Dec. 26, 1933. J. C. STOKES 1,940,890

DRILL BIT

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FIG. 1.

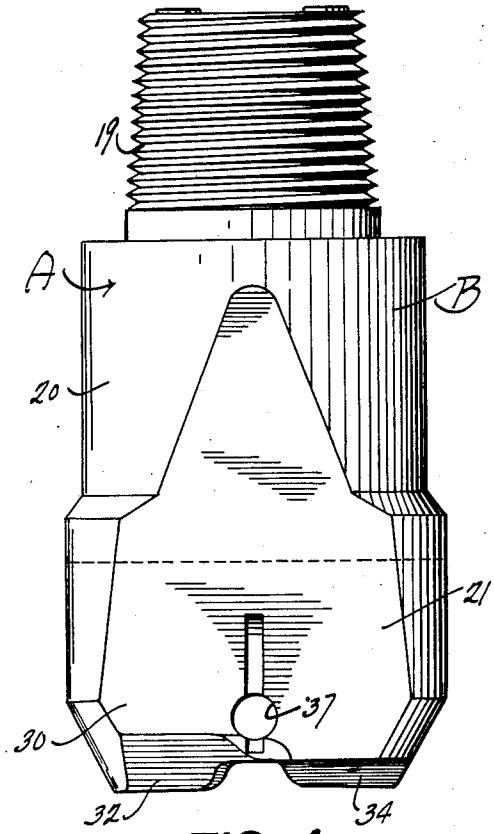


FIG. 2.

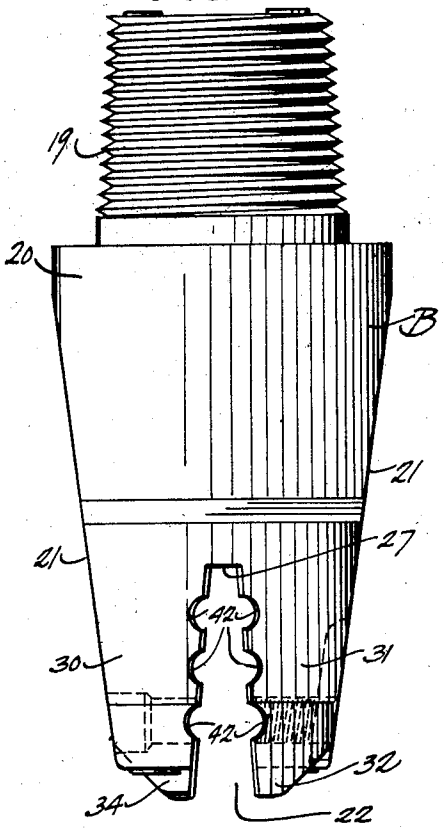


FIG. 4.

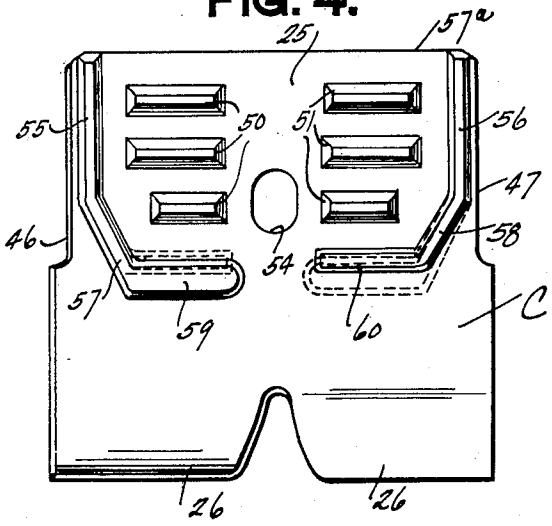
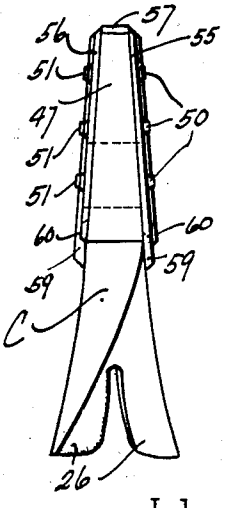


FIG. 5.



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FIG. 3.

