Nov. 18, 1924. 1,516,257

H. T. WHITE

CHUCK

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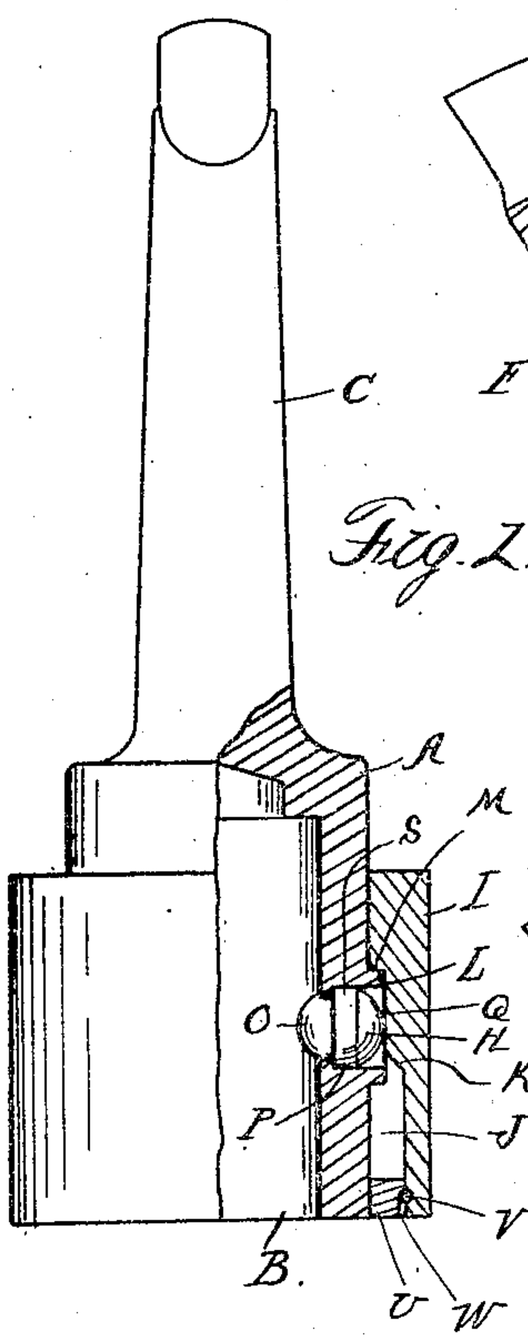

Fig. 1.

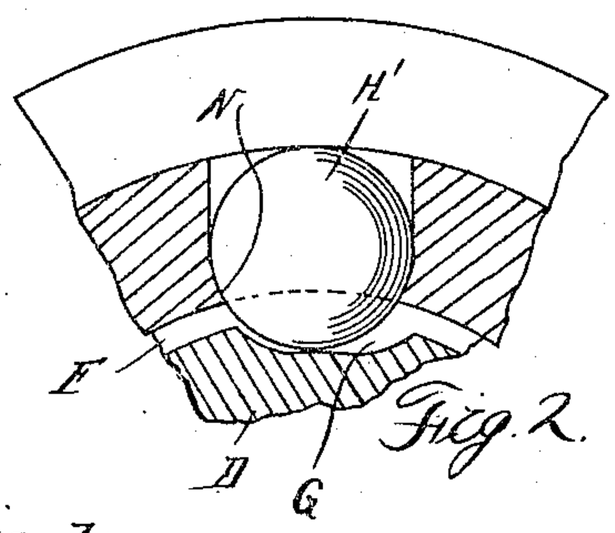

Fig. 2.

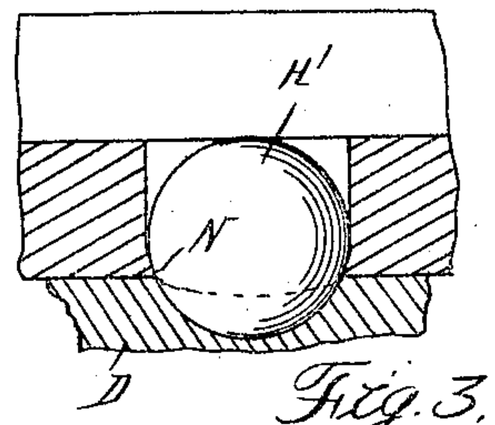

Fig. 3.

