Dec. 31, 1963 C. F. OSGOOD 3,116,052

CUTTER BIT AND SUPPORT THEREFOR HAVING RESILIENT DETENT MEANS

Filed Dec. 1, 1959 2 Sheets-Sheet 1

FIG. 1.

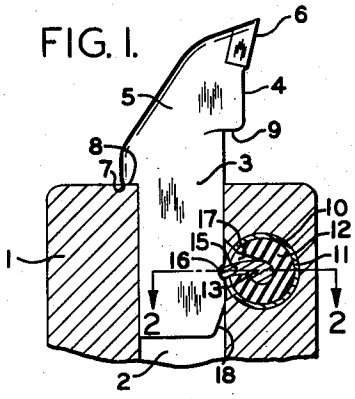


FIG. 2.

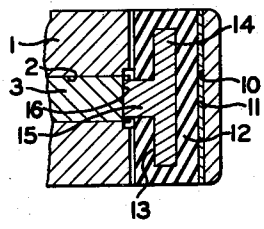


FIG. 4.

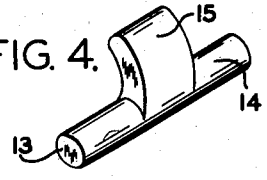


FIG. 3.

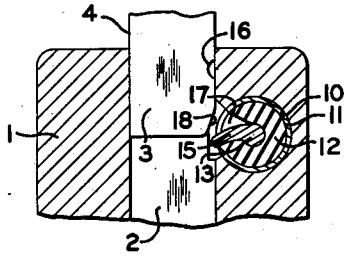


FIG. 5.

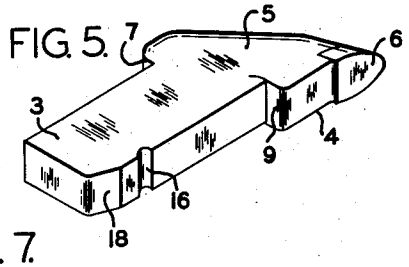




FIG. 7.

FIG. 6.

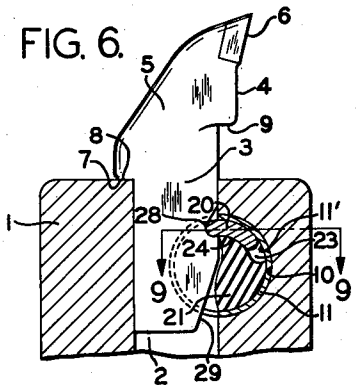


FIG. 8.

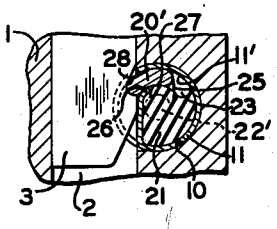


FIG. 9.

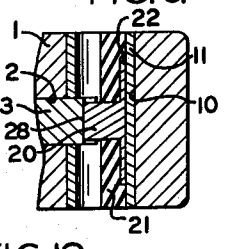


FIG. 10.

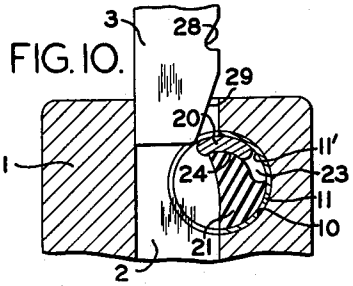


FIG. 11.

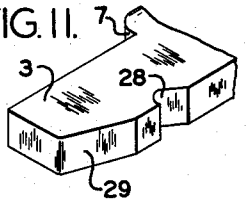
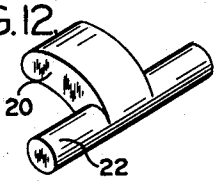


FIG. 12.



INVENTOR:

Charles F. Osgood

Dec. 31, 1963 C. F. OSGOOD 3,116,052

CUTTER BIT AND SUPPORT THEREFOR HAVING RESILIENT DETENT MEANS

Filed Dec. 1, 1959 2 Sheets-Sheet 2

FIG. 13.