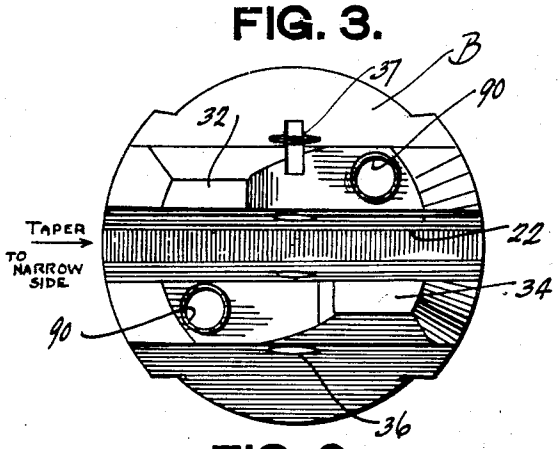


FIG. 6.

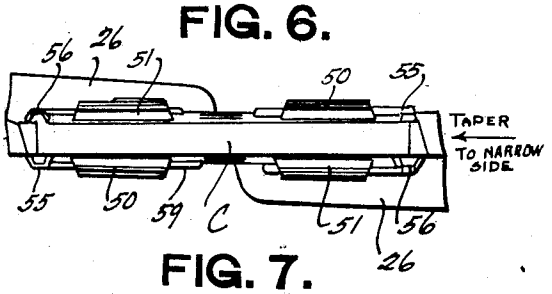


FIG. 7.

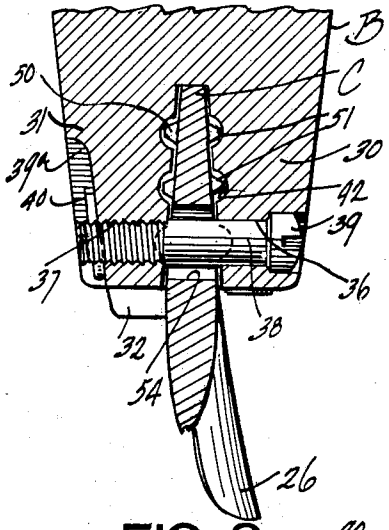


FIG. 9.

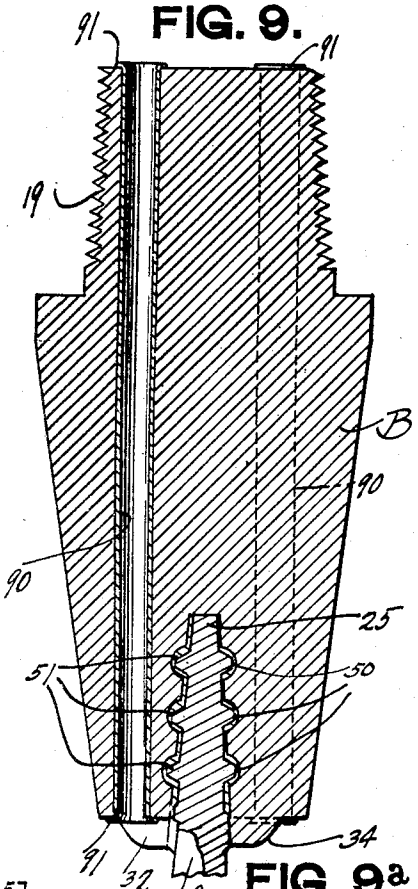


FIG. 8.

