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W. F. BOCK
RENEWABLE CUTTER FOR QUARRY DRILLS

2,545,913

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FIG. 1

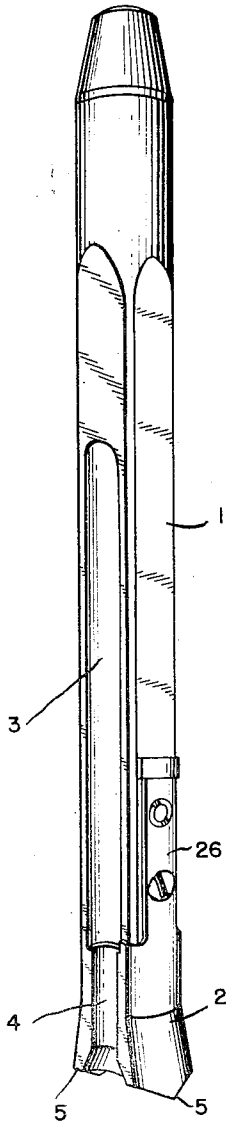


FIG. 2

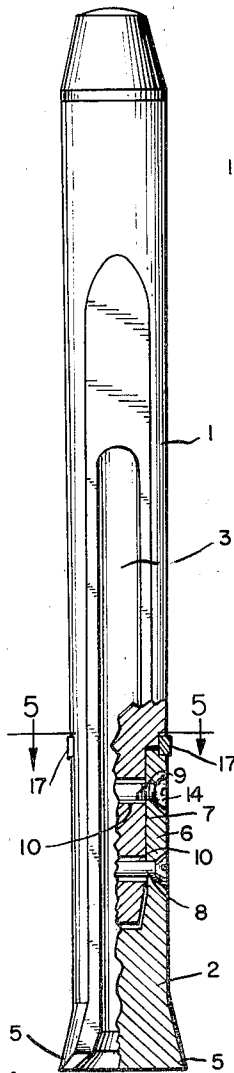


FIG. 5

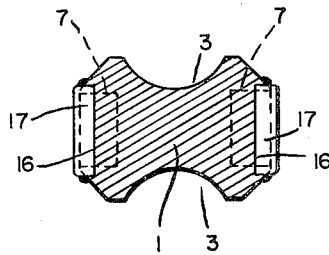


FIG. 3

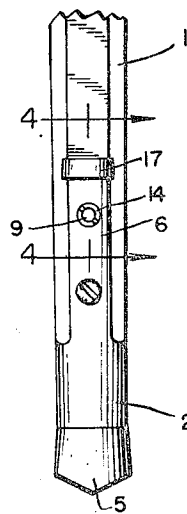
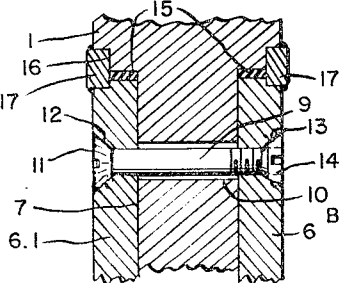


FIG. 4



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RENEWABLE CUTTER FOR QUARRY DRILLS

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4 Claims. (Cl. 255—61)

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This invention relates to rock drills for quarrying operations and particularly to improvements in removable and renewable cutters for such drills.

The main objects of this invention are to provide an improved cutter and bit construction for use in heavy drilling operations; to provide an improved removable cutter for quarry drill bits; to provide such a device that has substantially the same strength as the usual solid one-piece bit and drill construction; to provide an improved cutter for quarry bits that can be quickly and easily detached and replaced without handling or removing the bit itself; to provide such a device, for heavy quarry drills, that can be readily manipulated by one man; and to provide such a device that can be resharpened repeatedly until worn out without affecting or deteriorating the heavier and more costly bit.

Other important objects are to provide an improved detachable cutter construction that will relieve the bit of much of the shock arising from heavy rock drilling operations; to provide such a cutter that will have a stronger attachment or connection to the bit; and to provide an improved detachable cutter construction that will effectively prevent dirt or rock dust from working into the cutter and bit connection.

A specific embodiment of this invention is shown in the accompanying drawings in which:

Figure 1 is a perspective view in elevation, of the improved quarry drill.

Fig. 2 is a view of the same, partly in section, to show the improved attachment of the cutter to the bit.

Fig. 3 is a fragmentary view taken from one side of Fig. 2.

Fig. 4 is an enlarged fragmentary view, in section, as taken on line 4—4 of Fig. 3, and

Fig. 5 is a sectional view as taken on line 5—5 of Fig. 2.

In the form shown in the drawings, the improved drill comprises an elongate bit 1, which conforms to the shank portion of the ordinary drill, and a cutter 2 detachably mounted on the lower or working end of the bit. The bit may be of any suitable shape, in section, and is usually made with flattened sides, an opposing pair of which are fluted as at 3 in order to reduce the weight of the bit as much as possible without detracting from the sectional strength required for the drilling load.

