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Crosby

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[54] **ROTARY MINING TOOL RETAINING STRUCTURE**

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[52] **U.S. Cl.** ..... **299/86**, 37/142 A, 175/354, 299/92, 403/165, 40/289

[51] **Int. Cl.** **E21c 35/18**

[58] **Field of Search** ..... 299/86, 92; 403/165, 289; 175/354, 413; 37/142 A

[56] **References Cited**

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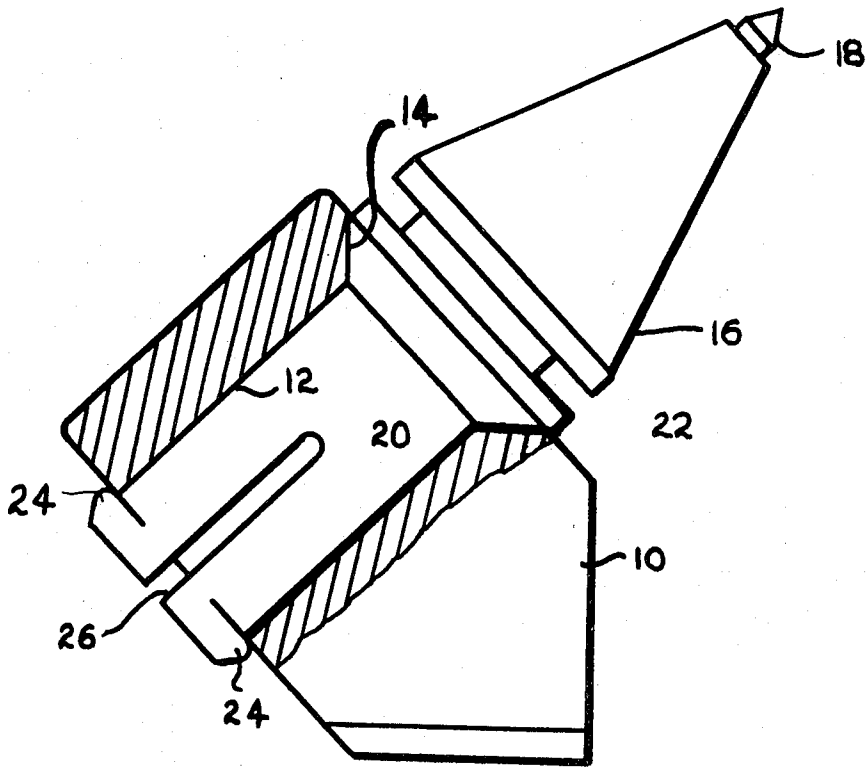
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Attorney, Agent or Firm—Melvin A. Crosby

[57] **ABSTRACT**

A mining tool of the type in which a pick style bit is rotatably mounted in a bore in a support member and is retained therein by retaining means integrally formed on the bit. The retaining means advantageously takes the form of at least one radial projection on the rear end of the bit shank with the bit shank being slotted to impart radial resilience thereto so the bit can be assembled with the support member and readily disassembled therefrom while being retained therein during work operations. The support member may comprise a support block adapted for being fixed to a driver with a sleeve rotatable in a bore in the block and, in turn, rotatably receiving the bit. The sleeve may be slotted axially from the rear end so as to have lateral resilience and be formed with one or more radial projections or protrusions at the rear end so that the sleeve, also, is releasably retained in the block by retaining means integral therewith.

