

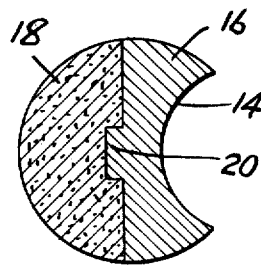
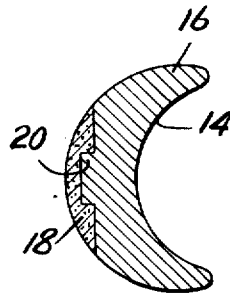
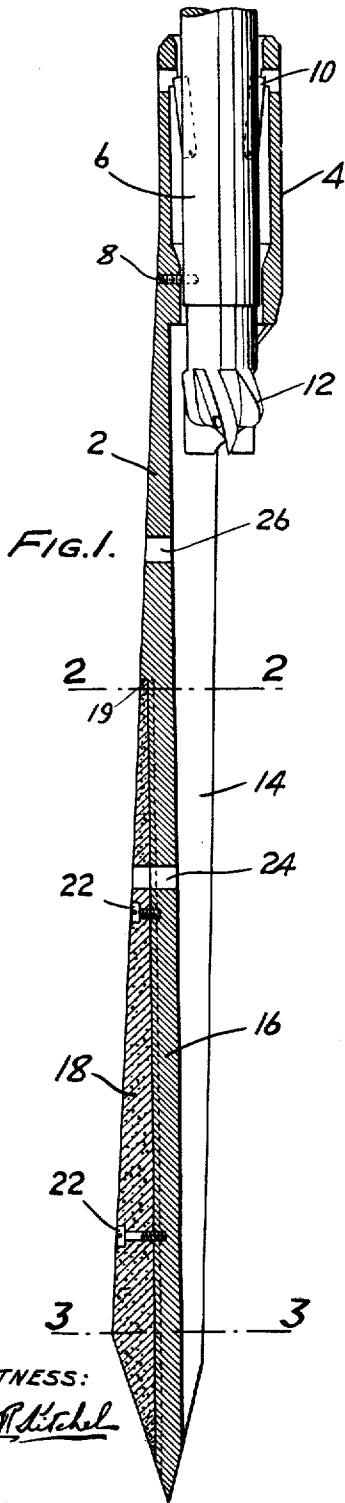
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WHIPSTOCK

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WHIPSTOCK

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4 Claims. (Cl. 255—1.6)

This invention relates to a whipstock and has particular reference to features of a whipstock enabling it to be readily removed from a hole.

A whipstock inherently involves a construction providing an enlargement of its lower portion in comparison with its upper portion as a necessary incident to the provision of a surface designed to deflect a drilling bit laterally of the axis of a hole. The result of this is that the whipstock is subject to becoming very tightly wedged in a hole, resisting attempts to remove it therefrom following the drilling of a deflected rat hole.

The primary object of the present invention is to provide a whipstock functioning in its deflection operations in the conventional fashion, but being adapted to be readily removed from the hole despite caving in of the hole or some other condition which would normally strongly resist whipstock removal.

This and other objects of the invention will become apparent from the following description, read in conjunction with the accompanying drawing, in which:

Figure 1 is a vertical sectional view showing the improved type of whipstock in association with the lower end of a drill stem;

Figure 2 is a transverse section taken on the plane indicated at 2—2 in Figure 1; and

Figure 3 is a transverse section taken on the plane indicated at 3—3 in Figure 1.

The whipstock comprises a metallic body portion 2 surmounted by a conventional type of collar, indicated at 4, secured to the lower end of the drill stem 6 by means of a shear pin 8 of the usual type. The lower end of the drill stem in the present instance is shown as carrying a bit 12 and as consisting of a retrieving sub arrangement provided with whipstock collar engaging dogs, indicated at 10, which may be selectively operated either to effect withdrawal of the whipstock from the hole with the drill stem or withdrawal of the drill stem without the whipstock, as may be desired. Such arrangements for the retrieving of a whipstock are illustrated in Kothny Patents 2,107,420 and 2,234,438, and in Kothny application Serial No. 366,113, filed November 18, 1940.

The whipstock in the present instance is illustrated as having the configuration described in the reissue patent to Keever No. 20,398, dated June 8, 1937, though it is obvious that the invention may be applied to other forms of whipstocks as well. The Keever whipstock is characterized by the fact that the groove 14 for guiding the bit is substantially axially aligned with

the drill stem as the assembly is made up, whereas in other whipstocks the guiding groove is at an angle with the axis of the drill stem and the back of the whipstock is approximately in line with the drill stem axis. In accordance with the present invention, the lower end of the whipstock, which is enlarged from the top toward the bottom, is made in two sections, one of these, 16, being a metallic continuation of the upper portion of the whipstock and the other, 18, being formed of some relatively readily drillable material secured to the metal portion 16 by the shear pins 22, also of relatively soft or drillable material. The upper end of the section 18 preferably abuts a shoulder 19 on the metal section as indicated.

The backing material 18 may comprise any one of a very large number of compositions which will readily occur to those skilled in the art. It may, for example, consist of a thermoplastic or thermosetting resin composition, of a phenol-formaldehyde or any other suitable type, or of wood, but the preferred material is a composition of asbestos fiber and cement of the type commonly used for the formation of non-metallic sheets or piping. This material, while it can be easily drilled up by a drilling bit, has a quite high compression strength and is quite resistant to breakage or chipping by the application of blows or shocks. It is consequently well adapted to resist the shocks and abrasion incident to the lowering of a whipstock into a bore hole. Furthermore, it does not disintegrate upon prolonged exposure to water and mud and will, therefore, stand up if for any reason the whipstock must remain in the hole for an extended period.

