March 25, 1947. J. FLEISCHER 2,418,021

GUN DRILL

Filed Sept. 19, 1944

Fig. 1.

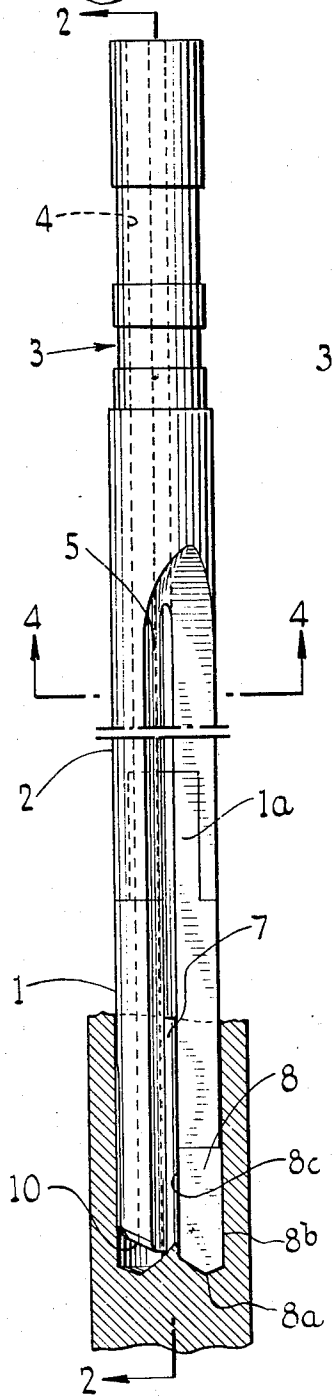



Fig. 2.

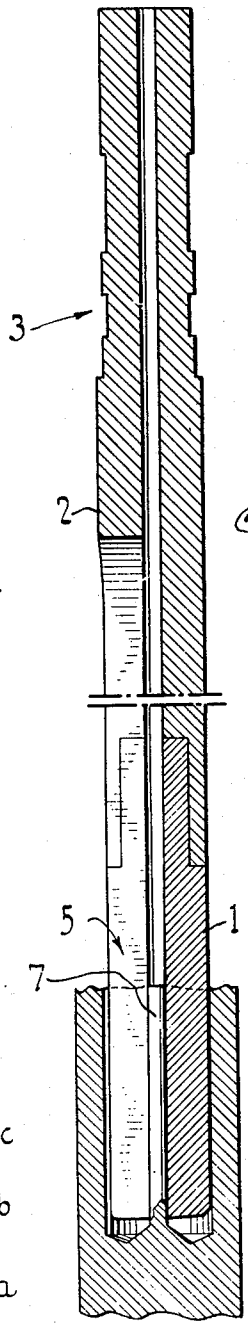



Fig. 5.

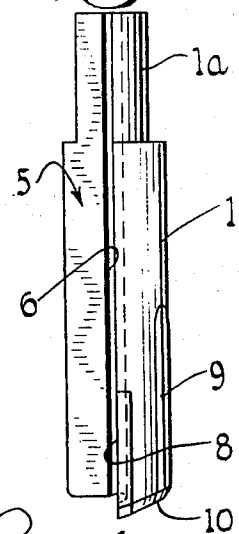



Fig. 4.

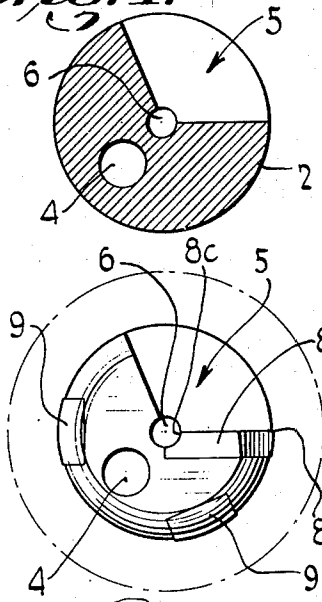



Fig. 3.

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## GUN DRILL

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7 Claims. (Cl. 77—68)

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This invention relates to drills commonly known as gun drills. The drill herein described, however, may be used for the drilling of all elongated hollow bodies, such as, cam shafts, gun or rifle barrels, gears, hollow arbors, and so forth.

In the drilling of elongated hollow bodies, such as the barrels of guns, rifles and the like, considerable difficulty has been experienced in keeping the drilling tool on a straight line as it is fed into the work, and in preventing the tool from chattering or from drifting sidewise during the drilling operation, which would result in the production of a bore with imperfect sidewalls and one which is not straight.