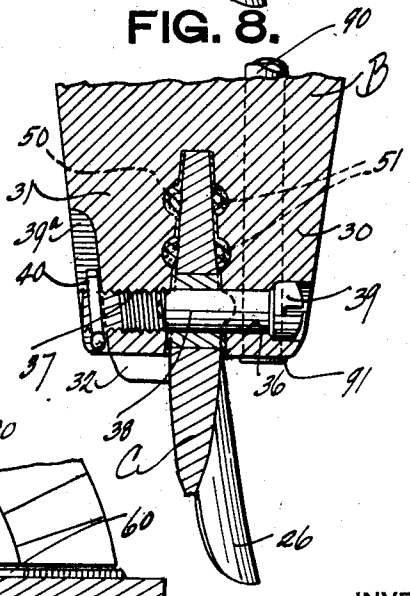
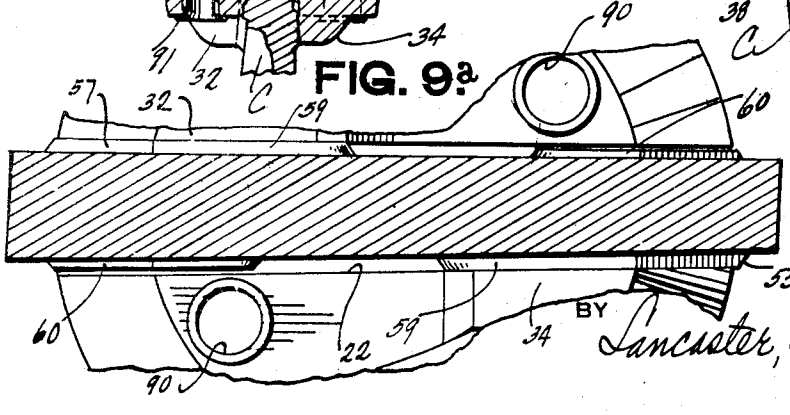


FIG. 9a.



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DRILL BIT

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FIG. 10.

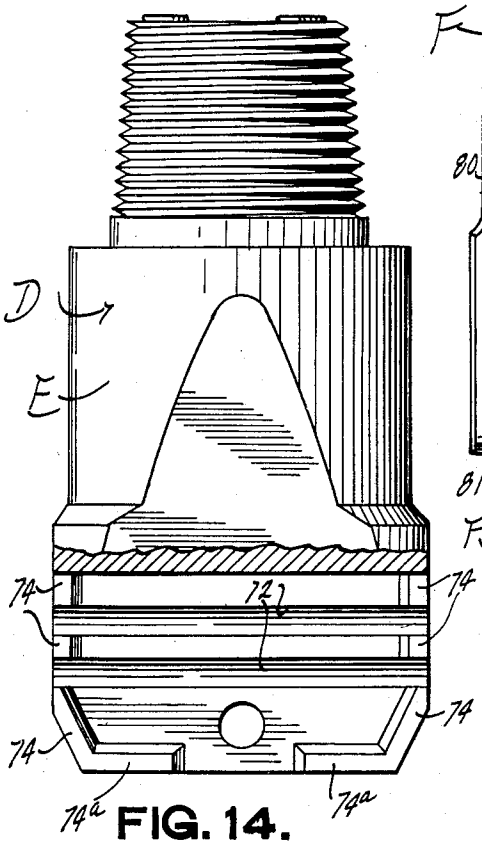


FIG. 12.

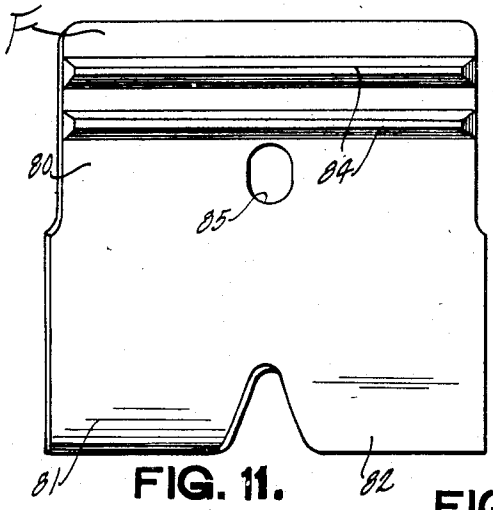


FIG. 11.

FIG. 13.

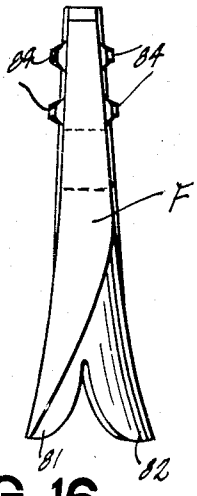


FIG. 16.