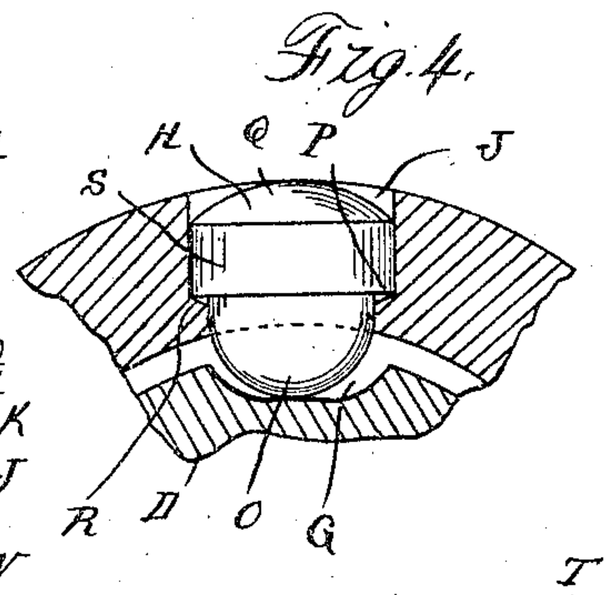

Fig. 4.

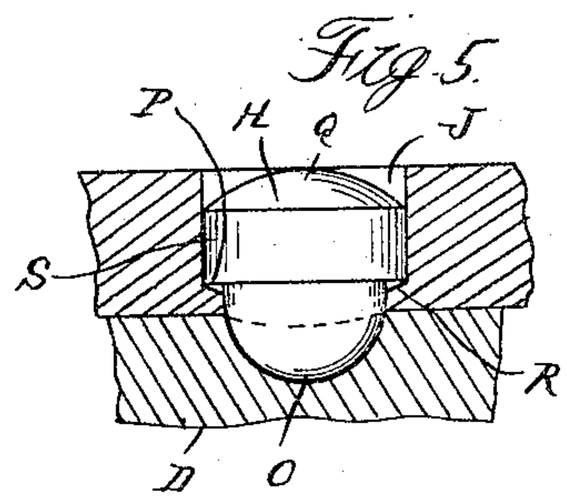

Fig. 5.

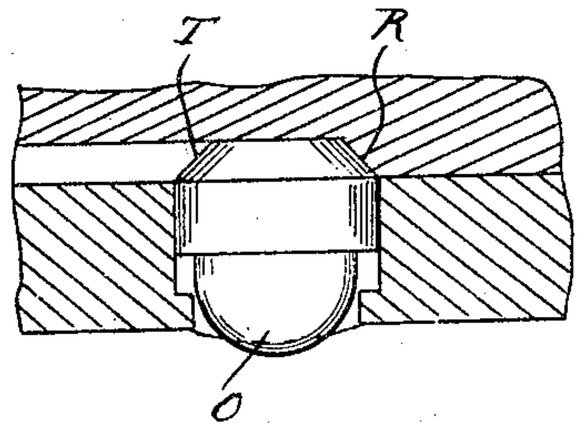

Fig. 7.

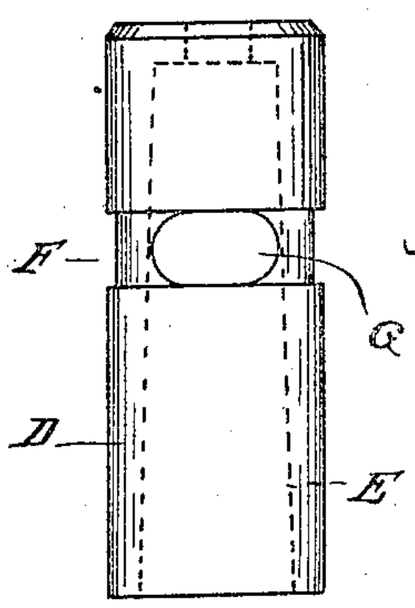

Fig. 6

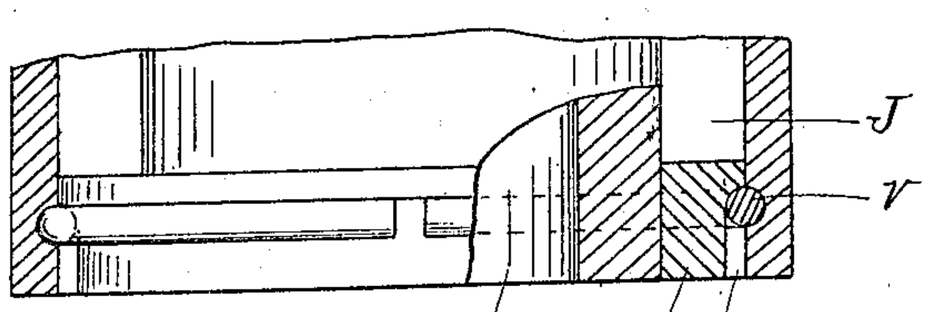

Fig. 8.