11 Claims, 8 Drawing Figures



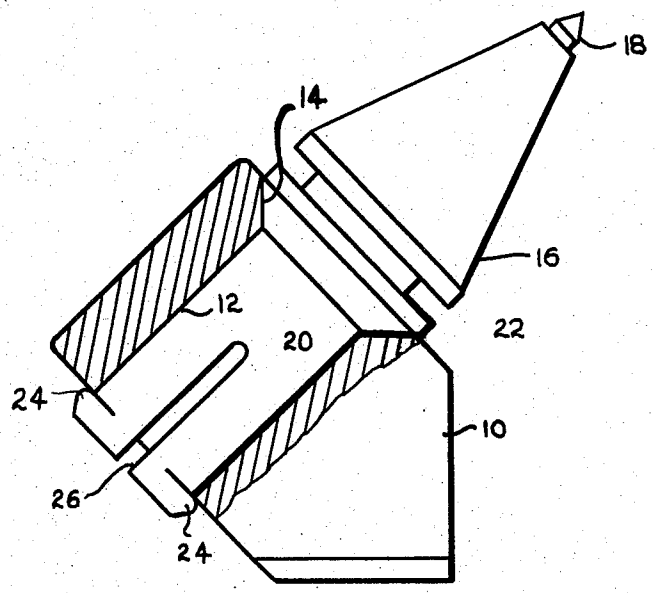


FIG. 1

FIG. 3

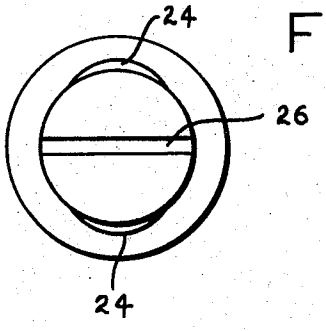
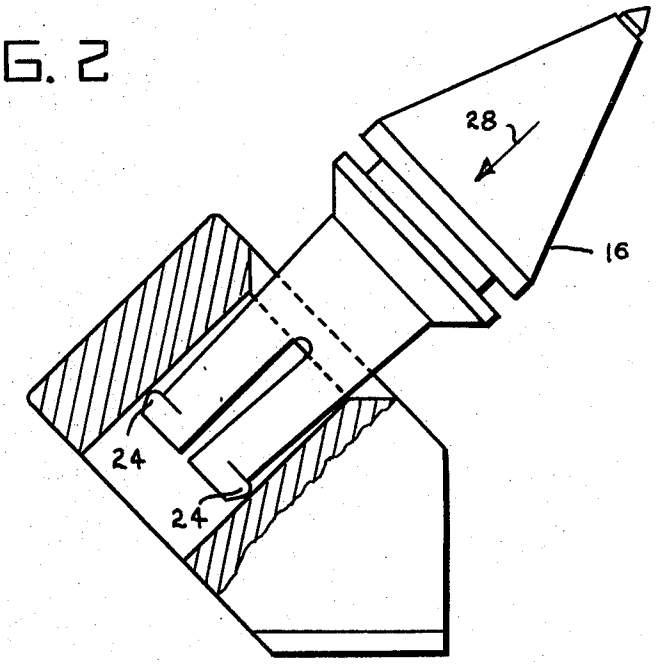


FIG. 2



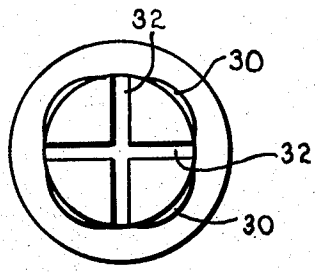


FIG. 4

FIG. 5

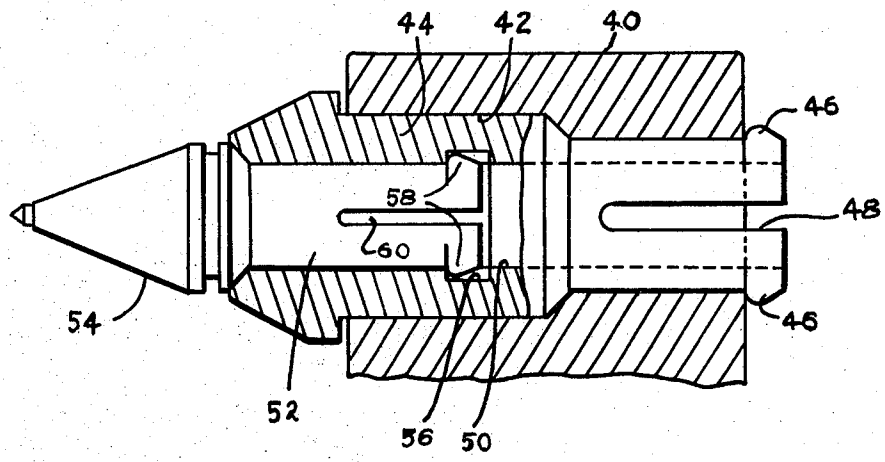
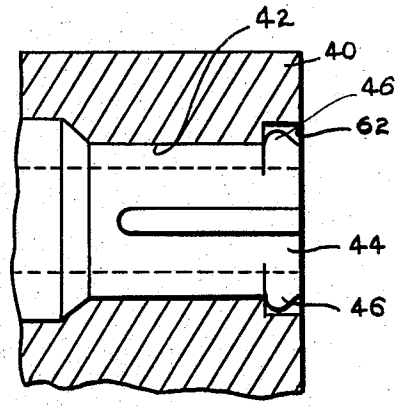


