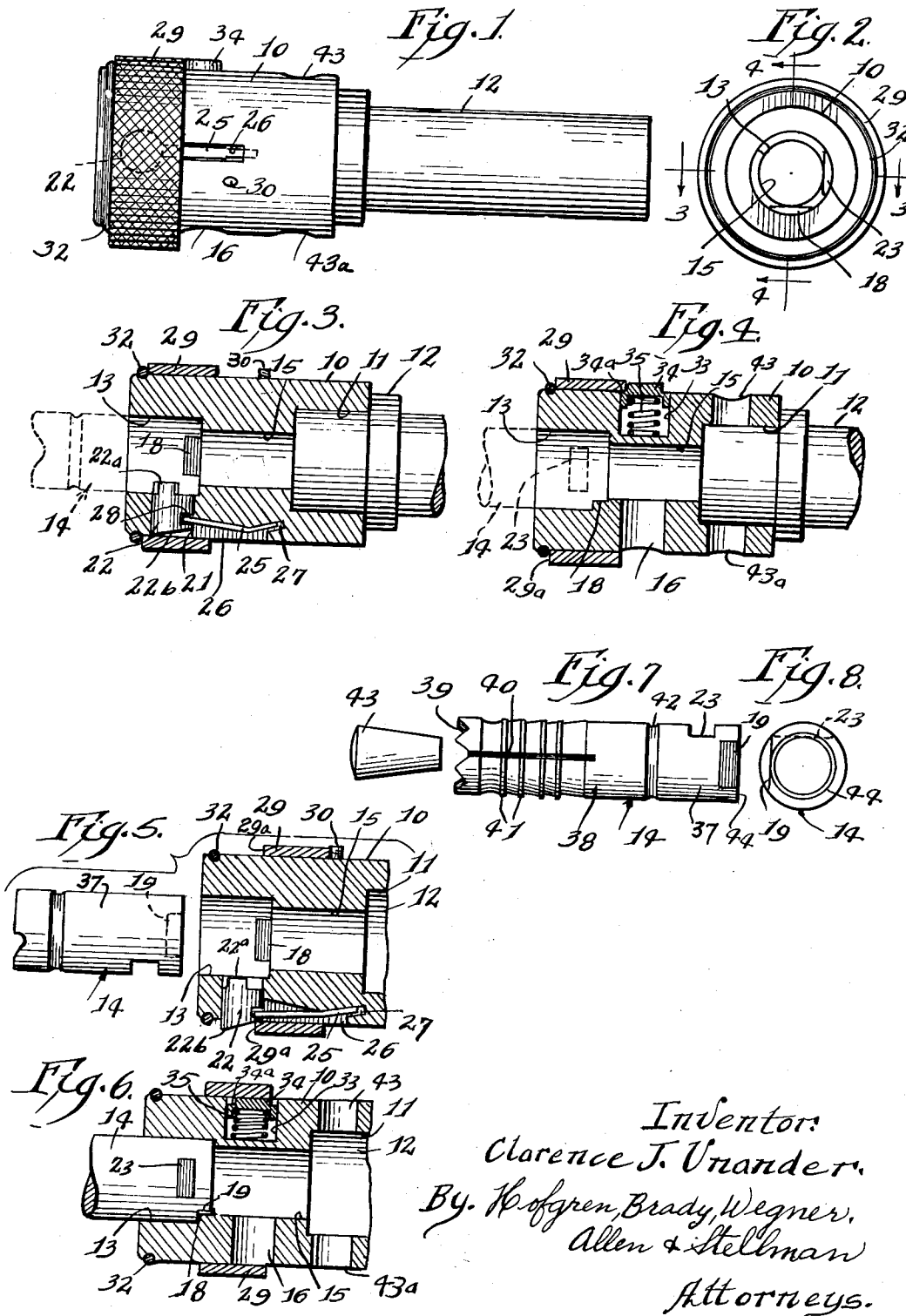


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ANCHOR CHUCK AND ANCHOR

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**ANCHOR CHUCK AND ANCHOR**  
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This invention relates to an article holder and more particularly to a chucking device for holding self-drilling expansion type anchors.

A primary object of this invention is to provide a chuck for a self-drilling expansion anchor that positively locks the anchor within the chuck and permits easy ejection of the anchor shank after the anchor setting operation is completed, without the use of a separate ejection tool.

