Dec. 16, 1941. E. R. SIEBERT ET AL 2,266,572

LOCKING BIT JOINT

Filed April 10, 1940

Fig. 1

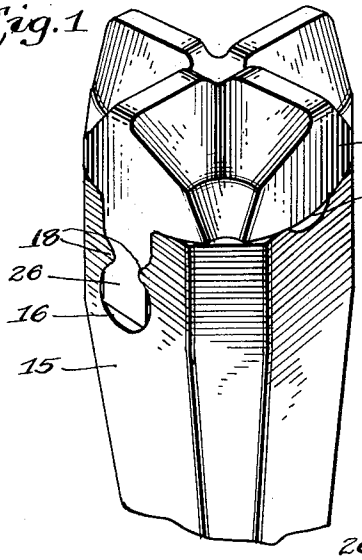


Fig. 2

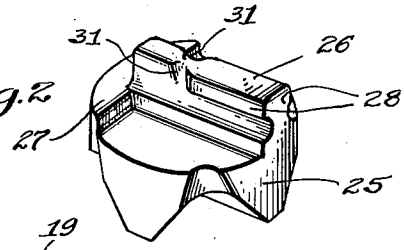


Fig. 4

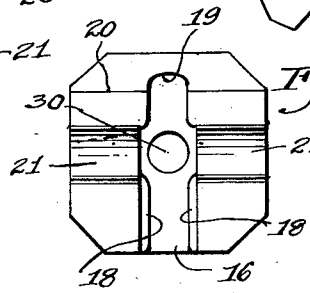


Fig. 3

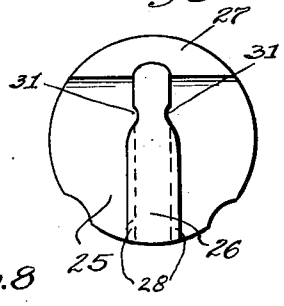


Fig. 8

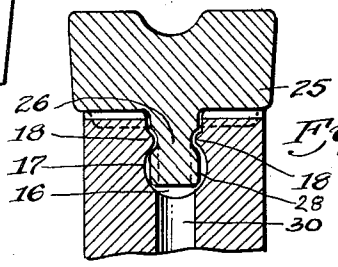
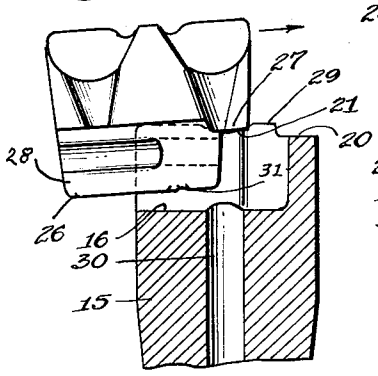


Fig. 5



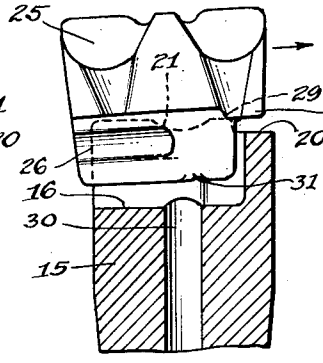


Fig. 6

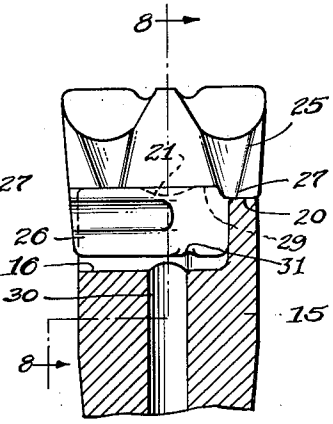
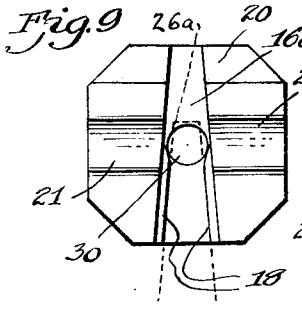


