May 9, 1933. A. MEUTSCH 1,908,161

COAL CUTTING CHISEL WITH HARD METAL CUTTING EDGE

Filed Aug. 20, 1930

Fig. 1

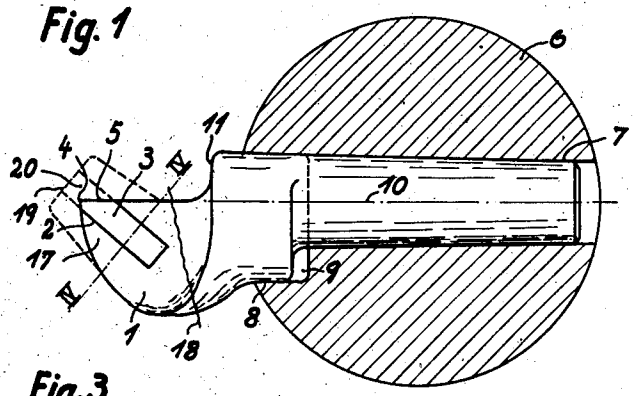


Fig. 2

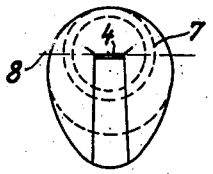


Fig. 3

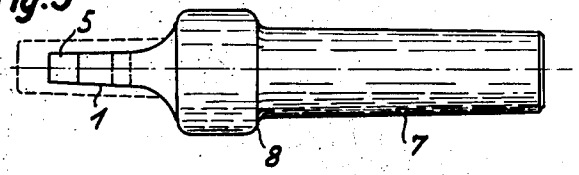
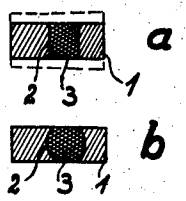


Fig. 4



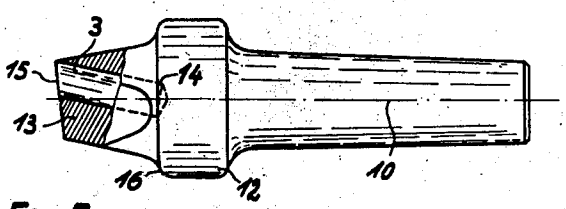


Fig. 5

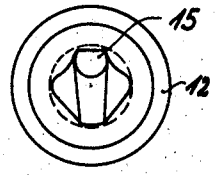


Fig. 6

Fig. 7

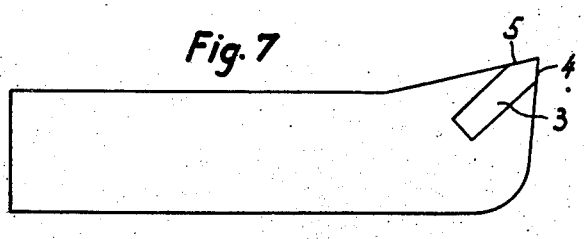
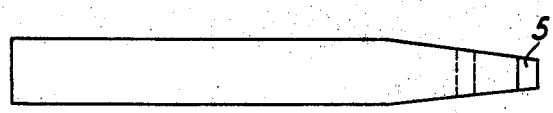


Fig. 8



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Patented May 9, 1933 1,908,161

UNITED STATES PATENT OFFICE

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COAL-CUTTING CHISEL WITH HARD METAL CUTTING EDGE

Application filed August 20, 1930, Serial No. 476,473, and in Germany May 6, 1930.

The present invention relates to picks for coal-cutting machines provided with inserted hard metal cutting-edges to keep sharp longer, and particularly to picks employed in coal-cutting machines of the bar and chain type. In view of the extraordinary stresses to which picks for coal-cutting machines are subjected by impact and breaking effects due to inequalities in the structure of the material to be cut, and especially to pipes or funnels of iron pyrites embedded therein, it was hitherto impossible to secure durably hard metal pieces to the coal-cutting chisel, because they were merely put on and soldered in the manner adopted for ordinary tools. Even if a lateral wall of the chisel was left standing to enlarge the soldering area, the damaging results of the impact and breaking action could not be overcome.

The invention provides a useful coal-cutting chisel with inserted hard metal cutting-edge by inserting the latter in the chisel member so that it is supported relative to both the cutting pressure and the tilting moments produced thereby. The efficiency of the new coal-cutting pick is increased further by providing means for keeping the pick always in proper cutting position.

Several embodiments of the new invention are illustrated in the accompanying drawing, in which:—

Figure 1 is a side-view of a pick for a coal-cutting machine of the bar type, in which the hard metal piece is received by a milled groove.

Figure 2 is a front-view thereof.

Figure 3 is a top-view thereof.

Figures 4*a* and 4*b* disclose a section on the line IV—IV, of Fig. 1, seen from above, with two different forms of cross-section of the hard metal piece.

Figure 5 is a side-view, partly in section, of a pick for a coal-cutting machine of the bar type, in which the hard metal piece is arranged in a bore of the pick.

Figure 6 is a front-view thereof.

