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(12) # EUROPEAN PATENT SPECIFICATION

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(54) **Cutting tool for a mining machine.**

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DE-A- 2 618 335
DE-A- 3 315 624
DE-A- 3 439 508
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Description

BACKGROUND OF THE INVENTION

This invention relates to cutting tools for use in mining machines of the kind which are used to cut a variety of soft materials such as coal.

One such cutting tool comprises a holding lug and a cutting insert secured in a bore or socket in one end of the lug. The cutting insert may be made of a wear-resistant material such as cemented carbide. Alternatively, the cutting insert may comprise an elongate pin one end of which has secured to it an abrasive compact which provides a cutting edge for the insert.

A plurality of these cutting tools (also known as picks) are positioned on a working surface, for example, the surface of a drum, and moved in a cutting direction against the face of the material to be cut. The cutting action is a slicing action in which the cutting insert is subjected to stress only when it is in contact with the material being cut. In other words, the cutting insert is subjected to alternate conditions of stress and non-stress.

Examples of cutting tools of this type are described in US-A-4,655,508 and US-A-4,678,237.

DE-A-3 439 508 relates to a mounting for a ploughing, shearing or bottom blade in coal-mining machines, having a blade body consisting of a blade head and a blade shank, wherein the blade shank is held by means of positive engagement in a blade pocket carried by the coal-mining machine. The blade shank is designed as a rectangular body, widening conically from its upper end towards its lower end and widening conically from its forward end to its rearward end. A receiving space, rectangular in longitudinal section and vertical section, is provided in the blade pocket, the inside dimensions of which space correspond to the larger dimensions of the blade shank. The blade pocket has in the ends holes the diameter of which is greater than the width of the receiving space. A circumferential wall region of the hole is in alignment with one longitudinal wall of the receiving space and, in the opposite longitudinal wall of the receiving space, the mutually aligned circumferential regions of the holes have in the end walls a sector-shaped recess. A fixing wedge is provided, the rear side of which is matched to the sector of the recess, while the front side of the fixing wedge is of flat design and has a wedge angle which corresponds to the inclination of the wall of the blade shank as seen in the longitudinal direction of the latter.

The invention is concerned with the cutting tools for mining machines of a type different to those discussed above. In particular the cutting tools are for machines which are used to cut soft to brittle coals in a gouging-type action. Such cutting tools comprise an elongate body, a formation projecting from one side of the elongate body for securing the tool to a movable surface of a machine, and a working surface at one end of the body. That working surface has secured in it a cutting insert made of cemented carbide. Cemented carbide has the disadvantage that it wears relatively quickly and also can give rise to sparking which is dangerous in a coal mining environment. With these machines, the cutting insert is always in contact with the material being cut and thus always under stress when in use.

SUMMARY OF THE INVENTION

According to the invention there is provided a cutting tool for a mining machine as defined in Claim 1.

DESCRIPTION OF THE DRAWINGS

Figure 1 illustrates a perspective view of a first embodiment of the invention; and

Figure 2 illustrates the working end of another embodiment of the invention.

DETAILED DESCRIPTION OF THE INVENTION

The cutting edge is preferably provided in two sections at an angle to each other, each section being coincident with the outer edge of the planar portion in which the abrasive compact is located. The two sections may both be straight or one may be straight and the other curved.

The abrasive compact will preferably be bonded to a cemented carbide support to form a composite abrasive compact. The composite abrasive compact will be located in the recess and bonded to the body through the cemented carbide support. Bonding of the compact or the composite abrasive compact may be achieved by means of a suitable high strength braze.

Examples of abrasive compacts and composite abrasive compacts are described in US-A-3,745,623, US-A-3,743,489 and GB-A-1,489,130.

Two embodiments of the invention will now be described with reference to the accompanying drawings. Referring to Figure 1, the cutting tool comprises an elongate body 10 having a formation 12 integrally formed therewith and projecting from one side 14 thereof. The body 10 has a first end 16 which provides a working planar surface 18 for the cutting tool and an opposite end 20. The working surface 18 has a recess 22 formed therein. This recess extends inward from an outer edge 24 of the planar working surface 18.

Located in the recess is a composite abrasive compact comprising an abrasive compact 26 bonded to a cemented carbide support 28. The cemented carbide support is bonded to the body 10 by means of a suitable high strength braze. The exposed outer edge of the abrasive compact is in two sections, a curved section 30 and a linear section 32. Both sections are coincident with the outer edge 24 of the planar working surface 18. This exposed outer edge of the abrasive compact provides the cutting edge for the tool.

The top planar surface of the abrasive compact 26 lies in the same plane as the planar working surface 18.

Figure 2 illustrates an alternative embodiment and like parts carry like numerals. The configuration of the planar working surface 18 and the configuration and shape of the composite abrasive compact varies.

