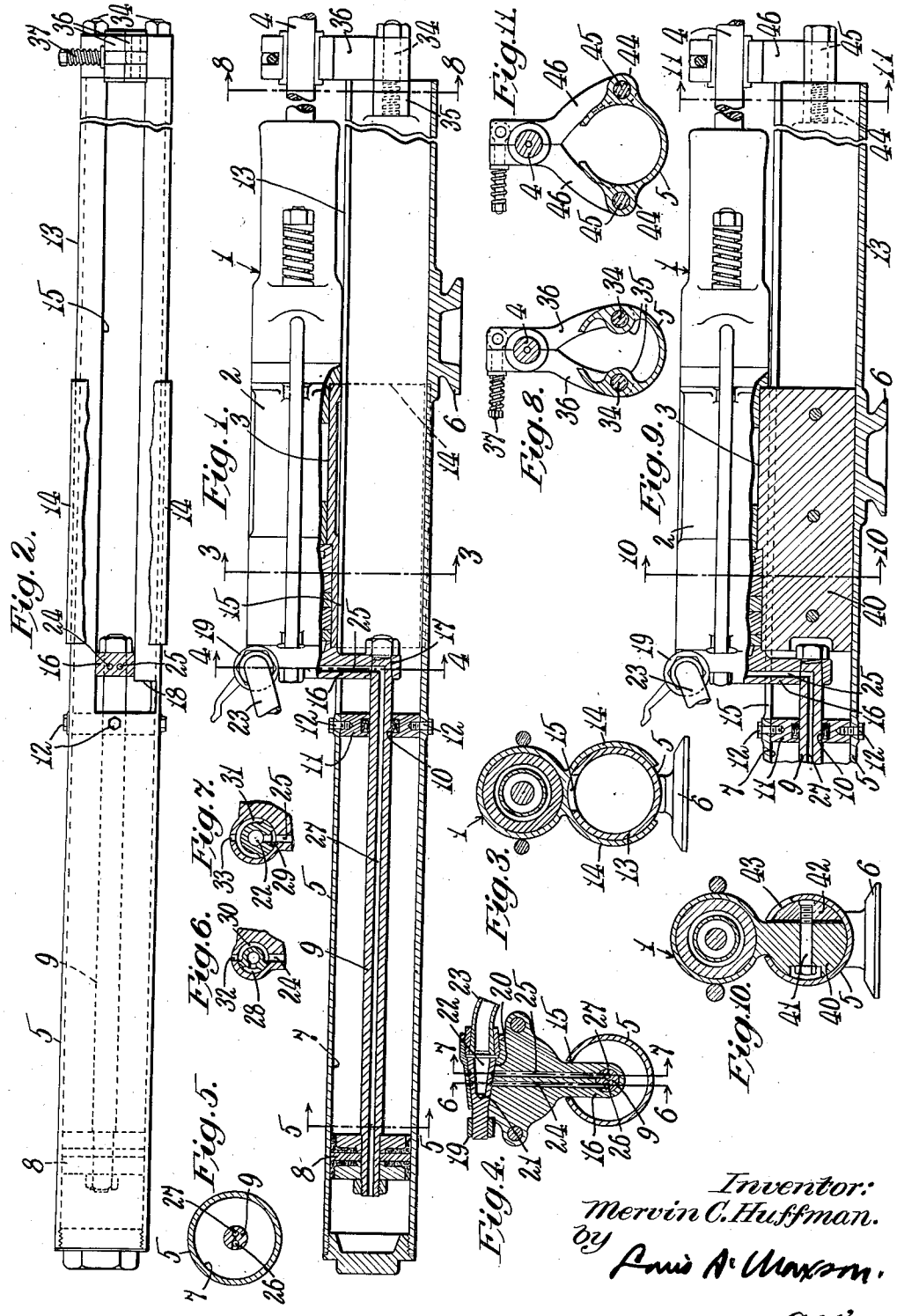
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ROCK DRILL MECHANISM

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ROCK DRILL MECHANISM

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This invention relates to rock drill mechanism, and more particularly has reference to improvements in the feeding and guiding means of a mounted rock drill of the drifter type.

An object of this invention is to provide an improved drill feeding and guiding means. Another object is to provide an improved feeding and guiding means for a rock drill of the mounted drifter type. A still further object is to provide a simple, relatively inexpensive, durable and positively acting device for feeding a rock drill. These and other objects and advantages of the invention will, however, hereinafter more fully appear.

In the accompanying drawing there are shown, for purposes of illustration, two forms which the invention may assume in practice.