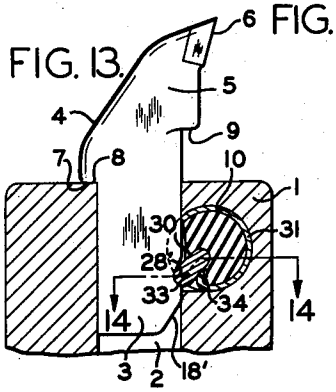


FIG. 14.

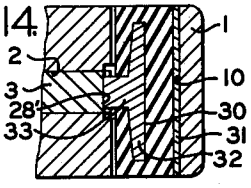


FIG. 15.

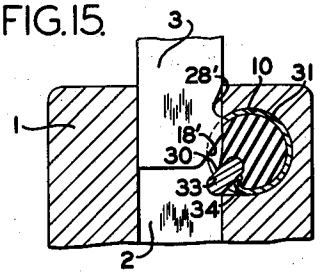


FIG. 16.

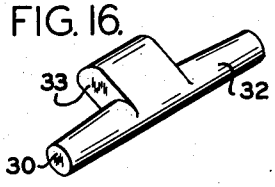


FIG. 17.

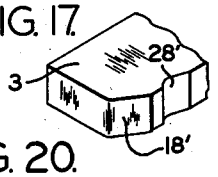


FIG. 18.

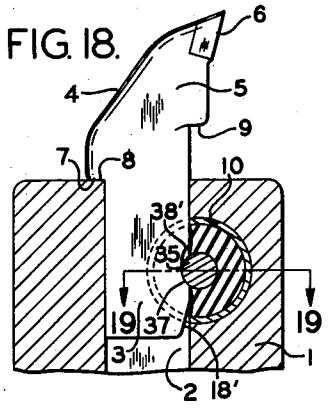


FIG. 19.

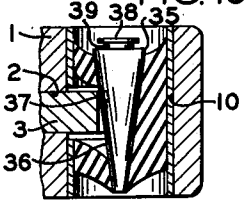


FIG. 20.

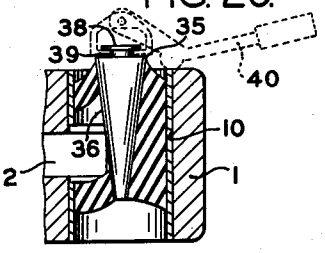


FIG. 21.

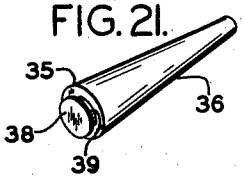


FIG. 22.

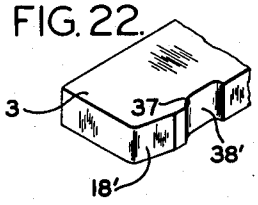


FIG. 23.

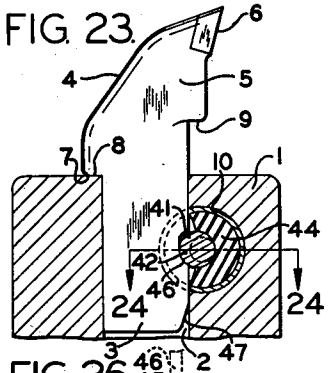


FIG. 24.

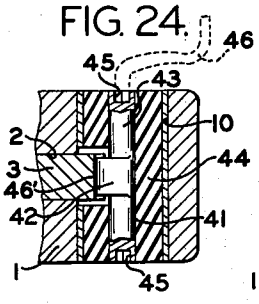


FIG. 25.

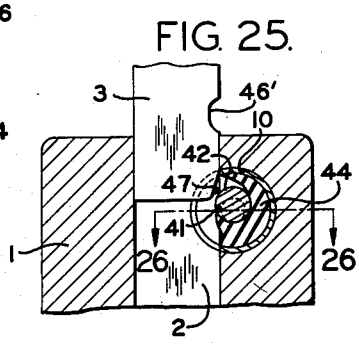


FIG. 26.