The composite abrasive compact is preferably a composite diamond abrasive compact. Such composite compacts are well known in the art.

Each of the cutting tools illustrated above may be suitably mounted in a mining machine of the type which is used to cut soft to brittle coals in a gouging-type action. In use, the cutting edges of the abrasive compacts of the tools will maintain constant contact with the material being cut. Typically, the tool is caused to traverse this material at a rate of 6 metres/second or more. The cutting tool ploughs its way through the coal dislodging it from the surface in which it is embedded in a scraping action. Because the cutting edge is provided by abrasive compact, the wear is much less than with a cemented carbide cutting edge, which due to the high cutting speed will tend to become blunt at a much earlier stage. In contrast, the compact edge remains sharp resulting in a more efficient cutting operation and reduced incidence of spark ignition. Further it has been found that the tendency for the cutting inserts, i.e. the composite abrasive compacts, to be dislodged in use is substantially reduced.

The interlocking configuration illustrated generally by the numeral 34 is believed to assist in this regard.

Claims

1. A cutting tool for a mining machine comprising:
   (i) an elongate body (10) having a working end (16) and an opposite end (20);
   (ii) a formation (12) projecting to one side of the elongate body (10) intermediate the ends (16) (20) and adapted to engage a complemental formation in the mining machine;
   (iii) the working end (16) of the body having an essentially planar portion (18) extending from an outer edge (24) of that end;
   (iv) a recess (22) formed in the planar portion which extends into the body from the outer edge (24); characterised in that:
   (v) an abrasive compact (26) is located in the recess and bonded to the body (10);
   (vi) said abrasive compact (26) has a leading edge (30) (32) which defines a cutting edge for the tool and a rear edge in the same plane as the cutting edge (30) (32) and bonded to the body;
   (vii) the rear edge of said abrasive compact (26) has a recess (34) formed therein into which the planar portion (18) extends; and
   (viii) said cutting edge consists of two sections (30) (32) being at an angle to each other and connected to each other through a discontinuity, each section being coincident with the outer edge (24) of the planar portion (18) in which the abrasive compact (26) is located.

2. A cutting tool according to Claim 1 wherein the two sections (30) (32) of the cutting edge are both straight.

3. A cutting tool according to Claim 1 wherein one section (32) of the cutting edge is straight and the other section (30) is curved.

4. A cutting tool according to any one of the preceding Claims wherein the top exposed surface of the abrasive compact is planar and lies substantially in the same plane as that of the planar portion (18) of the body (10) in which it is located.

5. A cutting tool according to any one of the preceding Claims wherein the abrasive compact is bonded to a cemented carbide support (28).

Patentansprüche

1. Schneidwerkzeug für eine Bergbaumaschine, mit:
   (i) einem länglichen Körper (10) mit einem Arbeitsende (16) und einem gegenüberliegenden Ende (20);
   (ii) einer zu einer Seite des länglichen Körpers (10) zwischen den Enden (16)(20) herausragenden Formation, die zum Zusammengreifen mit einer komplementären Formation in der Bergbaumaschine ausgestaltet ist;

(iii) wobei das Arbeitsende (16) des Körpers einen im wesentlichen planaren Bereich (18) aufweist, der sich von einer Außenkante (24) dieses Endes erstreckt;
(iv) wobei in dem planaren Bereich eine Ausnehmung (22) ausgebildet ist, die sich von der Außenkante (24) aus in den Körper hinein erstreckt; dadurch gekennzeichnet, daß:
(v) ein Abrasivkompakt (26) in der Ausnehmung angeordnet ist und mit dem Körper (10) verbondet ist;
(vi) der Abrasivkompakt (26) eine Vorderkante (30)(32), die eine Schneidkante für das Werkzeug bildet, sowie eine Hinterkante aufweist, die in derselben Ebene wie die Schneidkante (30)(32) angeordnet und mit dem Körper verbondet ist;
(vii) die Hinterkante des Abrasivkompaktes (26) eine Ausnehmung (34) aufweist, in die der planare Bereich (18) hineinragt; und
(viii) die Schneidkante aus zwei Abschnitten (30)(32) besteht, die unter einem Winkel zueinander angeordnet und durch eine Diskontinuität miteinander verbunden sind, wobei jeder Abschnitt mit der Außenkante (24) des planaren Bereiches (18), in dem sich der Abrasivkompakt (26) befindet, zusammentrifft.

2. Schneidwerkzeug nach Anspruch 1, bei dem die beiden Abschnitte (30)(32) der Schneidkante beide gerade sind.

3. Schneidwerkzeug nach Anspruch 1, bei dem ein Abschnitt (32) der Schneidkante gerade und der andere Abschnitt (30) gebogen ist.