Fig. 7

Fig. 9



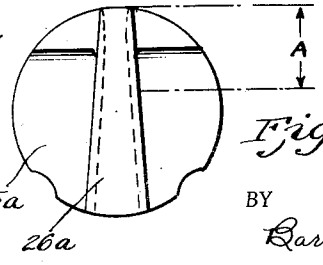


Fig. 10

INVENTORS
Edgar R. Siebert
Charles Erickson

BY
Barnes, Kisselle, Laughlin & Raisch
ATTORNEYS

Patented Dec. 16, 1941 2,266,572

UNITED STATES PATENT OFFICE

2,266,572

LOCKING BIT JOINT

Edgar R. Siebert, Detroit, and Charles Erickson, Ann Arbor, Mich., assignors to Ray E. Townsend, Ann Arbor, Mich.

Application April 10, 1940, Serial No. 328,856

11 Claims. (Cl. 255—64)

This invention relates to replaceable bits and rock drill shanks and more particularly to the connection between the bit and the shank on which it is used.

In rock drilling the wear on the bits is so great that it is necessary to provide replaceable bits to save the cost of sharpening the steel. Many attempts have been made to provide a satisfactory joint or connection between the replaceable bit and a drilling shank so that a bit could be used for starting holes and drilling at an angle without falling from the shank. Another problem is to provide a connection which is easily and cheaply formed as, for example, by forging and which necessitates no machining.

An object of the present invention is to provide a bit and connection therefor with a shank which solves the above problems. More specifically, it is an object to provide a bit connection which may be used without accessories to start a hole, straight ahead, or at an angle, and to provide a bit which does not drag from the shank when in use.

A further object is to provide a bit and shank connection which may be easily forged and in which adequate provision is made for water outlets to prevent the escape of dust from the drilling hole.

A further object is to provide a bit shank which is reinforced in such a manner that the splitting of shanks is practically eliminated.

Other objects and features of the invention, having to do with details of construction and operation, as, for example, ease of assembly, will be brought out in the following description and claims.

In the drawing:

Fig. 1 is a perspective view illustrating the shank and the bit in assembled relation.

Fig. 2 is a perspective view of the bottom of the bit.

Fig. 3 is a plan view of the bottom of the bit.

Fig. 4 is a plan view of the end of a shank.

Figs. 5 and 6 illustrate the bit as it is being assembled.

Fig. 7 is a similar view showing the bit in assembled position.

Fig. 8 is a sectional view on the lines 8—8 of Fig. 7.

Fig. 9 is a sectional view of a portion of the shank in which the retaining slot is placed through the entire shank.

Fig. 10 is a bottom plan of a bit which may be used with the shank of Fig. 9, the bit being provided with a taper.

The driving end of a shank 15 is provided with a transverse slot 16. This transverse slot is to have a cross-section formed to provide a locking or reentrant groove having a reentrant angle or curve, as, for example, a dovetail or keyhole slot. The slot 16 preferably has a cross-section as shown in Figs. 1 and 8, wherein there is a circular opening 17, above which are restrictions 18 extending along the slot in parallel relation. The slot 16 does not extend all the way through the shank but is ended at a wall portion 19. The attaching surface of the shank is also provided with a transverse recess 20 substantially at right angles to the slot 16 at the closed end thereof. The depth of the recess 20 is small as compared with the depth of the slot 16 and in actual practice, may be cut approximately from one-sixteenth to one-eighth of an inch deep. Across the central portion of the shank and parallel with, but spaced from, the recess 20 is another recess or groove 21 having a curved cross-section, as shown in Figs. 1 and 5.

The bit, indicated at 25, which cooperates with this shank has a transverse tongue 26 on its attaching surface. This tongue has a length which is substantially equal to the length of the slot 16. Extending transversely of the tongue 26 is a shoulder portion 27 which projects from the attaching surface of the bit and which is to be received by the recess 20 on the shank. The section of the tongue 26 is formed to correspond substantially with the section of the slot 16, at least as far as the restrictions 18 are concerned in the slot. The tongue is shown provided with opposed ribs 28 adapted to cooperate with these restrictions 18. The ribs 28 do not extend the length of the tongue but are cut short at the inner end to permit assembly. The same result might be obtained by shortening the restrictions 18 at the outer end.

