

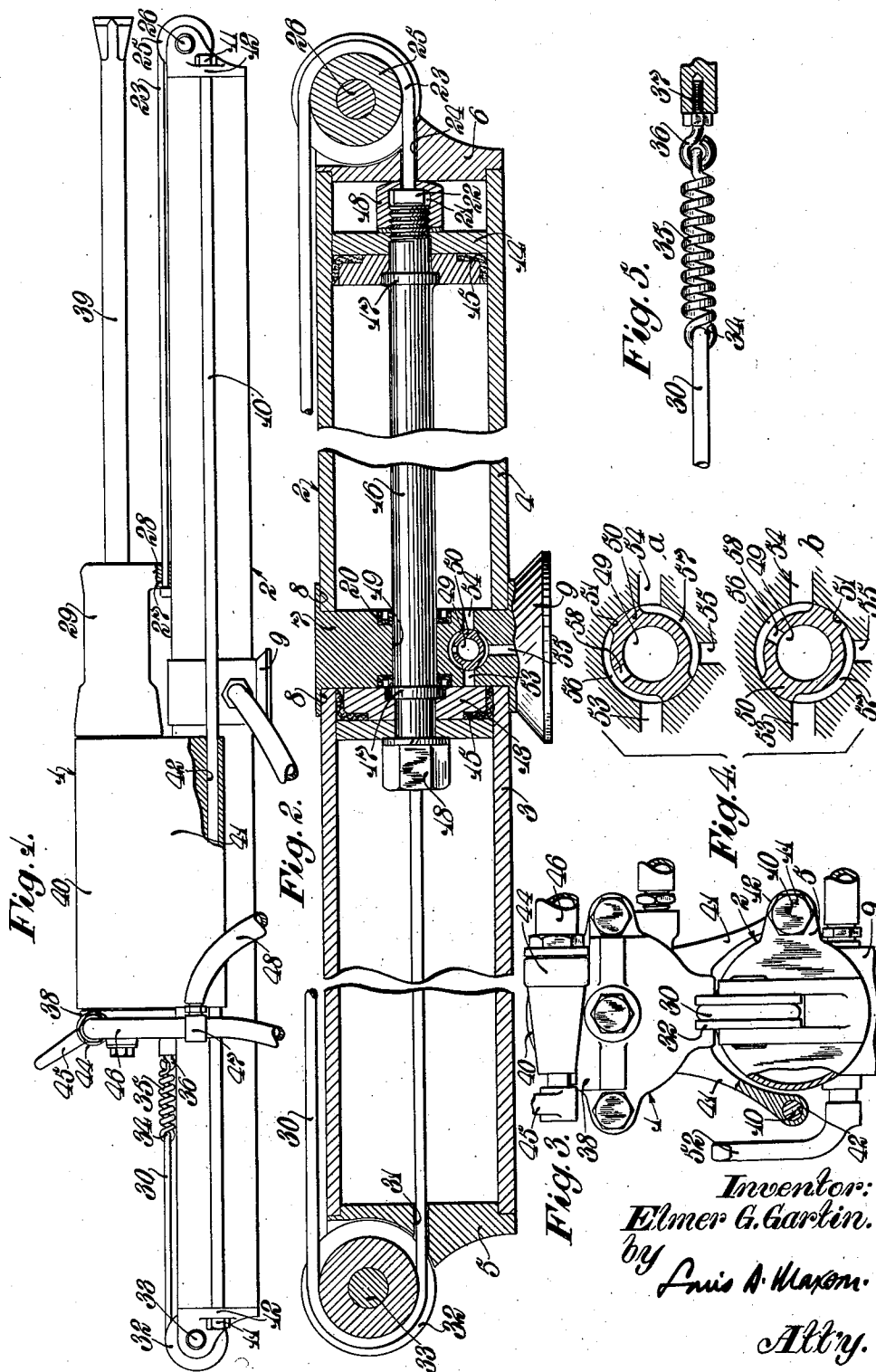
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ROCK DRILL

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ROCK DRILL

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10 Claims. (Cl. 121—9)

This invention relates to rock drills, and more particularly pertains to feeding mechanism for a rock drill of the mounted drifter type.

An object of this invention is to provide an improved rock drill feeding mechanism. A further object is to provide an improved pneumatic feeding mechanism for a rock drill of the mounted drifter type. Yet another object is to provide an improved supporting and guiding structure for such a rock drill, said supporting and guiding structure having associated therewith the improved feeding mechanism. These and other objects of the invention will, however, hereinafter more fully appear.

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 a side elevational view of the illustrative embodiment of the improved rock drill.