FIG. 6



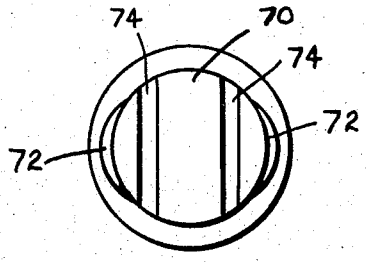


FIG. 7

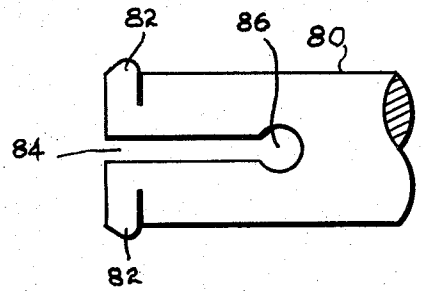


FIG. 8

ROTARY MINING TOOL RETAINING STRUCTURE

The present invention relates to mining tools and is particularly concerned with a retaining arrangement for use in retaining pick style bits in supporting members therefor and, also for retaining parts of a supporting member, such as a sleeve and block, in assembled relation.

Pick style mining tools are well known, and it is also well known to support such a mining tool in a support member so that the mining tool is free to rotate in the support member and thereby to remain sharp during continued use thereof.

Heretofore, the tools have been held in assembled relation either by separate keeper elements that are driven into the assembly of the bit and support member after assembly thereof, or by separate keeper elements which are mounted in grooves formed in the shanks of the bits.

Further, the support member is such a bit can take the form of a bored block having a sleeve rotatable in the bore and with a bit rotatably mounted in the sleeve. Heretofore, such sleeves have also been retained in assembled relation with the block by keeper elements separate therefrom, and which it is required to assemble with the sleeve either prior to or after assembly of the sleeve in the block.

With the foregoing in mind, the primary object of the present invention is the provision of a pick style mining bit in which the keeper device for retaining the bit assembled with a support member is formed integrally therewith.

Another object is the provision of a support member for a pick style bit made up of a sleeve rotatably mounted in a block in which the retaining means is retaining the sleeve in the block is formed integrally with the sleeve.

BRIEF SUMMARY OF THE INVENTION

According to the present invention, the shank of a mining tool, and which may be a pick style bit or a support sleeve for the bit, is slotted axially from the rearward end to impart lateral or radial resilience to the rear end of the bit or sleeve. The resilient portion of the bit or sleeve is then provided with one or more radial projections or protuberances, and upon the shank of the bit, or the sleeve, being forced into a bore until the projections register with a recess or the rear end of the bore, the bit or sleeve will be releasably retained in the receiving bore therefor while being free to rotate therein.

The exact nature of the present invention will become more clearly apparent upon reference to the following detailed specification taken in connection with the accompanying drawings in which:

FIG. 1 is a side view partly broken away showing a bit and block according to the present invention.

FIG. 2 is a view looking in at the rear end of the bit.

FIG. 3 is a view similar to FIG. 1 but showing the bit in the process of being assembled with the block.

FIG. 4 is a rear end view of a modified form which the bit can take.

FIG. 5 is a sectional view showing a bit and block according to the present invention with a sleeve interposed therebetween.

FIG. 6 is a fragmentary view similar to FIG. 5 but showing a modification.

FIG. 7 is a rear end view showing still another modification of the bit.

