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REVERSIBLE MOUNTING FOR DRILLING APPARATUS

Original Filed Oct. 16, 1944

Fig. 1.

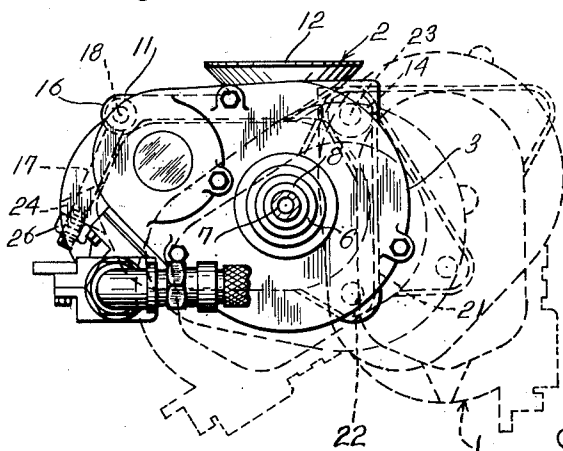


Fig. 2.

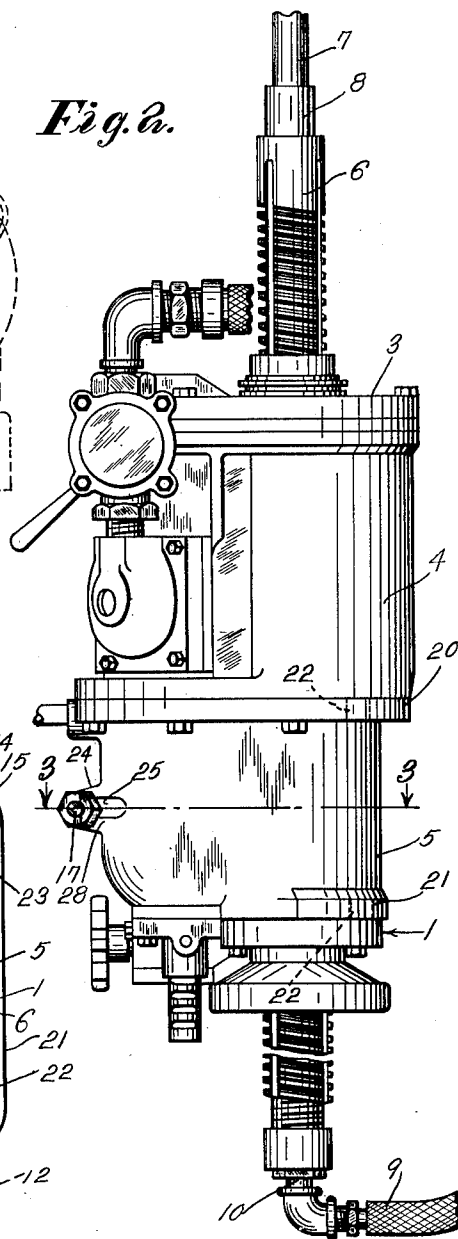


Fig. 3.

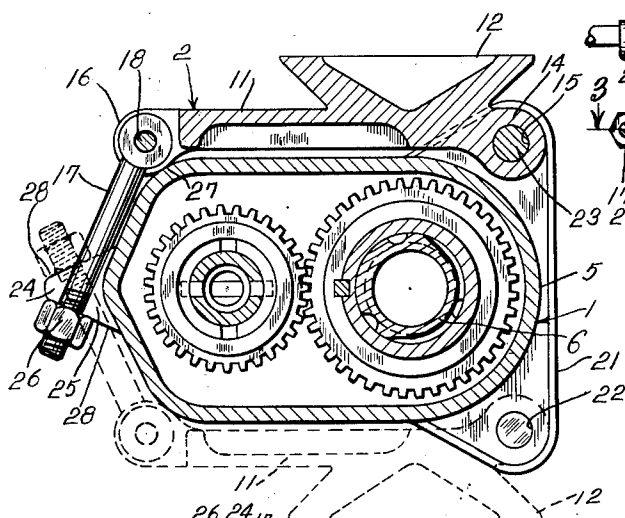
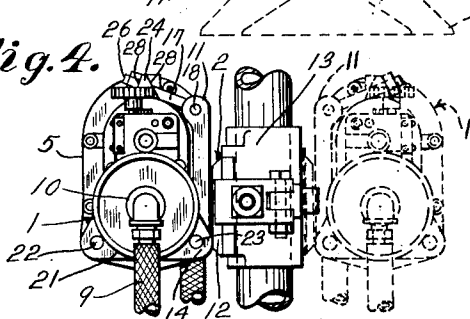


Fig. 4.