4. Schneidwerkzeug nach einem der vorhergehenden Ansprüche, bei dem die obere freiliegende Fläche des Abrasivkompaktes planar ist und im wesentlichen in derselben Ebene liegt wie diejenige des planaren Bereichs (18) des Körpers (10), in dem er sich befindet.

5. Schneidwerkzeug nach einem der vorhergehenden Ansprüche, bei dem der Abrasivkompakt mit einer Hartmetallunterlage (28) verbondet ist.

Revendications

1. Outil de coupe ou de taille pour une machine d'abattage dans les mines comprenant :
(i) un corps allongé (10 avec une extrémité de travail (16) et une extrémité opposée (20) ;
(ii) une formation (12) faisant saillie sur un côté du corps allongé (10) entre les extrémités (10, 20) et pouvant s'engager dans une formation complémentaire de la machine d'abattage ;
(iii) l'extrémité de travail (16) du corps présentant une portion sensiblement plane (18) s'étendant à partir d'un bord extérieur (24) de cette extrémité ;
(iv) un évidement (22) formé dans la portion planaire qui s'étend jusque dans le corps à partir du bord extérieur (24) ;
caractérisé en ce que :
(v) un corps compact abrasif (26) est situé dans l'évidement et il est lié sur le corps (10) ;
(vi) le corps abrasif (26) présente un bord d'attaque (30, 32) qui définit un bord de coupe ou de taille pour l'outil et un bord arrière dans le même plan que l'outil de coupe (30, 32) et il est lié sur le corps ;
(vii) le bord arrière du corps compact abrasif (26) présente un évidement (34) ménagé dans celui-ci dans lequel s'étend la portion plane (18) ; et
(viii) ce bord de coupe consiste en deux sections (30, 32) situées à un certain angle entre elles et qui sont reliées par une discontinuité, chaque section coïncidant avec le bord externe (24) de la portion plane (18) dans laquelle est situé le corps compact abrasif (26).

2. Outil de coupe selon la revendication 1, dans lequel les deux sections (30, 32) du bord de coupe sont droites.

3. Outil de coupe selon la revendication 1, dans lequel une section (32) du bord de coupe est droite et l'autre section (30) est courbe.

4. Outil de coupe selon l'une quelconque des revendications précédentes, dans lequel la surface de dessus exposée du corps compact abrasif est plane et se situe sensiblement dans le même plan que celui de la portion plane (18) du corps (10) où elle est située.

5. Outil de coupe selon l'une quelconque des revendications précédentes, dans lequel le corps compact abrasif est lié sur un support en carbure cémenté (28).

FIG. 1

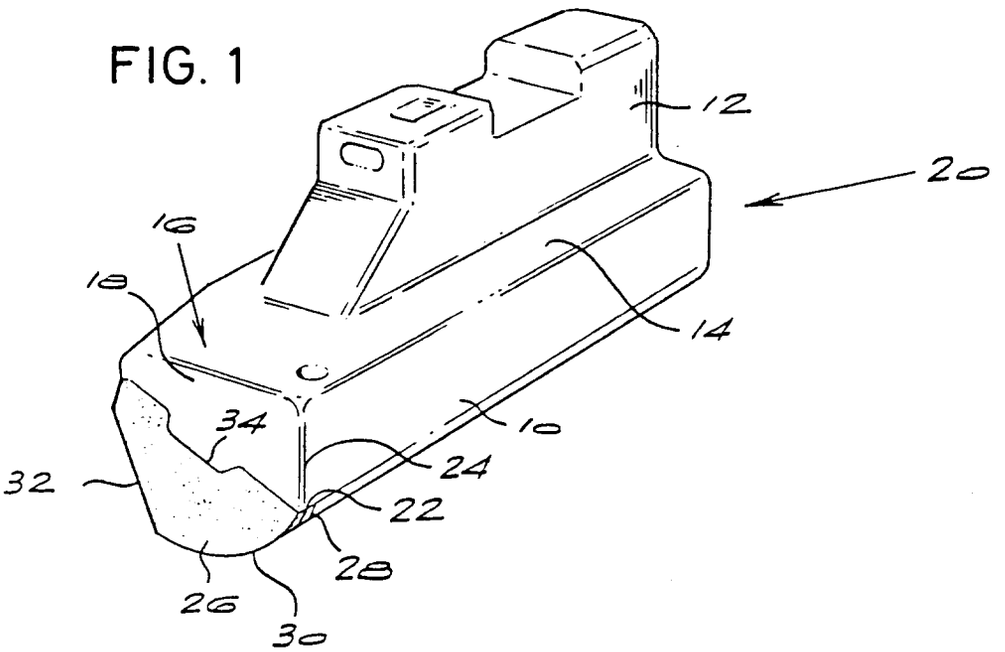

FIG. 2