In this drawing,—

Fig. 1 is a view in longitudinal section illustrating one illustrative form of the improved feeding and guiding means.

Fig. 2 is a plan view, with parts broken away, of the improved feeding and guiding means.

Fig. 3 is a cross sectional view taken on line 3—3 of Fig. 1.

Fig. 4 is a cross sectional view taken on line 4—4 of Fig. 1.

Fig. 5 is a cross sectional view taken on line 5—5 of Fig. 1.

Figs. 6 and 7 are cross sectional views taken on lines 6—6 and 7—7 of Fig. 4.

Fig. 8 is a cross sectional view taken substantially on line 8—8 of Fig. 1.

Fig. 9 is a view similar to Fig. 1, with its rearward portion broken away, showing a modified form of construction.

Fig. 10 is a cross sectional view taken substantially on line 10—10 of Fig. 9.

Fig. 11 is a cross sectional view taken substantially on line 11—11 of Fig. 9.

In the illustrative embodiment of the invention shown in Figs. 1 to 8, inclusive, there is shown a rock drill, generally designated 1, of the pressure fluid actuated hammer type comprising a motor cylinder 2 having a piston chamber 3 containing a reciprocable hammer piston for delivering impact blows to the shank of a drill steel 4. The rock drill 1 is guided and fed by improved means comprising an elongated tubular member 5 having a trunnion 6 adapted to be clamped in a saddle mounting of a suitable support. This tubular member has provided within its rearward portion a feed cylinder bore 7 containing a reciprocable feed piston 8 having a forwardly projecting piston rod 9 extending through a packed opening 10 formed in a front head 11 of the feed cylinder bore. This head 11 is in the form of a cylindrical block held tightly in position within the bore by screws 12. The prolongation of the tubular member 5 in advance of the feed cylinder bore provides a cylindrical guide 13 for the rock drill; and in this instance the drill cylinder has depending integral arcuate portions 14, 14 embracing the sides of the exterior periphery of the tubular guide portion 13. This tubular guide portion is slotted longitudinally at 15 between the feed cylinder head 11 and its forward end, and a lug 16 integral with the back head of the motor cylinder projects through this slot into connection at 17 with the front end of the piston rod 9. The sides of this longitudinal slot 15 engaging the vertical sides of the depending lug 16 guide the rock drill with respect to the tubular guide portion 13 during the feeding operation. The rear end of this longitudinal slot 15 is laterally arcuately slotted at 18 so that the drill, when in its rearmost position on its guide, may be swung laterally about the longitudinal axis of the tubular member, the trunnion 6 being so located with respect to the guide portions 14, 14 on the drill as to permit such lateral drill movement. By the provision of this arcuate slot, the drill may be swung laterally to facilitate drill steel changes in a well known manner. Arranged in the back head of the drill motor is a throttle valve mechanism 19 comprising a valve bore 20 containing a rotary throttle valve 21. Pressure fluid is supplied to a pressure chamber 22 in the valve through a usual pipe connection 23, and this valve controls the flow of pressure fluid from the chamber 22 to the cylinder of the hammer motor in a well known manner. Formed in the back head of the hammer motor cylinder is a pair of parallel passages 24 and 25 which communicate with parallel passages 26 and 27, respectively, formed in the piston rod 9 and communicating, respectively, with the feed cylinder bore at the opposite sides of the feed piston 8. Formed on the valve periphery are arcuate grooves 28 and 29 connected through passages with the pressure chamber 22 and communicable with the feed supply passages 24 and 25. The passages 24 and 25 are also communicable to exhaust through arcuate grooves 30 and 31 formed on the valve periphery and communicable with vent ports 32 and 33, respectively. Pivotally mounted on bolts 34, 34 secured within lugs 35 formed integral with the tubular member 5, is a pair of pivoted guide members 36, 36 adapted to be swung into a position to embrace the drill steel 4 to provide

steel guiding means. Releasable locking means 37 is provided for holding the guide members 36, 36 in their closed guiding position, this locking means being releasable at will to permit release of the guiding members from the drill steel.