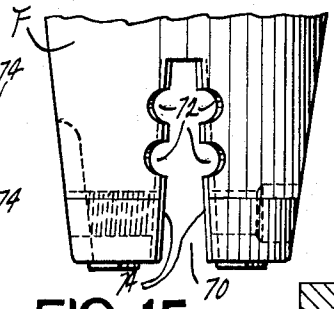
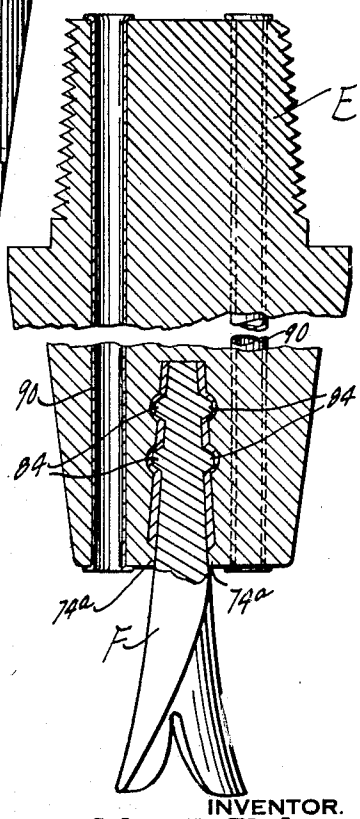
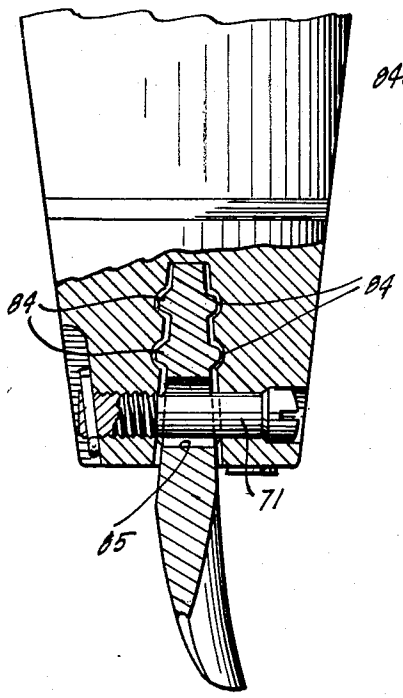
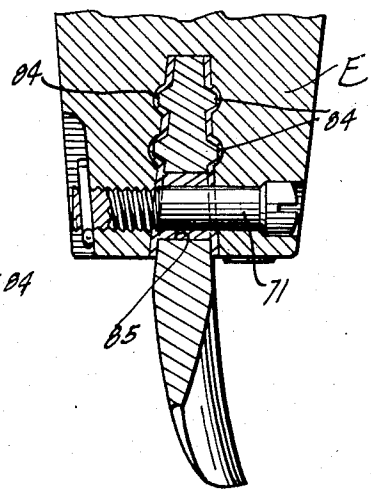


FIG. 15.







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UNITED STATES PATENT OFFICE

1,940,890

DRILL BIT

John C. Stokes, Houston, Tex.

Application January 24, 1933. Serial No. 653,349

7 Claims. (Cl. 255—61)

This invention relates to improvements in drill bits.

The primary object of this invention is the provision of an improved drill bit construction wherein the blade is attached to the bit body in a manner resembling that set forth in my U. S. Patent #1,819,850, but which differs thereover in an improved arrangement for holding the bit blade with a fusible cast material in a socket of the body holder in such manner that the blade may be readily driven from the holder or driven back into place again without necessity of melting the fusible material which assembles it in the holder socket, should it become necessary to sharpen the blade or replace the same in the holder with another blade.

A further object of this invention is the provision of an improved construction for assembling a bit blade, such as the fish-tail variety, in a socket of a supporting holder with interfitting parts which will permit the holder to support the blade should the cast metal or material which supplies the bond between the blade and holder be absent, fractured or displaced for any reason.

A further object of this invention is the provision of an improved arrangement for assembling a bit blade upon a holder in a socket of cast metal having a low fusing temperature, and having associated therewith improved means to permit the fusible material to flow readily into place with but small loss during the assembly operation.

A further object of this invention is the provision of an improved arrangement for assembling the bit blade upon a bit holder after the general manner set forth in my patent above referred to, but which embodies improved means for permitting a metal to metal contact of the blade with the holder during the drilling operation to relieve the fusible cast metal in which the blade is set in the holder of any severe drilling strains.

Other objects and advantages of this invention will be apparent during the course of the following detailed description.

In the accompanying drawings, forming a part of this specification, and wherein similar reference characters designate corresponding parts throughout the several views,

Figure 1 is a side elevation of the bit holder of the preferred form of invention.

