

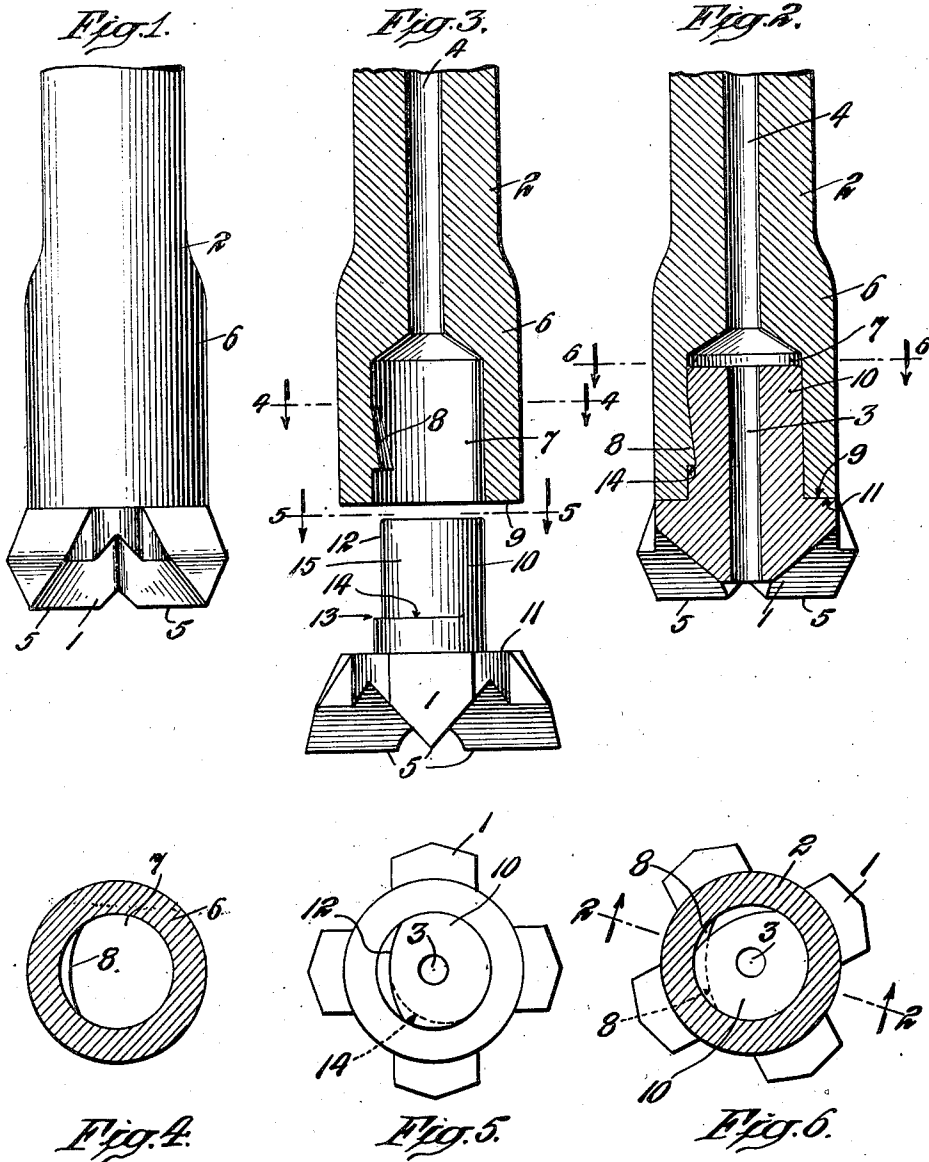
June 28, 1938.

G. G. BROWN

2,122,244

SOCKET CONNECTION

Filed Sept. 1, 1937



INVENTOR
Gouverneur G. Brown
BY
Philip A. Brown & Kenneth
ATTORNEYS

UNITED STATES PATENT OFFICE

2,122,244

SOCKET CONNECTION

Gouverneur G. Brown, Ashuelot, N. H.

Application September 1, 1937, Serial No. 161,891

9 Claims. (Cl. 255—64)

This invention relates to socket connections.

An object of the invention is to provide such a connection which can be readily assembled and disassembled and which will nevertheless be of great strength and rigidity.

A further object of the invention is to provide a connection such that the members to be connected will be cut away or weakened to the least possible extent and will not require undue widening at the point of connection.

