June 6, 1944. H. A. MILLS 2,350,565

DRILL CHUCK

Filed Aug. 12, 1942

Fig. 1

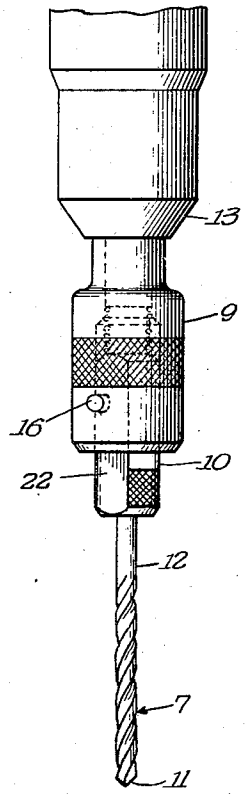



Fig. 2

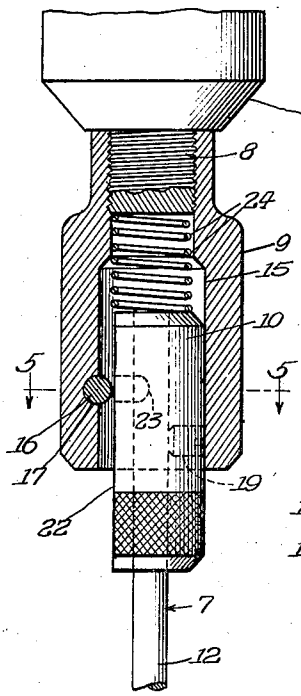



Fig. 3

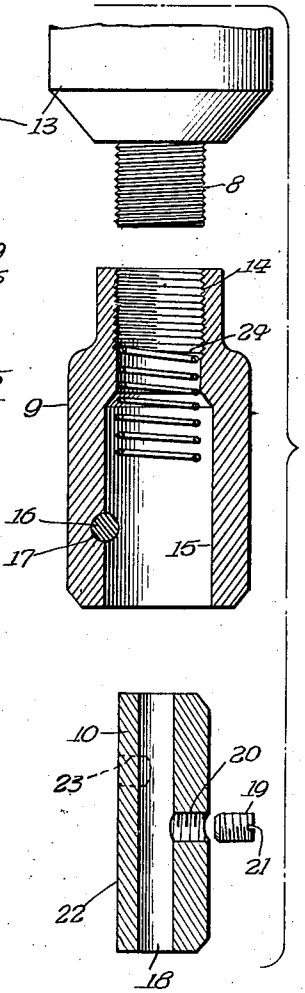



Fig. 4

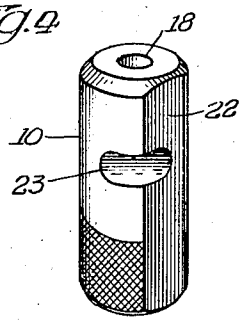



Fig. 5

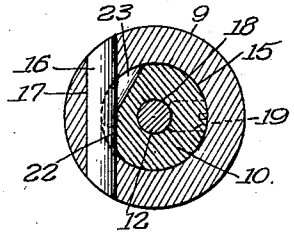
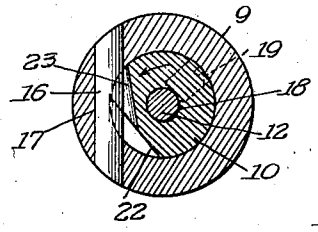



Fig. 6




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# UNITED STATES PATENT OFFICE

2,350,565

## DRILL CHUCK

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Application August 12, 1942, Serial No. 454,517

2 Claims. (Cl. 279—76)

The present invention relates generally to drill chucks. More particularly the invention relates to that type of drill chuck which serves to couple a drill bit to a power driven shaft and as its component parts comprises: (1) an elongated driving member which is provided at one end thereon with means for connection or attachment to the shaft and embodies at its other end a cylindrical longitudinally extending socket and a crosspin extending across one side of the socket; and (2) a removable adaptor which is designed to hold the drill bit, is shaped to fit within the socket in the driving member, and has a flat side for accommodating the crosspin and also has a notch leading from the flat side and adapted, when the adaptor is inserted into the socket and rotated in one direction relatively to the driving member, to receive the pin and form a driving connection between the driving member and the adaptor.

One object of the invention is to provide a drill chuck of this type which is an improvement upon, and has certain advantages over, previously designed chucks of the same general character and is characterized by the fact that the adaptor may be removed from the driving member with great facility.

Another object of the invention is to provide a drill chuck of the type under consideration in which the driving member embodies within the inner end of the adaptor receiving socket a helical spring which is mounted in a novel manner, is adapted, when the adaptor is inserted into place, to be compressed, and serves yieldingly to hold the adaptor and the driving member in connected relation and in addition to eject the adaptor from the driving member when the former is rotated in the reverse direction relatively to the latter in connection with removal of the adaptor from the socket.

A further object of the invention is to provide a drill chuck which is generally of new and improved design and may be produced at a low or reasonable cost.

Other objects of the invention and the various advantages and characteristics of the present drill chuck will be apparent from a consideration of the following detailed description.

