June 29, 1943. F. L. FULKE 2,322,929

MINING CHAIN BIT HOLDER AND BIT

Original Filed July 18, 1938

Fig. 1.

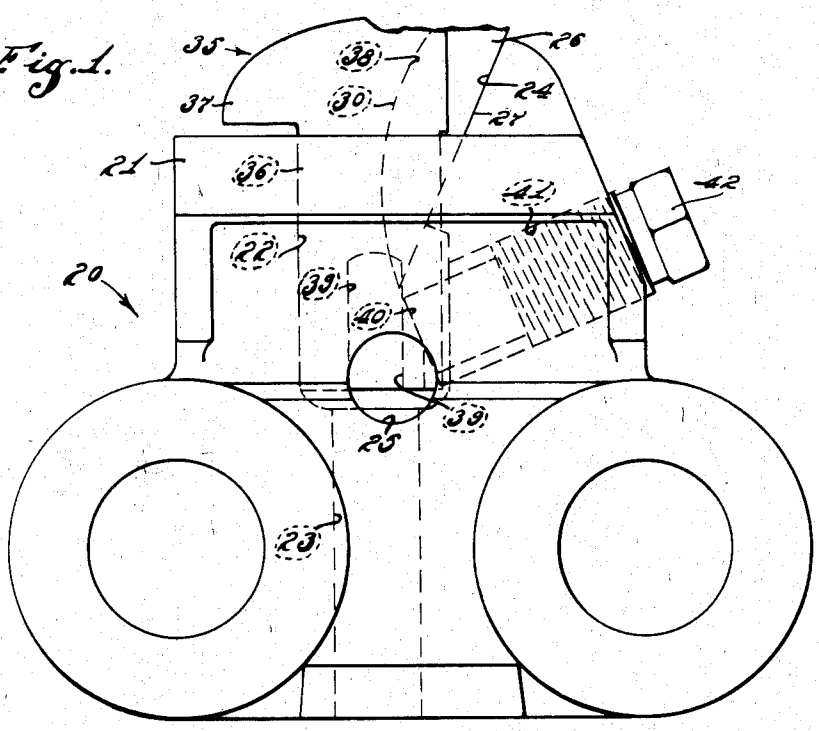


Fig. 2.

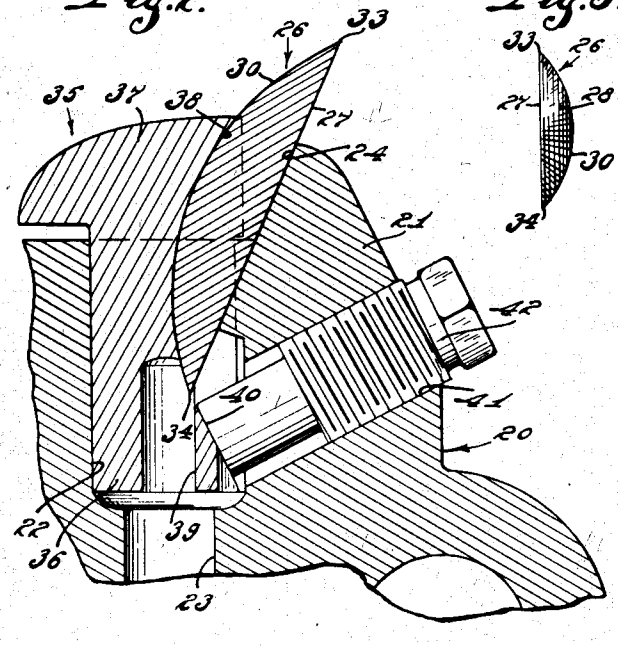


Fig. 3.

Fig. 4.

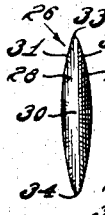
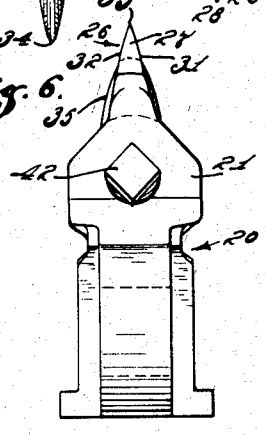


Fig. 5.



Fig. 6.



