June 26, 1945. A. FEUCHT 2,379,137

ROCK DRILL SUPPORTS

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Fig. 1

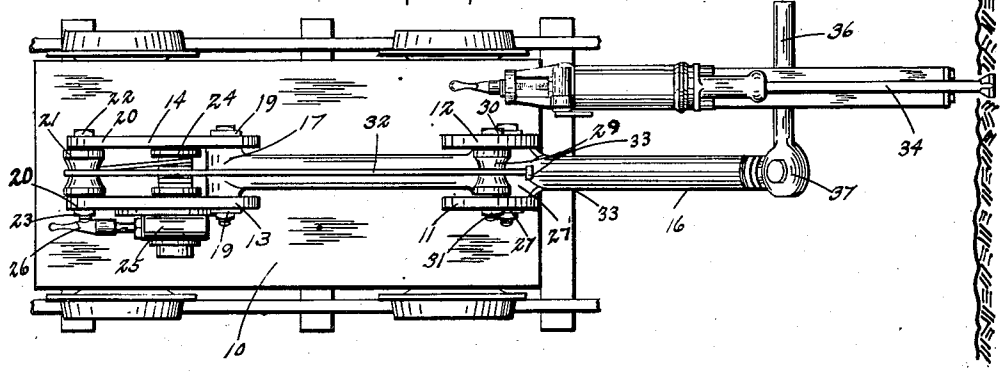
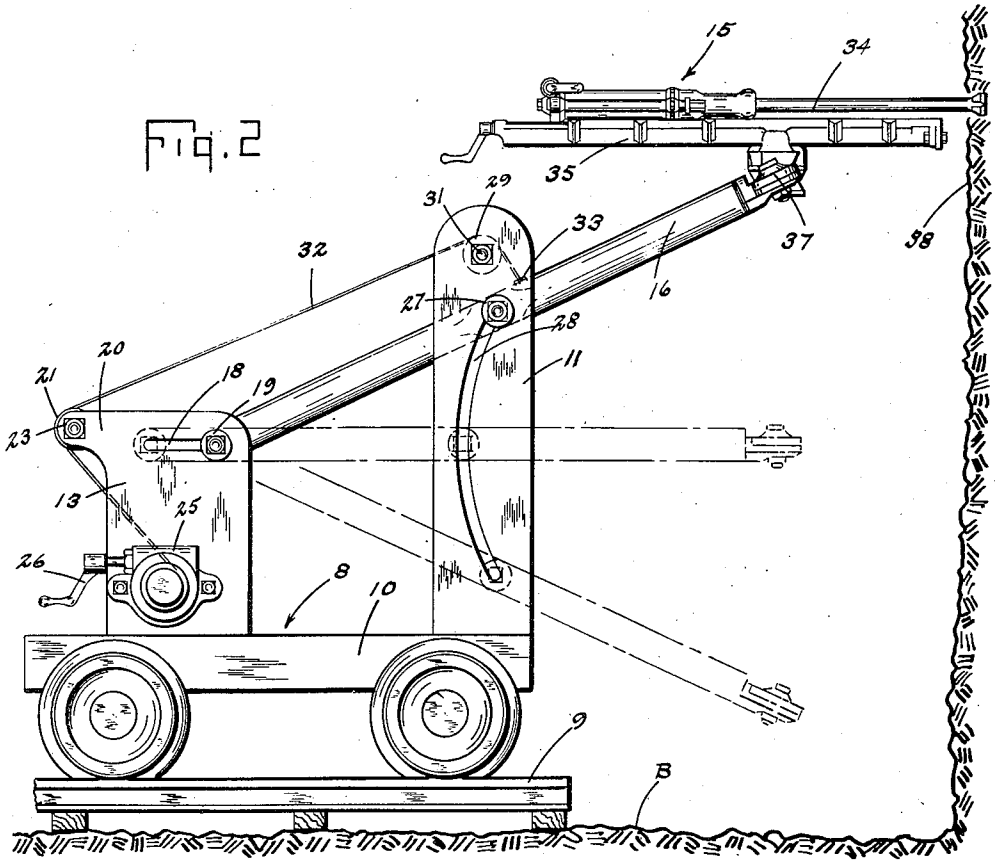