Figure 2 is an elevation of the improved holder shown in Figure 1, but at an angle of 90° with respect to Figure 1.

Figure 3 is a bottom plan view of the holder shown in Figures 1 and 2, showing more particularly bit blade socket slots.

Figure 4 is an elevation of the improved blade.

Figure 5 is an edge elevation of the blade of Figure 4.

Figure 6 is a top plan view of the blade.

Figure 7 is a vertical sectional view taken in a plane through the supporting bolt and showing the loose fitting manner in which the fish-tail blade is assembled in the holder prior to the pouring of the molten metal.

Figure 8 is a view similar to Figure 7, but showing the metal of low fusion point as cast in place in the slot, wherein the blade is set.

Figure 9 is a fragmentary sectional view taken through the bit holder and blade and more particularly showing an improved water course having a removable liner.

Figure 9a is a horizontal sectional view taken through the bit blade just below the lower end of the bit holder and looking in the direction of the holder, and showing, prior to the pouring of the casting material, the arrangement of slots, recesses, and filling passageways in which the cast metal is poured in its molten condition.

Figure 10 is a fragmentary side elevation of a modified form of bit holder.

Figure 11 is a fragmentary view showing the blade receiving slot in the lower end of the holder of Figure 10.

Figure 12 is an elevation of the improved blade which is associated in the holder of Figure 10.

Figure 13 is an edge elevation of the blade of Figure 12.

Figure 14 is a view showing the preliminary assemblage of the blade in a loose fitting relation upon the holder, showing the clearances wherein the molten babbitt or other soft metal is poured for firmly anchoring the blade in position upon the holder.

Figure 15 is a view similar to Figure 14, but with the fusible metal cast in the clearances between the blade and holder.

Figure 16 is a fragmentary sectional view taken through a side portion and a water course of the improved bit construction.

In the drawings, wherein similar reference characters designate corresponding parts throughout the several views, the letter A may generally designate the preferred form of invention which includes a bit body B and a blade C in an improved relation. In the modified form of invention D shown in Figures 10 to 16 inclusive there is provided a holder E having an improved blade F associated and assembled in an improved manner to the holder E.

In the form of invention A the holder or body

portion B has a substantially cylindrical shaped main portion 20 provided with an upwardly extending tapered externally screw threaded attaching shank 19. At opposite sides the body 20 is flattened convergently downward to the lower end, and in parallelism between the flattened surfaces 21 the body 20 is provided with a blade receiving slot 22 extending upwardly from the lower end of the holder B and diametrically therethrough from side to side. The shank 19 is of course adapted for assemblage to a drill line in conventional manner.

The slot 22 may be of any depth longitudinally of the body B and it is adapted to receive the upper flattened portion 25 of the fish-tail bit blade C, which may be of somewhat conventional construction in having the lower bit or drilling ends 26 turned in diametrically opposed relation, for well known rotary drilling.

The slot 22 which bifurcates the lower end of the holder B tapers decreasingly in width from the lower end of the holder upwardly, and the top of the slot 22 terminates in a dead end surface 27 which is in a plane normal to the axis of the holder. As will be noted from Figures 3 and 9a of the drawings the bit blade receiving slot 22 of the holder tapers uniformly in width from one side of the holder to the diametrically opposite side. This structural feature is also shown in Figure 2. The slot 22 really bifurcates the lower end of the holder into shank portions 30 and 31. The lower end of the shank 30 is provided with a depending lug 32 to one side of a plane intersecting the axis of the holder normal to the slot 22 and at the opposite side of said plane the lower end of the shank 31 is provided with a similar depending lug or extension 34. These lugs 32 and 34 are adapted to receive the blade C in a metal to metal contact for the purpose of receiving the drilling strains.

The shanks 30 and 31 are transversely apertured in aligning relation as shown in Figure 8 of the drawings and elsewhere, the shank 30 having an opening 36 therethrough and the shank 31 having an internally screw threaded opening 37 therethrough. These openings 36 and 37 are adapted to receive a transverse supporting bolt 38 which has a head 39 accommodated within a countersunk portion of the opening 36. The bolt threads of course screw thread into the threaded opening 37 and the shank 31 is externally recessed at 39^a for receiving the free end of the bolt and a detachable retaining pin 40 of the cotter pin variety, which is assembled in a relation shown in Figure 8 of the drawings. The facing surfaces defining the slot 22 are provided with opposed rectilinear recesses 42 which open at their ends at opposite sides of the slot 22, as is shown in Figure 2.