The cutter 2 is made in the usual form in as far as the teeth or cutting portions are concerned, but is of relatively short length com-

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pared with the length of the bit 1, as shown in Fig. 1, and is constructed to fit endwise on the lower end, or base, of the bit so as to form a flush continuation thereof. Also, the sides of the cutter, aligned with the fluted portions 3 of the bit, are likewise fluted as at 4 so that the toothed cutting end of the cutter presents a pair of oppositely diverging teeth 5. On the toothed sides of the cutter, a pair of parallel upwardly extending fingers 6 and 6.1 are provided for attachment of the cutter to the bit 1 and these fingers are arranged to fit squarely and snugly in the slots 7 formed in the flat or unfluted sides of the bit at its lower end. Thus the fingers 6 and 6.1 being slidably engaged in the slots 7, serve to hold the cutter fast and squarely on the end of the bit so that the cutter must turn with the bit, as an operative unit, when the latter is rotated.

As shown in the drawings, the cutter 2 is fastened to the bit 1 by a pair of bolts 8 and 9 which extend through the fingers 6 and 6.1 from side to side of the bit through a pair of holes 10 formed in the lower end of the bit. As shown in Fig. 2, the holes 10 are slightly larger in diameter than the mounting bolts 8 and 9 and each of the mounting bolts has threaded engagement with an opposite cutter finger respectively so that the bolts extend in opposite directions relative to each other.

For example, as shown in Fig. 4, the mounting bolt 9 is formed with an integral head 11 on one end that is tapered to fit into a similarly tapered countersink 12 in the finger 6.1, and the opposite end of the bolt 9 is threaded and engages in an appropriately tapped hole in the finger 6. The head 11 of the bolt 9 is arranged to seat into the countersink 12 so that the head will be flush with the outer surface of the finger 6.1 and the length of the bolt is such that its threaded end will extend into a tapered countersink 13 in the outer face of the finger 6, but not beyond. A tapered nut 14 is then screwed onto the threaded end of the bolt 9 and seated in the countersink 13, the nut 14 being of such thickness that it will seat flush with the outer surface of the finger 6, or slightly below the same.

The lower bolt 8 is of the same construction except that it extends through a countersunk hole in the finger 6 and is threaded into a tapped and countersunk hole in the finger 6.1. Thus, each of the mounting bolts is threaded into a respective opposite cutter finger with its tapered head frictionally engaging and pulling on the opposite finger thereby causing the fingers 6

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and 6.1 to clampingly engage in the slots 7 and against the body of the lower end of the bit 1.

As shown, the fingers 6 and 6.1 of the cutter 2 are of slightly less length than the length of the slots 7, leaving a small clearance between the end of the fingers and the ends, or shoulders, of the slots 7 in which a live rubber packing 15 may be inserted to seal the ends of the fingers against the entrance of dirt or ground rock into the slots. Also, a transversely extending step 16 is formed at the end of the channel 7 and a recoil plate 17 made of mild steel or iron is secured in this step, as by welding or brazing. The recoil plate extends from side to side of the slot 7 and is sufficiently wider than the step 16 so as to overhang the end or shoulder of the slot and engage the end portion of the respective cutter finger. As shown, the end portion of each finger is cut away on its outer side to form a step to receive the overhanging portion of the plate 17. The purpose of this relatively soft recoil plate is to yieldably absorb any shock imparted to the toothed end of the cutter and prevent the full force of such shock being transmitted to the body of the bit, thereby minimizing possibility of the bit being fractured. The recoil plate 17 also serves to substantially close the opening between the ends of the channel 7 and the end of the cutter fingers and the rubber packing 15 serves to further seal that opening and prevent the entrance of powdered rock or dirt behind the fingers.

In the operation of installing or removing the improved cutter it is only necessary to use a tool for tightening or unscrewing the bolts 8 and 9 and their respective nuts. The cutter itself is easily handled by one man and is installed by merely entering the fingers endwise into the slots of the bit and then sliding the cutter axially of the bit until the bolt openings are aligned. For removal, the bolts are first removed and then the cutter is allowed to drop away from the bit.

The main advantages of this invention reside in the solid, tight engagement of the removable cutter on the end of the bit whereby the cutter cannot work loose or in any way turn on the bit so as to become lost; and in the construction whereby one man may quickly and easily remove and change the cutters of heavy duty quarry drills with only the use of a relatively small light weight tool instead of the heavy ponderous tools ordinarily required.

