

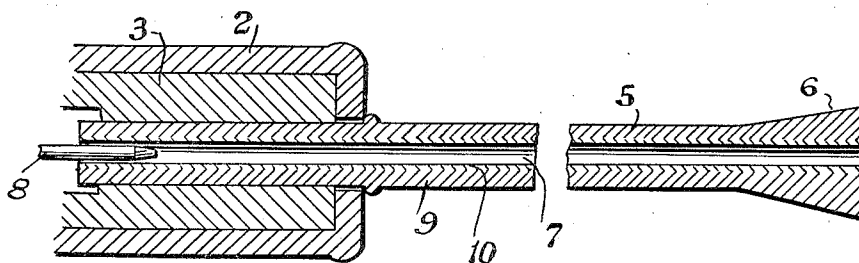
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HOLLOW DRILL STEEL

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UNITED STATES PATENT OFFICE.

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HOLLOW DRILL STEEL.

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The present invention relates to percussive rock drill tools and steel bars for making the same, having a longitudinal bore through which fluid is conveyed into the hole drilled by the tool.

When such hollow steel is put to use for drilling rock it develops transverse fractures which start from the bore. There seems to be little doubt that such fractures originate from pittings in the bore surface; these pittings leading to hair cracks in the steel, which under vibratory stress, develop into fractures.

It has been suggested that the pittings from which the hair cracks arise are those produced in the manufacture of the steel either as the result of drilling the billet from which the steel is rolled or by the indentations of the bore surface by the grains of the sand which is often used as a core to maintain the bore while the steel is being rolled. As the result of this belief steps have been taken to eliminate tool marks from the bore before rolling; and processes have been devised to prevent indentations of the inner surface of the steel by the material used as a core during the drawing down of the billet to form the hollow bar. For instance, in the sand core process, the sand or like material has been used in a very finely ground state; also the sand core has been enclosed in a copper or other metallic tube inserted into the bore so that when the steel is rolled down the grains of the core material indent not the steel but said tube, which is usually left in the finished steel. In other cases the core has been formed of solid copper which is withdrawn from the finished steel and leaves the bore thereof smooth.

My investigations, however, have indicated that the cracks in question originate to a large extent, and probably entirely, from pittings produced by corrosion of the bore surface by the water which is passed through the bore for cleaning the drilled hole and which is frequently acid. Such pitting by corrosion is intensified and hastened in the case of steel made by the sand core process, by the presence of the indentations produced by the sand grains, as above described.

The present invention accordingly consists in obviating or minimizing corrosion of the internal surface of rock drill steel by

water passing through the bore, and thereby preventing or diminishing transverse fracturing of the steel.

To this end the bore may be formed with a surface specially resistant to corrosion by the water or other fluid employed for cleaning the hole. Said surface may be of a permanent character and such as to remain intact when the steel and the rock drills formed from it are heated and subjected to the usual process of forging, hardening and welding.

Among the materials suitable for forming such a permanent surface are substantially pure iron, non-corroding metals such as nickel, and non-corroding ferrous alloys such as the aluminium and chromium alloys.

Numerous methods are available for producing a skin of the nature indicated on the wall of the bore either during or after the manufacture of the hollow rods. Substances which themselves are non-corroding or which form non-corroding alloys with the iron may be added by such means as electroplating, calorizing or the like. Again, a skin of substantially pure iron may be derived from the steel itself by chemical treatment or by de-carbonizing the heated steel surface by a current of air or oxygen. In appropriate cases substances employed for these purposes may be added to the core material before the steel is rolled.

In another method a tube of appropriate material such as pure iron or alloy is incorporated in the steel, preferably before the steel is rolled down. For example, the steel billet from which the hollow bar is to be rolled may be cast around a tube of pure iron or alloy; or around a rod which is subsequently drilled out to form a tube.

Instead of the surfaces of a permanent nature above described, there may be employed coatings of a less permanent and more easily renewable character such as coatings of varnish, paint and the like. Such a coating is applied after the rock drill has been forged and is renewed when necessary, for instance, after each subsequent forging of the tool.

The invention is illustrated in the accompanying drawing which shows a longitudinal section of the forward end of a hammer drill fitted with a tool made according to

the invention. 2 indicates the forward end of the drill casing, containing the rotatable chuck 3. In said chuck is inserted the tool comprising the shank 4 the stem 5 and the cutting end 6. Said tool has an axial bore 7 to which water is delivered by an axial tube 8.

The body 9 of the tool is made of the regular drill steel. Within this is the inner layer 10 which surrounds the bore 7 and is made of non-corroding metal closely united to the steel 9.

I claim:

1. Hollow rock drill steel having the sur-

face of the bore through the steel formed of non-corroding material.

2. Hollow rock drill steel having the surface of the bore through the steel formed of material other than tool steel, said material being permanently united to the steel, non-corroding, and such as to remain intact when the steel is heated and shaped for forging.

3. Hollow rock drill steel comprising a main body of tool steel and a core of non-corroding ferrous alloy providing the surface of the bore through the steel.

In testimony whereof I affix my signature.

LESLIE PRYCE.