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MINING CHAIN BIT HOLDER AND BIT

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Continuation of application Serial No. 219,709, July 18, 1938. This application November 9, 1940, Serial No. 365,005

17 Claims. (Cl. 262—33)

The present application is a continuation of my application Serial No. 219,709, filed July 18, 1938, being identical therewith in disclosure; and this application is, as was my said application Serial No. 219,709 a continuation in part of my application Serial No. 23,017, filed May 23, 1935, for Mining machine cutter chain and method of making elements thereof, now Patent No. 2,156,725, issued May 2, 1939, and my application Serial No. 23,592, filed May 27, 1935, for Mining machine and elements thereof, now Patent No. 2,156,726, issued May 2, 1939. This application is primarily directed toward the particular cutter bit disclosed in said patents and holding means therefor constituting an improvement over the holding means disclosed in the said patents.

An object of the present invention is to provide a bit for mining machine cutter chains which shall be extremely inexpensive, as compared to previously known bits, but which shall be of such character as to provide improved efficiency, improved facility of handling and changing, and to provide two alternatively usable cutter points. A further object of the invention is to provide a workable holder for such bits, employing only three pieces, yet providing for easy replacement of the wearable piece that holds the bit.

Through experience with small multiple pointed bits I have found that serious problems are involved in gripping such a small piece in cutting position, due to the fact that when cutting in hard impurities, any outward extension or projection from the surface of the blocks is severely abraded away by hard material not removed by the bit points or sides closely adjacent. I am aware of structures in which rear surfaces of such small bits are supported directly in a socket formed integrally with the block, with a clamp piece and screw ahead of the bit to engage and lock it, thus constituting a three piece holder. However such construction requires replacement of the expensive block itself when the bit supporting portion becomes mutilated by coring. I obviate this by providing a replaceable tool post projecting outward from the link to support the rear surface of the bit, said tool post being provided with a head which cooperates with an inclined flat surface on the bit block to clamp the bit in cutting position.

Further and more particular objects of the invention will appear as the description proceeds.

To the accomplishment of the above and related objects, my invention may be embodied in the form illustrated in the accompanying drawing, attention being called to the fact, however, that the drawing is illustrative only, and that change may be made in the specific construction illustrated and described, so long as the scope of the appended claims is not violated.

Fig. 1 is a bottom plan view of a mining machine chain link formed to accommodate my novel bit holding means, and showing such means in position to clamp my novel bit in place on the link or block;

Fig. 2 is a fragmentary longitudinal section taken upon a plane parallel to the plane of Fig. 1;

Fig. 3 is a side elevation of the bit of the present invention;

Fig. 4 is a rear elevation thereof;

Fig. 5 is an end view thereof; and

Fig. 6 is a reduced end elevation of the organization of Fig. 1.

Referring more particularly to the drawing, it will be seen that I have illustrated a mining machine chain link indicated generally by the reference numeral 20. Said link comprises, as usual, a head 21, and is formed with a bore extending from the outermost surface of the head 21 entirely through the link, said bore in the illustrated embodiment consisting of an enlarged portion 22 and a smaller portion 23.

The bore is formed, at its outermost portion, to provide an outwardly and forwardly sloping flat surface 24 for a purpose later to be described. The link block is preferably formed with a second bore 25 opening from the bore 22, at a point adjacent the shoulder formed between the portions 22 and 23, through that wall of the block which, in the working position of the block, is directed downwardly.

The bit of the present application is indicated generally by the reference numeral 26, and is illustrated in detail in Figs. 3, 4, and 5. Said bit comprises a flat front wall 27, the contour of which is a sharp-ended ellipse; and two identical convex walls 28 and 29, the contours of which are segments of convex circular figures. The walls 28 and 29 merge into a transversely rounded narrow edge 30 which, in structural effect, is substantially a line and which is so designated in certain of the claims appended hereto; the walls 27 and 28 meet in a cutting curved edge 31; and the walls 27 and 29 meet in a cutting curved edge 32, identical with the edge 31. The edges 31 and 32 meet, in the plane of the edge 30, in a sharp cutting point 33 at one end, and in a sharp cutting point 34 at the other end.