Another object is to provide a chuck as defined in the preceding paragraph having a body with an axial right cylindrical socket, and a locking lug slidably mounted in the body radially of the socket to selectively engage a groove in the anchor to preclude axial movement between the anchor and the socket with an outer sleeve slidable longitudinally on the body of the chuck to engage the locking lug and force it into locking engagement with the anchor, and to provide means for capturing the sleeve in a position whereby the anchor is locked in the chuck socket.

Another object of the invention is to provide a chuck as defined in the preceding paragraph in which a second lug engages a tool groove to prevent relative rotation of the tool.

Still another object of the invention is to provide an anchor having a pair of longitudinally and circumferentially spaced grooves in a straight cylindrical chucking end to engage chuck lugs and lock the anchor adjacent relative movement.

Further features and advantages of this invention will become apparent from the following detailed description taken in connection with the accompanying drawings in which:

FIGURE 1 is an elevational view of the chuck embodying the invention;

FIGURE 2 is an end elevational view of the chuck;

FIGURE 3 is a horizontal sectional view of the chuck taken substantially along the line 3-3 of FIGURE 2 with an anchor shown in broken line;

FIGURE 4 is a horizontal sectional view of the chuck taken substantially along the line 4-4 of FIGURE 2;

FIGURE 5 is similar to FIGURE 3 but showing the outer sleeve in a retracted position with an anchor in position for insertion in the chuck;

FIGURE 6 is similar to FIGURE 4 but showing the outer sleeve in a retracted position with an anchor inserted in the chuck;

FIGURE 7 is an elevational view of the anchor and its associated plug; and

FIGURE 8 is an end view of the anchor.

While this invention is susceptible of embodiment in many different forms, there is shown in the drawings and will herein be described in detail an embodiment of the invention with the understanding that the present disclosure is to be considered as an exemplification of the principles of the invention and is not intended to limit the invention to the embodiment illustrated. The scope of the invention will be pointed out in the appended claims.

Referring to the drawings, the chuck device comprises a body 10 having an axial recess 11 at one end which receives an anvil 12 in tight engagement therewith which is adapted to fit a percussive type tool (not shown). The other end of the body 10 is provided with an axial right cylindrical socket 13 for receiving a cylindrical shank

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of an expansion anchor 14 for embedding in cement and the like. An axial bore 15, of a smaller diameter than the socket 13 is provided between the socket and the recess 11 and a passageway 16 extends radially from the bore 15 to the outer surface of the body for a purpose hereinafter described.

A lug 18 is provided in the socket extending inwardly from the side and adjacent the bottom thereof. Lug 18 cooperates with a grooved notch 19 in the end of the expansion anchor 14 when the anchor is inserted into the socket to prevent relative rotational movement between the anchor and the socket about their axes. A bore 21 located generally midway the length of the socket, extends radially outward therefrom to the outer surface of the body 10 and receives a locking lug 22 having an inner end 22a and an outer end 22b mounted for movement radially of the socket. The outer end 22b has a surface tapered longitudinally of the body and the inner end 22a defines the locking end of the lug for engagement with a chordal groove 23 that is provided on the shank of expansion anchor 14 to prevent relative longitudinal movement therebetween after the anchor has been inserted in the socket. The lug 22 is longitudinally spaced from the lug 18, and preferably 90° apart as apparent in FIGURE 2 to prevent interference between the lugs and to facilitate their location on the relatively short socket.

The locking member 22 is normally biased to a first position, as shown in FIGURE 5, whereby the outer end 22b projects outward from the outer surface of the body 10 and the inner end 22a is substantially fully within the body. The biasing means for the locking member 22 includes a narrow elongated leaf spring 25 which is received by a shallow groove 26 located in the outer surface of the body 10. The groove 26 extends longitudinally and rearwardly from the bore 21 to a point generally midway the length of the body. A hole 27 extends generally longitudinally from the rear of the groove, at the bottom thereof and receives one end of the leaf spring 25, the other end engaging a hole 28 in the locking member 22 which is located directly below the most inwardly tapered portion of end 22b. It can be seen from the drawings that the bottom surface of the groove 26 has a crown generally midway its length for biasing the leaf spring 25 to normally urge the locking member 22 to the afore-described first position, as shown in FIGURE 5.

An outer sleeve member 29 is slidable longitudinally on the body 10 and over the tapered surface of the outer end 22b of locking member 22, moving it radially inward and causing the locking member to assume a second position whereby the inner end 22a projects inwardly in the socket 13 and the outer end 22b is substantially fully within the body 10, as shown in FIGURE 3.