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UNITED STATES PATENT OFFICE.

HARRY T. WHITE, OF DAYTON, OHIO.

CHUCK.

Application filed January 15, 1923. Serial No. 612,867.

To all whom it may concern:

Be it known that I, HARRY T. WHITE, a citizen of the United States of America, residing at Dayton, in the county of Montgomery and State of Ohio, have invented certain new and useful Improvements in Chucks, of which the following is a specification, reference being had therein to the accompanying drawings.

The invention relates to chucks and more particularly to that type adapted for engaging and releasing a tool during the continued rotation of the driving spindle. For instance, such chucks, when used on drill presses, will permit of exchanging drills without stopping the rotation of the spindle.

In the present state of the art, chucks of the character above described have been formed in which a collet or bushing for holding the drill is engageable with a socket rotating with the spindle and is coupled by automatically engaging dogs. These dogs in turn are controlled by the movement of a longitudinally adjustable sleeve surrounding the socket and independently revoluble, the arrangement being such that such sleeve may be grasped by the operator while the spindle is rotating and may be moved longitudinally to either release or engage the dogs.

Usually the dogs for locking the collet are formed by balls which engage apertures in the walls of the socket, being of a diameter greater than the thickness of said walls so as to project beyond the same either outwardly or inwardly. The collet is formed with a recess for engaging each ball when projected inwardly and the sleeve is formed with an annular recess for engaging the balls when projected outwardly. Adjacent to this annular recess in the sleeve is an inclined or cam portion operating when the sleeve is moved longitudinally of the socket to force the balls inward and into engagement with the collet.

A defect of the construction above described is that the dogs are retained in their recesses by only a slight fin, which soon wears away. Consequently, it frequently happens that the balls drop out, rendering the construction inoperative. My improved construction is one designed to overcome this defect as will be hereinafter set forth.

In the drawings:

Figure 1 is a sectional elevation of a chuck to which my improvement is applied;

Figures 2 and 3 are enlarged diagrammatic views illustrating, respectively, in cross-section and longitudinal section the defect of the ball dog construction;

Figures 4 and 5 are similar views illustrating my improved construction;

Figure 6 is an elevation of the collet;

Figure 7 is a view similar to Fig. 5 showing a slightly modified construction;

Figure 8 is a cross-section showing the manner of locking the retaining ring for the releasing sleeve.

A is the socket member having a cylindrical recess B therein and provided with a tapering shank C for engagement with the revolving spindle. D is the collet longitudinally engageable with the recess B and provided with a tapering socket E for receiving the shank of the drill or other tool. The collet D is provided with a shallow annular groove F and at one or more points, preferably on diametrically opposite sides thereof, with deeper recesses G for engaging the locking dogs H. These dogs are located in apertures extending through the side walls of the socket member A so that the outer ends of the dogs are engageable with a sleeve I. This sleeve has an annular recess J therein for permitting the outward movement of the dogs with a conical portion K adjacent thereto for forcing the dogs inward. Movement of the sleeve I is limited by an annular shoulder L formed therein, which engages with a cooperating annular shoulder M on the socket member.

As illustrated in Figures 2 and 3, the dogs H′ are spherical, engaging recesses in the wall of the socket and being of greater diameter than the thickness of said wall so as to project inward into the recesses G. The balls are retained from dropping out by fins N, but, as shown, these are very slight in thickness and of only limited extent. The reason why a more substantial bearing is not possible is that the ball must necessarily project a considerable distance for proper locking engagement with the collet. Also, the circular cross-section of the collet and of the socket for the same will render the distance from the center of the ball less in the axial

plane than in a horizontal plane. Therefore, in this axial plane the fin or shoulder is almost entirely cut away.