Fig. 2



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Fig. 3

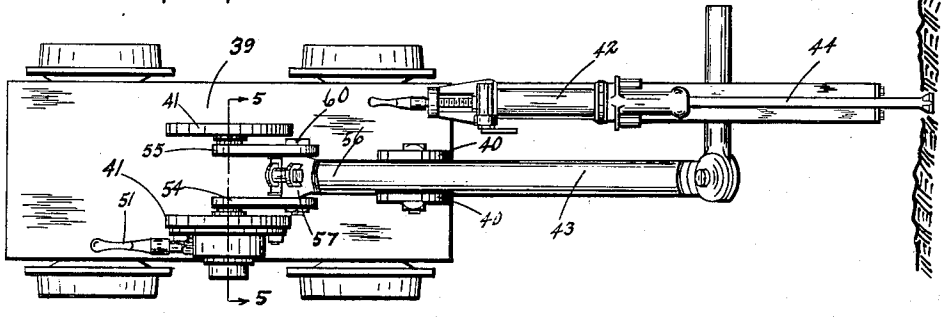


Fig. 5

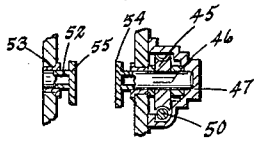


Fig. 4

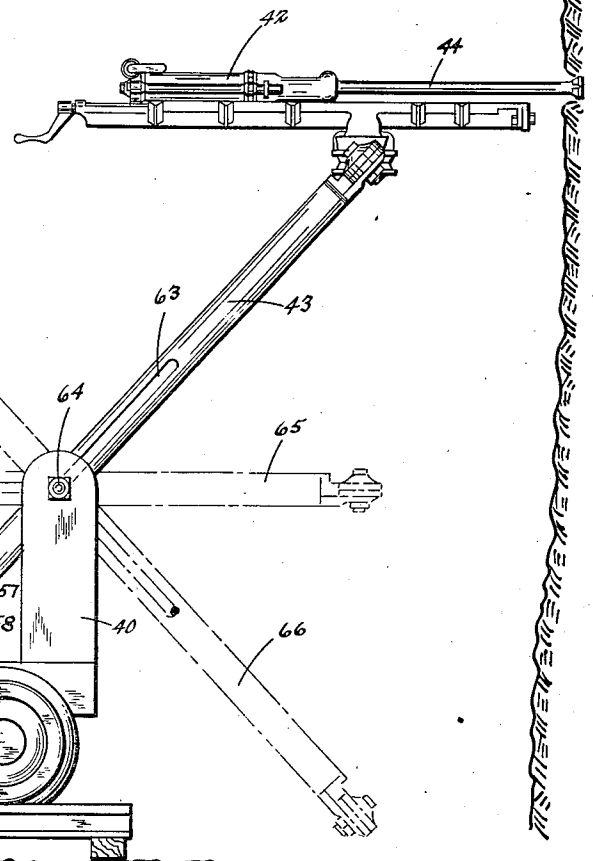
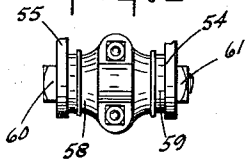


Fig. 6



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2,379,137

ROCK DRILL SUPPORT

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Application April 14, 1943, Serial No. 482,964

4 Claims. (Cl. 255—51)

The present invention relates broadly to rock drilling equipment but more particularly to a drilling apparatus including a rock drill of the drifter type having an adjustable mounting for supporting and moving the drill.

In work necessitating the use of such equipment, namely, tunneling operations requiring the removal of rock or ore, holes must be drilled for the blasting charges in the face of the workings to drive the tunnel or drift. The form of the tunnel face produced by such a blast will be governed primarily by the depth to which the holes are drilled. Flat perpendicular tunnel faces are particularly desirable, but to obtain the same it is necessary to have the blind ends of the holes lie in the same vertical plane extending laterally of the tunnel, so that the rock or ore body will break cleanly in approximately this same plane when the charges are fired.

Means for rapidly raising and lowering the rock drill in the process of drilling holes for a blasting round are well known in the art. Heretofore the supporting means controlling the position of the drill has been of the nature of an arm or boom-like member which pivots about a fixed point located on the base or frame of the supporting structure. A drill so held moves in a vertical arc, which sometimes necessitates shifting the position of the base or frame to compensate for variations in the distance between the drill and the work face.