The shape of the completed bit may, perhaps, be best described as the shape of a segment of a double convex disc. In this definition, the word

"segment" is used in its restricted geometrical sense, and refers to that portion of such double convex disc which is defined between a portion of the periphery of the disc and a subtending plane thereof. In other words, the bit has the shape of an element produced by cutting a double convex disc upon a plane including a (preferably minor) chord of said disc.

Obviously, while the bits may be made by so cutting a double convex disc, they may be much less expensively manufactured in any one of several different ways; for instance by the method disclosed in my said co-pending application.

It will be readily seen that this bit element, normally not over 2½ inches in length and approximately ⅛ of an inch in major width, provides an extremely inexpensive mining machine bit, double pointed, readily replaceable, and containing so little material that it will be less expensive to replace it than to resharpen it.

It will also be seen, from the following disclosure, that in the present application I have illustrated one extremely efficient, readily operable, holding means for such a bit; the advantages of which, when used in connection with the illustrated bit, will be readily apparent to anyone familiar with the art to which the present invention pertains.

A clamping element, indicated generally by the reference numeral **35**, for use with the bit of the present application, comprises a shank **36** receivable in the bore **22** and a head **37**. Said clamping element **35** is formed in its forward face with a recess **38** substantially conforming to the shape of, and adapted snugly to receive, a portion of the curved and convex walls of the bit **26**. From a consideration of Fig. 2, particularly, it will readily be seen that, when a bit **26** is engaged in said recess **38**, it will be snugly held with its surface **27** in contact with the flat surface **24** of the bore **22**. It will also be seen that, because of the particular shape of the bit and of the surfaces **24** and **38** between which said bit is clamped, working forces impressed upon the projecting cutter point **33** will have no tendency to loosen the bit from its clamped engagement; but instead, will tend to force the bit more deeply into the pocket defined by the recess **38** and the cooperating flat surface **24**.

The shank **36** is formed on its forward face with an inclined step **40** engageable by the end of a set screw **42** threadedly received in a bore **41** formed in the bit block; and it will be apparent, from a consideration of Fig. 2, that the set screw **42** tends, when turned down against the step **40**, to urge the shank **36** inwardly of the bore **22**.

Unavoidably, when a mining machine is used in a coal mine, fine coal dust finds its way into the sockets of the bit-carrying blocks. With devices of the prior art, it is not uncommon for the sockets to become so solidly packed with coal dust as to make it substantially, if not quite, impossible to remove the bit holding means disposed therein without actually drilling the metal away.

To overcome this difficulty, I provide a passage whereby coal dust, which finds its way into the socket **22**, may find egress therefrom. The action of the mining machine is such that coal dust will be shaken out, through a passage of the type which I have provided, during operation of the machine, so that it will never become packed in the socket.

As has been stated, the bore in which the shank **36** is received extends entirely through the bit block. In order further to facilitate egress of coal dust, however, I have provided the second bore **25** which leads downwardly from substantially the junction of the portions **22** and **23** of the primary bore, and opens through the downwardly-disposed wall of the bit block. In order further to facilitate the passage of coal dust through the block, however, I prefer to form the shank **36** with a bore or passage **39** which leads from a point adjacent the base of the recess **38** through the base of the shank **36** and so into the bore **22**. In practice, it is found that the coal dust passes straight through the organization of the present application and does not pack in the holder socket.

Under extreme conditions, it is possible that, in spite of the provision of the safeguards above described, dirt might become packed in the block socket. Under such circumstances, it will be clear that the provision of the bore **25** adjacent the base of the shank **36** would make it possible for the operator to insert a tool through the bore **25** to engage the base of said shank **36** to pry the holder **35** out of the bore.

In use, the bit **26** is placed in recess **38** of clamping element **35** and the two parts are inserted into the socket **22** with the face **27** of the bit resting on the surface **24** of the socket. Screw **42** is then forced down upon surface **40** of the holder **35**, and the holder **35** is thereby urged inwardly, surface **27** of the bit sliding inwardly on surface **24** of the socket **22** until the clamping element and bit are firmly wedged into place. Because of this wedging action of screw **42** on element **35**, the shank of the element **35** may loosely fit the bore **22** and the bore and shank need not be accurately machined. As a consequence, any distortions of the shank and socket resulting from normal use do not interfere with ready removal and replacement of the clamping element and bit.