With my improved construction illustrated in Figures 4 and 5, in place of using a spherical dog, I form the dog with integral segmental spherical portions of different radii. The inner portion O is of the smaller radius so as to permit of surrounding the same by a substantial fin or shoulder P formed by counterboring the wall of the socket A. The outer portion Q of the dog is of a larger radius, which provides a stop for forming a shoulder R engaging the fin P. There is also preferably a cylindrical portion S centrally between the spherical segmental portions, which serves as a guide to hold the dog from turning in its recess other than about the axis.

With the construction as described, the operation of engaging or disengaging a tool from the chuck comprises the raising of the sleeve or collar I and simultaneously inserting the collet D in the socket. The raising of the sleeve registers the annular recess J with the dogs H so that the collet will force these dogs outward. When, however, the shallow annular recess F is registered with the dogs and the sleeve is moved downward, this will force the dogs inward, first into engagement with said shallow recess and finally into engagement with the deeper recesses G. The latter will couple the collet and socket against rotation as well as against longitudinal separation so that the tool will rotate with the spindle.

With the modified construction shown in Figure 7, in place of forming the outer portion of the dog semi-spherical, it is of conical form, as indicated at T, to engage with the conical portion K of the sleeve.

One advantage of forming the shallow annular recess F is that it effectually precludes the sticking of the collet in the socket, due to any upsetting of the metal from use. With constructions that have heretofore been used, it frequently happens that the impact of the ball or dog against the end of the locking groove causes an upsetting of the metal, which in turn will hold the collet from being withdrawn from the socket. Such effect is entirely avoided with my construction.

For detachably engaging the sleeve I with the socket member A, I have provided a ring or collar U engaging the lower end thereof and slidably fitting the socket member. The collar U is detachably locked by means of a split spring ring V which engages a groove on the inner wall of the sleeve and a rabbet W in the collar U. The arrangement is such that by first slipping the collar U inward beyond its normal position, the split spring ring V may be inserted and sprung into the groove in the sleeve I, after which the collar U will be lowered to engage said ring V with the rabbet W. This will hold the ring from disengagement, which in turn will hold the collar from disengagement.

What I claim as my invention is:

1. In a chuck, the combination with a cylindrical socket member, of a collet for engaging said socket member having an annular groove therein and a deeper recess at one point in said groove forming an annular wall or shoulder below the surface of the collet, a sleeve or collar surrounding said socket and independently rotatable thereon, and a dog for coupling said collet to said socket located in a recess in the wall of the socket, said dog comprising an inner semi-spherical portion for engaging the annular groove in said collet and the deeper recess therein, a portion adjacent to said semi-spherical portion, being of greater diameter and forming an annular shoulder therebetween, and an outer end portion flush with said cylindrical socket member when said inner end engages said collet and spaced from said innermost portion by more than the thickness of the wall of said socket, said sleeve having an annular recess for engaging said outer portion, and a conical portion adjacent to said recess for forcing the dog inward, the recess in said socket being counterbored to form an annular shoulder for engaging said annular shoulder of the dog.

2. In a chuck, the combination with a socket member, of a collet insertable therein provided with an annular groove extending completely around the circumference thereof and a deeper recess at one point in said annular groove forming a driving wall or shoulder below the outer surface of said collet, and a dog in said socket engageable in said deeper recess to bear against said driving shoulder.

3. In a chuck, the combination with a socket member having an outwardly extending annular portion forming a shoulder, of a sleeve longitudinally slidable upon said socket member formed with a shoulder for engaging the shoulder on said annular portion, a collar arranged between said sleeve and socket member, a spring ring engaging an annular groove in the inner face of said sleeve, and a rabbet in the outer face of said collar for receiving said spring ring.

4. In a chuck, the combination with a socket member, of a collet insertable therein provided with a recess forming a driving wall or shoulder below the outer surface of said collet, and a dog in said socket engageable in said recess.

5. In a chuck, the combination with a socket member, of a collet for engaging said socket member having an annular groove therein, and a deeper recess at one point in said groove forming a driving wall or shoul-

der having its upper edge below the surface of said collet, a dog in said socket member engageable in the deeper recess of said annular groove against said driving shoulder, and means for moving said dog into said recess for coupling said collet and said socket.

6. In a chuck, the combination with a socket member, of a collet for engaging said socket member having an annular groove therein, and a deeper recess at one point in said groove forming a driving wall or shoulder at the intersection of said recess and said groove, a sleeve or collar surrounding said socket and independently rotatable thereon, and a dog for coupling said collet to said socket.

In testimony whereof I affix my signature.

HARRY T. WHITE.