

June 11, 1963

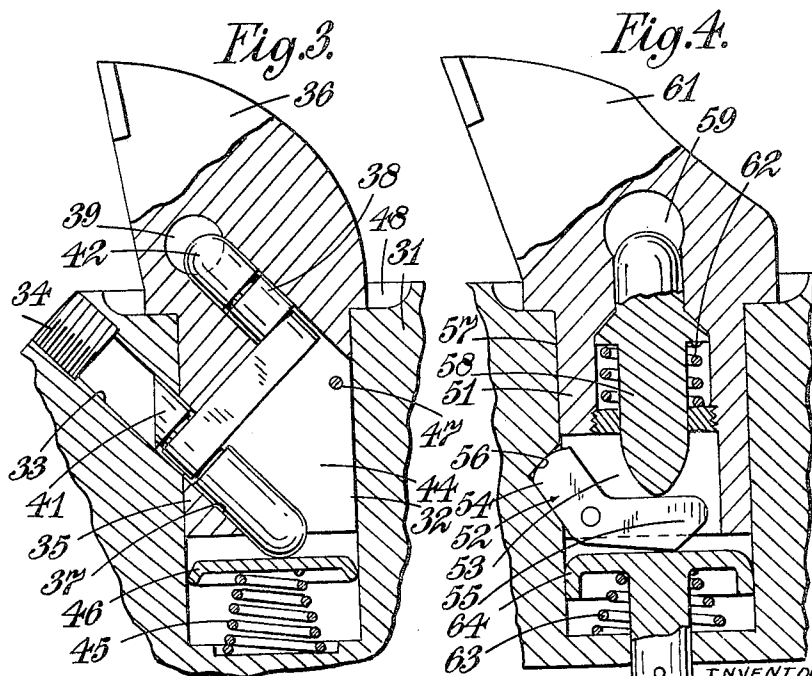
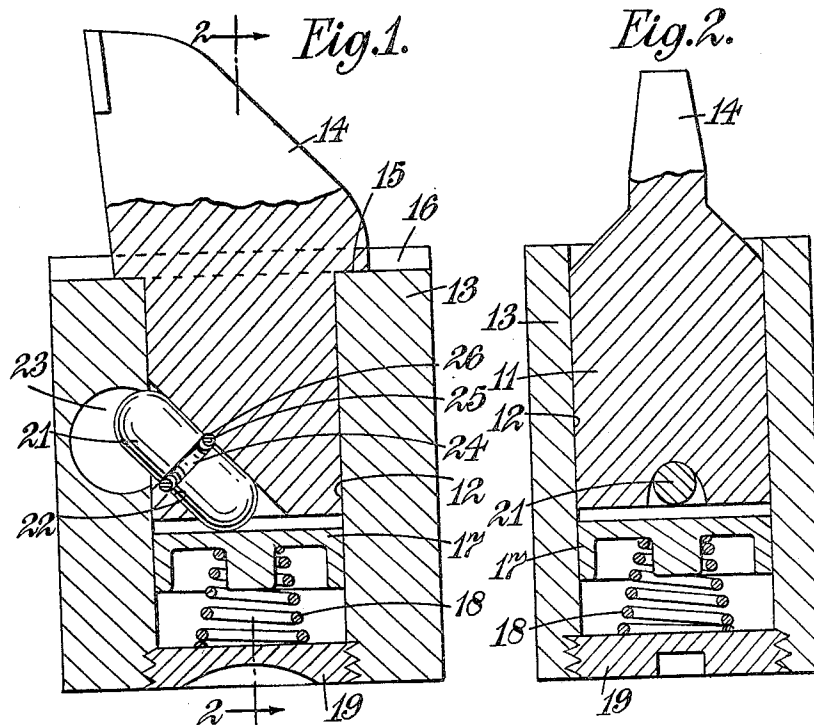
S. E. PROCTOR