Other advantages lie in the fact that the invention permits the use of the highest quality of cutter steels, since the extra cost is confined to the cutter, while the much larger and heavier bit may be made of the usual less costly metals. Further advantages are found in that the improved cutter can be more easily and quickly sharpened, because the weight of the bit does not have to be handled; and in the fact that the cutter may be resharpened repeatedly until it is completely worn out, without in any way causing deterioration of the bit which, being separate from the cutter, may be used indefinitely.

Although but one specific embodiment of this invention is herein shown and described, it will be understood that details of the construction shown may be altered or omitted without departing from the spirit of the invention as defined by the following claims.

I claim:

1. A quarry drill comprising a bit and a solid one-piece cutter disposed on the end of said bit,

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said bit having a pair of oppositely positioned longitudinal slots extending from its end and each terminating in a shoulder substantially normal to the bit axis, a pair of integral axially extending fingers on said cutter fitted squarely into said slots endwise, the ends of said fingers substantially abutting said shoulders, resilient packing means disposed transversely across the end of each slot against the shoulder thereof and abutting the end of the respective finger, and peripherally disposed shock means integral on the body of said bit and overhanging each of said shoulders for retaining said packing means, said last named means engaging the respective finger endwise and being relatively softer than the material of said bit, said bit having a pair of axially spaced openings there-through extending between said slots, each of said fingers having spaced openings aligned with the openings in said bit and said finger openings each having a tapered countersink at its outer end, a securing member extending through each set of said aligned openings and having an inwardly tapered head at one end seated in the respective countersink of one finger flush with the outer surface thereof and having its other end in threaded engagement with the respective opening in the opposite finger, and a tapered nut threaded on the said other end of each securing member and seated in the respective finger countersink flush with the outer surface thereof, said securing members extending in opposite directions relative to each other.

2. A quarry drill comprising a bit and a solid cutter disposed on the end of said bit, said bit having a pair of oppositely disposed longitudinal slots extending a predetermined distance inwardly from its end, a pair of axially extending fingers on said cutter fitted endwise in said slots in tight sliding engagement therewith, a shock plate of material relatively softer than the material of said bit disposed transversely across and overhanging the inner end of each slot in abutment endwise with the respective finger, a resilient packing disposed at the end of each slot behind the shock plate and engaging the ends of the respective finger, said bit having a transverse bore extending between said slots, said fingers each having an opening aligned with the bore in said bit, one of said finger openings being countersunk from its outer end and the other finger opening being countersunk from its outer end and internally threaded, a headed securing member extending through said one finger opening and the bore in said bit with its head seated flush in the countersink of said one finger opening and its opposite end in threaded engagement with the other finger opening, and a lock nut seated in the countersink of the other finger opening flush with the respective finger surface and in tight threaded engagement with said securing member.

3. A rock drill comprising a bit and a solid cutter disposed on the end of said bit, said bit having a pair of oppositely disposed longitudinal slots extending a predetermined distance inwardly from its end, a pair of axially extending fingers on said cutter fitted endwise and snugly in said slots, said fingers extending substantially to the ends of the respective slots, a shock plate of material relatively softer than the material of said bit disposed transversely across and overhanging the inner end of each slot in spaced relation with the bottom thereof, each shock plate being in abutment with an end portion

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of the respective finger, a resilient packing disposed at the end of each slot behind the respective shock plate and in engagement with the end of the respective finger, said bit and said fingers having aligned openings extending transversely therethrough, and a removable securing member extending between said fingers and through said aligned openings, said securing member having its ends flush with the outer surface of said fingers.

4. A rock drill comprising a bit and a solid cutter disposed on the end of said bit, said bit having a pair of oppositely disposed longitudinal slots extending a predetermined distance inwardly from its end, a pair of axially extending fingers on said cutter fitted endwise and tightly in said slots and extending substantially to the ends thereof, said fingers having their outer surfaces flush with the outer surface of said bit, a step on the outer side of each finger adjacent the end thereof, a shock plate of material relatively softer than the material of said bit disposed transversely across the inner end of each slot in spaced relation with the bottom thereof and in abutment with the step at the end portion of the respective finger, a resilient packing disposed at the end of each slot behind the respective shock plate and in engagement with the end of the respective finger, said bit having

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a transverse bore extending between said slots and said fingers each having an opening countersunk at its outer end aligned with the bore in said bit, and a removable securing member extending between said fingers through the bore in said bit, said securing member having an enlarged portion at each end seated tightly in the countersunk opening of the respective finger and flush with the outer surface thereof.

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REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
360,838	Yarlot	Apr. 5, 1887
881,709	O'Leary	Mar. 10, 1908
1,064,618	Craig	June 10, 1913
1,532,371	Brunson et al.	Apr. 7, 1925
1,571,871	Smith	Feb. 2, 1926
1,647,670	Sipe	Nov. 1, 1927
1,941,289	Bedford	Dec. 26, 1933

FOREIGN PATENTS

Number	Country	Date
453,798	France	Apr. 12, 1913