

[54] **SELF-SHARPENING BIT AND MOUNTING THEREFOR**

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[22] Filed: **Nov. 6, 1972**

[21] Appl. No.: **304,106**

Related U.S. Application Data

[63] Continuation of Ser. No. 69,161, Sept. 2, 1970, abandoned, which is a continuation of Ser. No. 498,639, Oct. 20, 1965, abandoned.

[52] U.S. Cl. **299/86, 175/354, 299/92**

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

[58] Field of Search **299/85, 86, 91-93; 175/354**

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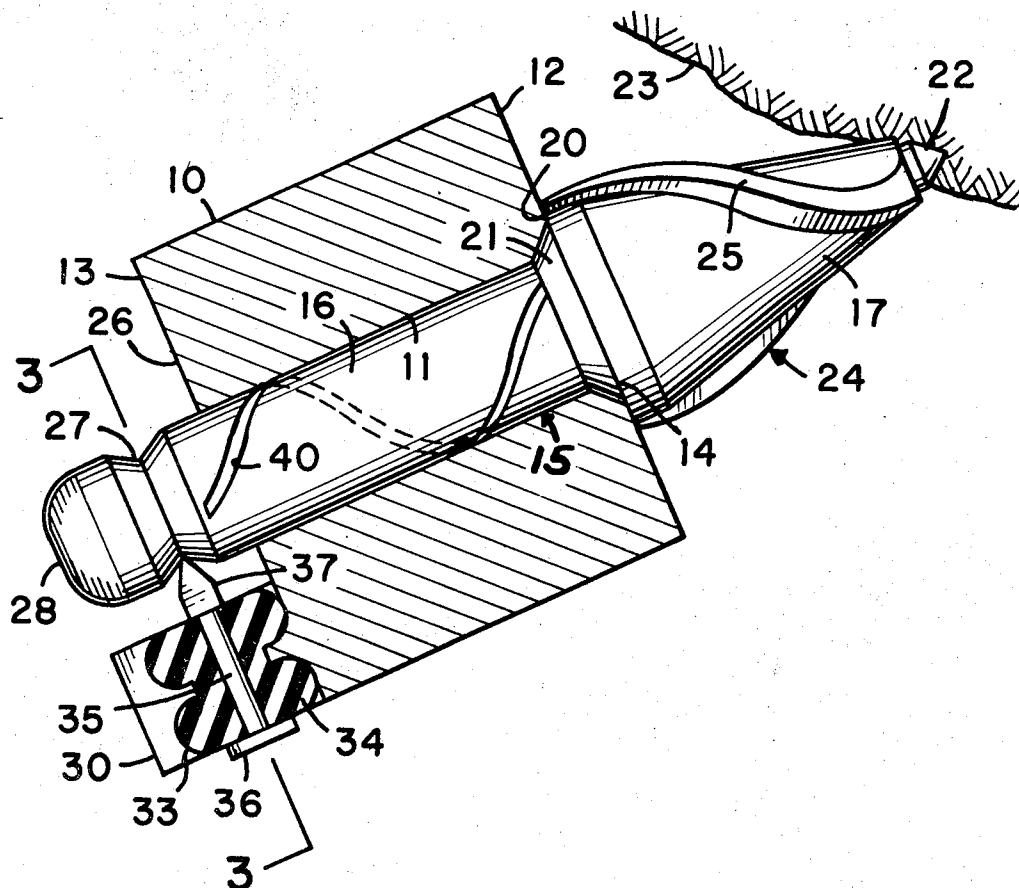
Primary Examiner—Ernest R. Purser