3,093,366

CUTTER BIT HOLDER

Filed Sept. 29, 1960

2 Sheets-Sheet 1



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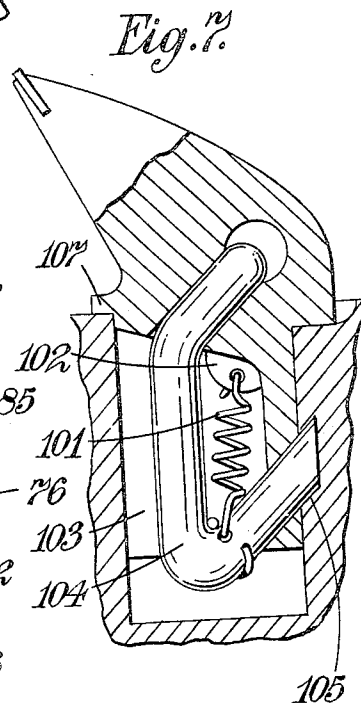
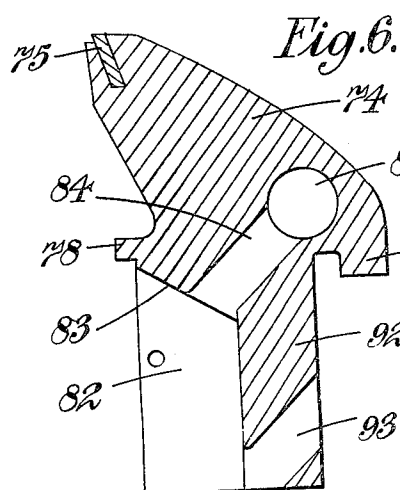
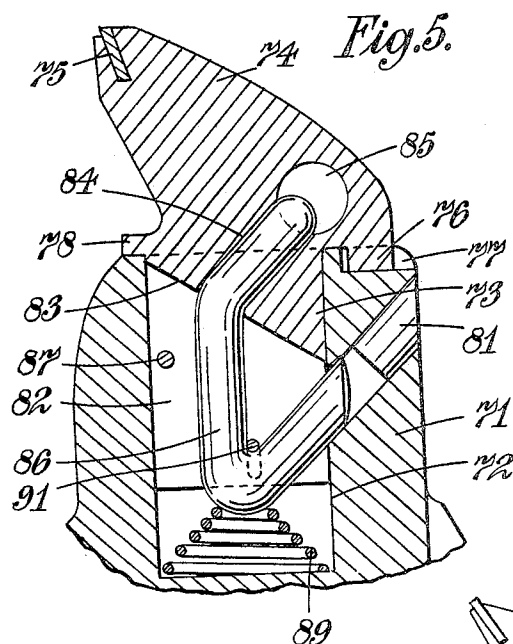
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2 Sheets-Sheet 2



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1

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CUTTER BIT HOLDER

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4 Claims. (Cl. 262—33)

This invention comprises improvements in or relating to coal-cutter picks.

It is an object of the invention to provide a quick release device for a coal-cutter pick so that it can be released from the pick box in the shortest possible time.

In coal-cutters as hitherto constructed, a pick is secured in pick boxes, whether in coal-cutter chains or on rotatable pillars or the like, by means of set screws which enter the pick box from one side and grip the shank of the pick. To change one pick for another, it is necessary to unscrew the set screw, loosen the pick shank and remove it and then to insert a new pick shank and screw up the set screw again. Under the conditions in which coal-cutting machines work, especially in cases where the picks do not have to be frequently changed, the screws frequently become rusted in and are difficult to remove. As there is a large number of picks on any coal-cutting machine, changing the picks under these conditions takes a long time and the machine is out of use during the whole of the time occupied for changing. Even where the screws are not rusted much time is wasted while the picks are changed and where corrosion has occurred, the time wasted is increased.

Accordingly the present invention provides a device for retaining a coal-cutter pick by its shank in a socket in a pick-box comprising a latch-member mounted within the shank for movement between a latched position in which the latch-member projects laterally of the shank for engagement with a recess in the wall of the socket and an unlatched position in which the latch-member is retracted into the shank, means to urge the latch-member into the latched position and an access bore transverse the axis of the shank whereby access to the latch-member may be had in order to move it into the unlatched position.