The primary object of the invention is to provide improved means for mounting the drill whereby the mounting can be maintained in a constant vertical plane parallel to the face of the work when moving from one drilling position to another.

A further object of the invention is to provide an improved mounting for rock drills adapted to be associated with a mine car or other support in such a manner that the boom or supporting member for the drill is capable of movement through a multiplicity of angles when changing the working position of the drill while maintaining the drill mounting in a single vertical plane substantially parallel to the face of the work.

Other objects and advantages more or less ancillary to the foregoing reside in the specific construction and aggroupment of the elements peculiar to this structure, as will become apparent from a more complete examination of this specification.

In the drawings:

Fig. 1 is a top plan view of the improved drill mounting means shown associated with a mine car.

Fig. 2 is a side elevational view thereof.

Fig. 3 is a top plan view of a modified form of the invention.

Fig. 4 is a side elevational view thereof.

Fig. 5 is a cross-sectional view taken substantially on line 5—5 of Fig. 3.

Fig. 6 is a detail elevational view of the rear end of the rock drill supporting boom as seen on line 6—6 of Fig. 4.

Referring to the drawings for a more detailed description and particularly Figs. 1 and 2 thereof, a mine car of conventional construction is generally designated by the reference numeral 8 the same being movable within a mine B on the tracks 9. It is to be understood that for purposes of illustration only, the supporting means for the drill is shown associated with a mine car, and that with slight modification, said means for supporting the rock drill and forming the present invention, is capable of use with any portable or stationary member.

Extending vertically from the front end of the car 8 and suitably attached to the floor 10 thereof, is a pair of members 11 and 12. A similar pair of upright members 13 and 14 is suitably connected to the floor of the car adjacent the rear end thereof. The uprights 11, 12, 13 and 14, together with means for rigidly supporting them such as the floor 10 of the car, constitute a frame. The members 13 and 14 are substantially shorter than the members 11 and 12 and support the means for effecting movement of the drilling apparatus generally designated by the reference numeral 15 and suitably supported on the upper end of the boom 16. While the boom 16 is illustrated as of tubular construction, it may be desired, in actual practice, to form the same substantially square in cross-section in which case the side walls of the boom would have frictional contact with the inner surfaces of the members 11 and 12.

The rear end of the boom 16 is substantially T-shaped as indicated at 17, the lateral extensions thereof having frictional contact with the inner faces of the members 13 and 14. The end 17 is in the shape of a hollow tube through which extends a bolt 19, the ends of which pass through an elongated slot 18 formed in each of the members 13 and 14. A nut or similar fastening means movably retains the end 17 between the members 13 and 14.

Each member 13 and 14 is formed with an ear like extension 20 between which is journaled a

pulley 21, the same being rotatable on a threaded shaft 22 which projects through the extensions 20 and is held therebetween by means of the nut 23.

Also supported between the members 13 and 14, there is a cable receiving drum 24 whose supporting shaft is associated with a conventional rotating mechanism 25. The rotating mechanism 25 may consist of a gear wheel and worm not shown, with the worm being operated through the crank 26 to effect rotation of the gear wheel which will in turn rotate the drum 24 for a purpose to be hereinafter more fully described.

The intermediate portion of the boom 16, or that portion of the boom which is disposed between the upright members 11 and 12 is pressed out as indicated at 27' for guiding contact with the inner faces of the members 11 and 12. The portion 27' carries a threaded stud 27 which extends completely through the two upright members and is movable in an arcuate slot 28 formed in each of said members. The arcuate slot 28 is best shown in Fig. 2 of the drawings and it is to be understood that a similar slot is also formed in the upright member 12 which is located in substantial parallelism with the slot 28. A pulley 29 is supported on a threaded shaft 30 between the members 11 and 12 adjacent their upper ends and is held between said members by means of a nut or the like 31.

A cable 32 has one end fixedly secured to the boom 16 as indicated at 33 and its other end is trained over and under the pulley 21 for attachment to the drum 24.

As before indicated the rock drill 15 is of conventional construction and includes a drill steel 34 and feeding mechanism 35. As is well known in the art, the drill steel 34 is moved into engagement with the work through the feeding mechanism 35 and is operated by compressed air to create a series of reciprocating impulses thereto. The front end of the boom 16 carries an arm 36 the same being attached to said boom by the clamping means 37. The arm 36 is connected to the feeding mechanism 35 by any desired means for supporting said feeding mechanism and rock drill for movement with the boom 16. For the purposes of this case, the arm 36 may be considered to be the drill mounting.