In assembling the bit, the inner end of the tongue 26 is projected into the outer end of the slot 16 and the clearance provided by the formation of ribs 28 permits a tilting of the bit. As the bit goes into the slot, Fig. 5, the shoulder 27 will drop down into the groove 21 and at the same time the inner ends of ribs 28 enter slot 16 below restrictions 18. The shoulder 27 must then be forced over a portion 29 which lies between the transverse groove 21 and the recess 20. This part of the movement is illustrated in Fig. 6. As the inward movement is completed, the shoulder 27 will drop down into recess 20 and the bit will be snugly locked in place, Fig. 7.

These bits may be formed of a standard size

and are so shaped that they may be forged. If it is desired, a starting shank can be forged with slightly closer dimensions than the remaining shanks so that in starting there will be an extremely tight fit. The remaining longer shanks may be dimensioned so that the bit will slip easily in place. Once in place, the bit will not move from its position unless it is removed by the operator. The ribs **28** and restrictions **18** are preferably formed so that there is clearance at the inner end to permit the assembly, as shown in Fig. 6, but with a fairly tight fit at the outer end, as shown in Fig. 1. By forming the tongue **26** with a flat end and making the hole **16** of rounded cross-section, a water groove is formed which will cooperate with the axial water hole **30** in the shank. The tongue is also provided with restrictions at **31** at the ends of ribs **28** which will feed water from the bottom groove to the groove **21** on the face of the shank so that water may flow from three sides of the bit. This will provide a water lock surrounding the bit so that the dust can not escape from the drill hole without being moistened.

In Figs. 9 and 10 a modification is shown in which a shank **32** is provided with a transverse groove **16***a* which extends through the shank and is tapered to correspond with a tongue **26***a* of a modified bit **25***a*. In this modification, the taper is so formed that the width of the taper at a point A distance from the small end is less than the width between the restrictions **18** at the widest point (Fig. 10). This makes for easy assembly and has the same purpose as the formation of ribs **28** in the preferred embodiment, that is, it permits inclined entry of the bit.

We claim:

1. In a rock drilling combination, a bit member, a shank member, a transverse reentrant slot on an axially normal attaining surface of one of said members, a transverse tongue on an axially normal attaching surface of the other of said members having a formation to cooperate with said reentrant slot, and a projection substantially at the edge of the attaching surface of one of said members extending transversely of said tongue or slot in a T formation and adapted to cooperate with a recess in the other of said members to lock the members together.

2. In combination, a rock drill bit and shank, said bit having a surface normal to its axis adapted to contact and be attached to one end of said shank, and means on said attaching surface of said bit adapted to cooperate with complemental recesses in said shank comprising projections in said bit surface arranged at right angles to each other in a T arrangement, one of said projections having a locking cross-section to cooperate with a reentrant recess in said shank.

3. In a rock drilling combination, a bit, a transverse tongue extending substantially across an attaching surface of said bit and having a cross section adapted to cooperate with a reentrant slot in a shank, and a shoulder projection on the same side of said bit as said tongue extending transversely of said tongue and located at one end thereof at the side of the bit, said shank having a recess at one end of said slot to receive said shoulder projection.

4. In a rock drilling combination, a bit member, a shank member, means forming a transverse reentrant slot extending substantially but not completely across an attaching surface of one of said members, a transverse tongue on the attaching surface of the other of said members having a formation to cooperate with said reentrant slot, said slot being formed to permit assembly of said members by relative transverse movement therebetween, a projection on the attaching surface of one of said members located at the end corresponding to the closed end of said slot and adapted to cooperate with a recess in the other of said members to lock the members together when assembled, and a groove formed in the attaching surface of said recessed member to receive said projection during a portion of said assembly movement.