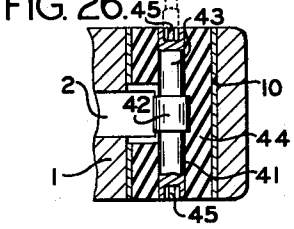
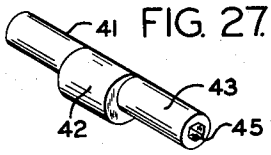


FIG. 27.



INVENTOR:

Charles F. Osgood

United States Patent Office 3,116,052 Patented Dec. 31, 1963

3,116,052

CUTTER BIT AND SUPPORT THEREFOR HAVING RESILIENT DETENT MEANS

Charles F. Osgood, Franklin, Pa., assignor to Joy Manufacturing Company, Pittsburgh, Pa., a corporation of Pennsylvania

Filed Dec. 1, 1959, Ser. No. 856,588
2 Claims. (Cl. 262—33)

This invention relates to a cutter bit and support therefor and more particularly to improved resilient detent means on the support and engaging the bit for not only holding the bit in cutting position but also for imparting an inward thrust to the bit shank.

It is becoming common practice to hold a mining machine cutter bit in cutting position on its support by yieldable detent means which may be released simply by applying an outward prying action to the bit. The present invention contemplates improvements over known forms of yieldable detent means in that the detent element not only serves to hold the cutter bit in position on its support but also imparts an inward thrust to the bit shank. In a preferred embodiment torsional forces are built up in a suitable manner within the yieldable mounting for the detent element, as for example, by insertion of the bit shank into the support socket, and such torsional forces act on the detent element to cause the latter to impart an inward thrust to the bit shank.

An object of the present invention is to provide an improved yieldable detent means for engagement with a bit shank for holding a cutter bit in cutting position on its support. Another object is to provide an improved yieldable detent means which not only holds the cutter bit in cutting position on its support but also serves to impart an inward thrust to the bit shank to hold a shoulder on the outer cutting portion of the bit against an outer surface of the bit support. A further object is to provide an improved yieldable mounting for a detent element not only for holding the latter in engagement with a notch on the bit shank but also for imparting through the detent element an inward thrust to the bit shank.

Still another object is to provide an improved yieldable detent means comprising a yieldable mounting in the form of a molded resilient plug of elastomeric material such as rubber bonded in shear to the inner walls of a metal sleeve and a detent element having a body portion embedded in the elastomeric material of the plug and projecting outwardly through an open side of the sleeve into engagement with the shank of a cutter bit. A still further object is to provide an improved yieldable detent means which may be pressed under load, as for example, upon insertion of a bit shank in a support socket, and as a result of such preloading imparting a yieldable inward thrust to the bit shank to hold the cutter bit firmly in cutting position on its support. These and other objects and advantages of the invention will, however, hereinafter more fully appear in the course of the ensuing description.

In the accompanying drawings there are shown for purposes of illustration several forms and modifications which the invention may assume in practice.

In these drawings:

FIG. 1 is a longitudinal vertical section through a preferred form of bit support and yieldable detent means, and showing a cutter bit held in supported position by the detent means.

FIG. 2 is a detail section taken on line 2—2 of FIG. 1.

FIG. 3 is a fragmentary view taken on the plane of FIG. 1 showing the bit shank in partly inserted position in the support socket, with the detent means released.

FIG. 4 is a perspective view of the detent element.

FIG. 5 is a perspective view of the cutter bit.

FIG. 6 is a longitudinal vertical section similar to FIG. 1, showing a modification.

FIGS. 7 and 8 are detail views showing another modified detent means.

FIG. 9 is a detail section taken on line 9—9 of FIG. 6.

FIG. 10 is a longitudinal vertical section similar to FIG. 6, with the bit shank partially inserted in the support socket, and with the detent means released.

FIG. 11 is a fragmentary perspective view of the cutter bit shown in FIGS. 6 and 10.