In the operation of the device, when desiring to move the rock drill 15 from the position illustrated in Fig. 2 of the drawings, the drill steel 34 is first withdrawn from the wall 38 of the mine. To lower the drill, counter-clockwise rotation is imparted to the drum 24 through the crank arm 26 which will unwind the cable 32 from the drum causing the intermediate portion of the boom 16 or more particularly its supporting stud 27 to move downwardly within the slots 28 of the members 11 and 12. At the same time, the end 17 of the boom 16 is traveling rearwardly within the slots 18 until the supporting stud 27 passes through the mid-position of the arcuate slots 28, and then travels forwardly within the slots 18 as the cable 32 is being unwound from the drum. By referring to Fig. 2 of the drawings, it will be noted from the dotted line illustration that the boom 16 has been moved into various positions without affecting the fore and aft position of the arm 36 and the clamp 37 thus maintaining the rock drill 15 and its drill steel 34 at substantially the same distance from the face of the wall 38. Thus when desiring to drill a hole, after changing the position of the drill 15, very little movement of the feeding mechanism is required in order to bring the drill steel 34 into contact with the wall of the mine. When moving the boom 16 and its supported drill 15 upwardly, the crank arm 26 is rotated in a clockwise direction which will wind the cable on the drum 24 and cause the rear end of the boom to move forwardly within the slots 18 and the intermediate stud 27 to move upwardly through the arcuate slots 28 until the drill 15 is brought into the desired drilling position. The pulleys 21 and 29 serve as a guide for the cable, preventing tangling of the same in its travel to and from the drum 24. The cable 32 having one end attached at 33 to the boom will cause said boom to be raised and lowered upon rotation of the drum 24 in a clockwise or counterclockwise direction, respectively.

In the form of the invention illustrated in Figs. 3 to 6 inclusive, there is also illustrated a mine car 39 having front and rear pairs of upright members 40 and 41, respectively, which uprights, together with the car floor, constitute a supporting frame. The rock drill 42 is supported upon an arm 42' at the upper end of the boom 43 in the same manner as in the preferred form. The boom 43 is movable in the said frame for raising and lowering the arm 42' or the drill mounting while maintaining it in a given vertical plane transverse to the supporting frame.

The rear pair of upright members 41 supports the mechanism for moving the boom 43 to various angular positions, some of which are illustrated in dotted lines in Fig. 4 of the drawings. Mounted on the outer face of one of the members 41, there is a gear wheel 45 rotatable on a stub shaft 46. The gear wheel 45 is encased within a stepped housing 47 which is bolted or otherwise secured to one of the members 41 as indicated at 48. Extending laterally from the housing 47 is an arm 49, the inner end of said arm carrying a worm gear 50 in mesh with the gear wheel 45. The outer end of the arm 49 carries a crank 51 adapted to be manually operated for rotating the worm gear 50 and gear wheel 45. The other member 41 has a relatively short stub shaft 52 projecting inwardly therefrom and mounted within a bearing 53. The shafts 46 and 52 have attached thereto or integral therewith parallel arms 54 and 55, respectively, which are rotatable with their respective shafts upon operation of the crank 51.

Supported between the free ends of the arms 54 and 55 is the lower end 56 of the boom 43, said lower end being connected to the arms for rotation therewith when changing the drilling location of the rock drill. The end 56 carries a bearing plate 57 which is bolted or otherwise secured to a second bearing plate 58. A hollow sleeve 59 is supported between the plates 56 and 57 through which extends a bolt 60 passing through aligned apertures in the free ends of the arms 54 and 55 whereby the unit including the heavy plates, sleeve and lower end of the boom is attached between the arms 54 and 55. A nut 61 retains the unit in fixed position. As shown in Fig. 6 of the drawings, the sleeve 59 equals the width of the space between the arms 54 and 55 preventing end play of the unit as rotation is imparted thereto. As is to be understood, this pivotal connection of the lower end 56 of the boom 43 will cause said end and arms to swing through the arc indicated in dotted lines in Fig. 4 and designated by the reference numeral 62 as rotation is imparted to the arms through the gears 45 and 50.