An important field of use of the invention is in the attachment of detachable rock drill bits to drill rods. In such use the stresses encountered are of large magnitude, as the drill rod is rapidly and heavily hammered, and at the same time rotated, giving rise to large compressive and torsional stresses at the point of connection of the bit. In addition, any irregularity in the material being drilled will generate canting or shearing stresses at this point of connection. It is an object of the invention to provide a connection having bearing surfaces adapted and located so as to bear these stresses efficiently and at the same time avoid binding of the connection and consequent difficulty in separation of the parts.

With the foregoing objects and other objects, which will appear in the following full description, in mind, the invention consists in the combination, arrangements and details of parts which will first be described in connection with the accompanying drawing and then more particularly pointed out in the appended claims:

In the drawing—

Figure 1 is a side elevation of a rock drill bit and rod joined together by a connection embodying the invention in a preferred form;

Figure 2 is a vertical axial section of the device of Figure 1;

Figure 3 is an exploded view showing the drill rod in section and the bit in elevation and with the latter turned to the proper position for insertion into the rod;

Figures 4 and 5 are sections taken on the lines 4—4 and 5—5, respectively, of Figure 3, and

Figure 6 is a section taken on the line 6—6 of Figure 2.

Referring to the drawing generally, the bit 1 and drill rod 2 are shown as of conventional form and are provided with the usual axial bores 3, 4, to permit pumping of air or water to the cutting edges 5 of the bit in the usual manner.

The lower end 6 of the rod 2 is enlarged to form a sleeve or socket 7 with a cylindrical inner surface which bears a projection 8 constituting a locking member. This projection 8 is advan-

tageously arcuate in cross section (see Fig. 4) and tapered backwardly from the end of the rod as shown in Figures 2 and 3. The bottom or rim of socket 7 forms an annular bearing surface 9 designed to transmit percussive force to the bit 1.

The body of bit 1 is formed with a plug 10 of cylindrical shape and adapted to enter socket 7, and at the base of the plug is provided with an annular shoulder 11 forming a bearing surface adapted to engage the surface 9 of the drill rod, previously mentioned. To insure proper engagement of surfaces 9 and 11, the plug 10 is made somewhat shorter than socket 7, providing clearance at its forward or upper end as shown in Figure 2.

Plug 10 is cut away to one side as shown in Figures 3 and 5 along an arc 12 corresponding to the arc of projection 8 at its forward or widest point. This cut away portion extends rearwardly or downwardly of plug 10 to a point 13 sufficiently far from the end of the plug to accommodate projection 8 when plug 10 is inserted into socket 7 so that the surfaces 9 and 11 are in engagement. Plug 10 is further cut away, as shown in Figures 2, 3, and 5, along an arc 14 located at the point 13 and coincident at one end with one end of arc 12 and extending circumferentially in the same direction as arc 12. Arc 14 however, extends further around the plug 10 than arc 12, being shown in the embodiment illustrated as occupying about 180° while arc 12 is shown as occupying about 110°. The plug body is tapered rearwardly from the upper end to arc 14 forming a surface 15, cam shaped in cross section.

In assembling the bit and rod the parts are held in the position of Figures 3, 4 and 5, and plug 10 inserted in socket 7. The bit is now turned (clockwise, in Figure 5) to approximately the position of Figure 6, at which point projection 8 and tapered cam surface 15 have pressed bearing surfaces 9 and 11 firmly together and further rotation is prevented.

As will be apparent from the foregoing description, the connection of the invention is of great utility in heavy duty work. Percussive stresses are borne directly by surfaces 9 and 11, and the latter is preferably located as close to the cutting edges 5 of the bit 1 as practical in view of the requirement that these edges be hardened and be preferably supported by tough unhardened metal. In practice surface 11 may be, as shown, spaced from the cutting edges 5 of the bit by less than half the width of the bit. Rotary stresses are carried by the substantial plug 10, sleeve 7 and projection 8, the last being preferably of concave

and arcuate form as shown, a shape which results in great strength as compared to a mere ridge, stud or the like. Tilting or canting stresses are borne by surfaces 9 and 11 and the external surface of the plug and internal surface of the socket, all of which are in close surface contact over large areas.

A great advantage of the present construction lies in the provision of a simple two piece connection in which each part can be cast or machined as a solid integral member. In this connection it should be noted that the conformation of the cooperating cam and tapered surfaces is such as to eliminate any need for filleting, a requirement which in the past has been of considerable disadvantage in bayonet joint constructions of various kinds, and has made it necessary to form projections separately and attach them to the parts upon which they are mounted. In the present invention it becomes possible, as shown, to make the plug convex in cross section at all points along its length, avoiding the use of keyways, threads and the like. Similarly, the socket can be made concave in cross-section at all points along its length. As a result, the connection is not only of great strength but the parts are much less affected by wear.