Fig. 2 is an enlarged vertical section showing structural details of the improved feeding mechanism.

Fig. 3 is a rear end elevational view of the drill shown in Fig. 1.

Fig. 4 is a diagrammatic view showing two positions of the feed controlling valve.

Fig. 5 is a detail view showing the resilient connection between the feed cable and drilling unit.

In this illustrative construction there is shown a rock drill of the mounted drifter type generally comprising a drilling unit 1 supported and guided in an improved manner and having improved pneumatic feeding mechanism generally designated 2.

The improved feeding mechanism comprises aligned cylinders 3 and 4 having at their remote ends head members 5 and 6, respectively, and arranged between their adjacent ends a common head member or partition 7. This head member 7 is provided with aligned bores 8 on its opposite faces for receiving the adjacent ends of the feed cylinders, while formed on the bottom of this head is a swivel plate 9 adapted to be clamped in a usual saddle mounting of a quarry bar or tripod support. The cylinders 3, 4 and heads 5, 6 and 7 are maintained in assembled relation by parallel tie rods 10, 10 extending longitudinally of the cylinders and having tightening nuts 11 engaging lateral lugs 12 formed on the heads 5 and 6 in the manner shown in Fig. 1. Reciprocably mounted in the feed cylinders 3 and 4, respectively, are feed pistons 13, 14 each having suitable cup packing 15 and rigidly secured to-

gether for unitary movement with respect to the cylinders by means of a common piston rod 16. The pistons are each secured to the piston rod by a collar 17 formed on the rod and a holding nut 18 threadedly secured to the rod, the piston being clamped by the nut against the collar. This piston rod extends through a central opening 19 formed in the central head or partition 7, and this opening is suitably packed by packings 20 for preventing leakage from the cylinders. The nut 18 for the front feed piston has a socket 21 for receiving a head 22 formed on an end of a feeding cable 23, this cable extending from the piston 14 of the front cylinder 4 centrally through an opening 24 formed in the head 6 and passes around a guide sheave 25 journaled on a shaft 26 suitably supported by the head 6, the cable passing from the top of the sheave rearwardly along the top of the feed cylinder 4 in parallelism therewith and secured at 27 within a socket formed in a depending lug 28 formed integral with the front chuck housing 29 of the drilling unit. The holding nut 18 for the rear feed piston 13 is provided with a similar socket for receiving the head of a cable 30, and this cable extends rearwardly through the rear cylinder through an opening 31 formed in the head 5 and passes around a sheave 32 journaled on a shaft 33 suitably carried by the head 5. This cable extends from the upper side of the sheave rearwardly along the rear feed cylinder 3 in parallelism therewith and is secured at 34 to a tension spring 35 for maintaining the cables 23 and 30 under tension. This spring is connected to an eye-bolt 36 adjustably threadedly secured at 37 within the rear head 38 of the drilling unit 1. This drilling unit comprises a hammer motor, of a standard design, for percussively actuating a drill steel 39 suitably mounted within the front chuck housing 29, and the cylinder 40 of the drilling unit, in this instance, is provided at its opposite sides with depending arms 41 each having a longitudinal bore 42 through which the tie rods 10, 10 of the feeding mechanism extend, these arms 41, 41 slidably engaging the tie rods 10 for supporting and guiding the drilling unit longitudinally of the feeding mechanism.

Now referring to the improved means for controlling the flow of pressure fluid to the feeding cylinders to effect reciprocation of the feed pistons, it will be noted that carried within the rear head block 38 of the drilling unit is a throttle valve mechanism 44 having a control handle 45 and a fluid supply connection 46, and this valve mechanism is adjustable to control the flow of pressure

fluid to the hammer motor of the drilling unit. Connected by a T 47 to the fluid supply connection 46 is a flexible hose 48 for supplying pressure fluid to the hollow interior 49 of a rotary valve 50 mounted in a bore 51 formed in a central head or partition 7 of the feeding mechanism. This valve has a suitable control handle 52. Connecting the valve bore 51 with the feed cylinders 3 and 4 are fluid supply passages 53 and 54, while also communicable with the valve bore is a vent passage 55. Formed externally on the valve 50 are circumferentially extending grooves 56 and 57, the former connected to the interior of the valve through a port 58. When the control valve 50 is in the position *a* shown in Fig. 4, pressure fluid is supplied from the interior of the valve through port 58, groove 56 to the forward feed passage 53 to the forward end of the rear feed cylinder 3 to act on the forward pressure area of the rear feed piston 13, thereby moving the piston rod 15 rearwardly, thereby drawing in the front feed cable 23, and as a result feeding the drilling unit in a forward direction, the rear end of the front feed cylinder 4 at the rear side of the feed piston 14 being connected to atmosphere through passage 54, groove 57 on the valve and vent passage 55. When the feed control valve is turned into the position *b* in Fig. 4, pressure fluid is supplied from the interior of the valve 50 through port 58, groove 56 and through the reverse feed passage 54 to the rear end of the front feed cylinder 4, the pressure fluid acting on the rear pressure area of the front feed piston 14 moving the latter and the piston rod forwardly, thereby drawing in the rear feed cable 30, and as a result the drilling unit is fed rearwardly, the forward end of the rear feed cylinder 3 at that time being connected to exhaust through passage 53, groove 57 and vent passage 55. The remote ends of the feed cylinders 3 and 4 at the front and rear sides of the feed pistons 14 and 13, respectively, are vented to atmosphere through the openings 24 and 31 in the heads 6 and 5, respectively.