The flat body 25 of the blade structure C may taper in width from side edge 46 to the opposite edge 47 so that it may have a wedging fit in the transversely tapered slot 22 of the holder. The opposite faces of the body portion 25 of the blade C are provided with pairs of ribs 50 and 51 in aligning relation, with their ends spaced at the vertical center of the blade. Any number of these pairs of ribs 50 and 51 may be provided, but preferably at each side three of the pairs are provided, the lowermost pair being the shortest in length. These ribs slip freely into the rectilinear recesses 42 in the facing walls of the slot 22 to interlock the blade C on the holder B against vertical dropping from the holder, as can readily be understood from Figure 7 of the drawings. These ribs directly interfit in the recesses 42 to prevent the longitudinal disconnection of the holder B and blade C. The blade C centrally of the body portion 25, that is, in the space between the facing ends of the ribs 50 and 51 is provided with a vertically elongated passageway 54 which freely receives therethrough the intermediate portion of the bolt 38. The blade C has the opening 54 vertically elongated to permit the top edge of the blade to engage with a direct metal to metal contact with the surface 27 at the top of the slot 22 when the fused metal is cast in the clearance spaces between the blade and holder; it being understood that the holder and blade are inverted during the casting operation, as will be subsequently mentioned.

The ribs 50 have the marginal edges thereof beveled, or they may be convexly arcuated if desired, so that when interfitting in their respective recesses 42 there are proper clearances to permit the free flowing of the molten metal as it is poured.

In order to prevent the molten metal from pounding out of the clearance spaces during drilling, opposite faces of the body 25 of the blade C are provided with marginal retaining ribs 55 and 56 on each of the faces thereof, which extend substantially from the top edge 57^a of the blade body 25 downwardly along the opposite sides of the blade and near their lower ends are inturned in straight line convergent relation 57 and 58 for the ribs 55 and 56 respectively, and thence horizontally inturned at 59 and 60 respectively, in parallelism with the ribs 50 and 51; said ribs 59 and 60 terminating in end spaced relation centrally of the blade. These rib portions 55 to 60 inclusive have the edges thereof beveled or rounded and they are all of substantially the same length, except that the rib portions at the narrow sides of the blade may be thicker than the other rib portions so as to permit the said rib portions to lie very close to the facing wall surfaces of the holder. It should be noted that the rib portions 59 are relatively wider and thicker than the rib portions 60 and the said rib portions 59 lie directly against the extension 32 or 34 of the holder B, as the case may be. The ribs 59 have a direct metal to metal contact with the extensions 32 and 34 to relieve the fusible cast metal of some of the drilling shocks and strains.

In this manner the major strain of drilling is transmitted from the blade C to the holder. This feature is shown in Figure 9a where the blade is shown as assembled in the slot of the holder, with the latter in inverted position. Under these circumstances there will be a direct metal to metal contact of the blade with the holder at the ribs 59, and also at the top of the slot 22 against the surface 27. If desired the ribs 55 and 57 may also have such direct metal to metal contact with the holder. It is shown in the sectional views of Figures 7 and 8 that medially of the blade C when assembled in the holder there will be clearance passageways into which the molten metal, such as solder or babbitt, which are fusible at lower temperatures than the metal of which the blade and holder are constructed, is poured. This molten metal flows downwardly between the rib portions 59 and 60 and about the ribs 50 and 51 into the passageway 54 surrounding the shank of the bolt 38 and into all of the clearance spaces between the ribs and the facing walls of the recesses 42 in which they fit and

into all of the clearance spaces between the blade C and the walls defining the slot 22 of the holder B, completely filling all of the interstices and voids in the slot 22; the molten metal being prevented from lateral overflow by suitable sealing material placed about the edges of the blade slot.