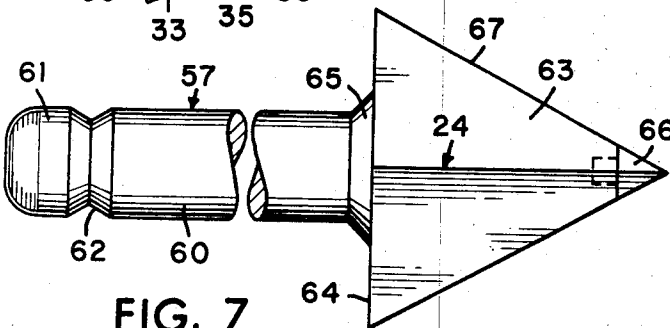
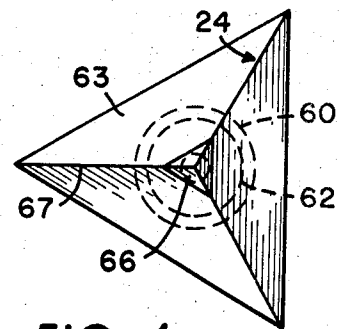
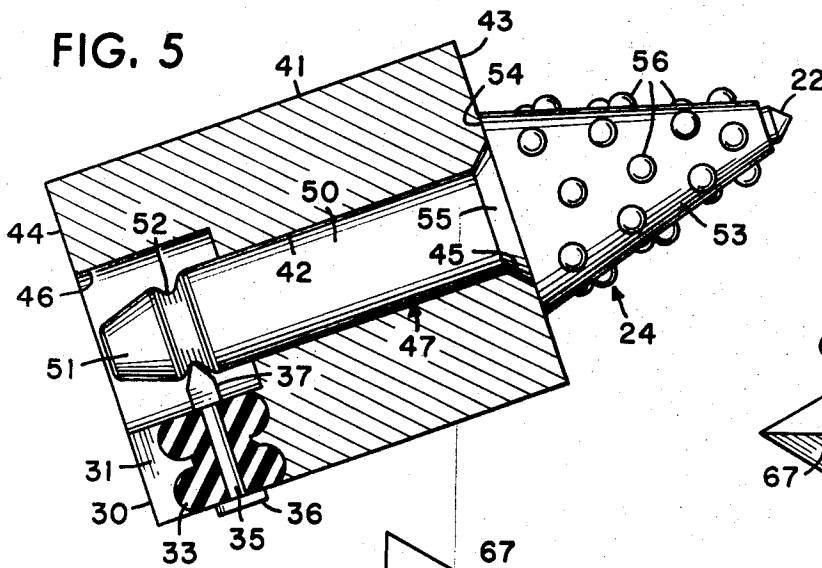
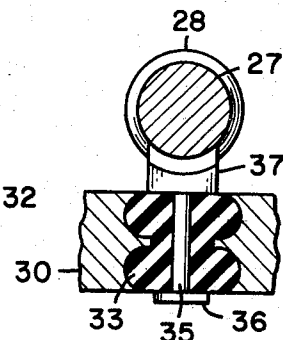
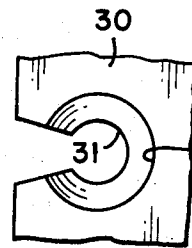
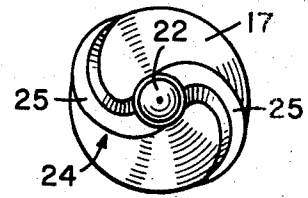
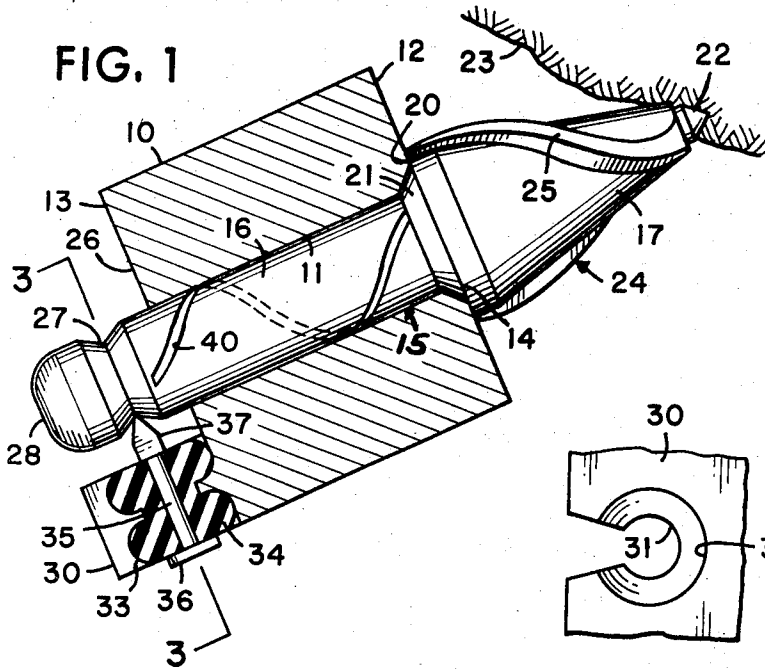
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ABSTRACT

Conically shaped point attach mining bits are retained for rotation in sockets and are provided with a plurality of protuberances extending outwardly from the periphery of the conical head. The protuberances consist of fins, knobs or the like and are adapted to frictionally engage the material being mined and cause turning of the bit in the socket.