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UNITED STATES PATENT OFFICE

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REVERSIBLE MOUNTING FOR DRILLING APPARATUS

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11 Claims. (Cl. 255—53)

1

This invention relates to drilling apparatus and more particularly to an improved reversible mounting for a drill such as a rotary blast hole drill especially designed for use in underground mines or tunnels.

In rotary blast hole drills of known types, such as a conventional high-speed diamond drill, the drill is usually mounted on a usual saddle mounting clamped in a conventional manner to a mine column, and the drill is usually provided with a swivel plate received and secured in the socket of the saddle mounting. The drill is oftentimes pivotally mounted or hinged on its support so that it may be swung laterally out of alinement with the drill hole, to allow pulling of the drill rods from the hole. The present invention contemplates improvements over such known types of drill mountings in that the drill may be reversely pivotally mounted or hinged on either side of its supporting means so as to facilitate positioning of the drill with respect to the work. Also, in accordance with the present invention, the drill is pivotally mounted or hinged on its support so that the drill in most of its positions may be swung downwardly out of alinement with the drill hole when it is desired to pull rods, thereby avoiding the need of special devices for holding the drill up in position during the rod pulling operation. By the provision of a reversible, two-position, pivotal mounting for the drill, not only is it made easier to position the drill with respect to the work during drilling and during the rod pulling operation, but also the drilling apparatus is safer to operate during both functions.

An object of the present invention is to provide an improved blast hole drilling apparatus. Another object is to provide an improved supporting means for a blast hole drill. A further object is to provide an improved reversible drill mounting whereby the drill may be supported in different reversed positions with respect to the work, simply by rearranging the drill on its mounting. A still further object is to provide an improved reversible, two-position mounting for a drill. Yet another object is to provide an improved pivotal or hinged drill mounting whereby the drill may be swung downwardly out of alinement with the drill hole during the rod pulling operation. Another object is to provide an improved reversible hinge plate for supporting a drill in reversed positions with the hinge plate located in the different positions of the drill at opposite sides of its supporting means. A still further

2

object is to provide improved supporting means for a drill wherein the supporting means is adapted to be connected to the drill at different points whereby the drill may be supported in different positions with respect to the work. These and other objects and advantages of the invention will, however, hereinafter more fully appear.

This application is a division of my copending application Ser. No. 558,848, filed October 16, 1944, now Patent No. 2,586,842, dated February 26, 1952.

In the accompanying drawing there is shown for purposes of illustration one form which the invention may assume in practice.

In this drawing:

Fig. 1 is an end view of a drilling apparatus constructed in accordance with an illustrative embodiment of the invention, looking toward the front end of the drill and with the drill shown in different lateral positions as indicated in full and broken lines.

Fig. 2 is a side elevational view of the drilling apparatus shown in Fig. 1, with the drill in vertical drilling position.

Fig. 3 is an enlarged cross sectional view taken on the plane of line 3—3 of Fig. 2, with the hinge plate shown in different positions at opposite sides of the drill as indicated in full and broken lines.

Fig. 4 is a somewhat diagrammatic end elevational view showing the drill supported in horizontal drilling position and with the drill in reversed positions with respect to its supporting means as indicated in full and broken lines.

In this illustrative construction, as shown in the drawing, the drilling apparatus includes a drill or drilling tool generally designated 1 and a supporting means or mounting generally designated 2. The drill 1 is, for illustrative purposes, of the high speed rotary blast hole type and is fully disclosed in the copending application above referred to. Evidently, the drill may assume various other forms.