FIG. 8 is a fragmentary side view showing a still further modification of the bit.

DETAILED DESCRIPTION OF THE INVENTION

In FIG. 1, 10 represents a support block having a bore 12 extending therethrough from front to back with the front end of the bore being formed with a flared seat 14.

Reference numeral 16 indicates a bit of a substantially conventional shape which has a forward portion tapering into a point 18 and at which point there may be inserted a hard wear resistant insert such as an insert of cemented tungsten carbide. The bit has rearward portions in the form of a shank 20 extending through bore 12 and at the forward end of bore 12 the bit comprises a flared region 22 which engages seat 14 at the forward end of the bore. Region 22 forms a rearwardly facing abutment element for transmitting loads from the bit to the block.

According to the present invention, the rearward end of shank 20 is formed with one or more radial protuberances, or projections, 24. The shank, furthermore, is axially split by the seat 26.

As will be seen in FIG. 2, the protuberances 24 are diametrically opposed and are on a diameter at right angles to the diameter of cut 26 and extend for a relatively short distance circumferentially. The slot 26 permits the rearward end of shank 20 to have sufficient radial resilience that the shank of the bit can be pushed through bore 20 from the front end into the position in which the bit is shown in FIG. 1.

When the bit reaches this position, the legs of the shank formed by the slot 26 will spring outwardly and protuberances 24 will thereafter prevent the bit from being dislodged from the block. However, the bit can be removed from the block by driving the bit forwardly.

FIG. 3 schematically shows the bit 16 in the process of being inserted into the block, as indicated by arrow 28, and it will be seen that the legs of the bit are sprung toward each other so that the protuberances 24 can pass through the bore 12.

FIG. 4 shows a rear end view of a modification of the bit in which the bit is provided with four protuberances 30 distributed thereabout and two cuts 32 are formed in the shank of the bit at right angles to each other. The modification of FIG. 4 works the same way as the modifications of FIGS. 1 to 3 in that the shank of the bit can be pressed into the bore in the block and, later, the bit can be pressed, or driven, out of the bore when it is desired to separate the bit from the block.

The protuberances 24 do not engage the rear face of the block under pressure so that the bit is free to rotate in the bore under the influence of working loads imposed on the bit.

It will be appreciated that with the protuberances 24 configured as shown with a rather flat angle on the rearwardly facing side, the bit can relatively easily be inserted into the bore while the steeper angle on the forwardly facing side of the protuberances 24 prevents the bit from easily becoming dislodged from the bore during work operations.

FIG. 5 shows a modification in which a block 40 is provided with a shouldered bore 42 extending therethrough in which is mounted a sleeve 44. Sleeve 44 has a shoulder engaging the shoulder in the block and has

a rearward end protruding from the block and formed with protuberances **46**. The rear end of sleeve **44** is split, or slotted, as at **48** and the sleeve can be assembled with the block in the same manner as described in connection with the modifications of FIGS. **1** to **3**.

The sleeve has a central bore **50** to receive the shank **52** of a bit **54** constructed similarly to the bit of FIGS. **1** to **3**. The bore **50** is provided with an annular recess **56** to receive the protuberances **58** formed on the rear end of the shank **52** of the bit and which shank is axially split as indicated at **60**.

FIG. **6** shows that the rear end of the bore **42** in block **40** could be provided with a counterbore **62** to accommodate the rearward end of the sleeve **44** so that the protuberances **46** on the rear end of the sleeve and the rear end of the sleeve would be disposed within the axial limits pf block **40**.

FIG. **7** is another view looking at the rear end of a bit with the rear end of the shank **70** of the bit being provided with protuberances **72** adjacent each of which there is formed an axial incision, or slot, **74** in the bit shanks so as to impart lateral resilience thereto to permit the bit to be introduced into the bore of a block and removed therefrom.

FIG. **8** shows the shank **80** of a bit having protuberances **82** at the rear end of the shank and with an axial incision, or slot, **84** extending axially of the shank at right angles to the plane of the protuberances **82**. In FIG. **8**, the shank **80** is provided with a transverse drilled hole **86** which imparts greater resilience to the legs formed by incision, or slot, **84** for greater ease of assembling the bit with the supporting member therefor and separating the bit therefrom.