19 Claims, 7 Drawing Figures





SELF-SHARPENING BIT AND MOUNTING THEREFOR

This is a continuation, of application Ser. No. 69,161 filed Sept. 2, 1970 now abandoned that was a continuation of application Ser. No. 498,639, filed Oct. 20, 1965 and now abandoned.

This invention relates generally to improvements in a bit and mounting therefor, and more particularly to an improved point-attack bit that turns in its mounting to provide a self-sharpening action resulting in longer bit wear and life.

It is an important objective to provide a point-attack bit that will turn automatically as the bit picks a wall so that wear is distributed substantially evenly over the periphery of the bit head, thereby creating a self-sharpening action. This self-sharpening bit includes a shank, a tapered head integral with the shank, and means on the tapered head for striking the wall to turn the bit upon picking of the wall by the tapered head.

An important objective is realized by the provision of turning means on the tapered head providing a cross-section perpendicular to the bit axis which is a departure from a circular cross-section, the turning means being adapted to strike the wall as the tapered head picks the wall to cause a turning of the bit angularly to a different position so that a different peripheral surface is presented to and engages the wall upon the next stroke of the bit. Specifically, it is advantageous to provide at least one cross-section perpendicular to the shank axis and along the length of the tapered head which is a departure from the circular cross-section in order for the head to have a turning means capable of imparting a twist or turning action to the bit.

Another important object is afforded by the provision of a tapered head integral and coaxial with the shank, and by the provision of a protuberance on the tapered head which provides the non-circular cross-section perpendicular to the shank and head axis, the protuberance serving to strike the wall to turn the bit upon picking of the wall by the tapered head.

Still another important object is achieved in that the turning means on the tapered head includes a fin on and extending lengthwise of the tapered head. It is advantageous to have a structural arrangement in which the fin extends spirally along the length of the tapered head.

An important objective is attained by constructing the bit with a substantially conical head integral and coaxial with the shank and by providing a protuberance on and extending laterally outward from the conical head, the protuberance constituting the turning means. There can be a plurality of protuberances about the periphery of the conical head or the protuberance can consist of a straight or spiral fin extending the length of the conical head.

Another important object is provided by constructing the tapered head so that it has a many-sided cross-section perpendicular to the head and shank axis defining a plurality of longitudinal corners along the length of the tapered head, the longitudinal corners constituting the turning means capable of striking the wall upon picking action of the bit.

Yet another important object is realized by the provision of a spiral means consisting of either a rib or groove, on the shank for moving cuttings axially along

the shank away from the head upon turning of the bit.

An important object is afforded by a bit and block assembly in which a block is provided with a substantially cylindrical bore, and a point-attack bit of the type mentioned previously which has its elongate shank rotatively mounted in the block bore, the shank being provided with a peripheral groove. A locking element resiliently mounted on and carried by the block rides in the shank groove and engages the shank to preclude unintentional withdrawal from the bore, yet enables turning of the shank within the block bore by the turning means on the tapered head as such turning means strikes the wall incident to picking the wall by the tapered head.

Another important objective is achieved by the bit and block assembly in constructing the locking element with a pointed tip having an arcuate length riding in an annular groove formed in the bit shank for more effective and efficient action.

It is an important object to provide a bit and block assembly in which the cuttings can fall or be discharged from the bottom of the cylindrical block bore, and thereby prevent such cuttings from packing within the bore between the bit shank and block in a manner to hinder, obstruct or preclude rotation or intermittent turning action of the bit shank within the block bore.

An important objective is attained by the provision of a cylindrical bore that extends completely through the block, and by the provision of a rearwardly tapered end on the shank extending from the peripheral locking groove, the tapered shank end providing a lateral space that permits the cuttings to emerge and be discharged from the block bore and block. An advantage is provided by the structural arrangement in which the shank end including the peripheral groove extends through and beyond the mounting bore of the block.

Still another important object is to provide a self-sharpening point-attack bit and a mounting therefor that is simple and durable in construction, economical to manufacture and assemble, and highly efficient in operation.