It is the object of the present invention to provide a drill for the drilling of elongated hollow bodies, such as rifle barrels, cam shafts or the like, which is provided with means at its cutting tip to prevent it from moving off center or from chattering or vibrating.

Another object of the invention is to provide a drill of the gun drill type which will automatically provide a centering cut during the drilling operations.

Another object of the invention is to provide a gun drill which will produce a more uniform, smoother bore by which reaming and like finishing operations in connection with the drilling may be eliminated.

Another object of the invention is to provide a drill for drilling gun or rifle barrels or other elongated hollow bodies in which unequal heating of the tungsten carbide tips, usually employed in such drills, is prevented and in which chattering of the drill is prevented so as to avoid breakage of the tungsten carbide tips.

Another object of my invention is to provide a drill for the drilling of elongated hollow bodies, such as gun or rifle barrels or the like, on which tungsten carbide tips may be successfully used without incurring the expense which arises under present practice from the high breakage of tungsten carbide tips when used on drills of this type.

Various other objects and advantages of the invention will appear as this description proceeds.

Referring now to the drawings which illustrate a preferred form of embodiment of the invention:

Figure 1 is a side view partially in section showing my improved drill and the manner of using it;

Figue 2 is a sectional view substantially along the line 2—2 of Figure 1;

Figure 3 is an end view of the drill illustrated in Figure 1;

Figure 4 is a sectional view on the line 4—4 of Figure 1; and

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Figure 5 is a side view of the drill tip when turned approximately 90° from the position illustrated in Figure 1.

As illustrated in Figure 1, the drill consists of the bit or tip 1, having a reduced portion 1*a* suitably secured to a holder portion 2 by welding, copper brazing, or the like, and the holder portion 2 is secured to a shank 3 that is adapted to be inserted in an ordinary drill press or gun drilling machine. A hole 4, which forms a conduit for oil or other lubricant under pressure, extends through the entire drill assembly, and in operation conveys the lubricant to the cutting tip at the end of the drill. A flute 5 extends substantially the entire length of the drill to provide for chip clearance and the center portion of the tip 1 and holder 2 is provided with a circular opening 6 of a considerably smaller diameter than the drill itself.

In the operation of the drill, the circular opening 6 forms a wire or rod 7 from the work being drilled as illustrated at the bottom of Figures 1 and 2. The rod 7 extends from the face of the work throughout the length of the drilled material and forms a centering rod or wire around which the drill rotates. This centering rod or wire 7 is integral with the face of the work being drilled and automatically keeps the drill on a true straight line path and prevents chattering and sidewise drift or deflection. The material left in the centering rod or wire 7 also reduces the amount of metal which it is necessary for the drill to remove in the original operation. At the end of the drilling operation, the wire or rod 7 is automatically severed from the work by the passage of the drill through the end of the barrel being drilled.

The drill bit 1, which is illustrated in end view in Figure 3, is provided with a tungsten carbide or other hardened cutting edge 8, and is preferably also provided with two tungsten carbide inserts 9 along its circumference to promote the cutting and smoothing of the bore of the gun or shaft being drilled.

The primary cutting surface provided by the tungsten carbide member 8, as illustrated in Figure 1, extends from the edge of the center opening 6 of the drill forward to the point 8*a* and then upwardly to where joinder is made with side 8*b* to provide the advance cutting edge, while the side 8*b* serves to cut or cut and ream the inner surface of the gun barrel or other object being drilled. The inner edge 8*c* of the carbide or other hardened cutting tip forms the central rod or wire 7 from the work as the drilling proceeds and thereby

serves to automatically provide a centering and steadying bar around which the drill rotates, the rod 7 being of the same diameter as the center opening 6.

The tip of the drill on the opposite side of the center from the advance cutting edge is ground to a slant 10 substantially coinciding with the slant or rake leading from the center to the advance cutting point 8a, and that portion of the tungsten carbide cutting tip 8, which lies between the advance cutting point 8a and the side 8b, is given a suitable rake or slope as indicated particularly in Figure 1.

The oil or other lubricant flowing through the passage 4 flows into the space provided between the cutting end of the drill and the advance face of the work, and serves to lubricate and cool the cutting edge of the drill and the work, and from the advance face of the drill it flows into the flute 5 and back along this flute to assist in carrying the chips out of the work.

