E. M. SMITH AND A. W. WINSALL.

CHUCK FOR HOLDING DRILLS, REAMERS, AND THE LIKE.

APPLICATION FILED AUG. 13, 1919.

1,343,795.

Patented June 15, 1920.

2 SHEETS—SHEET 1.

Fig. 1.

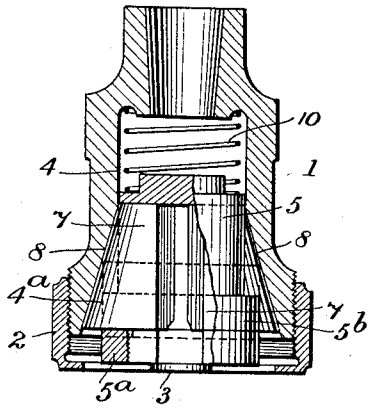


Fig. 2.

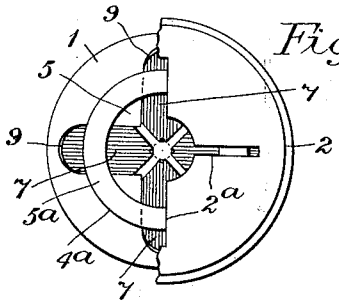


Fig. 3.

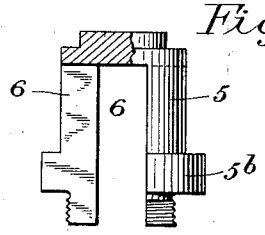


Fig. 4.



Fig. 6.

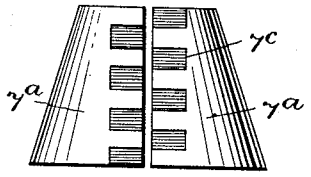


Fig. 7.

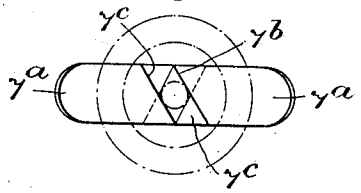


Fig. 8.

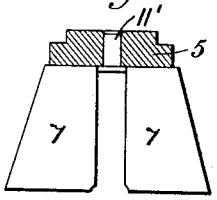
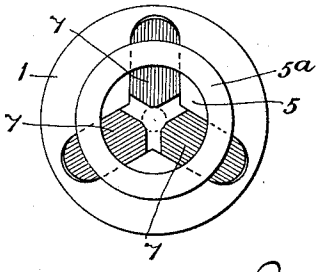


Fig. 5.



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Fig. 9.

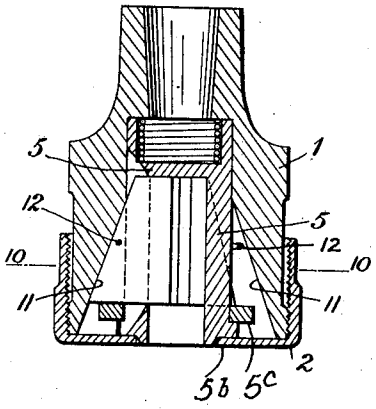
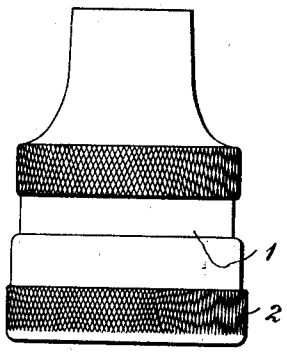


Fig. 11.



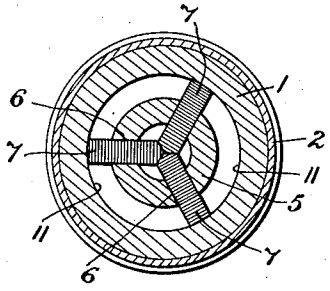


Fig. 10.

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UNITED STATES PATENT OFFICE.

ERIC MONTAGUE SMITH, OF KEYNSHAM, NEAR BRISTOL, AND ALBERT WILLIAM WINSALL, OF KEYNSHAM, ENGLAND.

CHUCK FOR HOLDING DRILLS, REAMERS, AND THE LIKE.

1,343,795. Specification of Letters Patent. **Patented June 15, 1920.**

Application filed August 13, 1919. Serial No. 317,376.

To all whom it may concern:

Be it known that we, ERIC MONTAGUE SMITH, managing director of Tangent Tool Company (Cosmos,) Limited, of Tangent Works, Bath Road, Keynsham, near Bristol, in the county of Somerset, England, and ALBERT WILLIAM WINSALL, draftsman, residing at "Homeleigh," Rock Road, Keynsham aforesaid, both subjects of the King of Great Britain, have invented new or Improved Chucks for Holding Drills, Reamers, and the like, of which the following is a specification.