In the modified form of construction shown in Figs. 9 to 11, inclusive, the rock drill and feeding and guiding means are substantially the same as those above described. In this instance, however, the drill is provided with an integral semicircular block 40 having secured thereto, by a bolt 41, a segmental block 42; the blocks 40 and 42 cooperating to form a cylindrical guide block slidable within the bore of the guiding portion of the tubular member 5. In this instance, the longitudinal slot 15 is provided with an elongated lateral arcuate slot 43 to permit lateral movement of the rock drill about the axis of the feed cylinder bore, this elongated lateral slot being necessary to receive both the lug 16 and the connection of the cylindrical guide block 40, 42 with the drill motor cylinder. In this form of the invention, the forward end of the tubular member is provided with lateral lugs 44, 44 projecting outwardly therefrom and supporting pivoted bolts 45 on which pivoted guide members 46, 46 are pivotally mounted; these guide members providing, as in the form of the invention shown in Fig. 8, guiding means for the drill steel, and having similar releasable locking means. Otherwise, this form of the invention is the same as that above described.

The improved feeding and guiding means operates in the following manner: The tubular member 5 is supported with respect to the work by the trunnion 6 in a saddle mounting of a suitable support with the drill in the position shown in Fig. 1. The guiding elements of the steel guiding means are swung into their guiding position with respect to the steel to guide the drill during starting of the drill hole. The throttle valve is then turned into a position to supply pressure fluid through the supply pipe 23 to the motor cylinder to effect reciprocation of the hammer piston, and as a result the drill steel is percussively actuated. The throttle valve is then turned into the position shown in Fig. 7 to supply pressure fluid from the valve chamber 22 through groove 29 and passages 25 and 27 to the feed cylinder bore at the rear side of the feed piston 8 while the front end of the cylinder bore is connected to exhaust, the pressure fluid acting on the rear pressure area of the piston to move the latter forwardly, thereby feeding the rock drill forwardly along the tubular guide portion 13 of the tubular member 5. After starting of the hole, the locking means 37 for the pivoted guiding elements is released and the guiding elements swung laterally about their pivots out of guiding relation with respect to the steel. When the rock drill has been fed forwardly to its extreme limit of travel and it is desired to change drill steels, pressure fluid is supplied to the forward end of the cylinder bore to act on the forward pressure area of the piston while the rear end of the cylinder bore is connected to exhaust, and as a result the rock drill is fed rearwardly along its guide. When the rock drill is in its rearmost position and the drill steel shank is released from the drill chuck, it may be swung laterally about the longitudinal axis of the tubular member, the depending projection 16 moving laterally at that time in the arcuate slot 18, the drill being moved to a position at one side of the drill hole. Such lateral positioning of the drill facilitates replacement of the drill steel from the drill hole, it being possible to withdraw the steel from the hole longitudinally along the side of the drill. When a new steel has been inserted in the drill hole, the rock drill is again swung into the position shown in Figs. 1 and 3, and the drill steel shank reinserted within the drill chuck. The drill is then again fed forwardly to complete the drill hole. The operation of the form of the invention shown in Fig. 9 is similar to that above described, the only difference in this instance being that the drill guide slides internally within the tubular member instead of along the exterior periphery thereof. In this form of the invention, the drill is likewise swung laterally with respect to its guide to facilitate drill steel replacement.

As a result of this invention, it will be noted that an improved rock drill feeding and guiding means is provided which is of an extremely simple, inexpensive and durable construction, the tubular drill guiding means being formed as an integral part of the feed cylinder. It will further be noted that the improved feeding and guiding means has associated therewith improved means permitting lateral swinging of the rock drill with respect to the guiding means, thereby to facilitate drill steel removal. These and other uses and advantages of the improved drill feeding and guiding means will be clearly apparent to those skilled in the art.

While there are in this application specifically described two forms which the invention may assume in practice, it will be understood that these forms are shown for purposes of illustration only, and that the invention may be further 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. In a rock drilling mechanism, the combination with a rock drill, of feeding and guiding means for said drill comprising an elongated tubular member having formed within its rearward portion a feed cylinder, the forward portion of said tubular member in advance of said feed cylinder constituting a cylindrical guiding means having a circular guiding surface, sliding supporting means for the drill providing an arcuate guiding surface slidably guided on said circular guiding surface, a feed piston reciprocable in said feed cylinder, and a connection between said feed piston and the rock drill.

2. In a rock drilling mechanism, the combination with a rock drill, of feeding and guiding means for said drill comprising an elongated cylindrical tubular member having formed within its rearward portion a feed cylinder having a front head, the forward portion of said tubular member in advance of the feed cylinder head constituting a cylindrical guiding means for the drill on which the latter is slidably guided, said drill having supporting means providing a surface the converse of said cylindrical guiding surface and coacting with the latter, a feed piston reciprocable in said feed cylinder, a forwardly extending piston rod secured to said feed piston and projecting through a packed opening in the front cylinder head, and a depending lug integral with the drill and connected to the front end of said piston rod.