The drill 1 disclosed herein comprises a casing 3 including a casing section 4 which houses a motor, and a casing section 5 which houses conventional change speed gearing and the feed nut, and the motor is adapted to drive a hollow shaft or drill spindle 6 to which a conventional tubular drill rod 7 is connected as by a usual adaptor 8. The shaft 6 is exteriorly threaded, and the feed nut contained in the casing section 5, and driven through the change speed gearing, engages the

3

threads of the threaded shaft 6 to effect axial feed of the shaft and the drill rod with respect to the drill casing. A conventional hose connection 9 is adapted to supply through a conventional swivel 10 a cleansing fluid to the hollow shaft 6 and to the drill rod through which the fluid is conducted to the bottom of the drill hole, in a well known manner. Since the specific structure of the drill does not per se enter into the present invention, further description of the drill is herein unnecessary other than to state that the drilling implement carried by the drill rod may be rapidly rotated to effect drilling of a hole and may be fed axially toward and retracted from the work.

Now referring to the specific structure of the improved supporting means or mounting 2, it will be noted that a reversible support member or hinge plate 11, has formed integral therewith a swivel plate 12 adapted to be clamped in the usual socket of a saddle mounting 13 on a conventional mine column or any other suitable support. This hinge plate has at one end, in adjacency to the swivel plate 13, a lug 14 which is formed with a bore 15 and the other end of the plate has spaced lugs 16 between which an eye-bolt 17 is pivotally mounted on a pivot pin 18 supported within the spaced lugs 16. The drill casing 3 has front and rear transverse flange portions 20 and 21 integral with the casing section 5 at opposite ends of the latter and each flange portion has spaced parallel openings 22 respectively at the opposite sides of the drill, with each pair of the openings in the flanges 20 and 21 in longitudinal alinement. The lateral lug 14 of the hinge plate 12 is adapted to fit between the front and rear flange portions 20 and 21 on the drill casing at one side of the drill and a hinge pin 23 passes through the bore 15 in the lug and is secured in the alined openings 22 in the flange portions 20 and 21. The opposite side of the drill casing from the flange portions 20, 21, has a centrally located, notched or slotted lug 24, and the eye-bolt 17 is swingable in the slot 25 between the spaced flange portions provided by the lug, and when this eye-bolt is properly positioned, a nut 26 threaded on the eye-bolt and engaging the adjacent surface of the lug, when tightened, is adapted to secure the drill casing firmly to the hinge plate with the adjacent side of the casing abutting the hinge plate at 27. When the eye-bolt is loosened and swung outwardly from the notched lug, the drill may be swung laterally on the hinge pin 23 relative to the hinge plate. The hinge plate 11 may be supported in any desired position to support the drill to drill holes at any desired location, but normally the hinge plate is vertically disposed as shown in Fig. 4 with the pivot pin 23 horizontal and at the bottom of the plate so that the drill may be swung downwardly on its pivotal mounting to locate the drill rod rotating and feeding shaft 6 out of alinement with the drill hole.

If it is desired to locate the drill in a reversed position at the opposite side of its supporting means as indicated in broken lines in Fig. 4, the drill may be detached from the hinge plate and the hinge plate, upon loosening of the saddle mounting 13, may be swung to the opposite side of its support, and thereafter the drill may be reattached at its opposite side to the hinge plate in the manner shown. The sides 28 of the notched or slotted lug 24 are oppositely inclined as shown in Fig. 3, so that the nut 26 may en-

4

gage one side when the hinge plate is located at either side of the drill casing. Thus it will be seen that the hinge plate 11 may be secured to either side of the drill casing, thereby permitting the drill to be mounted in opposite positions relative to its supporting means.