The invention consists in the several novel features which are hereinafter set forth and are more particularly defined by claims at the conclusion hereof.

In the drawing which accompanies and forms a part of this specification or disclosure and in which like numerals of reference denote corresponding parts throughout the several views:

Figure 1 is a side view of a drill chuck embodying the invention;

Figure 2 is an enlarged section showing the adaptor inserted in the socket in the driving member but before being rotated relatively to the driving member in order to bring the crosspin into seated relation with the notch;

Figure 3 is a longitudinal section showing the various parts of the drill chuck in disconnected relation;

Figure 4 is a perspective of the adaptor;

Figure 5 is a transverse section taken on the line 5—5 of Figure 2; and

Figure 6 is a similar transverse section showing the adaptor after it has been rotated into connected relation with the driving member.

The chuck which is shown in the drawing constitutes the preferred form or embodiment of the invention. It is designed to connect a drill bit 7 for drive by a power driven shaft 8 and comprises an elongated driving member 9 and an adaptor 10.

The drill bit 7 is of standard or conventional design and has a spiral type cutting end 11 and a smooth end 12. The shaft 8 is externally threaded and forms the driving element of an electric or pneumatic drill 13.

The driving member 9 is preferably formed of hardened, cold rolled steel and has at one end thereof an internally threaded bore 14 for the externally threaded shaft 8 of the drill 13. The bore 14 extends longitudinally of the driving member and is of substantially uniform diameter from end to end. The driving member is connected to the shaft 8 by inserting the externally threaded end of the shaft into the bore 14 and then rotating the member relatively to the shaft in order to bring the thread on the shaft into engagement with the internal screw thread around the bore 14. In addition to the bore 14 the driving member 9 is provided with a cylindrical socket 15. This socket extends longitudinally of the driving member and is of slightly greater diameter than the bore 14. It extends through the other end of the driving member and intersects or is in communicating relation with the inner end of the bore 14. A hardened steel cross-pin 16 is mounted in a transversely extending hole 17 in the portion of the driving member that has the socket 15. The hole is located adjacent the central portion of the socket and intersects one side of the socket, as shown in the drawing. The pin is permanently secured within the hole by way of a drive fit and, due to

the position or location of the hole, has its central inner portion disposed within the socket 15.

The adaptor 10, like the driving member 9, is preferably formed of hardened, cold rolled steel. It is substantially cylindrical and has a longitudinal centrally disposed bore 18 for the smooth end 12 of the drill bit 7. This bore extends from one end of the adaptor to the other and is of uniform diameter from one end thereof to the other. The diameter of the bore 18 is slightly more than the diameter of the smooth end of the drill bit in order that such end may be readily inserted into the bore in connection with assembly of the drill bit and adaptor. A set screw 19 is disposed in an internally threaded, transversely extending hole 20 in the central portion of the adaptor and serves releasably to hold the drill bit in connected relation with the adaptor. The hole 20 intersects the bore 18 and extends or leads through the outer surface of the adaptor. The outer end of the screw 19 is provided with a kerf 21 for a screw driver or other turning tool. When the set screw is tightened the inner end thereof is brought into engagement with the smooth end of the drill bit and serves to lock the bit to the adaptor. When such screw is loosened the bit may be removed from the adaptor. The set screw is of such length that when it is in its operative position the outer end thereof does not project beyond the outer face of the adapter. The adaptor is slightly less in diameter than the socket 15 and is adapted to fit within the socket, as shown in Figures 1 and 2. One side of the adaptor is cut away or shaped to form a full length flat 22 for accommodating the inner central portion of the crosspin 16 and permitting the adaptor to be inserted into the socket and slid partially past the pin. A notch 23 is formed in the central portion of the adaptor and this notch intersects and leads from the flat 22 and is adapted to receive the inner central portion of the cross-pin 16, when the adaptor is inserted into the socket and then turned relatively thereto, as shown in Figure 6. In assembling the adaptor with respect to the driving member the adaptor is first inserted into the socket and then turned or manipulated so as to bring the flat 22 into alignment with the crosspin. Thereafter the adaptor is slid into the socket until the notch 23 registers with the inner central portion of the crosspin. As soon as the notch is in registry with such portion of the crosspin the adaptor is rotated so as to bring the crosspin into seated relation with the notch. When the crosspin is seated within the notch driving connection is established between the driving member and the adaptor and the adaptor is held against axial displacement with respect to the driving member. The notch 23 leads from the flat 22 in the direction in which the adaptor is driven by the driving member. The adaptor is of such length that when it is in assembled relation with the driving member one end thereof is positioned externally of the socket 15. Such end of the adaptor is knurled so that it may be readily grasped in connection with insertion and removal of the adaptor with respect to the socket. By reason of the fact that the flat 22 is full length a portion of the flat is exposed when the adaptor is in place and provides a flat surface whereby the adaptor may be gripped by a wrench and turned in the event that the crosspin becomes jammed in the notch 23. The set screw 19 is so positioned that when the adaptor is in connected relation with the driving member it is disposed within the socket. Because of this arrangement the socket defining portion or wall of the member prevents loosening of the set screw when the adaptor is in place.

