Nov. 6, 1956 J. F. JOY 2,769,628

MINING MACHINE CUTTER BIT

Filed Oct. 28, 1948

Fig. 1.

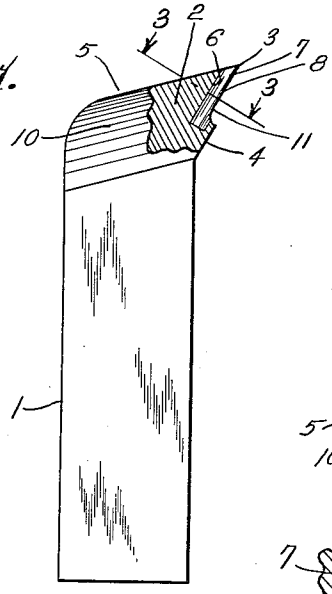


Fig. 2.

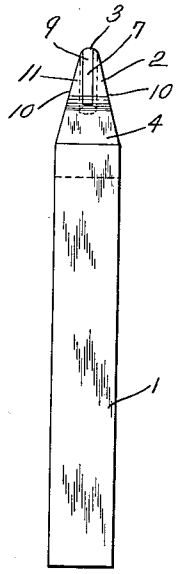


Fig. 3.

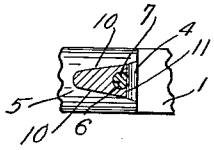


Fig. 4.

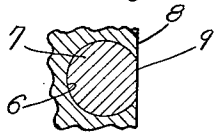


Fig. 5.

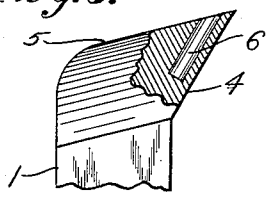


Fig. 6.

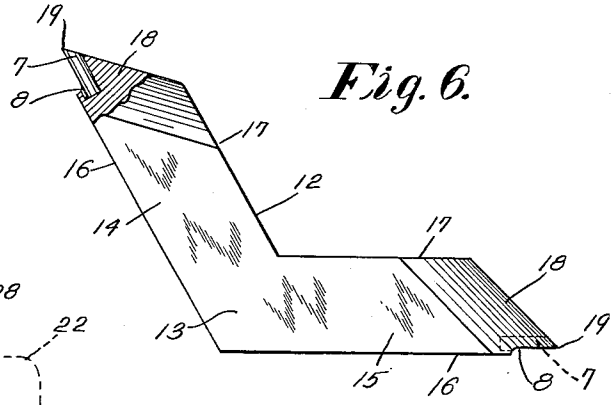
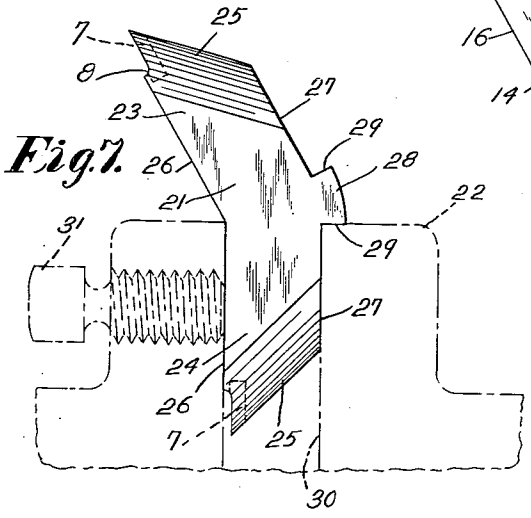


Fig. 7.



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MINING MACHINE CUTTER BIT

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4 Claims. (Cl. 262—33)

This invention relates to cutter bits and more particularly to a cutter bit especially designed for use with mining machines.

In cutter bits, and especially those used with the cutter chains of coal cutting machines, it has become common practice to place hard metal inserts in the cutting points to increase the resistance to wear. Such hard metal inserts, which are usually composed of tungsten carbide, are usually secured, as by silver soldering or brazing, in recesses in the bit points, and considerable difficulty has been encountered in the proper securing of the inserts in place. Even with such hard metal inserts, it has been found necessary to resharpen the cutting points by grinding at intervals and difficulty has also been encountered in the provision of adequate support for the inserts while attaining the desired cutting clearances. The present invention contemplates improvements over known types of cutter bits in that the hard metal inserts are secured in place in the bit points and adequately supported in an improved manner, thereby providing a cutter bit having a self-sharpening characteristic and improved wearing qualities, resulting in longer bit life. The hard metal inserts in the cutting point of the cutter bit of the present invention are secured in place and the cutting point is formed by a novel method. In certain embodiments the cutter bit has two cutting points and is reversible.