In one construction the access bore traverses the pick-box and intersects the recess in the wall of the socket and the insertion of a tommy bar into the access bore releases the pick by engaging the projecting end of the latch-member and causing it to retract into the shank.

In a second construction the access bore traverses the head of the pick and the insertion of a tommy bar into the access bore releases the pick by engaging a release-member operatively connected to the latch-member and causing it to retract into the shank. Preferably the release-member is a plunger slidable in the shank of the pick.

Preferably the means to urge the latch into the latched position comprise a spring in the bottom of the shank-receiving socket and a plate urged upwardly by the spring into engagement with a tail on the latch-member.

Embodiments of the device according to the invention will now be described by way of example and with reference to the accompanying drawings, in which:

FIGURE 1 is a sectional elevation of a coal-cutter pick retained by its shank in a socket in a pick-box,

FIGURE 2 is a section on line 2—2 of FIGURE 1,

FIGURE 3 is a sectional elevation of a second coal-cutter pick retained by its shank in a socket in a pick-box,

FIGURE 4 is a sectional elevation of a third coal-cutter pick retained by its shank in a socket in a pick-box,

2

FIGURE 5 is a sectional elevation of a fourth coal-cutter pick retained by its shank in a socket in a pick-box,

FIGURE 6 is a sectional elevation of an alternative coal-cutter pick for use in the construction shown in FIGURE 5, and

FIGURE 7 is a sectional elevation of a fifth coal-cutter pick retained by its shank in a socket in a pick-box.

In the construction shown in FIGURES 1 and 2, a pick is provided with a shank 11 to fit a socket 12 in a pick-box 13 and the head 14 of the pick is joined to the shank by a shoulder 15 which, when the pick is home in the pick-box, rests in a slot 16 cut across the top of the socket.

In the base of the socket there is a plunger 17 beneath which is a spring 18 tending to urge the plunger upwards and the plunger is capable, if the pick is not held by retaining means in the pick-box, of ejecting it outwards. The spring seats on a plug 19 which closes the bottom of the socket.

The inner end of the shank contains a latch-member 21. The latch-member is constituted by a short round-ended cylindrical plug which is received slidably in a hole 22 drilled through the shank in a direction at 45° to its length in such a position that the lower end of the hole is concentric with the bottom of the shank and the upper end breaks out of the side of the shank part of the way between the bottom end of the shank and the shoulder 15. The latch-member is long enough to project at one end below the bottom of the shank into engagement with the plunger 17 and at the same time to project at the other end from the side of the shank. A transverse access bore 23 is broached through the pick-box at such a position that it cuts partly across the socket provided for the shank of the pick thus forming a recess in the wall of the socket. The upper end of the latch-member where it projects from the side of the shank of the pick, is able to enter into this recess under the effect of the spring pressure exerted by the plunger and will so lock the pick against withdrawal.

If a tommy-bar is inserted into the side of the pick-box through the access bore, it can be used to force the latch-member inwards against the action of the spring plunger until the latch-member is retracted into the shank clear of the recess, whereupon the spring plunger will force the cutter-pick shank, with the latch-member in it, upwardly out of the pick-box. Thus the pick is automatically ejected as soon as it is released.

The tommy-bar for this purpose should be of D-section so that its shank fits the access bore in the pick-box and its flat side engages and releases the latch-member.

If desired, the latch-member may have a groove 24 cut around the middle of its length and a mating groove 25 may be cut in the wall of the hole in which the locking member slides. In the latching position, the grooves will register with one another. Around the latch-member in the grooves there may be a spring ring 26 which tends to centre the latch-member in the latching position but will yield to allow it to be pushed into the unlatched position when desired. The spring ring must be made weak enough to permit the spring plunger to push the latch-member into the latching position notwithstanding the friction the ring produces.