FIG. 12 is a perspective view of the modified detent element of FIGS. 6 and 9.

FIG. 13 is a longitudinal vertical sectional view of a bit support and detent means constructed in accordance with a further modification.

FIG. 14 is a detail section taken on line 14—14 of FIG. 13.

FIG. 15 is a view similar to FIG. 13 showing the bit shank in partially inserted position, with the detent means released.

FIG. 16 is a perspective view of the modified detent element of FIGS. 13, 14 and 15.

FIG. 17 is a fragmentary perspective view of the shank of the cutter bit of FIG. 13.

FIG. 18 is a longitudinal vertical section taken through still another modified construction.

FIG. 19 is a detail section taken on line 19—19 of FIG. 18.

FIG. 20 is a view similar to FIG. 19 showing the detent element held in released position by a releasing instrument, with the latter indicated in dotted lines.

FIG. 21 is a perspective view of the modified detent element of FIGS. 18 and 19.

FIG. 22 is a fragmentary perspective view of the shank of the cutter bit of FIG. 18.

FIG. 23 is a longitudinal vertical section of a cutter bit and detent means constructed in accordance with still another modified form of the invention.

FIG. 24 is a detail section taken on line 24—24 of FIG. 23, with a detent rotating tool indicated in dotted lines.

FIG. 25 is a view similar to FIG. 23 with the bit shank in partially inserted position and the detent means in released position.

FIG. 26 is a detail section taken on line 26—26 of FIG. 25.

FIG. 27 is a perspective view of the modified detent element shown in FIG. 23.

In the form of the invention shown in FIGS. 1 to 5 inclusive a bit support 1 has a conventional socket 2 of rectangular cross section for receiving the rectangular shank 3 of a cutter bit 4. The bit has an outer head portion 5 carrying a hard metal cutting point 6 and formed with an inwardly facing rearward shoulder 7 adapted to rest at 8 against an outer surface of the bit support. The bit head has a forward shoulder 9 adapted for engagement by a suitable bit releasing instrument for prying the bit shank from the support socket, in a known manner. The bit support has a transverse bore 10 opening into the support-socket and in which is fitted a metal sleeve 11 of cylindric form within which a resilient mounting in the form of a resilient plug or block 12 of elastomeric material such as rubber is bonded in torsional shear to the inner sleeve-wall. A detent element 13 has a cylindric body portion 14 embedded within the resilient block and to which the elastomeric material is bonded and projecting from the body portion is a curved detent portion 15 projecting through an open side of the sleeve 11 and receivable in a transverse notch 16 in the front face of the bit shank. A suitable clearance space 17 may be formed between the elastomeric material and the curved

outer surface of the detent portion to permit the detent element to be forced with a turning action upwardly and inwardly by an inclined surface 18 on the inner front portion of the bit shank as the latter is inserted in the support socket. As the projecting end portion of the detent element is turned upwardly and inwardly a turning or twisting action is applied to the resilient plug relative to its outer sleeve 11 and the torsional force so provided is transmitted through the detent element to the bit shank thereby to apply an inward thrust to the bit shank to hold the head shoulder 7 against the outer surface of the bit support. Thus the detent element not only holds the bit in cutting position on its support but also imparts an inward thrust to the bit shank due to the torsional spring action of the elastomeric material of the plug. When the bit is pried out in a suitable manner from its socket the detent may spring back out of the shank notch. If desired, when the bit shank is released from the detent means, as shown in FIG. 3, the downward swinging movement of the detent portion 15 of the detent element may be limited by the underlying edge of the outer sleeve.