An object of the present invention is to provide an improved cutter bit. Another object is to provide an improved cutter bit especially designed for use with the cutter chain of a coal cutting machine. A further object is to provide an improved cutter bit having a hard metal insert set in a novel manner in the cutting point for improving the wearing qualities of the bit. A still further object is to provide an improved cutter bit having a self-sharpening cutting point. Yet another object is to provide an improved cutter bit having a cutting point of wear resisting material and formed in a novel manner. Other objects and advantages of the invention will, however, hereinafter more fully appear.

In the accompanying drawing there are shown for purposes of illustration one form and two modifications thereof which the invention may assume in practice.

In this drawing:

Fig. 1 is a side elevational view, partially in central longitudinal section, of a cutter bit constructed in accordance with an illustrative embodiment of the invention.

Fig. 2 is a front elevational view of the cutter bit shown in Fig. 1.

Fig. 3 is a detail sectional view taken on the plane of line 3—3 of Fig. 1.

Fig. 4 is an enlarged fragmentary sectional view taken on the plane of Fig. 3 showing the hard metal insert and the manner of holding the same in position on the cutting point of the bit.

Fig. 5 is a fragmentary view, partially in side elevation in section, showing the cutter bit in a step of partial completion.

Fig. 6 is a side elevational view, with a portion in section, illustrating a modified form of cutter bit.

Fig. 7 is a side elevational view illustrating another modified form of cutter bit with the bit shown in operative relation with respect to a conventional chain block.

First referring to the form of the invention shown in

Figs. 1 to 5, inclusive, it will be noted that the cutter bit has a conventional rectangular shank **1** adapted for reception in a socket of a chain block of a conventional cutter chain, and formed integral with the shank at the outer end of the bit is an outwardly and forwardly tapered cutting portion **2** providing a cutting point or tip **3**. The cutting portion **2** has a plane front face **4** extending forwardly and outwardly obliquely with respect to the bit shank, and an outer end surface **5** recedes from the cutting point. The cutting bit may be formed from a blank which may be forged or otherwise formed, and in Fig. 5 the partially formed cutting portion of the bit is shown at a step subsequent to the blank forging operation and prior to completion of the cutting point. After the blank forming operation, a recess herein a hole or bore **6** is suitably formed as by drilling in the cutting portion **2** with the hole axis in parallelism with the oblique front face **4** of the cutting portion with its front wall in adjacency to the front face. A hard metal insert **7** of cylindrical form and desirably composed of tungsten carbide is inserted in the hole **6** with its inner end resting firmly on the hole bottom, and is secured in the hole as by silver soldering, brazing or otherwise in a well known manner. The front face **4** of the cutting portion is then suitably cut away at **8**, as by grinding, throughout a substantial portion of the length of the face, and by this cutting away operation the front wall of the bore is removed a substantial portion of its length and circumferentially through an arc of substantially 60° so that the front side of the insert throughout a substantial portion of its length is exposed. Thus a longitudinal slot-like opening is provided lengthwise of the bore-walls, while retaining a sufficient wall-area firmly to hold the insert against forward lateral release from the bore. Preferably, during this cutting away or grinding operation, the front face of the insert is flattened at **9** and the plane face thus provided extends to the cutting tip. The outer end surface **5** of the bit portion **2** may then be finished, as by grinding or otherwise, to provide a slightly rounded outer edge which may taper slightly rearwardly from the front cutting face of the bit point. The cutting portion **2** also has relatively inclined plane side surfaces **10** (Figs. 2 and 3) which slightly taper rearwardly and inwardly with respect to the front cutting face **11** of the bit point to provide the desired cutting clearance. By cutting away the front wall of the bore **6** in which the insert is secured, a narrow forward portion of the front face of the insert is exposed while the insert is firmly held against forward lateral release from the bore, and by the novel arrangement disclosed a self-sharpening characteristic is provided so that as the outer edge and side walls of the cutting point wear away a new portion of the hard metal insert is exposed to the work.

In the modification shown in Fig. 6, the novel cutting point construction of the form above described is embodied in a double ended reversible cutter bit **12** having a body **13** formed with relatively inclined arm portions **14** and **15** arranged at an obtuse angle. These arm portions have plane parallel front and rear surfaces **16** and **17** which intersect along parallel lines lying in a plane bisecting the bit body at the apex of the angle. These parallel surfaces terminate in the cutting portions **18** which provide cutting points or tips **19** at the opposite extremities of the bit. The cutting portions are formed in the same manner as the cutting portion of the first embodiment and have the same self-sharpening characteristic and improved wear resisting qualities. By setting the cutting points inwardly of the plane faces **16** of the bit body in the manner shown, the inactive cutting point is protected from engagement with the bit support or block socket walls when the bit is secured in cutting position on its support or block.