The foregoing and numerous other objects and advantages of the invention will more clearly appear from the following detailed description of several embodiments, particularly when considered in connection with the accompanying drawing, in which:

FIG. 1 is a side elevational view, partly in cross-section, of a bit and block assembly, illustrating the picking action of the bit;

FIG. 2 is a front end elevational view of the bit head shown in FIG. 1;

FIG. 3 is a fragmentary, cross-sectional view taken along line 3—3 of FIG. 1;

FIG. 4 is a fragmentary, side elevational view of the block showing the keyhole slot adapted to receive the resilient insert of the locking means;

FIG. 5 is a side elevational view, partly in cross-section, of a modified bit and block assembly;

FIG. 6 is a front elevational view of the tapered head of a modified point-attack bit, and

FIG. 7 is a side elevational view of the modified bit shown in FIG. 6.

Referring now by characters of reference to the drawing, and first to the embodiment of FIGS. 1-4, it will be understood that the block 10 is provided with

a substantially cylindrical bore 11 extending through the front block face 12 and the rear block face 13. The bore 11 is slightly flared at the front block face 12 to provide an outwardly divergent shoulder 14.

One embodiment of the point-attack bit generally indicated at 15, is shown in FIG. 1. This bit 15 includes an elongate shank 16 having a circular cross-section. The bit shank 16 is rotatively mounted within the cylindrical block bore 11. A tapered head 17 is formed integrally and coaxially with the shank 16, the head 17 tapering toward the forward end of the bit. The larger end of the tapered head 17 is provided with a rearwardly facing, annular shoulder 20 engaging the front block face 12 about the block bore 11. The shank 16 includes an enlarged, outwardly diverging shank portion 21 integrally connected to the tapered head 17, the shank portion 21 engaging the annular bore shoulder 14.

Inserted in and attached to the smaller end of the tapered head 17 is a carbide cutting tip 22. The tip 22 is provided with a relatively sharp point. As is illustrated in FIG. 1, the tapered head 17 including the carbide tip 22 picks at the wall 23 in order to cut away a portion of such wall 23. The tapered head 17 enters the wall 23 with its smaller end foremost and with its longitudinal axis arranged at a slight angle to the surface of the wall in an intermittent picking action.

It will be understood that this bit and block assembly is utilized in a cutting machine that operates to move the bit head 17 point first into the wall 23 in the picking action described previously, and operates to move the bit head 17 continuously into, through and out of the wall 23 in a curved path for a complete picking action.

In the embodiment of FIG. 1, the tapered head 17 has a substantially conical configuration. A turning means generally referred to by 24 is provided on the tapered head 17, the turning means 24 providing a cross-section perpendicular to the shank and head axis which is a departure from a circular cross-section. This turning means 24 engages the wall 23 during picking action by the tapered head 17, the interengagement of the turning means 24 and wall 23 causing the head 17 and shank 16 to turn. In the bit species disclosed in FIG. 1, the turning means 24 includes a rib or fin 25 on and extending spirally along the length of the tapered head 17. Specifically, in FIG. 1, the spiral fin 25 extends laterally outward from the conical head 17. The number of spiral fins 25 provided on the tapered head 17 can vary. A total of two such fins 25 are shown in FIGS. 1 and 2. A turning motion is imparted to the tapered head 17 by the action of one or more such fins 25 striking the wall 23, thereby causing the tapered head to be self-sharpened.

The bit 15 is assembled to the block 10 by inserting the bit shank 16 into the block bore 11 until the head shoulder 20 abuts the front block face 12. The block 10 is cut away at the rear to provide a recess 26 adjacent the block bore 11 into which the shank end 28 extends. This shank end 28 is provided with a peripheral, annular groove 27.

The block 10 includes a rearwardly extending block portion 30 partially defining the recess 26 and laterally spaced from the shank end 28. As is best seen in FIG. 4, the block portion 30 is provided with a rear opening keyhole slot 31. Each side of the block portion 30 is provided with a circular depression 32, the purpose and

function of which will be apparent upon later description of parts.