3. In a rock drilling mechanism, the combina-

tion with a rock drill, of feeding and guiding means for said drill comprising an elongated tubular member having formed within its rearward portion a feed cylinder having a front head, the forward portion of said tubular member in advance of the feed cylinder head constituting a cylindrical guiding means for the drill on which the latter is slidably guided, said drill having guiding means supporting the same and providing a surface coacting directly with said cylindrical guiding means, a feed piston reciprocable in said feed cylinder, a forwardly extending piston rod secured to said feed piston and projecting through a packed opening in the front cylinder head, and a depending lug integral with the drill and connected to the front end of said piston rod, said tubular guide portion of said tubular member having a longitudinal slot through which said depending lug projects into connection with said piston rod.

4. In a rock drilling mechanism, the combination with a rock drill, of feeding and guiding means for said drill comprising an elongated tubular member having formed within its rearward portion a feed cylinder having a front head, the forward portion of said tubular member in advance of the feed cylinder head constituting a cylindrical guiding means for the drill on which the latter is slidably guided, a feed piston reciprocable in said feed cylinder, a forwardly extending piston rod secured to said feed piston and projecting through a packed opening in the front cylinder head, a depending lug integral with the drill and connected to the front end of said piston rod, said tubular guide portion of said tubular member having a longitudinal slot through which said depending lug projects into connection with said piston rod, and an arcuate circumferentially extending slot communicating with the rear end of said longitudinal slot permitting lateral movement of said depending lug whereby said drill may be moved laterally about the axis of said piston rod with respect to said tubular guide member.

5. In a rock drilling mechanism, the combination with a rock drill, of feeding and guiding means for said drill comprising an elongated cylindrical tubular member provided within its rearward portion with a feed cylinder, the forward portion of said tubular member in advance of said feed cylinder constituting guiding means for the drill on which the latter is slidably guided, said drill having arcuate guiding elements slidably engaging the exterior periphery of the guiding portion of said tubular member.

6. In a rock drilling mechanism, the combination with a rock drill, of feeding and guiding means for said drill comprising an elongated tubular member provided within its rearward portion with a feed cylinder, the forward portion of said tubular member constituting guiding means for the drill on which the latter is slidably guided, said drill having arcuate guiding elements slidably engaging the exterior periphery of the guiding portion of said tubular member, and means permitting lateral movement of the drill relative to said tubular member when said drill is in its rearmost position on said guiding portion.

7. In a rock drilling mechanism, the combination with a rock drill, of feeding and guiding means for said drill comprising an elongated tubular member provided within its rearward portion with a feed cylinder, the forward portion of said tubular member constituting guiding means for said drill on which the latter is slidably guided, and a cylindrical block secured to said drill and slidably engaging the interior periphery of the guiding portion of said tubular member.

8. In a rock drilling mechanism, the combination with a rock drill, of feeding and guiding means for said drill comprising an elongated tubular member provided within its rearward portion with a feed cylinder, the forward portion of said tubular member constituting guiding means for said drill on which the latter is slidably guided, and a cylindrical block secured to said drill and slidably engaging the interior periphery of the guiding portion of said tubular member, said tubular guiding portion having a longitudinal slot and the connection between the drill and said guiding block extending through said slot.

9. In a rock drilling mechanism, the combination with a rock drill, of feeding and guiding means for said drill comprising an elongated tubular member provided within its rearward portion with a feed cylinder, the forward portion of said tubular member constituting guiding means for said drill on which the latter is slidably guided, a cylindrical block secured to said drill and slidably engaging the interior periphery of the guiding portion of said tubular member, said tubular guiding portion having a longitudinal slot and the connection between the drill and said guiding block extending through said slot, and an arcuate circumferentially extending slot communicating with the rear end of said longitudinal slot permitting lateral movement of said connection whereby the drill may be moved laterally with respect to said tubular member.

10. In a rock drilling mechanism, the combination with a rock drill, of feeding and guiding means for the drill including a feed cylinder containing a reciprocable feed piston, a cylindrical tubular guide alined with the feed cylinder and formed by a continuation of the latter beyond one end of said feed cylinder, and on which the drill is slidably guided, said drill having supporting means providing a guide surface mating with said cylindrical guide, and a connection between said feed piston and the drill.