Figure 7 is a side-view of a pick for a coal cutting machine of the chain type and

Figure 8 is a top-view thereof.

In the modification shown in Fig. 1 the coal-cutting chisel is flattened on both sides of its front end 1 and provided with a continuous milled groove 2 inclined towards the longitudinal direction of the pick and adapted to receive the hard metal piece 3 so that the front upper end thereof remains free to serve as cutting-edge, the free front surface 4 of the hard metal piece being kept consideraby smaller than the upper surface 5 in order to provide a suffciently broad cutting surface 5 in connection with a sufficient support by the front portion of the chisel. The components of cutting pressure are fully supported and, furthermore, the tilting moments acting approximately in the direction of the arrow and endangering the connection of the hard metal piece with the chisel are safely taken up by the overlapping chisel portion. The cross-section of the slot 2 may be rectangular (Fig. 4*a*), though it is preferred to give it the form shown in Fig. 4*b* where it is broader in the centre than on the sides so as to protect the hard metal piece against any lateral stresses also. Particularly preferred is the rounded or circular form of cross-section, which avoids sharp corners favouring the formation of cracks owing to continuous strain and permits convenient production of the slot as a bore.

Owing to the considerably increased stressing of the coal-cutting pick due to the use of hard metal as cutting-edge, special and ample provision must be made for preventing the coal-cutting pick inserted in the bar 6 by means of an ordinary conical bolt 7 from moving. In the modification according to Fig. 1 the cross-cutting pick is thus provided with an eccentric projection 8 which fits into a corresponding clearance 9 in the bar 6. As the eccentricity of the projection is directed downwardly, the moment of resistance of the pick relative to the bending stresses of the cutting pressure is simultaneously increased to a considerable extent.

Furthermore, provision is made also for preventing as much as possible the development of torsional stresses during cutting by disposing the edge 5 of the hard metal piece on a plane extending within or below the axis 10 of the bolt 7. To return the coal-cutting

pick if moved out of its correct turning position by extraordinary strain, the flattened sides of the front chisel portion 1 are kept almost parallel. As the chisel portion 1 is located below the axis 10 of the bolt, the pick will be brought back into proper working position in the extraordinary cases referred to by the co-operation of the flat chisel portion and the cut in the coal or stone.

The type described permits the elimination of another drawback of the known kinds of of tools, which has to do with frequent damaging of the hard metal piece or of the front portions of the chisel when the coal-cutting pick is knocked into the bar 6. Since the cutting portions are lowered, it is possible to provide the pick with a broad striking surface 11 which excludes any possibility of damaging the cutting parts when driving in the chisel.

In the modification shown in Figs. 5 and 6 the simplified production of the coal-cutting pick is emphasized, the front chisel portion 13, which has the form of a bilaterally flattened truncated cone projecting from the collar 12, being provided with a prismatic or cylindrical bore 14 wherein the prismatic or cylindrical hard metal piece 3 is soldered. The hard metal piece is thus inserted in the pick in such a way that, with the exception of one end surface, it is surrounded on all sides by the chisel to which it can be soldered everywhere so that the connection cannot be severed even by any transverse stresses. The conical shape of the chisel portion 13 permits convenient removal of the chisel metal during regrinding of the edge 15, as the chisel cone can be handled like the wood of a lead pencil. As the slope of the chisel cone corresponds approximately to the inclination of the hard metal piece 3, the height of the supporting chisel portion being in front never varies in spite of regrinding. This modification may be provided also with an eccentric projection 8 (Fig. 1), and in a corresponding construction of the front chisel portion the cutting-edge may be disposed, as in Fig. 1, on a plane extending along or below the axis 10 of the bolt.

The collar 12 serves further for facilitating the attachment and removal of the pick. The front face 16 of the collar 12 is kept broad enough to permit a pipe to be put thereon during driving in. The transition from the surface 16 to the chisel portion is hollowed out considerably to prevent the formation of cracks which would surely develop, owing to high continuous strains, if the transition were sharp-cornered.

The modification according to Figs. 7 and 8 relating to coal-cutting pick of prismatic cross-section for a coal-cutting machine of the chain type discloses an attachment of the hard metal body 3 similar to the modification according to Fig. 1, and the form of cross-section in particular may be chosen according to Fig. 4b.

Picks as described cannot be utilized up to the limit of efficiency of their hard metal cutting edges, since the great stresses which the insertions will withstand, owing to the peculiar described arrangement, exceed the strength of the chisel itself. Particularly the chisel metal taking up the components of cutting pressure is exposed to such great unit pressure as to be forced away when cutting pressure is at its highest. Furthermore, in the portion of the pick projecting from the bar or chain in the coal-cutting machine excessive bending strains are produced by the blows during the cutting operation, and the grinding effect due to the cross-feed of the pick acts destructively on the lateral surfaces of the latter so that the bearing strength of the pick head is reduced quickly.

As to the form of invention shown in Fig. 1, under increased strain the pick portion 17 positioned under the hard metal portion will be forced away, the pick break off within the zone indicated by the line 18 or the side surfaces ground off rapidly.