The locking mechanism interconnecting the block 10 and bit 15 includes a resilient insert 33 constructed of rubber or the like which is inserted into the keyhole slot 31 and retained by the block portion 30, the resilient insert 33 having enlarged end flanges that seat in the circular depressions 32. A locking pin 35 extends through and is carried by the rubber insert 33, one end of the pin 35 being provided with an integral plate 36 engaging the outer side of the rubber insert 33, while the inner end of the pin 35 is provided with an integral head 37 engaging the inside face of the rubber insert 33. The pin head 37, as is shown in FIGS. 1 and 3, is tapered to a point and has an arcuate length enabling the pin head 37 to ride in the annular groove 27 and engage the shank 16 to preclude unintentional withdrawal of the shank 16 from the block bore 11, yet permit turning of the shank 16 within the block bore 11 by the turning means 24 incident to picking action of the bit 15 into wall 23.

Upon insertion of the bit shank 16 into the block bore 11, the shank end 28 will laterally depress the pin head 37 into and against the resilient insert 33. When fully inserted, the resiliency of the insert 33 will snap the pin head 37 into the annular shank groove 27 to preclude unintentional withdrawal. To replace the bit 15, the bit shank 16 can be forcefully pushed, knocked or pried out of the block bore 11, the pin head 37 being rearwardly and/or laterally displaced as it rides outwardly on the rearmost sloping margin defining the annular shank groove 27 and on the shank end 28.

It may be possible for fine cuttings to work into the cylindrical bore 11 between the bit shank 16 and the block 10. Upon turning or twisting of the bit shank 16 while the bit head 17 is picking the wall 23, the cuttings will move down through the block bore 11 and be discharged out the bottom of the block 10, the cuttings falling into and out of the block recess 26 around the shank end 28.

To assist in the discharge of these cuttings from the cylindrical block bore 11, the shank 16 can be provided with a spiral means 40, taking the form of either a groove or rib, extending the length of the shank 16 and winding in a direction such that the spiral means 40 will engage and transport the fine cuttings axially along the shank 16 and out the rear end of bore 11 as the shank 16 is turned by the turning means 24 during picking operation of the tapered head 17.

It will be understood that FIGS. 1 through 4 disclose only one species of the point-attack bit 15 and only one species of the block 10 utilized to mount such a point-attack bit 15. The species of bit 15 can be used with other similar block constructions in order to obtain the same advantageous results. Similarly, the particular species of block 10 can be utilized with other point-attack bits to afford the advantageous results of this bit and block assembly.

For example, FIG. 5 discloses a block 41 provided with a substantially cylindrical bore 42 therethrough opening at the front block face 43 and rear block face 44. One end of the bore 42 is provided with an outwardly divergent shoulder 45 at the front block face 43. The rear end of the block 41 is provided with a recess 46 about the rear opening of bore 42.

The locking mechanism disclosed in FIG. 5 is essentially the same as that previously described with respect

to the species of FIGS. 1-4. The block 41 includes a rearwardly extending block portion 30 provided with a rear-opening keyhole slot 31. A resilient insert 33 is carried by the block portion 30, the insert 33 being placed into the keyhole slot 31. A locking pin 35 is carried by and extends through the resilient insert 33, the pin 35 including a plate 36 engaging the outer face of the insert 33, and including a pointed, arcuate length head 37 engaging the inner face of the resilient insert 33. The pin head 37 extends into the block recess 46.

Obviously, the bit 15 disclosed in FIG. 1 can be utilized in the block 41 of FIG. 5 in exactly the same manner as previously described. However, FIG. 5 discloses another species of bit 47 having a turning means 24 of different construction than that disclosed by the species of bit 15 in FIG. 1.

The bit 47 (FIG. 5) includes an elongate cylindrical shank 50 rotatively mounted in the block bore 42. The shank end 51 extends outwardly of the bore 42 and into the recess 46. A peripheral, annular groove 52, is provided in the shank end 51, the pin head 37 riding in the groove 52 and engaging the shank 50 to preclude unintentional withdrawal of the shank 50 from the block bore 42. For reasons which will later appear, the shank end 51 rearwardly of the shank groove 52 is of reduced cross-section and tapers rearwardly.

The bit 47 includes an integral, tapered head 53 formed coaxially with the shank 50. Particularly, the tapered head 53 is substantially conical. The larger portion of the tapered head 53 provides a rearwardly facing annular shoulder 54 engaging the front block face 43 around the front opening of bore 42. The shank 50 is provided with an outwardly diverging shank portion 55 integrally connected to the tapered head 53, the shank portion 55 engaging the outwardly diverging bore shoulder 45. The forward, smaller end of the tapered head 53 is provided with a pointed, carbide tip 22.