The improved arrangement for assembling the blade and holder and receiving and maintaining the cast metal in place permits the drill bit blade to be readily removed without melting the fusible filling material. Furthermore, the fusible metal may more readily flow into place to fill all the interstices. The fusible cast metal protects the blade and holds it in place and also supports the blade during reverse. Both the bolts 38 and the interfitting feature of the ribs in the slots 42 prevent any disconnection of the blade from the holder should the solder, babbitt, or whatever fusible plastic metal is used work loose.

In the modified form of invention D shown in Figs. 10 to 16 the holder E is bifurcated at its lower end to provide a slot 70 which extends diametrically across the holder from side to side and upwardly from the lower edge of the holder. The slot 70 may taper both in a direction axially of the holder and from side to side, as is well shown in Figure 11, in accordance with the features above described for the preferred form of invention. The bifurcated end of the holder may be transversely apertured and recessed for receiving the bolt 71 in a manner similar to the construction described in the preferred form of invention. The facing walls of the slot 70 is preferably provided with directly opposed pairs of rectilinear recesses 72, which may taper from end to end to accord with the taper of the slot 70, as shown in Figure 11. These recesses 72 open at both ends of each upon the outer surfaces at diametrically opposed sides of the holder. The slot 70 is furthermore provided at each side thereof with retaining ribs 74 which lies immediately adjacent the outer surfaces of the holder at the sides of the slot, and are also provided with portions 74^a extending inwardly along the lower margins of the wall of the slot but terminating centrally of the slot, which is directly at the axis of the holder. These ribs 74 and 74^a of course project into the slot 70 and close the slot 70 when the blade is assembled therein at the sides of the slot and along the lower portion of the slot except directly at the center of the holder. The blade F has a body portion 80 which is flattened and tapered vertically and transversely in accordance with the construction above described for the preferred form of blade. The body 80 has the blade portions 81 and 82 integrally connected therewith in the usual fish-tail assemblage. On the opposite flat faces of the body 80 there are provided ribs 84 which may be of any approved number, and which are of straight line formation and extend from side edge to opposite side edge of the blade, and are adapted to be received in a loose fitting relation in the recesses 72 of the holder, in the position shown in Figure 14 of the drawings, so that the blade is thus interfitted with the holder to prevent the dropping of the blade from the holder by gravity. The retaining bolt 71 also cooperates to that end. The blade F is provided with the vertically elongated slot 85 for receiving the bolt 71 therethrough in accordance with the same structure above described for the preferred form of invention.

When the blade F is assembled in the slot 70 of the holder D the rib portions 74 and 74^a contact at their faces with the opposite surfaces of the blade F, to prevent, during drilling, the pounding out of the cast metal which fills the voids and clearance between the blade and walls of the holder defining the slot 70.

The molten babbitt, solder, or other metal having a lower fusing temperature than the metal of the blade and holder is poured into the space between the facing ends of the ribs 74^a with the holder and blade inverted and the molten metal readily flows into all of the voids and clearance spaces between the blade and walls defining the slot. There is a direct metal to metal contact of the top of the blade with the top dead surface of the slot 70 of the holder, as shown in the drawings, and preferably the ribs 74 and 74^a have a direct metal to metal contact with the walls of the blade. This is shown in Figure 16, wherein the rib portions 74^a have a direct metal to metal contact with the opposite side of the blade F.

It will be noted from Figures 9, 9*a* and 16 that the holders are provided with water courses which open at the lower end of the holders above the leading sides of the blade portions. These water courses are preferably provided with removable linings 90 of any approved durable material, which is preferably metal. The liner is tubular in form and secured at its ends similar to a boiler tube by peening or welding the said ends at 91 over the outer surfaces at the ends of the holder. This removable water course lining will prevent frequent replacements of the entire holder. It is a well known fact that the water courses are badly cut by sandy mud, and with the present construction it will only be necessary to replace the lining tube.

It will readily be appreciated that either the slot of the holder or the blade which is disposed in the slot may be tapered in thickness from side to side, or both may be tapered. The side retaining ribs interposed in the slots between the blades and walls of the slot not only hold the blade in place to permit the pouring of the molten metal but act as barriers to prevent loss of the cast metal, and furthermore incident to their close relation with the facing surfaces of the holder there will be less strain occurring on the fusible cast metal and thus the latter will be prevented from cracking and pounding out. The ribs in their interfitting relation with the recesses may be either tightly fitted or loosely fitted as necessary or desired.