In the construction shown in FIGURE 3, a cutter-box 31 on a coal-cutter chain is provided with a circular pick-shank receiving socket 32 having a flat bottom of somewhat greater depth than the pick-shanks to be employed. A hole 33 is drilled through the cutter-box into the side of the socket at an angle of about 45° downwards and the upper end of the hole is stopped by a screwed plug 34. Picks are provided having circular shanks 35 and

3

rectangular heads 36. By a rectangular head is meant rectangular as viewed from along the axis of the pick shank. The back of each head behind the tip as viewed in side elevation is curved in the usual way.

A hole 37 is drilled through the pick shank at 45° to its length in a position in which it will register with the inclined hole 33 in the side of the socket when the shank is fully home. A second hole 38 parallel to the hole 37 is drilled in the shank in a position in which it extends upwardly into the head of the pick and the head is drilled with a somewhat larger access bore 39 which intersects the end of the second hole 38.

A latch member 41 is provided which is circular in cross-section and is an easy sliding fit in the hole 37, the upper end of the latch member being cut off at such an angle that if it is forced right back in the hole 37 in the shank its end will be flush with the side wall of the shank. It is able however, to slide upwardly and outwardly from this position into a position in which it enters the inclined hole 33 in the side of the socket and in the latter position it will serve to lock the pick-shank in place.

A release plunger 42 is provided which fits the hole 38 in the pick-shank and which has a rounded head capable of being pushed into a position where it enters the intersecting access bore 39 in the pick-head. The release plunger 42 is rigidly connected to the latch-member 41 by a cross-bar 43, the plunger, the cross-bar and the latch-member being made in one piece.

To allow room for the cross-bar to slide in the pick-head the metal at 44 between the hole 37 and the hole 38 for the release plunger is removed. Thus, if a tommy-bar is passed through the access bore in the head of the pick, it will force the release plunger downwardly and make the plunger withdraw the latch-member.

In the bottom of the socket there is a conical spring 45 which urges a little plate 46 upwardly against the bottom end of the latch-member 41, which is rounded to receive it. This spring urges the latch-member upwardly and outwardly into engagement in the hole in the side of the socket and the tommy-bar, if inserted, will cause the latch-member to be retracted against the spring.

If the pick-shank tends to stick in the socket when the tommy-bar is inserted it is quite easy to rotate the pick by the head of the tommy-bar in the socket and set it free. Undue depression of the release plunger by the tommy-bar can be prevented by means of a cross-pin 47 which is driven through the shank a little below the position at which the release plunger fully withdraws the latch-member. Other means, such as a circlip could be used to retain the latch-member within the pick.

In order to prevent rotation of the pick relatively to the socket when in use, the rectangular sides of the head of the cutter are employed in conjunction with a recess 48 formed across the mouth of the socket. The recess is machined just a little wider than the head of the pick and when the shank of the pick is pushed into the socket the sides of the head enter the recess and prevent it turning. The freeing of the cutter-shank by turning it with the tommy-bar is not thereby prevented because very slight movement is all which is necessary.

In the construction shown in FIGURE 4, instead of a slidable latch-member in the shank 51 of the pick, there is a pivoted latch 52 which works in a transverse slot 53 machined across the inner end of the shank. This latch 52 has two arms 54 and 55 which are at an angle of about 135°; one arm 54 acts as the latch-member and enters a recess 56 in the side of the socket 57. The other arm 55, when the latch-member is so entered, extends at right angles to the axis of the shank across the centre line thereof. In this position it can be engaged by a release-plunger 58 slidable within the shank coaxially therewith. As before, the head of the release plunger 58 enters a transverse access bore 59 in the head 61 of the cutter-pick which can be used for the insertion of a tommy-bar. The quick-release plunger is held upward by a spring 62 which sur-

4

rounds it within the shank. There is a further spring 63 and cover plate 64 in the bottom of the socket to urge the tail of the latch outwardly against the release plunger and to cause the head of the latch to snap out into the recess formed in the side of the socket.

As before, the head of the pick fits into a recess cut across the mouth of the socket.