The turning means 24 consists of a plurality of protuberances 56 extending laterally outward about the periphery of the conical head 53. Although the protuberances 56 in FIG. 5 are shown to be hemispheres, they can be of any shape and can be located in a regular pattern or at random on the periphery and along the length of the conical head 53. In any event, one or more of these protuberances 56 will provide a non-circular cross-section perpendicular to the head and shank axis, and will provide a turning means engageable with the wall 23 upon picking action of the conical head 53 to effect a turning of the head 53 and shank 50.

It will be understood that the bit 47 can be advantageously utilized with the species of block 10 shown in FIG. 1 in a bit and block assembly to provide all of the functional advantages and results discussed previously.

Specifically referring to the embodiment of FIG. 5, the bit 47 is connected to the block 41 by inserting the shank 50 into the block bore 42 until the head shoulder 54 engages the front block face 43. Upon insertion, the tapered shank end 51 will laterally depress the pin head 37 against the loading of the resilient insert 33. Upon complete insertion of the shank 50, the pin head 37 will snap into the annular shank groove 52 and engage the shank to prohibit unintentional withdrawal of the shank 50 from the block bore 42.

As the bit head 53 is moved into a wall 23 in a picking action with the smaller end foremost, the carbide tip 22 and the conical head 53 will enter into the wall to cut and dislodge the material comprising such wall. The protuberances 56 constituting the turning means 24 engage the wall 23 and cause the conical head 53 to turn or twist in one direction or the other. Upon continuous picking action and movement of the tapered head 53, the head moves through and out of the wall 23. Because the bit head 53 has been turned during this picking action, the head 53 is located in a different relative position for the next picking action into wall 23. The periphery of the head 53 and the carbide tip 22 is constantly being changed in its angular position because of such bit turning, and consequently, during this intermittent picking action of the bit head 53, there is a tendency for the head 53 and tip 22 to wear evenly about such periphery and be self-sharpened.

During the turning of bit shank 50 in the block bore 42, the pin head 37 rides in the annular shank groove 52. It is possible for very fine cuttings to enter the block bore 42 between the shank 50 and block 41. The turning action of the shank 50 prevents these fine cuttings from packing within the bore 42 such as to hinder or block the bit rotation. These fine cuttings will pass axially along the bore 42 and bit shank 50, and will fall or discharge into the enlarged recess 46 around the shank end 51. The pointed arcuate length of the pin head 37 riding in the groove 52 prevents any clogging of the groove 52 by the fine cuttings. In fact, the pin head 37 will urge these cuttings rearwardly and outwardly of the groove 52 as permitted by the reduced tapered configuration of the shank end 51.

To remove the bit 47, the bit 47 is forcefully pushed, struck or pried outwardly to remove the shank 50 from block bore 42. Upon this intentional withdrawal, the bit shank 50 will depress the pin head 37 laterally and/or rearwardly against the loading of the resilient insert 33 sufficient to remove the pin head 37 from the annular shank groove 52.

The species of bit 57 disclosed in FIGS. 6 and 7 can be conveniently and advantageously used with either of the mounting blocks 10 or 41 in the same manner as the species of bits 15 and 47 can be interchanged with such blocks 10 and 41 to obtain the same functional results.

The bit 57 includes an elongate shank 60 having a shank end 61 provided with a peripheral, annular groove 62 adapted to receive the cooperating pin head 37. In addition, the bit 57 includes a forwardly tapered head 63 formed integrally and coaxially with the shank 60. The larger end of the tapered head 63 is provided with a rearwardly facing shoulder 64. The shank 60 includes an integral, outwardly divergent shank portion 65 connected integrally with the tapered head 63. A carbide tip 66 is attached to and carried by the smaller forward end of the tapered head 63.

The tapered head 63 of bit 57 is of a many-sided pyramid shape. In the embodiment disclosed, three flat sides are utilized to form a triangular cross-section perpendicular to the head and shank axis. This many-sided cross-section, anywhere along the length of the tapered head 63, provides a plurality (a total of three in the embodiment disclosed) of longitudinal corners 67 constituting a turning means generally indicated at 24. These longitudinal corners 67 correspond to the fins 25 in FIG. 1 and to the protuberances 56 in FIG. 5 to provide

a turning means 24 engageable with the wall 23 upon picking action of the tapered head 63 to effect a turning or twisting of the bit 57 in one direction or the other. As the tapered head 63 of bit 57 moves into, through and out of the wall 23 incident to dislodging material from wall 23 in a picking action, the engagement of the longitudinal corners 67 with the wall 23 causes the bit 57, and particularly the tapered head 63, to move to a different angular position for the next picking stroke of the head 63. Consequently, all of the periphery of the tapered head 63 is presented to the wall 23 in a picking action at different times in different angular positions, whereby the periphery of the tapered head 63 and carbide tip 66 is worn substantially evenly and is maintained in a cutting tapered configuration because it is self-sharpened.