The modification shown in FIGS. 6, 9, 10, 11 and 12 has a similar bit support and cutter bit but with a modified detent means. In this instance, the curved detent portion 20 is guided for arcuate movement along the inner wall 11' of the metal sleeve 11, and the resilient plug 21 in which the cylindric body 22 of the detent element is embedded has a clearance space 23 to permit such inward movement of the detent portion. The elastomeric material of the plug is bonded at 24 to the inner wall of the detent portion 20 as well as to the cylindric body portion 22. In FIGS. 7 and 8 a modified detent element is shown with the curved detent portion 20' connected by spaced armlike portions 25 to the axially spaced end portions of a cylindric body 22'. The metal sleeve, in this instance, has a curved bent portion 26 in guiding engagement with the curved inner wall 27 of the detent portion 20'. The bit shank is transversely notched at 28, as shown most clearly in FIGS. 6, 10 and 11, and has an inclined surface 29 at its front inner portion. When the bit shank is inserted in the support socket (FIG. 10) the inclined surface 29 engages the detent portion 20 and forces the latter arcuately inwardly along the inner wall of the metal sleeve 11, pressing or squeezing the elastomeric material, so that when the detent portion is opposite the notch 28 the built-up torsional spring action of the elastomeric material moves the detent into the notch. In FIG. 8 the detent element is shown forcing the bit shank inwardly into the block socket yieldingly to urge the head shoulder 7 of the bit against the outer surface of the support. In FIG. 6 the elastomeric material urges the detent portion arcuately inwardly, and here, too, the detent portion may be arranged to impart a thrust to the bit shank to urge the latter inward in the support socket. When the cutter bit is pried outwardly in a suitable manner the detent portion springs out of the shank notch.

There is shown in FIGS. 13 to 17 inclusive still another modification. As in the other forms of the invention a detent element 30 is embedded in and bonded to the elastomeric material of a generally cylindrical block in turn bonded to the inner wall of a cylindrical metal sleeve 31 pressed or otherwise secured in position within a transverse bore in the cutter bit support. The detent element has a transverse body portion 32 (FIG. 16) and a projecting detent portion 33, the latter being engageable with a notch in the bit shank as in the other embodiments above described. The metal outer sleeve has an inwardly bent portion at 34 engaging the inner plane surface of the detent portion for guiding the detent element for rectilinear movement along an oblique path rather than a torsional movement of the earlier forms above described. Evidently the detent element and the mounting may be so formed that the detent portion may move slightly curvilinearly instead of rectilinearly without departing from the invention. When the bit shank is inserted in the support socket 2, as shown in FIG. 15, the inclined surface 18' on the bit shank engages the detent portion and shoves the detent portion upwardly and outwardly along a straight path, and when the notch 28' assumes a position opposite the detent element, the detent portion snaps into the notch to hold the cutter bit in position on its support. Simultaneously the detent element imparts an inward thrust to the bit shank to urge the shoulder 7 on the outer bit head against the outer surface of the support. The cutter bit may be released from its support simply by prying outwardly with a suitable instrument to release the detent element from the notch in the bit shank, as in the earlier embodiments.

In FIGS. 18 to 22 inclusive a still further modified embodiment is shown. In this instance, the cylindric metal sleeve has a resilient plug of elastomeric material such as rubber bonded in axial shear to its inner wall, and embedded in and bonded to the resilient plug is a detent element 35 having a wedging surface 36 engageable, as shown in FIG. 19, with the bottom wall 37 of a recess or notch 38' in the front face of the bit shank (see FIGS. 18 and 22). Evidently the side of the detent element opposite the wedging surface may lie in the surface of a cylinder, if desired. The detent element has an outer head portion 38 of disklike form providing an annular groove 39 for the reception of a suitable releasing instrument, indicated in dotted lines at 40 in FIG. 20, whereby the detent element may be moved axially outwardly to release its wedge portion from the shank recess so that the bit shank may be withdrawn from the support socket (FIG. 20). Thus the detent element not only locks the bit shank in position but also imparts an inward thrust to the bit shank to hold the shoulder 7 on the outer bit head against the outer surface of the support. When the instrument 40 is released from the wedge groove the latter is moved axially inwardly by the springlike action of the rubber-like material to bring the wedging surface 36 in wedging contact with the bit shank. The inclined surface 18' on the inner forward portion of the bit shank forces the detent element laterally upon insertion upon the bit shank into the support socket, and when the recess 38' assumes a position opposite the detent element the latter snaps into the recess by the spring action of the elastomeric material of the rubber-like block in which the detent element is embedded. Thus the detent may have both axial and lateral movements as a result of the yielding of its resilient mounting.