The intermediate portion of the boom **43** is slidably held between the pair of upright members **40**. An elongated slot **63** is formed in the boom **43** and extends entirely therethrough. A bolt or other fastening means **64** extends through the pair of members **40** and the slot **63** in a manner to permit the boom **43** to slide relative to the upright members **40** as the arms **54** and **55** are rotated in the manner previously described.

The operation of this form of the invention is thought to be readily obvious from an inspection of Fig. 4 of the drawings. When desiring to change the location of the drill **42** and drill steel **44** for a new drilling position, the crank **51** will be rotated in a clockwise direction to lower the drill which will cause the arms **54** and **55** to rotate following the path of the arc **62**. This rotation of the arms will permit the boom **43** to slide the length of the elongated slot **63** while maintaining the outer end of the boom and the arm **42'** in a single vertical plane transverse to the supporting frame. The dotted line illustration **65** shows the boom **43** in a substantially horizontal position but it will be observed that the clamping end of said boom is directly beneath its position in the full line illustration. The dotted line illustration **66** shows the boom **43** having moved approximately 90 degrees from the full line position, while maintaining the outer or clamping end thereof in the same vertical plane. When desiring to raise the drill **42** and its drill steel **44**, the crank **51** will be rotated in a counter-clockwise direction which will reverse the travel of the arms **54** and **55** through the arc **62** causing sliding movement of the boom **43** within the limits of the slot **63**.

While the arm **54** alone is directly connected to the rotating gears **45** and **50**, the rigid connection of the lower end of the boom **43** to the arm **55** is sufficient to rotate the arm **55** in unison with said arm **54**. As is to be understood, the arms **54** and **55** are in parallel relation at all times, either during movement or when stationary.

In each form of the invention, means have been provided for raising and lowering the boom and at the same time moving it longitudinally, so that the end of the boom which supports the drill moves vertically or parallel to the face of the wall being drilled. After repositioning the drill, very little forward movement of the drill steel is thus required in order to again bring the same into drilling contact with the wall of the mine.

Although the foregoing description is necessarily of a detailed character, in order to completely set forth the invention, it is to be understood that the specific terminology is not intended to be restrictive or confining and it is to be further understood that various rearrangements of parts and modifications of structural detail may be resorted to without departing from the scope or spirit of the invention as herein claimed.

I claim:

1. In drilling mechanism, front and rear supports rigid with respect to each other, a boom carried by said supports and extending beyond the front support, a drill mounting at the forward end of said boom, said boom being arranged to swing through a vertical arc for adjusting the height of said drill mounting, cooperating means between the boom and one of said supports for moving the boom longitudinally as it swings in order to maintain a straight vertical path of movement for said mounting, and a horizontally slidable interconnection between the boom and the other of said supports, said interconnection remaining at a fixed level.

2. In drilling mechanism, front and rear supports rigid with respect to each other, a boom carried by said supports and extending beyond the front support, a drill mounting at the forward end of said boom, a pin and slot connection between the boom and said rear support, the pin of said connection remaining at a fixed level in its support and constituting a pivot about which the boom swings through a vertical arc for adjusting the height of said drill mounting, and cooperating means between the boom and said front support for moving the boom longitudinally as it swings in order to maintain a straight vertical path of movement for said drill mounting.

3. In drilling mechanism, front and rear supports rigid with respect to each other, a boom carried by said supports and extending beyond the front supports, a drill mounting at the forward end of said boom, a pin and slot connection between the boom and said rear support, the pin of said connection remaining at a fixed level in its support and constituting a pivot about which the boom swings through a vertical angle for adjusting the height of said drill mounting, cooperating means between the boom and said front support for moving said boom longitudinally as it swings in order to maintain a straight vertical path of movement for said drill mounting, and flexible means attached to said boom and operated from said rear support for swinging the boom up or down about the pin of said pin and slot connection.

4. In drilling mechanism, front and rear supports rigid with respect to each other, a boom carried by said supports and extending beyond the front support, a drill mounting at the forward end of said boom, a pin and slot connection between the boom and said front support, the pin of said connection remaining at a fixed level and constituting a pivot about which the boom swings through avertical arc for adjusting the height of said drill mounting, and a crank on said rear support comprising an arm pivotally connected with the said boom, the parts being so dimensioned and arranged and the movement of the crank being through an angle such that said drill mounting is maintained in a straight vertical path as the boom swings up or down.

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