In using each of the bits 15, 47 and 57, the turning means 24 provided on the tapered heads 17, 53 and 63 respectively, engage the wall and coast with the wall 23 to turn the bit and keep the respective heads sharp during this intermittent picking action. In each of the bits 15, 47 and 57, the respective heads 17, 53 and 63 have a non-circular cross-section perpendicular to the shank and head axis and along the length of such head. It is this structure making the cross-section a departure from a circular configuration, namely the spiral fins 25 (FIG. 1), the protuberances 56 (FIG. 5) and corners 67 (FIG. 7), which constitutes the turning means 24.

In the bit and block assembly, the shanks 16, 50 and 60 of the bits 15, 47 and 57 respectively are rotatively mounted in the block bores. The locking mechanisms interconnecting the blocks and the bit shanks hold the bit and block securely in assembly yet permit the relative turning movement of the shank. The pin head 37 of each locking mechanism rides in the peripheral annular grooves 27, 52 and 62 of the respective shanks.

Although the invention has been described by making detailed reference to several embodiments, such detail is to be understood in an instructive, rather than in any restrictive sense, many variants being possible within the scope of the claims hereunto appended.

I claim as my invention:

1. A bit and block assembly comprising:
 - a. a block movable along a mine face, the block being provided with a substantially cylindrical bore,
 - b. a point-attack bit including an elongate shank rotatively mounted in the block bore,
 - c. a substantially conical head integral and coaxial with the shank, the head having a reduced diameter leading end and a larger diameter trailing end, and
 - d. a cutting tip on the reduced diameter leading end of the head penetrating the material being mined with a scraping action upon travel of the bit along a mine face,
 - e. spiral fins extending outwardly from the conical head and along the conical head from the leading to the trailing end, the spiral fins providing frictional contact with the material being mined to effect positive turning of the bit upon picking movement of the cutting tip along the mine face.
2. A bit and block assembly as defined in claim 1, in which:
 - f. the substantially cylindrical bore extends through the block to provide an open rear bore end,

g. spiral means having the same spiral direction as the spiral fins is provided on the shank for moving cuttings axially along the shank away from the conical head upon turning of the bit to discharge the cuttings from the bore through the open rear bore end out of the block.

3. In a cutter bit for mining machines and the like and in combination with a mining machine cutter block movable along a mine face and forming a support for the bit,

a generally frusto-conical head having a reduced diameter leading end and a large diameter trailing end,

a concentric shank extending from the large diameter trailing end of said head for rotatable mounting in the mining machine cutter block,

a hardened cutting tip recessed in and bonded to the small diameter leading end of said head and extending axially therefrom and having a generally conical cutting tip penetrating the material being mined with a scraping action upon travel of the bit along a mine face,

and spiral ribs extending along said conical head from the leading to the trailing end thereof and providing the frictional contact with the material being mined to effect positive turning of the bit within the cutter block upon cutting movement of said cutting tip along a mine face.

4. A cutter bit in accordance with claim 3, wherein

the shank has an outwardly opening recess extending thereabout wherein a pin mounted in the cutter block and extending chordally of the shank, extends along said recess to accommodate rotation of said bit within said cutter block and to retain said bit to said block, and wherein the spiral ribs are uniform in cross section throughout their length, leaving furrows therebetween increasing in width from the leading to the trailing end of the bit.

5. In a cutter bit,

a cutter block therefor of a type moving along the mine face as it is advanced into the mine face,

a cylindrical shank rotatably mounted in said cutter block and supporting the bit at a cutting angle with respect to a mine face,

a generally frusto-conical head extending from said shank and tapering toward its outer end, a generally conical cutter tip inserted in and bonded to the end of said head and extending axially therefrom,

the frusto-conical face of said head having helical convolutions in the form of spiral ribs extending for the length of said face to effect positive rotation of said bit by the wedging of said ribs into the material being mined during the operation of advancing said tip into and along a mine face, to effect a mining operation.