It is obvious that should it become necessary to drive a blade from its holder, the cast metal can be left upon it and the blade may be driven back into the socket without remelting the fusible cast metal. I also contemplate having several bit blades for a holder which can be successively cast in place in the holder slot and then knocked out. They will then be ready for selective use in the holder, merely by drawing into place.

Various changes in the shape, size, and arrangement of parts may be made to the forms of invention herein shown and described, without departing from the spirit of the invention or the scope of the claims.

I claim:

1. In a drill bit construction the combination of a holder bifurcated at its lower end to provide a transverse slot opening at the bottom and opposite sides of the holder, said transverse slot tapering in width from one side of the holder to the other side, a blade transversely slidable into said slot and movable therein to a direct

engagement with the walls of the slot at the trailing sides of the blade most adjacent to the cutting edges, said blade where it is otherwise disposed within said slot having clearance spaces between the same and the walls of the slot, and a readily fusible shock absorbing metal cast in said clearance spaces.

2. In a drill bit construction the combination of a holder having a slot at the lower end thereof, a blade fitted into said slot and having a direct metal to metal contact with the slot at the trailing sides of said blade, the blade at the opposite sides thereof facing the walls of said slot having clearance spaces, shock absorbing metal cast in said clearance spaces between the walls of the slot and the facing surfaces of said blade itself, said blade having a direct contact at the top thereof with the metal of the holder at the top of said slot, and other means connecting the blade upon the holder against dropping from said slot.

3. In a drill bit construction the combination of a holder having a slot at the lower end thereof, a blade fitted into said slot and having a direct metal to metal contact with the slot at the trailing sides of said blade, the blade at the opposite sides thereof facing the walls of said slot having clearance spaces, shock absorbing metal cast in said clearance spaces between the walls of the slot and the facing surfaces of said blade itself, said blade having a direct contact at the top thereof with the metal of the holder at the top of said slot, and other means connecting the blade upon the holder against dropping from said slot, including an interfitting lug and groove connection of the blade in said slot so that the blade may be slid into the slot from a side of the holder.

4. In a drill bit construction the combination of a holder having a slot at the lower end thereof, a blade fitted into said slot and having a direct metal to metal contact with the slot at the trailing sides of said blade, the blade at the opposite sides thereof facing the walls of said slot having clearance spaces, shock absorbing metal cast in said clearance spaces between the walls of the slot and the facing surfaces of said blade itself, said blade having a direct contact at the top thereof with the metal of the holder at the top or said slot, other means connecting the blade upon the holder against dropping from said slot, including an interfitting lug and groove connection of the blade in said slot so that the blade may be slid into the slot from a side of the holder, and a transverse bolt extending through the holder and blade and intersecting said slot and limiting the transverse sliding movement of the blade into or out of said slot.

5. In a drill bit construction the combination of a holder having a transverse slot opening at the lower end thereof and at opposite sides thereof, a blade having a slot inserting end provided at opposite side surfaces with transversely projecting horizontal ribs, the facing walls of said slot having grooves therein for receiving said ribs with an interfitting connection, said ribs terminated short of the drilling axis of said blade to provide an opening at opposite sides of the blade opening at the bottom of said slot, a retaining barrier at opposite sides of the blade between the walls of the same and the walls of the slot, and a shock absorbing metal cast in the passageway and spaces between said blade and the walls of said slot and surrounding said ribs, said barriers when the blade is assembled in said holder being positioned to prevent pounding out of the metal cast in said slot between the blade and the walls of the slot.

6. As an article of manufacture a blade comprising a holder attaching portion provided on opposite walls thereof with holder connecting projections, and barrier ribs provided on the walls of the holder attaching portion extending adjacently along the side edges of the said portion and around beneath the side projections.

7. In a drill bit construction the combination of a holder having a transverse slot opening at the lower end thereof and at a side thereof, a blade having a slot inserting end provided on the opposite walls thereof with transversely projecting ribs, the facing walls of the slot having grooves therein for receiving said ribs with a loose interfitting connection, retaining barriers in the spaces between the facing walls of the blade and slot at the lateral entrance to the slot, shock absorbing metal cast in said clearance spaces and surrounding said ribs and within the grooves to firmly anchor the blade in the holder, said barriers preventing pounding out of the cast metal during drilling.

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