It will be noted that the inner tip of the bit (point **34** in Fig. 2) lies free from contact with the element **35**, the block **20**, and the screw **42**. Therefore any battering of the active tip of the bit, arising from normal use, will not interfere with reversal of the bit to bring the previously unused tip of the bit into active position.

It will also be noted that resistance offered by the work to passage of the bit tends to drive the bit inwardly along surface **24** of the block **20** and concurrently to drive the element **35** inwardly into the block **20**, thereby maintaining the bit firmly in place at all times so as to avoid all chattering of the bit and element **35** in the block.

I claim as my invention:

1. As a new article of manufacture, a cutter bit comprising a metal piece having the shape of a segment of a symmetrical double-convex disc.

2. As a new article of manufacture, a cutter bit formed with a continuous flat face terminating in cutting points at its opposite ends, said bit further being formed with two sides leading from the lateral edges of said flat face and merging in an arc of a circle.

3. The combination with a cutter bit, of a holder therefor comprising a block formed with a socket, and a clamping element comprising a head and a shank, said shank being receivable in said socket, a recess formed in said head and conforming substantially to the contour of a portion of the rear surface of said bit and adapted snugly to receive said portion and to hold a flat front surface of said bit against a flat surface

provided on said block, said shank being formed with a dirt passage opening from said recess into said socket.

4. The combination with a cutter bit, of a holder therefor comprising a block formed with a socket therein disposed, in the working position of the block, upon a substantially horizontal axis, a clamping element comprising a head and a shank, said shank being receivable in said socket, a recess formed in said head and conforming substantially to the contour of a portion of the rear of said bit and adapted snugly to receive said portion and to hold a flat front surface of said bit against a flat surface provided on said block, said shank being formed with a dirt passage opening from said recess into said socket, and said block being formed with a bore intersecting said socket and opening through that wall of said block which, in the working position of said block, faces downwardly.

5. The combination with a cutter bit, of a holder therefor comprising a block formed with a socket therein disposed, in the working position of the block, upon a substantially horizontal axis, a clamping element comprising a head and a shank, said shank being receivable in said socket, a recess formed in said head and conforming substantially to the contour of a portion of the rear surface of said bit and adapted snugly to receive said portion and to hold a flat front surface of said bit against a flat surface provided on said block, said shank being formed with a dirt passage opening from said recess through the base of said shank, and said block being formed with a bore intersecting said socket adjacent the base of said shank and opening through that wall of said block which, in the working position of said block, faces downwardly.

6. The combination with a cutter bit, of a holder therefor comprising a block formed with a socket, and a clamping element comprising a head and a shank, said shank being receivable in said socket, a recess formed in said head and conforming substantially to the contour of a portion of the rear surface only of said bit and adapted snugly to receive said portion and to hold a front surface of said bit against an abutment surface provided on said block, said shank being formed with a dirt passage opening from said recess into said socket.

7. A mining machine chain link having a socket, an immovable forwardly and outwardly inclined abutment upstanding from the link and in front of the mouth of said socket, a tool post with its inner end received in said socket and its outer end protruding therefrom and having an open-sided bit engaging seat formed on its front side corresponding in contour with a rear surface only of a plural pointed bit carried therein and generally inclined inwardly and rearwardly and extending into said socket, and a threaded member engaging the forward surface of the inner end of the tool post for shifting it axially of said socket to wedge a front surface of said bit against said abutment.

8. In a mining chain link, a socket, an immovable abutment upstanding from the link in front of said socket, a movable tool post in the socket and upstanding therefrom, a bit having a curvilinear back side engaged against a corresponding open groove formed in the front side of the tool post, and means including a screw threadedly mounted in said link on an axis inclined to the axis of said socket and projectible into said socket and an abutment surface on said tool post substantially perpendicular to said screw axis and engageable by said screw for shifting the tool post axially to wedge a front surface of the bit against said abutment.

9. As a new article of manufacture, a cutter bit formed with a flat front face outlining an elongated ellipse defining a pair of opposite cutting ends, and a pair of identical side surfaces leading from the lateral edges of said ellipse and converging in a curving, blunted rear edge, conforming to the arc of a circle.