6. A cutter bit in accordance with claim 5, wherein the ribs are of a generally V-shaped cross section throughout their length and have furrows therebetween opening to the end of the head supporting the tip and increasing in width from the leading to the trailing end thereof to provide a self-cleaning serrated end portion of said head wedging into and rotating said bit during the operation of advancing said tip into and along a mine face, to effect a cutting operation.

7. The structure of claim 6,
wherein the shank has an outwardly opening annular
recessed portion extending thereabout,
wherein a pin extending through said block is slidably
engaged by said recessed portion to accomodate ro- 5
tation of said bit in said block and to retain said bit
thereto,
and wherein the ribs are V-shaped in cross section
and of uniform cross section throughout their
length and leave furrows therebetween increasing 10
in width from the leading to the trailing end of said
cutter bit.
8. A point-attack bit for removing material from a
mine face comprising:
- a. an elongate shank, 15
 - b. a substantially conical head integral and coaxial
with the shank, the head having a reduced diameter
leading end and a larger diameter trailing end, and
 - c. a plurality of protuberances on and extending out- 20
wardly from the periphery of the conical head, the
protuberances providing frictional contact with the
material being mined to effect positive turning of
the bit upon picking the mine face by the conical
head. 25
9. A point-attack bit as defined in claim 8, in which:
- d. the protuberances are provided about the periph-
ery of the conical head between the leading end
and the trailing end, at least one of the protuber-
ances being in position to frictionally engage the 30
material being mined to effect positive turning.
10. A point-attack bit as defined in claim 9, in which:
- e. the protuberances are circumferentially spaced
relatively so that at least one of the protuberances 35
will frictionally engage the material being mined to
effect positive turning.
11. A point-attack bit as defined in claim 10, in
which:
- f. the protuberances consist of a plurality of individ- 40
ual knobs formed on and projecting laterally out-
wardly from the periphery of the conical head.
12. A point-attack bit as defined in claim 10, in
which:
- f. the protuberances consist of fins on and extending 45
the length of the conical head from the leading to
the trailing end, and projecting laterally outwardly
from the periphery of the conical head.
13. A bit and block assembly, comprising:
- a. a block movable along a mine face, the block being 50
provided with a substantially cylindrical bore,
 - b. a point-attack bit including:
 - 1. an elongate shank rotatively mounted in the
block bore,
 - 2. a substantially conical head integral and coaxial 55
with the shank, the head having a reduced diame-

- ter leading end and a larger diameter trailing end,
and
 - 3. a cutting tip on the reduced diameter leading
end of the head penetrating the material being
mined with a scraping action upon travel of the
bit along a mine face, and
 - c. a plurality of protuberances extending outwardly
from the periphery of the conical head and along
the conical head between the leading end and the
trailing end, the protuberances having frictional
contact with the material being mined to effect
positive turning of the bit upon picking and scrap-
ing movement of the cutting tip and head along the
mine face.
14. A bit and block assembly as defined in claim 13,
in which:
- d. the protuberances are provided about the periph-
ery of the conical head between the leading end
and the trailing end, at least one of the protuber-
ances being in position to frictionally engage the
material being mined to effective positive turning.
15. A bit and block assembly as defined in claim 14,
in which:
- e. the protuberances are circumferentially spaced
relatively so that at least one of the protuberances
will frictionally engage the material being mined to
effect positive turning.
16. A bit and block assembly as defined in claim 15,
in which:
- f. the protuberances consist of a plurality of individ-
ual knobs formed and projecting laterally out-
wardly from the periphery of the conical head.
17. A bit and block assembly as defined in claim 15,
in which:
- f. the protuberances consist of fins on and extending
along the length of the conical head from the lead-
ing to the trailing end, and projecting laterally out-
wardly from the periphery of the conical head.
18. A point-attack bit for removing material from a
mine face, comprising:
- a. An elongate shank, and
 - b. A head integral and coaxial with the shank, the
head including a plurality of laterally projecting
fins extending generally longitudinally of the bit yet
at an angle to the longitudinal axis of the bit, the
fins providing frictional contact with the material
being mined to effect a positive turning of the bit
upon picking of the mine face by the head.
19. A point-attack bit as defined in claim 18, in
which:
- c. the head including the fins provides a substantially
conical profile having a reduced leading end and a
larger trailing end.
- * * * * *