groove; and a transversely split sleeve fitted in said groove to loosely embrace said body so that concrete particles can pass into said groove and beneath said sleeve for lubricating the latter, and the split in said sleeve providing communication between the interior of the sleeve and the adjacent end of the slot, said

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sleeve having an outside diameter exceeding that of said thread.

5. A rotary bit for drilling concrete and the like, including: an elongated cylindrical body; a boring head on one end of said body having teeth on its outer periphery; a spiral thread exteriorly on said body having an outside diameter body less than the diameter defined by said teeth; an annular groove in said body between said head and the adjacent end of said thread; said body having a slot longitudinally therein intersecting said thread and communicating with the bottom of said groove; and a transversely split sleeve fitted in said groove to loosely embrace said body so that concrete particles can pass into the sleeve for lubricating the latter, and the split in said sleeve providing communication between the interior of said sleeve and the adjacent end of the slot, said sleeve having an outside diameter substantially equal to the diameter defined by said teeth.

6. A rotary bit for drilling concrete and the like, including: an elongated cylindrical body; a boring head on one end of said body having teeth on its outer periphery; a spiral thread exteriorly on said body having an outside diameter less than the diameter defined by said teeth; said body having an annular groove therein between said thread and said head, and a slot longitudinally therein intersecting said thread; and a transversely split resilient sleeve rotatably fitted in said groove and having an outside diameter substantially equal to the diameter defined by said teeth.

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7. A rotary bit for drilling concrete and the like, including: an elongated cylindrical body; a boring head on end of said body having teeth on its outer periphery; a spiral thread exteriorly on said body having an outside diameter less than the diameter defined by said teeth; said body formed with an annular groove between said head and said thread, and a slot longitudinally therein intersecting said thread and communicating with said groove; and a transversely split resilient sleeve rotatably fitted in said groove, said sleeve having an outside diameter substantially equal to the diameter defined by said teeth, and axial grooves at circumferentially spaced intervals in its outer periphery through which concrete particles loosened by said teeth can pass into the adjacent end of said thread.

CARL V. TILDEN.

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