5. In a rock drilling combination, a bit member, a shank member, each of said members having an attaching surface normal to the central axis, said surfaces to be positioned adjacent each other in assembly, a projection on one of said surfaces adapted to lie in a recess in the other of said surfaces when said members are assembled to prevent relative transverse movement of said members in at least one direction, and a reentrant slot and tongue formed, respectively, on said members arranged when assembled to lock said members against transverse and axial relative movement and to permit slight cocking of said members during assembly whereby said projection may enter said recess.

6. In a rock drilling combination, a bit member, a shank member, each of said members having an attaching surface normal to the central axis, said surfaces to be positioned adjacent each other in assembly, a projection on one of said surfaces adapted to lie in a recess in the other of said surfaces when said members are assembled to prevent relative transverse movement of said members in at least one direction, and a reentrant slot and tongue formed, respectively, on said members arranged when assembled to lock said members against transverse and axial relative movement and to permit slight cocking of said members during assembly whereby said projection may enter said recess, said slot and tongue extending the greater portion of the distance but not across said members whereby the slotted members are provided with a reinforcing wall.

7. In a rock drilling combination, a bit member, a shank member, each of said members having an axially normal attaching surface, said surfaces to be positioned adjacent each other in assembly, a projection on one of said surfaces adapted to lie in a recess in the other of said surfaces when said members are assembled to prevent relative transverse movement of said members in at least one direction, a slot extending transversely of and substantially across one of said members, having reentrant grooves along only a portion of its length, and a tongue on the other of said members having a length substantially as long as said slot and provided with ribs along a portion of its length to cooperate with the reentrant portions of said slot.

8. In a rock drilling combination, a bit member, a shank member, each of said members having an attaching surface normal to the central axis, said surfaces to be positioned adjacent each other in assembly, a projection on one of said surfaces adapted to lie in a recess in the other of said surfaces when said members are assembled to prevent relative transverse movement of said members in at least one direction, and a re-

entrant slot and tongue formed, respectively, on said members throughout the greater portion thereof arranged when assembled to lock said members against transverse and axial relative movement and to permit slight cocking of said members during assembly whereby said projection may enter said recess, said slot being formed deeper than the depth of said tongue whereby to provide a water passage.

9. In a rock drilling combination, a bit member, a shank member, each of said members having a substantially continuous attaching surface extending transversely thereof, said surfaces to be positioned adjacent each other in assembly, a projection on one of said surfaces when said members are assembled to prevent relative transverse movement of said members in at least one direction, and a reentrant slot and tongue formed, respectively, on said members arranged when assembled to lock said members against transverse and axial relative movement and to permit slight cocking of said members during assembly whereby said projection may enter said recess, said slot and tongue having a depth relatively great as compared to said recess and projection.

10. In a rock drilling combination, a bit member, a shank member, each of said members having an attaching surface normal to the central axis, said surfaces to be positioned adjacent each other in assembly, a projection normal to one of said surfaces adapted to lie in a recess in the other of said surfaces when said members are assembled to prevent relative transverse movement of said members in at least one direction, a reentrant slot and tongue formed, respectively, on said members arranged when assembled to lock said members against transverse and axial relative movement and to permit slight cocking of said members during assembly whereby said projection may enter said recess, and an additional recess formed in one of said surfaces to receive said projection during a portion of the assembly movement and thereby reduce the amount of cocking necessary to assembly.

11. In a rock drilling combination, a bit member, a shank member, each of said members having an attaching surface normal to the central axis, said surfaces to be positioned adjacent each other in assembly, a projection normal to one of said surfaces adapted to lie in a recess in the other of said surfaces when said members are assembled to prevent relative transverse movement of said members in at least one direction, and a tapered slot and tongue formed, respectively, on said members arranged when assembled to lock said members against relative axial movement and against relative transverse movement in all but one direction, said projection and recess serving to lock said members against relative transverse movement in said one direction.

EDGAR R. SIEBERT.
CHARLES ERICKSON.