In the construction shown in FIGURE 5 a cutter-box 71 on a coal-cutter chain is provided with a circular pick-shank receiving socket 72 having a flat bottom at a somewhat greater depth than the pick-shanks to be employed. A pick is provided having a circular shank 73 and a pick-head 74. A hardened insert 75 is mounted at the cutting edge of the pick-head. The back of the head is curved and has a heel 76 which is received in a slot 77 in the pick-box when the shank of the pick is fully entered into the socket; the engagement of the heel and the socket prevents the pick from rotating. Although only one slot 77 is shown in FIGURE 5, other slots may be provided to correspond with other angular positions of the cutter-pick with respect to the socket. The pick-head is also formed with a collar 78 which surrounds the pick head except at its heel; the collar 78 seals the socket 72 when the pick-shank is pushed home to prevent coal-dust from penetrating into the socket.

A bore 81 is drilled through the cutter-box into the side of the socket at an angle of about 45° to the axis of the socket. The bore 81 is drilled at the rear of the socket, that is to say below the heel. However, other bores may be drilled into the socket to correspond to other angular positions of the cutter-pick with respect to the socket, in particular a corresponding bore may be drilled diametrically opposite to the bore 81 so that the cutter-pick may be reversed. The lower part of the pick-shank is slotted, the slot 82 terminating at an oblique wall 83. A bore 84 is drilled through the oblique wall 83 and into the pick-head 74 where it intersects a cross-bore 85; the bore 84 is inclined at an angle of about 45° to the axis of the shank so that it is parallel to the bore 81 in the cutter-box when the shank is received in the socket.

A latch-member 86 is bent from a metal wire of circular cross-section. The wire is bent into the shape of three sides of a parallelogram; thus when the central portion is mounted in the pick-shank parallel to the axis of the pick-shank, the two end portions are inclined at about 45° to the axis of the pick-shank so that the upper end portion of the latch-member enters the bore 84 in which it has an easy sliding fit. The central portion and the lower end portion of the latch-member 86 slide easily into the slot 82. A cross-pin 87 is secured across the slot 82 so that the latch-member cannot fall out of the slot. However, the cross-pin does allow the latch-member to slide between two positions; these two positions are a latched position, in which the lower end portion of the latch-member projects from the slot 82 in the shank and in which the upper end portion projects into the cross-bore 85 in the pick head 74, and an unlatched position, in which the lower end portion is retracted into the slot 82 and the upper end portion does not project into the cross-bore 85. A conical spring 89 is formed with a loop 91 by which it is secured to the latch-member 86.

When the pick-shank is pushed home in the socket 72 the spring 89 is compressed against the bottom of the socket and so urges the latch-member 86 upwards and into the latched position. In this latched position the lower end portion of the latch-member projects from the slot 82 and enters the bore 81 in the cutter-box, so that the pick cannot be withdrawn from the socket. In order to withdraw the pick a tommy-bar is inserted into the cross-bore 85 in the pick head 74. This insertion of the tommy-bar causes the latch-member to move into the unlatched position against the action of the spring 89. In this unlatched position the lower end portion of the latch-member is retracted from the bore 81 into the slot 82, so that the pick-shank can be withdrawn from the socket.

5

In practice it is preferred to drill the bore 81 so that it is not quite parallel to the bore 84 and the end portions of the latch-member. Thus the bore 81 may be drilled at 50° to the axis of the pick-shank, as shown in broken lines. In this manner a wedging action is obtained between the latch-member and the bore 81. This wedging action not only serves to secure the latch-member more firmly in the bore 81 but also tends to draw the pick-shank into the socket and so to enable the collar 73 to seal the open end of the socket.

When the pick is cutting coal a turning moment is applied to the pick-head which tends to rotate the pick in a clockwise direction; this moment is resisted by the heel 76 supported in the slot 77 in the cutter-box. It is an advantage to locate the bore 81 in the rear of the socket so that no load is imposed on the latch-member 86 due to the cutting pressure on the pick.

Since the conical spring is secured to the latch-member, it is withdrawn from the socket with the pick-shank. Thus the latch-member and the spring can both be readily cleaned of any coal-dust which might have penetrated into the socket.