10. In a mining machine chain, a bit block formed with a socket defining an outwardly inclined abutment surface, in combination, a cutter bit formed with a substantially continuous flat front face terminating in cutting points at its opposite ends, said bit further being formed with allochiral side surfaces leading respectively from the lateral edges of said front face and merging in an arc of a circle, and a brace for said bit including a shank receivable in the socket of such block and a head, said brace being formed to provide a seat having allochiral side walls merging in an arc of a circle and conforming generally to the contour of a portion of the surfaces of said bit side surfaces intermediate said cutting points, the perpendicular distance from such abutment surface to the arc of said seat being less at either end of said seat than at its midpoint when said shank is received in such socket, whereby said seat wedges the flat face of said bit against such surface.

11. In a mining machine chain, a bit block formed with a socket defining an outwardly inclined abutment surface, in combination, a cutter bit formed with a substantially continuous flat front face terminating in cutting points at its opposite ends, said bit further being formed with allochiral side surfaces leading respectively from the lateral edges of said front face and merging in an arc of a circle, and a brace for said bit including a shank receivable in the socket of such block and a head, said brace being formed to provide a seat having allochiral side walls merging in an arc of a circle and conforming generally to the contour of a portion of the surface of said bit side surfaces intermediate said cutting points, the perpendicular distance from such abutment surface to the arc of said seat being less at either end of said seat than at its midpoint when said shank is received in such socket, whereby said seat wedges the flat face of said bit against such surface, and means carried by said block and shiftable with respect thereto in engagement with said shank to effect such wedging action.

12. In a mining machine chain, a bit block formed with a socket and formed to provide a rearwardly and outwardly facing inclined surface angularly related to the axis of said socket, a bit having a cutting face terminating in oppositely directed cutting points and adapted to bear against said surface, and a holder for said bit having a shank receivable in said socket and having a head projecting from said socket, said bit being shaped with an arcuate edge lying in a plane normal to its cutting face and including said points, and said holder being formed with a seat conforming in contour with a portion of said edge and embracing portions of the lateral walls of said bit, said seat extending an appreciable distance in both directions from the midpoint of said arcuate edge, whereby the perpendicular distance from said inclined surface to the said con-

forming portion of said seat is less at either end of said seat than at said midpoint.

13. In a coal cutting mechanism, an organization comprising a socketed member, a small plural pointed cutting tooth, a tooth supporting post with its inner end extending into the socket of said member and its outer end projecting therefrom, said post having an open-sided bit-engaging seat recessed on its front face corresponding in contour with a rear surface only of said tooth and generally inclined inwardly and rearwardly and extending into said socket, a screw taking downwardly in said socketed member with its end face extending into the socket of said member to engage and step down upon a shoulder formed on the lower front side of the inner end of said post to thrust said post inwardly of said socket upon the line of its longitudinal axis, together with an immovable forwardly and outwardly inclined wedging surface formed on said socketed member at the front of the mouth of said socket, overlying said screw and engaging in a wedge lock manner the front face of said bit coincidental with said inward thrust of said post.

14. For use in a mining machine, a bit holder formed with a shank and a head, and further formed with a bit-receiving recess opening through the front face of said head, and with a hole in said shank intersecting said recess and opening through an external surface of said shank.

15. In combination, a plural-pointed bit and a holder therefor, said holder being formed with a shank and a head, and being further formed with a recess opening through the front face of said head and generally inclined forwardly and outwardly, and with a hole in said shank intersecting said recess and opening through an external surface of said shank, said bit being received in said recess with an inactive point projecting into said hole.

16. For use in a mining machine, a bit holder formed with a shank and a head, and further formed with a bit-receiving recess opening through a wall of said holder, and with a hole in said shank intersecting said recess and opening through the inner end of said shank.

17. The combination with a mining machine chain bit block having a socket therein, of a plural-pointed bit and a holder therefor, said holder being formed with a shank receivable in said socket, and with a head, said holder being further formed with a recess opening through the front face of said head and generally inclined forwardly and outwardly, and with a hole in said shank intersecting said recess and opening through an external surface of said shank, a step formed on the forward surface of said shank and comprising an outwardly and rearwardly inclined plane, and a screw having a flat nose threadedly mounted in a bore in said block and flatly engageable with said step to urge said holder inwardly of said socket, said step intersecting said hole and being disposed inwardly beyond the inner end of said recess.

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