As the tip 8 is performing a cutting operation along the edges 8b and 8c as well as at the advance cutting edge, it tends to heat uniformly from all sides thereby reducing breakage due to ununiform heating where the tip is used to cut only along the advance cutting edge and side cutting edge 8b, and as the drill is kept from chattering by the central rod or guide 7, formed during the drilling operations, strain on the drill, and particularly on the more brittle tungsten carbide cutting edge, is reduced and breakage of the drill and of the harder cutting edge is likewise reduced.

The tip 1 as illustrated in Figure 5 may be readily removed from the shank 2 and a new tip inserted whenever necessary.

While I have illustrated the drill as operating in a vertical position, it will be readily understood that it may be used just as readily in a horizontal or other position and that various modifications and changes may be made from the embodiment illustrated, other cutting materials than tungsten carbide may be used and the tip of the drill can be given different configurations to suit the particular cutting requirements without departing from the spirit of my invention or the scope of the claims thereto.

I claim:

1. In a drill of the type described, an elongated body having a cutting tip thereon, a chip flute extending along said body and cutting tip, said drill having a center opening extending through said body and cutting tip, said opening extending at least the entire length of said flute and cutting depth of said drill, and a cutting edge at the end of said tip extending from the outer circumference of the said tip and terminating at said center opening whereby an undrilled center rod is formed from the work for guiding said drill during a drilling operation.

2. In a drill of the type described, an elongated stem, a cutting tip thereon, a lubricant conduit extending through said stem and cutting tip, a chip flute extending along said stem and cutting tip, said drill having a center opening extending through said stem and cutting tip and communicating with said chip flute, said center opening extending at least the entire length of said flute and cutting depth of the drill, and a cutting edge at the end of said tip extending from the outer circumference of the said tip and terminating at said center opening whereby an undrilled center rod is formed from the work



for guiding said drill during a drilling operation.

3. In a drill of the type described, an elongated drill stem, a cutting tip thereon, a lubricant conduit extending through said stem and cutting tip, a chip flute extending along said stem and cutting tip, said drill having a circular center opening extending through said stem and cutting tip and communicating with said chip flute, said center opening extending at least the entire length of said flute and cutting depth of the drill, and a cutting edge at the end of said tip extending from the outer circumference of the said tip and terminating at said center opening and extending forward from the center opening whereby an undrilled center rod is formed from the work for guiding said drill during a drilling operation.

4. In a drill of the type described, an elongated drill stem, a cutting tip thereon, a chip flute extending along said stem and cutting tip, said drill having a circular center opening extending through said stem and cutting tip and communicating with said chip flute, said center opening extending at least the entire length of said flute and cutting depth of the drill, and a tungsten carbide cutting member at the end of said tip extending from the outer circumference of the said tip and terminating at said center opening and extending forward from the center opening whereby an undrilled center rod is formed from the work for guiding said drill during a drilling operation.

5. In a drill of the type described, an elongated drill stem, a cutting tip thereon, a lubricant conduit extending through said stem and cutting tip, a chip flute extending along said stem and cutting tip, said drill having a circular center opening extending through said stem and cutting tip and communicating with said chip flute, said center opening extending at least the entire length of said flute and cutting depth of the drill, and a tungsten carbide cutting member at the end of said tip extending from the outer circumference of the said tip and terminating at said center opening and extending forward from the center opening, and tungsten carbide inserts along the circumference of said tip opposite the chip flute whereby an undrilled center rod is formed from the work for guiding said drill during a drilling operation.

6. In a drill of the type described, an elongated drill stem, a cutting tip thereon, a lubricant conduit extending through said stem and cutting tip, a chip flute extending along said stem and cutting tip, said drill having a circular center opening extending through said stem and cutting tip and communicating with said chip flute, said center opening extending at least the entire length of said flute and cutting depth of the drill, and a tungsten carbide cutting member at the end of said tip extending from the outer circumference of the said tip and terminating at said center opening and extending forward from the center opening, a rearward slope on said tip on the side opposite said tungsten carbide cutting member, and tungsten carbide inserts along the circumference of said tip opposite the chip flute whereby an undrilled center rod is formed from the work for guiding said drill during a drilling operation.

7. A drill tip of the type described having a lubricant conduit extending through said tip, a chip flute extending along said tip, said tip having a circular center opening extending through

said tip and communicating with said chip flute, said center opening extending at least the entire length of said flute and cutting depth of the drill, a tungsten carbide cutting member at the end of said tip extending from the outer circumference of the said tip and terminating at said center opening and extending forward from the center opening whereby an undrilled center rod is formed from the work for guiding said drill during a drilling operation, and means to secure said tip on a drill stem.

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