These drawbacks are eliminated by hardening the surface layer of the pick metal supporting the hard metal insertion and of the pick portion chiefly exposed to bending and grinding so that the surface pressure available for supporting the hard metal insertion is sufficiently large and, on the other hand, sufficient toughness of the pick relative to impacts and ample resistance to grinding are insured.

It was hitherto impossible to provide a hardened body portion for picks, since oxidation processes and quenching, in view of the high hardening temperatures, had a crushing or generally damaging effect upon the hard metal portion. However, the damaging effects of high hardening temperatures are eliminated by the described universal embedding of the hard metal insertion and by the hardening and production processes described below, and a useful hardened coal cutting pick with hard metal insertion is produced possessing superior efficiency compared with unhardened ones.

In order to make it possible to harden the pick provided with a hard metal insertion, the swaged blank, as indicated by the hatched lines Figs. 1, 3 and 4, is overdimensioned in its front portion so as to universally enclose the hard metal piece after the clearance 2 has been milled or drilled while its upper end is disposed somewhat below the opening 19 of the clearance 2. The hard metal piece may be provided with its final working surfaces already at the time when it is introduced from above, and when the copper solder is poured in, the hollow space 20 formed in this manner is filled with copper solder to such an extent that the hard metal piece is

surrounded on all sides by a protecting cover and, if the pick is exposed to higher hardening temperatures and quenched, no damaging influences can affect the hard metal piece 3.

After the hardening process, which, in order to form a tough core to increase resistance to impact stresses, is preferably carried on within a surface layer measuring some millimetres, the superfluous portions in front of the chisel and of the solder are removed until the chisel has the form indicated by the full lines, and the cutting edge and perhaps the side surfaces of the hard metal piece are exposed.

What is claimed is:—

1. In a coal cutting pick with hard metal cutting edge a recessed front pick portion, a staff-like hard metal piece inserted in said front pick portion and fastened to it by soldering, and metal parts of said front pick portion completely overhanging the foremost boundary surface of the hard metal piece adapted to support the tilting forces produced by the cutting pressure.

2. In a coal-cutting pick with hard metal cutting edge, a recessed front pick portion, and a staff-like hard metal piece inserted in the said front pick portion and fastened to it by soldering, the recess being inclined towards the longitudinal direction of the pick and adapted to receive the said hard metal piece so as to leave a cutting edge free on the front upper end thereof.

3. In a coal-cutting pick with hard metal cutting edge, a recessed front pick portion, and a staff-like hard metal piece inserted in the said front pick portion and fastened to it by soldering, the recess being inclined towards the longitudinal direction of the pick and adapted to receive the said hard metal piece so as to leave a cutting edge free on the front upper end thereof and being wider in cross-section in the center than on the sides for protecting the said hard metal piece against lateral stresses.

4. In a coal-cutting pick with hard metal cutting edge, a pick front portion, a boring in the said front portion inclined towards the longitudinal direction of the pick, and a cylindrical staff-like hard metal piece inserted in the boring and fastened to the pick by soldering, the said hard metal piece being covered on all sides by the pick metal with the exception of the upper front end surface.

5. In a coal-cutting pick, a hard metal piece, and a front pick portion having a recess for receiving the said hard metal piece, the recess being inclined towards the axis of the body of the pick and the supporting portion of the pick extending correspondingly parallel therewith and maintaining approximately the same height during regrinding of the front portion of the pick.

6. In a coal-cutting pick, a front pick portion having the shape of a truncated cone, and a hard metal piece inserted in the said pick, the truncated cone shape of the said pick facilitating removal of the pick metal during regrinding while maintaining the universal support of the hard metal piece.

7. In a coal-cutting machine, a pick, a bar for inserting the pick therein, a bolt for holding the pick, and a cutting edge on the said pick disposed on a plane extending below the axis of the said bolt to prevent the development of torsional moments.

8. In a coal-cutting machine, a pick, a bolt thereon, and the flattened sides of the front portion of the said pick located below the axis of the bolt being almost parallel and downwardly extended to push back, in cooperation with the cutting groove in the coal, the pick into correct turning position if displaced by extraordinary strains.

9. In a coal-cutting machine, a pick and a collar attached to the pick, the collar having an annular front driving face extending through a flute into the front pick portion.

10. A coal-cutting pick comprising a hard metal insertion connected to the pick metal by soldering and surface-hardened pick portions, the said pick portions supporting the hard metal insertion and being exposed to bending and grinding stresses to insure ample unit pressure for supporting the said hard metal insertion, sufficient toughness of the pick relative to impact stresses, and ample resistance to grinding stresses.

11. In a coal cutting machine a pick, a bar for inserting the pick therein, a bolt for holding the pick, a projection on the bolt in the form of a cylindrical disc having a greater diameter than the bolt and the axis of which is disposed below the axis of the bolt, and a cylindrical recess in the bar fitting over the said projection.

The foregoing specification signed at Cologne, Germany this 1st day of August 1930.

ADOLF MEUTSCH.