In setting up the drilling apparatus, the hinge plate 11 is placed at the side of the drill casing 3 to permit drilling in the desired position and is secured to the drill casing by extending the hinge pin 23 through the alined openings in the flange portions 20 and 21 and the bore 15 in the plate lug 14 and by swinging the eye-bolt into the slot of the notched lug 24 and tightening the nut 26, firmly to clamp the hinge plate to the side of the drill casing. The swivel plate 12 of the hinge plate may then be placed in the socket of the saddle mounting 13 and the saddle mounting may be tightened in a well known manner to clamp the swivel plate securely in position within the socket. When it is desired to effect drilling in the same direction at the opposite side of the support, as for example when it is desired to drill holes at opposite sides of the mine passageway or tunnel, the drill may be detached from the hinge plate by releasing the eye-bolt 17 and disconnecting the hinge pin 23 and the saddle mounting may be rotated with respect to the column in a conventional manner to locate the hinge plate at the opposite side of the column as indicated in broken lines in Fig. 4. The drill may then be moved to the opposite side of the column and reattached to the hinge plate with the opposite side of the drill casing engaging the hinge plate in the manner indicated in broken lines in Fig. 3. When the drill is located in either of its reversed positions with respect to its supporting means as shown in Fig. 4, and it is desired to pull rods, the eye-bolt 17 may be released and the drill swung downwardly on the horizontal hinge pin 23 to locate the drill out of alinement with the drill hole. In Figs. 1, 2 and 3, the drill is shown in vertical drilling position with the hinge pin 23 upright and when in this position the drill, when the eye-bolt 17 is released, may be swung laterally in a horizontal direction to locate the drill at one side of the drill hole. By loosening the saddle mounting 13 in a conventional manner, the swivel plate 12 may be rotated in its socket to permit change of the angular position of the drill and upon re-tightening of the saddle mounting the drill may be firmly clamped in adjusted position.

As a result of this invention, an improved drilling apparatus is provided which may be easily and quickly adjusted into different drilling positions with respect to the work. By the provision of the hinge plate which may be attached to either side of the drill casing, the drill may be mounted in reversed positions with respect to its supporting means at opposite sides of the latter. By pivotally mounting the drill mounting on the hinge plate, the drill may be quickly swung downwardly out of alinement with the drill hole to permit pulling of the drill rods. The reversible hinge plate permits mounting of the drill at either side of the mine column thereby enabling the operator to assume a relatively safe position, as for example, when the drill is operating at the edge of a stope. By the provision of a hinge plate, the drill may be swung downwardly, thereby rendering the positioning of the drill during rod pulling relatively easy. The improved drill mounting is extremely simple and compact and is of a sturdy construction well adapted to meet

5

the severe demands of service. These and other advantages of the invention will be clearly apparent to those skilled in the art.

While there is in this application specifically described one form which the invention may assume in practice, it will be understood that this form of the same is shown for purposes of illustration, and that the invention may be 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 desire to secure by Letters Patent is:

1. Supporting means for a drilling apparatus comprising, in combination, a casing, flange portions projecting laterally from the casing of the drilling apparatus at one side of the latter, flange portions projecting laterally from the casing at the opposite side of the latter and having oppositely facing surfaces, a support member positionable at opposite sides of the casing between said first and second mentioned flange portions, means for pivotally connecting one end of said support member to said first mentioned flange portions when it is at either side of the casing, a bolt pivotally connected to the opposite end of said support member and receivable between said second mentioned flange portions, and means threaded on said bolt and engageable with said oppositely facing surfaces for clamping said support member to the casing.

2. In a drilling apparatus, a drilling tool having a casing provided with spaced attaching portions one at each of its opposite sides, a transposable support for the drilling tool having an attaching portion and disposable in reversed positions at either side of said casing with its attaching portion in cooperating relation with one of said attaching portions of said casing, and an attaching element positionable selectively in engagement with said cooperating attaching portions of said casing and said support, whereby said support may be transposed and attached to either side of said casing.

3. In a drilling apparatus, a drilling tool having a casing provided with spaced pivot portions one at each of its opposite sides, a transposable support for the drilling tool having a swivel plate and provided with a pivot portion and disposable selectively at either side of said casing with its pivot portion in cooperating pivotal relation with one of said pivot portions of said casing, and a pivot element positionable in engagement with said cooperating pivot portions in either transposed position of said support for pivotally attaching said support to either side of said casing whereby said tool may be swung laterally from either side of said support.