The modification shown in FIGS. 23 to 27 inclusive comprises a detent element 41 having a camlike detent portion or cam 42 and a cylindric body portion 43, the latter being embedded in and bonded to the molded elastomeric material of a cylindric plug or block 44 secured by bonding within an outer metal sleeve, as in the other embodiments. The ends of the detent body are desirably formed with polygonal sockets 45 for the reception of a suitable turning instrument indicated in dotted lines at 46 in FIG. 24. The cam portion 42 of the detent element is engageable in a notch 46' in the front face of the bit shank and the detent not only locks the bit shank in position in its support but also, due to its counterclockwise rotary cam action (FIG. 23) imparts an inward thrust to the bit shank to hold the shoulder 7 on the outer bit head down against the outer surface of the supports. The detent element may be manually turned clockwise to the right, as viewed in FIG. 23, to move the cam portion 42 out of the shank recess (FIG. 25) to enable insertion of the bit shank into or withdrawal of the same from the support socket. Also the inclined surface 47 on the inner forward portion of the bit shank may force the detent element laterally as the bit shank is inserted into the support socket and when the recess assumes a position opposite to the detent position the latter may snap into the shank recess by the spring action of the elastomeric material in which the detent is embedded.

Evidently, in the several forms of the invention above

described, the detent has a dual duty, i.e. not only to hold the cutter bit in cutting position on its support but also to impart an inward thrust to the bit shank to urge the outer bit head against the outer surface of the support. Further, the support for the cutter bit may assume various forms such as a lug for a cutter chain or a cutter arm of a rotary boring head. Also instead of the elastomeric material for use as a spring other springlike means may be employed, as for example, a metallic torsion spring. Moreover the cylindric portion of the detent body may have shapes other than cylindrical, as for example, a polygonal shape, so that the elastomeric material may be secured firmly thereto.

As a result of this invention an improved cutter bit and bit support are provided having improved yieldable detent means for holding the cutter bit in cutting position on its support while permitting rapid release of the cutter bit from its support by a simple prying action. The improved yieldable detent means not only acts to hold the cutter bit in cutting position on its support but also applies an inward thrust to the bit shank which must be overcome to effect release of the bit shank from the support socket. By the provision of the resilient torsional mounting for the detent the latter is urged with a rotary motion toward locking position, in an improved manner. The improved resilient detent means is not only relatively simple and compact in design but also may be applied to a conventional cutter bit and bit support with a minimum of change. These and other advantages of the invention will be clearly apparent to those skilled in the art.

While there are in this application specifically described several forms and modifications which the invention may assume in practice, it will be understood that these forms and modifications of the same 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 desired to secure by Letters Patent is:

1. In a cutting mechanism, the combination with a support having a socket and a cutter bit having a shank receivable in said socket, of improved means for holding the bit in cutting position on the support comprising a transverse bore in said support and entering the rear side of said socket, a rotary lock arranged in said bore for rotation relative to said support and having a locking element constantly urged arcuately toward a complemental locking surface on the rear side of the inner portion of the bit shank, said locking element being maintained against translatory movement relative to said locking surface of said bit shank during movement of the latter into bit holding position, and resilient means for constantly urging said lock toward seated position and against whose resilient yielding action the lock is releasable.

2. A cutting mechanism as set forth in claim 1 wherein said constantly urging means includes resilient torsional means within said transverse bore and said lock comprising a detent seated against the bit shank and constantly urged arcuately inwardly toward bit holding position by said torsional means.

References Cited in the file of this patent

UNITED STATES PATENTS

2,907,559	Brown et al.	Oct. 6, 1959
2,965,365	Krekeler	Dec. 20, 1960