In addition to the driving member 9 and the adaptor 10 the chuck comprises a helical spring 24. This spring is disposed within the driving member and extends longitudinally of the latter. One end of the spring is mounted in the inner end of the bore 14 and is suitably secured in place. The other end of the spring projects into the inner end of the socket 15 and is adapted to abut against the adaptor 10, as shown in Figure 2. The spring is of such length that it is placed under compression when the adaptor is inserted into and locked with the driving member. The spring has a twofold purpose in that it serves yieldingly to hold the adaptor in connected relation with the driving member and also to eject the adaptor in connection with withdrawal from the driving member. When the adaptor is in place the spring bears against the adjacent adaptor end and subjects the adaptor to an outward pressure which tends to hold the notch defining portion of the adaptor in firm engagement with the inner central portion of the crosspin. When the adaptor is turned so as to bring the flat 22 into registry with the crosspin in connection with removal of the adaptor from the driving member the spring, due to its pressure on the adaptor, operates to eject the adaptor from the driving member.

When the chuck is to be used the smooth end 12 of the bit 7 is inserted into the bore 18 of the adaptor and then the set screw 19 is tightened so as to lock the bit and adaptor together. After connection of the bit to the adaptor the adaptor is inserted into the socket 15 and then, after proper manipulation to bring the flat into alignment with the crosspin, is slid inwards until the notch 23 is in alignment with the crosspin. This particular operation results in the spring 24 being placed under compression. As soon as the adaptor is inserted to a point where the notch is in alignment with the crosspin it is turned, as heretofore described, so as to bring the inner central portion of the crosspin into seated relation with the notch. After turning of the adaptor so as to effect seating of the crosspin with respect to the notch the adaptor is in connected relation with the driving member and is held in place by the action of the compression spring. When it is desired to remove the adaptor to provide for the use of another adaptor having a different drill bit the adaptor 10 is reversely rotated so as to bring the notch defining portion of the adaptor out of seated relation with the crosspin. As soon as the adaptor is properly rotated the spring automatically ejects the adaptor from the driving member.

The herein described drill chuck is essentially simple in design and construction and may be produced at a low or reasonable cost. It is adapted for high production operations where it is necessary frequently to change drill bits and, due to the fact that the chuck is small in size, the drill with which the chuck is associated may be used in small places.

Whereas the chuck has been described as being primarily adapted for coupling a drill bit to a power driven shaft it is to be understood that it may be used for coupling other tools or other types of bits. It is also to be understood that the invention is not to be restricted to the details set forth since these may be modified within the

scope of the appended claims without departing from the spirit and scope of the invention.

Having thus described the invention what I claim as new and desire to secure by Letters Patent is:

1. As a new article of manufacture, a chuck adapted to couple a bit to an externally threaded power driven shaft and comprising an elongated driving member having a longitudinal internally threaded bore at one end thereof for connection to the shaft and embodying at its other end an open ended cylindrical socket axially aligned and communicating with, and of greater diameter than, the bore, and in addition a crosspin having a portion thereof projecting into one side of the socket, and a readily removable substantially cylindrical adaptor of greater length than the socket, provided with mounting means for the bit, adapted to have one end thereof inserted into the socket and having a full length flat at one side to accommodate the crosspin in connection with insertion of said one end into the socket and also having a notch leading from the flat and adapted to receive said crosspin and form a driving connection therewith when the adaptor after insertion of said one end thereof into the socket is rotated or turned in one direction relatively to the driving member, and a helical spring having one end thereof fitting snugly and secured within the inner end of the bore and its other end projecting into the inner end of the socket, adapted to be engaged directly and compressed by the adaptor when said one end of the adaptor is inserted into the socket and serving yieldingly to hold the adaptor in place when it is rotated in said one direction relatively to the driving member and also to eject the adaptor from the socket when it is reversely rotated relatively to said driving member for removal purposes.

2. As a new article of manufacture, a chuck adapted to couple a bit to a driven shaft and comprising an elongated driving member having at one end thereof a longitudinal bore for receiving the shaft together with means for securing the bore defining portion thereof to the shaft, and embodying at its other end an open ended cylindrical socket axially aligned and communicating with, and of greater diameter than, the bore, a substantially cylindrical adaptor of greater length than the socket, provided with mounting means for the bit and adapted to have one end thereof fit in the socket, a detachable connection designed releasably to secure said one end of the adaptor in the socket and form a driving connection between the drive member and the adaptor, and consisting of coacting parts on the adaptor and driving member arranged to be rendered operative when said one end of the adaptor is inserted into the socket and the adaptor is turned in one direction relatively to the driving member and inoperative when the the adaptor is reversely rotated relatively to the driving member, and a helical compression type spring having one end thereof fitting snugly and anchored within the inner end of the bore and its other end projecting normally into the socket, adapted to be engaged directly and compressed by the adaptor when said one end of the latter is inserted into the socket in connection with mounting of the adaptor and serving yieldingly to hold the adaptor in place when the parts of the connection are in their operative position and also to eject the adaptor from the socket when it is reversely rotated relatively to the driving member.

HAROLD A. MILLS.