In each case, the bit is rotatably supported in the supporting member and can be assembled therewith by pressing or hammering the bit into the receiving bore therefor and the bit can be removed in the same manner. However, no separate keeper elements or the like are required and the construction of the bit is, therefore, simpler than those arrangements in which the bit must be provided with grooves and separate keeper members that have to be assembled with the bit.

Modifications may be made within the scope of the appended claims.

What is claimed is:

1. An excavating tool comprising coaxial forward and rearward portions and adapted for assembly with a support member, said forward portion tapering inwardly to a point at the front end and said rearward portion being substantially circular in cross section at each axial point therealong and adapted for being closely but freely rotatably received in a bore in the support member with the forward portion of the tool protrudiing axially from the forward end of the bore and with the rearward portion of the tool protruding at the rearward end from the rear end of the bore, an element of abutment means on said tool adapted for engagement with an element of abutment means on the support member to sustain working thrusts imposed on said tool in the rearward direction, said rearward portion of the tool comprising at least one radially resilient region integral therewith near the rearward end of said rearward portion, and at least one projection on the radially outer side of said radially resilient region protruding radially therefrom and adapted for engagement with the support member rearwardly of the rear end of the bore in the support member for releasably and freely rotatably retaining the tool in assembled relation with the support member, said tool being drivable into and out of the bore in the axial direction.

2. An excavating tool according to claim **1** in which said rearward portion comprises at least one axial slot on the radially inward side of said radially resilient region and extending into the rearward portion of the tool from the rear end thereof.

3. An excavating tool according to claim **1** in which at least the rearwardly facing side of said projection is inclined to facilitate driving said rearward portion in the bore in the support member.

4. An excavating tool according to claim **1** in which said rearward portion is formed with at least one slot extending axially forwardly therein from the rear end, the said rearward portion on at least one radial side of the slot comprising said radially resilient region of the rearward portion, said projection being formed on the radially outward side of the radially resilient region near the rearward end thereof.

5. An excavating tool according to claim **4** in which said slot is a diametral slot and the rearward portion of the tool on both sides of said slot forms a said radially resilient region, and a said projection of the radially outward side of the rearward end of each said radially resilient region.

6. An excavating tool according to claim **4** in which said projection is centered in a plane perpendicular to the plane of the slot and extends a short distance on each side of the plane.

7. An excavating tool according to claim **4** in which the end of said slot remote from the rearward end of said rearward portion is enlarged in a direction lateral to the slot.

8. an excavating tool according to claim **4** in which said slot is offset radially from the axis of said rearward portion, and the smaller part of the rearward portion on the one side of said slot forming said radially resilient region of the rearward portion of the tool.

9. An excavating tool according to claim **1** in which said rearward portion is formed with two intersecting slots extending axially into said rearward portion from the rear and dividing said rearward portion into a plurality of parts each of which forms a said radially resilient region and each of which has a said projection at the radially outward side at the rear end and in about the circumferentially central region.

10. An excavating tool according to claim **1** in which said element of abutment means on said tool comprises a shoulder formed on the tool at the juncture of said forward and rearward portions and tapering inwardly toward the rear.

11. a support member for supporting a tool having a pointed forward portion and a cylindrical rearward portion with said portions being coaxial, said support member including a tubular sleeve having an inside diameter adapted closely but freely rotatably to receive the rearward portion of the tool and having an outside diameter adapted rotatably to be received in a bore in a support block, said sleeve having at least one axial slot extending therein from the rear end and imparting radial resilience to the rear end of the sleeve, at leat one radial projection on the outside of the sleeve at the rear end adapted for engagement with the support block at the rear end of the bore in the support block to retain the sleeve in assembled relation therewith while permitting the sleeve to rotate freely in the sup-

port block, said sleeve having a rearwardly facing element of abutment means for engagement with the support block and a forwardly facing element of abutment means for engagement with the tool, and means for releasably retaining said tool in assembled relation with said sleeve while permitting free rotation of the tool and sleeve relatively.

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