11. In a rock drilling mechanism, the combination with a rock drill, an elongated cylindrical shell, a block secured within the shell bore between its ends for dividing the shell into a feed cylinder and a cylindric guide portion, a feed piston reciprocable in said feed cylinder bore, a cylindric guide member slidably engaging the cylindric guiding surface on said guide portion of said cylindrical shell, said guide member connected to the rock drill, and a connection between said feed piston and the rock drill.

12. In a rock drilling mechanism, the combination with a rock drill, an elongated cylindrical shell, a block secured within the shell bore between its ends for dividing the shell into a feed cylinder bore and a cylindric guide portion, said cylindric guide portion having a longitudinal slot, a feed piston reciprocable in said feed cylinder bore, a cylindric guide member slidably engaging the cylindric guiding surface on said guide portion of said cylindrical shell, said guide member connected to the rock drill and having a key portion slidably engaging the side edges of said slot for preventing relative rotation between said guide member and said guide portion, and a connection between said feed piston and the rock drill.

13. In a rock drilling mechanism, the combination with a rock drill, of feeding and guiding means for said drill comprising a cylindrical tube

having formed within its rearward portion a feed cylinder, the tube bore forming the bore of the feed cylinder and the forward cylindrical portion of said tube in advance of the feed cylinder constituting a cylindrical guiding means for the drill on which the latter is slidably guided, said drill having a guide associated therewith conversely cylindrical to said cylindrical guiding means, a feed piston reciprocable in said cylinder, and a connection between said feed piston and the rock drill.

14. In a rock drilling mechanism, the combination with a rock drill, of feeding and guiding means for said drill comprising a cylindrical tube having formed within its rearward portion a feed cylinder, the tube bore forming the bore of the feed cylinder, the forward cylindrical portion of said tube in advance of the feed cylinder constituting a cylindrical guiding means, a cylindric guiding element in telescopic guiding relation with the cylindrical guiding portion of said tube and connected to the rock drill, a feed piston reciprocable in said feed cylinder, and a connection between said feed piston and the rock drill.

15. In a rock drilling mechanism, the combination with a rock drill, of feeding and guiding means for said drill comprising a cylindrical tube having formed within its rearward portion a feed cylinder, the tube bore forming the bore of the feed cylinder, the forward cylindrical portion of said tube in advance of the feed cylinder constituting a cylindrical guiding means, a cylindric guiding element in telescopic guiding relation with the cylindrical guiding portion of said tube and connected to the rock drill, the guiding portion of said tube having a longitudinal slot therein, and a portion movable with said guiding element and engaging said slot, a feed piston reciprocable in said feed cylinder, and a connection between said feed piston and the rock drill.

16. In combination, cooperating relatively longitudinally movable guiding elements, one generally cylindrical externally and the other generally cylindrical internally, whereby mating guiding surfaces are provided, a rock drill supported on one of said elements for longitudinal movement therewith, and feeding means including relatively reciprocable cylinder and piston members alined with the other of said elements and having one of its said members fixed to the said other of said elements in longitudinal alinement therewith and its other said member operatively connected to said drill-supporting element.

17. In combination, in a drilling apparatus, cooperating relatively longitudinally movable guiding elements, one generally cylindrical externally and the other generally cylindrical internally, whereby mating guiding surfaces are provided, a rock drill supported on one of said elements for longitudinal movement therewith, and feeding means including relatively reciprocable cylinder and piston members alined with the other of said elements and having one of its said members fixed to the said other of said elements and its other said member operatively connected to said drill supporting element, said apparatus further including means for precluding relative rotation between said guiding elements except in one predetermined longitudinal relation thereof.

18. In combination, feeding means including a feed cylinder and a feed piston therein, a guiding element providing a guiding surface conforming to the surface of a cylinder coaxial with said feed cylinder and in longitudinal alinement with the latter and of arcuate extent exceeding 180°, a cooperating guiding element providing a guiding surface mating with said first mentioned guiding surface and coacting with the latter to effect longitudinal guiding of and also positioning against bodily lateral displacement of said second guiding element relative to the first, a tool carried by one of said guiding elements, and means providing an operative connection between said feeding means and the other of said guiding elements.

19. In combination, a rock drill, feeding means therefor including relatively reciprocable cylinder and piston elements, and guiding means for said drill for supporting and guiding the same during feeding including means coaxial with said feed cylinder and providing in longitudinal alinement with the latter an elongated guiding surface more than 180° in arcuate extent in cross section, a cooperating relatively slidable guiding element having a guiding surface coacting directly with said first mentioned guiding surface and having a contact therewith of more than 180° of arcuate extent, operative connections between said guiding element and said feed piston, and means for mounting said drill on said guiding element.

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