FIGURE 6 shows an alternative form of pick which can be used in the manner described with reference to FIGURE 5. In FIGURES 5 and 6 like features are referred to by the same reference numerals. This alternative pick has a pick head identical with that shown in FIGURE 5. Similarly it is formed with an oblique bore 84 and a cross-bore 85. However, the slot 82 in the lower part of the shank does not pass diametrically across the shank but merely extends a little further than the axis of the shank. The rear portion 92 of the shank remains integral with the pick. A further oblique bore 93 is drilled through the rear portion 92 at an angle of about 45° to the axis of the shank so as to receive the lower end portion of the latch-member.

Although the spring means urging the latch-member into the latched position in the embodiments described with reference to FIGURES 1 to 6 are generally in compression when the latch-member is in the latched position, so as to exert the aforementioned pick-ejecting force when the latch is withdrawn, it will be noted that the spring means do not have to exert any force when the latch-member is in its latched position. The spring means are only required to position the latch-member, which then provides a mechanical latch to retain the pick in its cutter-box. Such a mechanical latch is not provided by non-mechanical methods of retaining picks in cutter-boxes, for example methods relying on frictional forces.

FIGURE 7 shows an alternative construction of pick and cutter-box which is very similar to the construction described with reference to FIGURE 6. However in the construction according to FIGURE 7 a tension spring 101 replaces the compression spring 89 shown in FIGURE 5. The tension spring 101 is secured at one end to a plate 102 at the upper end of the slot 103 formed in the pick-shank. The other end of the tension spring 101 is secured to a latch-member 104 which is similar to the latch-member 86 shown in FIGURE 5. The tension spring 101 urges the latch-member into its latched position in which it engages a notch 105 formed in the wall of the pick-shank receiving socket.

In order to insert the pick shown in FIGURE 7 into its socket it is necessary to insert a tommy-bar into the cross-bore 106 so as to move the latch-member into its

6

unlatched position. The pick-shank can then be inserted into the socket and on removal of the tommy bar the pick-shank is latched in position. The pick-shank can be withdrawn from the socket on re-insertion of the tommy-bar into the cross-bore 106.

In this construction the tension spring 101 can be so arranged as to be under tension when the latch-member is in its latched position. Under such circumstances the spring 101 will have a tendency to pull the pick into the socket in the cutter-box and will thus ensure that the socket is firmly sealed by the collar 107 on the pick-shank, against penetration of coal-dust into the socket.

It is to be understood that the invention is not limited to the details of the foregoing examples; for instance the spring 18 of FIGURE 1 might be secured to the plunger 21 in a manner similar to that shown in FIGURE 5. Furthermore, although in the foregoing examples the means to urge the latch-member into the latched position are mechanical springs, it is to be understood that these springs could be replaced by other materials of an elastic nature such as rubber or by any other form of biasing means. Furthermore, although in the foregoing examples the shanks of the cutter picks are circular, it is to be understood that the shanks could be rectangular or may have any other cross-sectional shape.

I claim:

1. In a coal cutter pick and pick box assembly of the class in which said pick is provided with a shank for longitudinal reception and removal from the socket of a pick box, said pick box normally supporting the pick with its head projecting from the said socket, the combination with said assembly of releasable means for securing the pick in the pick box comprising a latch member slidably guided through said shank for movement into and from latching reception in a recess in the wall of the socket, a plunger spaced from said latch member and slidably guided in the head of the pick for movement parallel to the movement of the latch member, and means interconnecting said latch member and plunger for movement together, said pick head being formed with a bore therethrough transversely to said plunger, said plunger projecting partially across said bore in the latched condition of said latch member.

2. The combination defined in claim 1 including resilient means within said socket urging the latch member toward its latched position.

3. The combination of claim 2 wherein said latch and said plunger are both guided for transverse rectilinear movement with respect to said longitudinal reception and removal of the pick.

4. The combination as defined in claim 2 in which said plunger has a domed end disposed to project partially across said bore in the latched condition of the latch member.

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