FIGURE 5 shows the chucking device in condition for receiving the expansion anchor 14. The locking member 22 is biased to its first position and the sleeve 29 moved rearward from the end of the body to a position whereby a leading edge 29a of the sleeve remains over the lowermost edge of the tapered surface of end 22b to prevent the locking lug 22 from escaping the hole 21. At least one stop lug 30 extends radially outward from the surface of the body 10 to limit the rearward movement of the sleeve 29 so that a portion of the sleeve will always be over a portion of the outer end 22b and keep the locking lug within the hole 21. The expansion anchor 14 is inserted in the socket 13 and positioned so that the lug 18 engages the notch 19 in the end of the anchor. The sleeve 29 is then moved longitudinally forward toward the end of the body and over the tapered surface of the outer end 22b forcing locking lug 22 radially inward against the urging of spring 25 to its second position

whereby the inner end 22a projects inwardly in the socket 13 and engages the chordal groove 23, locking the anchor in the socket. A snap ring 32 is provided in a circumferential groove about the body 10 adjacent the end thereof to limit the forward movement of the outer sleeve 29 over the end of body 10.

Means are provided to lock the sleeve 29 in its forward position to maintain end 22a of locking lug 22 in engagement with groove 23 in the anchor. The means include a recess 33 provided in the surface of the body 10 extending radially inward and preferably located diametrically opposite the passageway 16. The recess 33 slidably receives a button member 34 which is biased radially outward by a spring 35 within the recess and has a lip 34a around the periphery thereof. When the sleeve 29 is in its forward position, it is captured between the snap ring 32 and the button 34 thereby keeping the locking lug 22 in its second position whereby the anchor 14 is locked within the socket. The rear edge of the sleeve 29 is positioned over the lip 34a of button 34 when the sleeve is in its forward position to retain the button within the recess 33 and prevent its escape therefrom, as shown in FIGURE 4.

When it is desired to remove the anchor 14 from the chucking device, the button 34 is depressed radially inward against the urging of the spring 35 to place its top surface substantially fully within the body 10 and the sleeve 29 moved rearward over the top surface of the button and against the stop 30, thereby maintaining the button 34 substantially within the body, as shown in FIGURE 6. The rearward movement of the sleeve also allows the locking member 22 to assume its first position and the anchor can be removed from the socket.

The expansion anchor 14 is shown in FIGURES 7 and 8 and may be of any well known type of self-drilling expansion anchor having an internal longitudinal bore, except that the shank 37 is cylindrical and not tapered and has substantially the same outer diameter as the body 38 of the anchor. The grooved notch 19 is transverse the length of the anchor and adjacent the end of the shank. The chordal groove 23 is spaced longitudinally on the shank from the notch 19 and circumferentially located 90° therefrom so that the notch and the groove correspond with the location of the lugs 18 and 22 in the socket 13.

Hardened drill teeth 39 are located at an end of the anchor body 38 for drilling a hole in concrete and longitudinal grooves 40 and circumferential ridges 41 are provided on an outer surface of the body to aid in securing the anchor within the hole.

An annular groove 42 around the circumferential surface of the anchor, between the shank 37 and the body 38 provides a weakened cross section of the anchor whereby the shank may be broken off from the body after the anchor setting operation is completed.

When using the chuck and expansion anchor combination, the anvil 12 is connected to a percussive type power tool (not shown) and the cylindrical shank 37 of the anchor is locked in the chuck socket 13. A hole is drilled to a predetermined depth in a concrete surface by operating the percussive tool to transmit striking force to the end surface 44 of the shank to drive the hardened teeth 36 into the concrete surface as the anchor is rotated. The anchor is then removed from the hole and a tapered hardened steel expander plug 43 inserted in the end thereof. The anchor is again inserted in the hole and the percussive tool operated to force the anchor over the expander plug and expand the sides of the anchor to tight gripping contact with the sides of the hole. When the anchor has been expanded sufficiently, the percussive tool is tilted to break off the shank of the anchor at annular groove 42 and the shank is easily dislodged from the chuck by moving the sleeve 29 rearward, allowing the locking member 22 to move radially outward thereby disengaging the end 22a from the groove 23. In operation, it has been found that when the button 34 is de-

pressed, the vibration imparted to the chuck by the percussive tool is sufficient to cause the sleeve 29 to move rearward over the button 34 and automatically release the locking lug 22 from the tool shank and allow the shank to fall out of the chuck of its own accord.