This invention relates to drill chucks which can be easily manipulated to lock or release the drill by hand only without the necessity of separate locking means such as spanners, keys or the like.

The accompanying drawings illustrate several different forms of chuck constructed in accordance with this invention, in which:—

Figure 1 is a part sectional elevation and Fig. 2 an inverted plan with part removed of one form wherein four jaws are employed in grooves provided to receive same in the body part.

Fig. 3 is a part sectional elevation of the cage or inner member which carries the jaws and Fig. 4 is a detail.

Fig. 5 is an inverted plan with cap removed, of a modified construction wherein three jaws are used.

Figs. 6 and 7 are respectively elevation and plan showing how two jaws only may be employed.

Fig. 8 is a detail of modification.

Fig. 9 represents a vertical section of another embodiment of this invention.

Fig. 10 represents a transverse section thereof on line 10—10 of Fig. 9.

Fig. 11 represents a side elevation thereof.

Referring first to Figs. 1 to 4:—

The improved chuck comprises a body part 1 the outer or lower end of which is screw-threaded and provided with a screwed ring or cap 2 having a central hole 3. The interior of the body 1 is bored out for a suitable distance as at 4 to receive a sliding or floating member 5 (referred to as the cage) which is provided with four transverse slots 6. (See Fig. 3.) Jaws 7 are mounted in said slots so as to be capable of sliding tranversely therein.

The outer sides or edges of the jaws 7 are inclined or tapered toward the axis from the lower ends as at 8 and are semi-circular in cross-section, see Fig. 2 and project from the cage 5 and bear in the correspondingly formed grooves or recesses 9 in the interior wall of the body 1 while the opposite or inner sides of the jaws in cross-section are beveled or chamfered so that the four jaws present four bearing points or edges all equi-distant from the axis of the body (see Fig. 2).

The cage 5 may if desired be made in two parts to facilitate manufacture in which case the lower part is provided with a ring 5^a secured to the cage proper by screw threads or otherwise. This is shown clearly in Figs. 3 and 4. The lower part of the cage is preferably made of larger diameter than the upper part as at 5^b the interior of the body 1 being correspondingly bored to suit same for a suitable distance as at 4^a, as will permit of the sliding action.

In use, the locking ring 2 is unscrewed the required amount (according to the diameter of the drill) and the drill inserted with the end thereof in contact with the top or inner end of the cage 5. The locking ring is then screwed up by thumb and finger which causes the jaws to be moved inwardly to grip the drill more or less firmly by reason of the inclined or tapered outer edges of the jaws co-acting with the tapered grooves of the body part.

Upon pressure being applied by the operating lever of the machine, the pressure reacts through the drill, tending to move the cage relatively to the body with the result that the jaws are pressed tightly onto the drill and securely grip same, the gripping pressure increasing proportionately as the operating pressure increases and thus the great disadvantage of the drill slipping in use is obviated.

It will be seen that as soon as the pressure due to the drilling operation is relieved, the grip on the drill is correspondingly lessened and the drill may then be easily released simply by slightly unscrewing the cap 2.

The lower end of the locking cap is preferably formed of thin metal which may be slit as at 2^a or formed so as to provide a number of spring tongues to provide a resilient pressure upon the cage so as to prevent the possibility of the drill working loose when the drilling pressure is relieved.

Within the inner end of the bore of the

body a light spring 10 is provided adapted to bear upon the inner end of the cage 5 so that said cage will always follow the locking cap 2 when the latter is unscrewed, to permit of the insertion of a drill of a size which it is required to use.

Instead of four jaws being employed as described two or three may be used but for cheapness and convenience of manufacture either four or two are preferred, although three jaws may also preferably be used—*e. g.*, as in Figs. 9 to 11.

Fig. 5 shows a construction having three jaws and Figs. 6 and 7 a two jaw construction.

As shown in the last-mentioned construction the two jaws 7^a are formed at their inner or gripping faces of V-shape in cross-section as at 7^b the opposing sides being slotted or cut away in staggered formation at 7^c in the usual way so as to permit of the jaws coming close together to hold drills of small diameter.

In the modified construction shown in Figs. 9 to 11 the body part 1 of the chuck is formed with an internal cone 11 and the outer side of each jaw 7 bears against the interior conical wall thereof.