4. In a drilling apparatus, a drill casing having a portion symmetrically arranged with respect to a median plane in which the longitudinal axis of the drill lies and spaced attaching portions one at each side thereof, a transposable support for said drill casing disposable at opposite sides of the latter, and attaching means for selectively securing said support to either side of said casing and selectively engageable with said attaching portions, said attaching means including an attaching element connected to said support and engaging said casing portion in either transposed position of said support with respect to said casing.

5. In a drilling apparatus a drill having a casing provided with longitudinally spaced, trans-

6

verse flanges, and a supporting plate having a swivel element adapted to be secured to supporting means, said plate having a portion selectively received between said transverse flanges at either side of said drill casing, and means for attaching said plate to said casing in either position thereof including a securing element engaging said flanges and said plate portion.

6. In a drilling apparatus, a drill having a casing provided with longitudinally spaced, transverse flanges, a supporting plate having a swivel element adapted to be secured to supporting means, said plate having a portion receivable between said flanges at either side of said drill casing, said plate portion having a bore and said flanges having openings disposable in registry with said bore, and a hinge pin received in said flange openings and passing through said bore to provide a pivotal mounting for said drill in either of its positions on said supporting plate.

7. In a drilling apparatus, a drill having a casing, a hinge plate adapted for engagement with supporting means, means for pivotally attaching said plate to said drill at either side of said casing, whereby the drill may be supported at either side of the plate supporting means, and means for rigidly securing the plate and casing together in either position of said plate and releasable to permit swinging of said drill relative to said plate.

8. In a drilling apparatus, a drill including a casing having transverse flanges spaced lengthwise thereof, said flanges each having parallel openings respectively at the opposite sides of said casing, a pair of said openings at each side of said casing being aligned, a hinge plate having a lug provided with a bore, said plate being disposable at either side of said casing with said lug positioned between said flanges and said bore in registry with a pair of aligned flange openings, and a hinge pin received in said aligned flange openings and passing through said lug bore thereby to provide a pivotal mounting for the drill in either of its positions on said plate.

9. In a drilling apparatus, a drill including a casing having transverse flanges spaced lengthwise thereof, said flanges each having parallel openings respectively at the opposite sides of said casing, a pair of said openings at each side of said casing being aligned, a hinge plate having a lug provided with a bore, said plate being disposable at either side of said casing with said lug positioned between said flanges and said bore in registry with a pair of aligned flange openings, a hinge pin received in said aligned flange openings and passing through said lug bore thereby to provide a pivotal mounting for the drill in either of its positions on said plate, an eye-bolt pivotally mounted on said plate, said casing having a centrally located, slotted lug on the opposite side thereof from said transverse flanges, said eye-bolt in either position of said plate with respect to said drill casing being swingable into the slot of said central lug, and a nut threaded on said eye-bolt and engageable with said slotted lug for securing said casing rigidly to said plate in either plate position.

10. In a drilling apparatus, a drilling tool having a casing provided with spaced attaching portions one at each of its opposite sides, a transposable support for the tool adapted for attachment to the tool at either side of said tool

7

casing and having spaced attaching portions one at each end thereof and disposable selectively in reversed positions at either side of said casing with one of its attaching portions in cooperating relation with one of said attaching portions of said casing, a releasable attaching element positionable in engagement with said cooperating attaching portions for connecting the latter together, a releasable holding element cooperating with said other attaching portion of said support, and a securing portion located centrally of said casing and with which said holding element is engaged in either transposed position of said support at either side of said casing for rigidly securing said tool casing and said support firmly together.

11. In a drilling apparatus, a drill casing, a transposable drill support adapted for attachment to either side of said drill casing and disposable selectively in reversed positions at either side of said casing, and releasable securing connections between said casing and said support for securing said support in either of its transposed positions to either side of said casing, said casing having spaced securing portions one at each of its opposite sides, said support having a securing portion at one end selectively cooperating with said casing portions

8

in either transposed position of said support, and an adjustable securing element connected to the other end of said support and engaging said casing in either transposed position of said support for securing said support and said drill casing firmly together.

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