While this material is cited as a preferred one, it will be evident that the material used may even comprise concrete, a soft metal or a composition such as concrete containing metallic reinforcing if the metal used is a soft one such as copper or brass or some lead or tin composition. However, considerations of expense point to a composition such as that described above.

The pins 22 may be formed of brass or other readily shearable metal, and should be sufficiently soft to be easily drilled up if they remain in the hole after removal of the whipstock.

The metallic portion 16 of the whipstock preferably presents a cross-section which at least does not substantially increase in area from the top to the bottom. Desirably the design is such that this metal portion 16 has a constant or decreasing cross-sectional area from top to bottom. The usual wedge adapted to hold the whipstock

against turning after it is forced into the earth at the bottom of the hole is provided at the lower end of the metal portion 16. A keying ridge 20 is also desirably provided on the metal portion 16 to be embraced by the non-metallic or weaker portion 18 of the whipstock to prevent this portion of the whipstock from being twisted off the metallic portion during the drilling operation. Openings 24 and 26 may be provided through the whipstock to serve for the passage of rods to support the same at the surface during initial assembly.

In the operation of this whipstock, it is lowered into the hole and, after orientation, forced into the earth in the usual fashion. During the lowering the shoulder 19 will prevent the backing section 18 from being sheared off. Drilling may thereafter proceed in conventional manner to form a rat hole.

Generally, after completion of the drilling and when an attempt is made to remove the whipstock through the use of the retrieving sub, it will come out of the hole without difficulty, and in such case, the invention does not come into play, because the backing portion 18 of the whipstock will come up with its main metallic body portion 16. However, if the whipstock becomes stuck through the pressure of the walls of the hole against it, as soon as sufficient upward force is applied to overcome the shearing strength of the pins 22, the metallic portion 16 will be withdrawn, leaving the wedge shaped portion 18 in the hole. The withdrawal of the portion 16 after the shearing of the pins presents no difficulty, since there is no enlargement of its lower portion tending to hold it in the hole by any wedging action and, in fact, if there is a slight reduction of the cross-section toward the bottom, a lateral pressure would tend to aid rather than obstruct its removal. Removal will be easy even if the lower portion of 16 be somewhat greater in cross-section than the upper portion thereof, provided the major enlargement of the lower part of the whipstock is primarily due to the backing portion 18. All that is required is that the separation of the backing portion from the metal portion leaves substantially less possibility of seizure of the metal portion than that occurring in the case of the whipstock as a whole.

If removal occurs as just described, the backing portion 18, as well as parts of the shear pins 22, will remain in the hole. When drilling is resumed, however, this debris will be readily drilled up and is completely unobjectionable. Upon removal of the portions of the shear pins which may still remain in the metallic portion of the whipstock, another backing portion 18 may be secured thereto through the medium of new pins 22. Since the expensive portions of the whipstock are represented primarily by the part 16 and the structure of the collar, and the backing portion 18 and pins are quite inexpensive, it will be evident that the whipstock may be used over and over again with no substantial

danger of its ever becoming lost in the hole. The loss of actual value of the whipstock, however, is not generally a major consideration, but rather the desirability of avoiding loss is, for the greater part, dictated by the necessity for an expensive fishing operation to remove from the hole a whipstock which has become wedged therein, since the steel of which the whipstock is formed cannot be drilled up. The present invention accordingly not only substantially insures against the loss of the value of the whipstock, but also against the cost of an expensive and time-consuming fishing job.

It will be evident that the principles of the invention may be embodied in other specific ways without departing from the scope of the invention.

What I claim and desire to protect by Letters Patent is:

1. A whipstock comprising a metallic portion having a tool guiding face, a portion backing said metallic portion formed primarily of non-metallic readily drillable material, and means releasably securing said portion together, the enlargement of the lower portion of the whipstock in comparison with the upper portion thereof being primarily due to said backing portion so that when the latter is freed from the metallic portion the metallic portion may be readily withdrawn from a hole.

2. A whipstock comprising a metallic portion having a tool guiding face, a portion backing said metallic portion formed primarily of readily drillable material, and means releasably securing said portions together, the enlargement of the lower portion of the whipstock in comparison with the upper portion thereof being primarily due to said backing portion so that when the latter is freed from the metallic portion the metallic portion may be readily withdrawn from a hole.

3. A whipstock comprising a metallic portion having a tool guiding face, and a portion backing said metallic portion formed primarily of non-metallic readily drillable material, and secured to said metallic portion by at least one shear pin, the enlargement of the lower portion of the whipstock in comparison with the upper portion thereof being primarily due to said backing portion so that when the latter is freed from the metallic portion the metallic portion may be readily withdrawn from a hole.

4. A whipstock comprising a metallic portion having a tool guiding face, and a portion backing said metallic portion formed primarily of readily drillable material, and secured to said metallic portion by at least one shear pin, the enlargement of the lower portion thereof being primarily due to said backing portion so that when the latter is freed from the metallic portion the metallic portion may be readily withdrawn from a hole.

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