In the modified embodiment shown in Fig. 7, the improved cutting portions of the embodiments above de-

scribed are shown embodied in a double ended reversible cutter bit 21 which is designed for use with a conventional chain block shown in broken lines at 22 of a cutting machine cutter chain. The cutter bit has a body formed with relatively inclined portions 23 and 24 which at their outer portions support the improved cutting points or tips 25. These cutting portions have parallel front and rear plane surfaces 26 and 27, and projecting rearwardly from the rear surfaces at the apex of the angle is an abutment 28 provided with opposed abutment surfaces 29, 29. The cutting points of the bit of this embodiment are formed in the same manner as in the embodiments above described, and the hard metal cutting points are set inwardly with respect to the front faces 26 in the manner similar to the embodiment shown in Fig. 6. The chain block 22 has a right angle socket 30 for receiving the inactive cutting portion of the bit, and a usual set screw 31 engages the front surface 26 of the inactive portion to hold the rear surface 27 thereof against the rear socket wall. The abutment 28 rests on the outer surface of the chain block and serves to limit inward movement of the bit in the socket, thereby to provide a predetermined bit gauge.

In the several embodiments described above, the hard metal inserts are so set in the cutting portions of the bit and are so shaped that as the cutting point or tip wears away, self-sharpening of the cutting point occurs due to wearing away of the metal at the outer ends and sides of the cutting portion of the bit to expose a new portion of the hard metal insert which provides the cutting point or tip. By grinding the point surfaces at intervals the cutting point may be readily reshaped to keep it in its most effective cutting condition. By this method of manufacture, the hard metal insert is firmly held in position in the cutting portion of the bit. In the two modified embodiments, when one cutting point becomes dull or unduly worn, the bit may be reversed end for end with respect to its support or block, thereby to present a sharp cutting point to the work. The grinding away of the front face of the cutting portion results in a setting back of the hard metal cutting point with respect to the front face of the bit, thereby serving to protect the insert from injury when the bit is secured in position on its support or block. In the embodiment last described, not only may the bit be readily reversed when one point becomes dull, but also a predetermined bit gauge is provided. The cutter bit of the several embodiments is not only simple in design, but is also extremely rugged, well adapted to meet the demands of service. Other advantages of the invention will be clearly apparent to those skilled in the art.

While there are in this application specifically described one form and two modifications which the invention may assume in practice, it will be understood that these forms and mode of practice are shown for purposes of illustration and that the invention may be further modified and embodied in various other forms without departing from its spirit or the scope of the appended claims.

What I claim as new and desire to secure by Letters Patent is:

1. A cutter bit comprising a bit body having a shank and an integral outer end portion providing a plane front face disposed at a substantial angle with respect to the longitudinal axis of the shank and a receding outer surface, said front face and said receding outer surface converging forwardly at the bit point, said end portion having a hole of uniform circular cross section formed therein close to and in parallelism with said front face with the forward side of said hole opening outwardly through said plane front face to provide a narrow slot extending to the bit point, said hole opening outwardly through said receding outer surface, a hard metallic insert of generally cylindrical pluglike form received and secured by bonding in said hole, said slot being of less width than the diameter of said insert and said insert having a flattened front surface coextensive with said slot, said flattened surface lying flush with said front face and extending to the bit point to provide a wear-resisting cutting tip.

2. A cutter bit comprising a bit body having a shank and an integral outer end portion provided with a plane front face obliquely disposed with respect to the longitudinal axis of said shank and a receding outer surface, said front face and said receding outer surface converging forwardly at the bit point, a recess of uniform cross section formed in said end portion in parallelism with said front face with said recess opening forwardly through said front face along a substantial portion of the length of said recess to provide a narrow slot of less width than the width of said recess, said recess opening outwardly through said receding outer surface, and a hard metal insert of pluglike form received and secured by bonding in said recess and having a plane narrow front surface lying between the sides of said narrow slot and said front flattened surface extending outwardly to said bit point to provide a wear-resisting cutting tip.

3. A cutter bit comprising a bit body having an outer end cutting portion provided with an oblique front plane face and a receding outer surface, a hole of uniform circular cross section formed in said outer portion in parallelism with and in adjacency to said front face with the front wall of said hole opening forwardly through said front face along a substantial portion of its length to provide a narrow slot of less width than the diameter of said hole, said hole opening outwardly through said receding outer surface, and a hard metal insert of generally cylindrical pluglike form received and secured by bonding in said hole, said insert having a plane front face extending between the sides of said slot substantially coextensive with said slot, said plane front face of said insert lying flush with said plane front face of said outer portion and extending to the cutting point to provide a wear-resisting cutting tip.

4. A cutter bit comprising a body having a forwardly and outwardly projecting outer end cutting portion providing a cutting point, a bore of uniform circular cross section formed in said cutting portion from its outer end surface with said bore opening through the front side of said cutting portion to provide a narrow slot extending outwardly to the cutting point and of less width than the diameter of said bore, said slot extending into the front wall of said bore circumferentially through an arc of substantially 60°, and a hard metal insert of cylindrical pluglike form received and secured by bonding in said bore and having a narrow front portion exposed by said slot, said bore retaining sufficient wall-area for firmly holding said insert against displacement from said bore and said insert extending outwardly to the cutting point of the bit to provide a wear-resisting cutting tip.

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