Furthermore, projection 8 and surface 15 are of limited circumferential extent, leaving large engaging cylindrical areas of plug 10 and socket 7, which insures that the bit 1 and rod 2 will be co-axial and in effect makes them, when connected, a single rigid metallic structure.

These various advantages in the connection of the invention result, in the field of rock drilling chosen as illustrative, and for which the connection is especially designed, in a connection of such strength as materially to reduce the necessary bulk. For example, with a 1½ inch diameter drill rod, bits of as small diameter as 1¾ inch may be employed as against a 1½ inch minimum diameter in practical constructions of the prior art.

It will be understood that, while the connection is of especial value in uses involving great stresses, it is applicable also to other uses in which a compact and rigid connection which can be easily assembled and disassembled is required, but where great strength is not necessary. In such use the advantages in simplicity of manufacture will normally be of great importance.

What is claimed is:

1. A socket connection comprising a socket having a cylindrical inner surface and a projection on said surface and a plug adapted to enter said socket, one side of said plug being reduced to form a rearwardly tapered cam surface coacting with said projection, and said plug being cylindrical elsewhere and convex in cross section at all points.

2. A socket connection comprising a socket and a projection thereon, and a plug adapted to enter said socket, one side of said plug being reduced to form a rearwardly tapered cam surface coacting with said projection, said plug and socket being cylindrical elsewhere and respectively convex and concave in cross section at all points.

3. A socket connection comprising a socket having a cylindrical inner surface and a projection on said surface and a plug adapted to enter said socket, one side of said plug being reduced to form a rearwardly tapered cam surface coacting with said projection, said plug being cylindrical elsewhere and convex in cross section at

all points, and the rim of said socket and base of said plug forming cooperating bearing surfaces, whereby insertion and rotation of said plug in said socket forces said bearing surfaces firmly together.

4. A socket connection comprising a socket and a projection thereon, and a plug adapted to enter said socket, one side of said plug being reduced to form a rearwardly tapered cam surface coacting with said projection, said plug and socket being cylindrical elsewhere and respectively convex and concave in cross section at all points, and the rim of said socket and base of said plug forming cooperating bearing surfaces, whereby insertion and rotation of said plug in said socket forces said bearing surfaces firmly together.

5. A socket connection comprising a socket and a plug adapted to enter the same, said plug and socket being formed with cooperating and reversely tapered cam surfaces of limited circumferential extent for locking them together upon relative rotation and being cylindrical elsewhere and being at all points along their lengths, convex and concave, respectively.

6. A socket connection comprising a socket and a plug adapted to enter the same, said plug and socket being formed with cooperating and reversely tapered cam surfaces of limited circumferential extent for locking them together upon relative rotation and being cylindrical elsewhere and being at all points along their lengths, convex and concave, respectively, and the rim of said socket and base of said plug forming cooperating bearing surfaces, whereby insertion and rotation of said plug in said socket forces said bearing surfaces firmly together.

7. A rock drill rod and detachable bit, said rod comprising a socket having a cylindrical inner surface and a projection on said surface and said bit comprising a plug adapted to enter said socket, one side of said plug being reduced to form a rearwardly tapered cam surface coacting with said projection, said plug being cylindrical elsewhere and convex in cross section at all points, and the rim of said socket and base of said plug forming cooperating bearing surfaces, whereby insertion and rotation of said plug in said socket forces said bearing surfaces firmly together.

8. A rock drill rod and detachable bit, said rod comprising a socket having a cylindrical inner surface and a projection on said surface and said bit comprising a plug adapted to enter said socket, one side of said plug being reduced to form a rearwardly tapered cam surface coacting with said projection, said plug being cylindrical elsewhere and convex in cross section at all points, the rim of said socket and base of said plug forming cooperating bearing surfaces, whereby insertion and rotation of said plug in said socket forces said bearing surfaces firmly together, and the bearing surface at the base of said plug being situated close to the cutting portion of said bit.

9. A rock drill rod and detachable bit, said rod comprising a socket and a projection thereon, and said bit comprising a plug adapted to enter said socket, one side of said plug being reduced to form a rearwardly tapered cam surface coacting with said projection, said plug and socket being cylindrical elsewhere and respectively convex and concave in cross section at all points, and the rim of said socket and base of said plug forming cooperating bearing surfaces, whereby insertion and rotation of said plug in said socket forces said bearing surfaces firmly together.