When the hole in the concrete mounting surface is being drilled, the cuttings pass through the internal bore of the expansion anchor and through the bores 15 and 16 in the chuck body and are discharged to the atmosphere. Diametrically opposed recesses 43 and 43a are provided in the chuck body 10 adjacent the anvil 12 for receiving the ends of handle rods (not shown) to turn the chuck body when drilling the hole in the concrete mounting surface, to facilitate such drilling.

The aforescribed embodiment of the chucking device has many advantages over devices now in use that rely on a tapered socket communicating with a tapered shank on the expansion anchor. Since the anchor is locked in the chuck at all times during the drilling operation, it will not be separated therefrom even if the chuck face comes in contact with the concrete when drilling a hole and in the event the anchor binds in the hole, operation of the percussive tool will assist in removing it. The locked position of the anchor and the chuck will also permit the running of the percussive tool for cleaning the internal portion of the anchor of cuttings from the concrete without disengaging the anchor from the chuck.

The anchor shank end 44 that receives the force transmitted from the percussive tool or impact hammer has an outer diameter equal to the diameter of the anchor body 38 and therefore offers considerably more surface and strength at the point of impact than a tapered shank end would provide and consequently heavier impact hammers may be used without concern to distortion or collapse of the shank.

Other advantages are that this type of chuck eliminates a need for an ejector key that is required when using a tapered shank anchor since there is no wedging or seizing of the tapered end of the anchor in the chuck. Manufacturing difficulties encountered in establishing and maintaining acceptable tolerances for matching tapers on the chuck and on the anchor shank are eliminated. The diameter of the shank is controlled by steel industry tolerances, and never changed or varied in manufacturing. The above advantages greatly facilitate the operation of securing an expansion anchor in a concrete mounting surface.

I claim:

1. An expansion anchor for use in concrete mounting surfaces comprising: a generally cylindrical body with a bore therethrough and a straight cylindrical shank with a continuation of said bore therein defining an annular end for the shank, a notch on an outer surface of the shank adjacent the end thereof and transverse the length of the anchor for receiving an element to prevent rotational movement of the anchor, a chordal groove on the surface of the shank longitudinally and circumferentially spaced from the notch for receiving an element to prevent axial movement of the anchor, a plurality of hardened teeth on an end of the body for drilling a hole in the concrete, a series of circumferential ridges and longitudinal grooves in an outer surface of the body to aid in securing said anchor within said hole, and a circumferential groove in an outer surface of the anchor between the shank and the body providing a weakened anchor cross section whereby the shank is severed from the body after the anchor is secured in the hole.

2. A cement anchor and chuck combination comprising: a body provided with an axial right cylindrical socket with a base wall and a central passage, an opening connecting said passage with the exterior of the body, a hollow anchor having a cylindrical shank fitting said socket with an annular impact receiving end engaging said base wall, a lug in said socket and a groove on said tool shank interengageable to prevent relative rotational movement

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between the tool and the socket, a locking lug movably mounted in the body radially of the socket, the locking lug having a first position whereby an outer end projects beyond the outer surface of the body and an inner end is substantially fully within the body, an outer sleeve slidable longitudinally on the body and adapted to engage the projecting outer end of the locking lug and force said lug to a second position by virtue of movement of the sleeve toward an end of the body, whereby the outer end of the locking lug is substantially fully within the body and the inner end projects into the socket, said anchor shank having a chordal groove for selectively receiving the inner end of said locking lug when the locking lug is in its second position to preclude relative axial movement between the anchor and the socket, and means to lock the outer sleeve to retain the locking lug in its second position, the cuttings formed by the anchor passing through the hollow anchor, central passage and opening to the exterior of the body, said means to retain the locking lug in second

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position including a button mounted in the side of the body and biased radially outward to overlap and retain the outer sleeve in a position toward the end of the body and over the outer end of the locking lug, said button being manually depressible to allow movement of the outer sleeve away from the end of the body and over the button whereby said locking sleeve assumes its first position.

## References Cited in the file of this patent

## UNITED STATES PATENTS

|           |          |                |
|-----------|----------|----------------|
| 1,076,971 | Geiger   | Oct. 28, 1913  |
| 1,084,152 | Kessell  | Jan. 13, 1914  |
| 1,195,350 | Gilman   | Aug. 22, 1916  |
| 2,019,332 | Atkins   | Oct. 29, 1935  |
| 2,680,636 | Griffin  | June 8, 1954   |
| 2,807,473 | Kiehne   | Sept. 24, 1957 |
| 2,926,353 | Werstein | Mar. 1, 1960   |
| 2,944,523 | Werstein | July 12, 1960  |
| 2,963,935 | Shields  | Dec. 13, 1960  |