In this arrangement (Figs. 9 to 11) the interior of the body part 1 is provided with a conical or tapering bore 11 for a suitable distance—*e. g.*, as shown in the drawings; and, at the inner (smaller) end of said cone, the bore is continued of cylindrical form for a suitable distance to receive therein the inner end of the cage 5 which latter in the case illustrated is provided with three jaws 7 carried in transverse slots 6 provided to receive same in the said cage 5; said transverse slots 6 and jaws 7 therein being spaced equi-distant around the cage 5; and the outer edge or outer side of each such jaw acts against and co-acts with whichever part of the interior of the conical wall 11 same happens to bear against or make contact with.

The reduced portion of the cage 5 in Fig. 9 is adapted to enter the central opening of the cap 2. A ring 5^c is slipped over the shank of the cage 5 and seats on the enlarged portion 5^b thereof. The jaws 7 seat upon the ring 5^c, in such a manner, that when the cap 2 is screwed tight, the said ring will push up the jaws into their closest relative position.

12 is a light spring wire or tie which is passed loosely through the group of jaws 7 in the cage 5, to normally tie or hold said jaws loosely in position in said grooves in the cage 5 if and when the latter is withdrawn from the body part 1; the arrangement of said wire or spring 12 being such as not to interfere in any way with the movement of the jaws 7 when in operation within the chuck, and also serving to keep the jaws always open, and preventing them from falling out of the cage when the latter is removed from the body of the chuck. This spring ring 12 serves to keep the inclined backs of the jaws 7 in contact with the conical bore 11 of the body 1, thus insuring that as the screw cap 2 is unscrewed the jaws 7 automatically open radially outward from the center thus facilitating the insertion of the drill shank in any position.

In operation, when the outer edges of the jaws 7 are forced against the interior conical wall 13 the frictional contact therewith locks and holds said jaws against any relative rotary movement between said jaws and said body part and thus forms an absolute clutch action between these parts and thereby positively rotates the drill the shank of which is gripped by said jaws.

In the case of chucks for holding the larger sizes of drills, the inward travel of the jaws may be limited; this facilitates the entry of the drill shank as the opposing gripping faces are always kept apart. This is shown in Fig. 8 wherein a pin 11′ having an enlarged head is inserted from the inner side through the top of the cage, said enlarged head serving to maintain a minimum distance between the jaws.

In the case of drills or the like having tapered shanks, the gripping edges of the jaws could be similarly tapered and thus, by providing two sets of jaws either straight or taper shank drills can be used at will. This will be found especially useful where the tang of the drill has been broken off.

What we claim is:—

1. A drill chuck comprising in combination; a body having the lower portion provided with a conical bore with the larger diameter of the latter at the lower end of said body and having in axial alinement therewith a cylindrical bore extending upwardly from and of the same diameter as the smaller diameter of said conical bore, an abutment at the top of said cylindrical bore, a non-rotating slotted cage the top end of which is adapted to form an abutment for the top end of the shank of the drill and said cage having the upper exterior portion thereof cylindrical and of approximately the same diameter as the aforesaid cylindrical bore in the body and adapted to fit and slide freely in said body axially thereof, a spring located between the top end of said slotted cage and the aforesaid abutment in the body and tending to thrust said cage outward, jaws carried in the slots in said cage each said jaw having the outer edge tapered to the conical bore in the body and having the inner edge of each said jaw beveled or chamfered so as to present gripping edges to the drill shank and said edges spaced equidistant apart from one another around said drill shank, and a detachable

cap adjustable on the lower end of said body and having the inside of said cap adapted to engage the lower end of said cage.

2. A drill chuck comprising a body provided with longitudinal flaring grooves, a non-rotating slotted cage adapted to slide in said body axially thereof, jaws carried in said cage and movable in said grooves, a spring tending to thrust said cage outward, and a detachable cap adjustable on the lower end of said body and provided with an elastic head which engages said cage.

3. A drill chuck comprising a body provided with longitudinal flaring grooves, a non-rotating slotted cage adapted to slide in said body axially thereof, jaws carried on said cage and movable in said grooves, a spring tending to thrust said cage outward, and a detachable cap engaging the lower end of said body and provided with a slotted head forming spring catches which engage said cage.

4. A drill chuck comprising a body provided with longitudinal flaring grooves, a non-rotating slotted cage adapted to slide in said body axially thereof, jaws carried in said cage and movable in said grooves, a spring tending to thrust said cage outward, and a detachable cap adjustable on the lower end of said body and provided with an elastic head which engages said cage, said cage having a reduced portion at its lower end and a detachable ring thereon.

5. A drill chuck comprising a body provided with longitudinal flaring grooves, a non-rotating slotted cage adapted to slide in said body axially thereof and provided with a recess in its upper end, jaws carried in said cage and movable in said grooves, a spring disposed in said recess and tending to thrust said cage outward, and a detachable cap adjustable on the lower end of said body and provided with an elastic head which engages said cage.

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