As a result of this invention, it will be noted that an improved pneumatic feeding mechanism for a rock drill of the mounted drifter type is provided, the improved feeding mechanism having associated therewith improved means for supporting and guiding the drilling unit. It will further be noted that an improved feeding mechanism is provided of the multi-cylinder and piston type having improved connections between the pistons and the drilling unit whereby cylinder leakage is reduced to a minimum while at the same time rendering the same extremely simple in design. These and other uses and advantages of the improved rock drill 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. In a rock drill, a feeding mechanism comprising a pneumatic feeding device comprising a plurality of feed motor parts held in assembled relation by parallel longitudinally extending tie rods and embodying a power feeding element, and a drilling unit mounted on said feeding mechanism and having guide elements slidably engaging

said tie rods, said tie rods constituting the sole support for the drilling unit whereby the latter is supported and guided wholly independently of said power feeding element.

2. In a rock drill, a feeding mechanism comprising a pneumatic feeding device comprising a plurality of feed motor parts held in assembled relation by parallel longitudinally extending tie rods, a drilling unit mounted on said feeding mechanism and having guide elements slidably engaging said tie rods, and feeding connections between the opposite ends of the feeding device and the opposite ends of the drilling unit, said tie rods forming the sole guiding means for said drilling unit and supporting the latter wholly independently of said feeding connections.

3. In a rock drilling mechanism, the combination with a rock drill, of feeding mechanism for said drill comprising a central trunnion support, aligned feed cylinders mounted on the opposite sides of said support, the latter forming an intermediate head for the adjacent ends of said cylinders, outer heads for the remote ends of said cylinders, parallel tie rods extending longitudinally of said cylinders along the sides of the latter for securing said outer heads, cylinders and intermediate support in assembled relation, said tie rods forming longitudinal guideways along which said rock drill is slidably guided, feed pistons reciprocable in said cylinders, a piston rod connecting said pistons for movement in unison and passing through a packed opening in said intermediate head, connections between the remote sides of said pistons and said rock drill, and means for supplying motive fluid selectively to the adjacent ends of said cylinders for effecting movement of said pistons in one direction or the other thereby to effect feeding of the rock drill in either of opposite directions along said tie rod guideways.

4. In a rock drilling mechanism, the combination with a rock drill, of feeding mechanism for said drill comprising a central trunnion support, aligned feed cylinders mounted on the opposite sides of said support, the latter forming an intermediate head for the adjacent ends of said cylinders, outer heads for the remote ends of said cylinders, parallel tie rods extending longitudinally of said cylinders along the sides of the latter for securing said outer heads, cylinders and intermediate support in assembled relation, said tie rods forming longitudinal guideways along which said rock drill is slidably guided, feed pistons reciprocable in said cylinders, a piston rod connecting said pistons for movement in unison and passing through a packed opening in said intermediate head, connections between the remote sides of said pistons and said rock drill, means for supplying motive fluid selectively to the adjacent ends of said cylinders for effecting movement of said pistons in one direction or the other thereby to effect feeding of the rock drill in either of opposite directions along said tie rod guideways, said motive fluid supply means comprising a control valve arranged in said intermediate head and passages controlled thereby for controlling the flow of motive fluid from a supply source to the adjacent ends of said cylinders.

5. In a rock drilling mechanism, the combination with a rock drill, of feeding mechanism for said drill comprising a central trunnion support, aligned feed cylinders mounted on the opposite sides of said support, the latter forming an intermediate head for the adjacent ends of said cylinders, outer heads for the remote ends of said cylinders, parallel tie rods extending longitudinally of

said cylinders along the sides of the latter for cylinders, heads and tie rods supported solely by securing said outer heads, cylinders and intermediate support in assembled relation, said tie rods forming longitudinal guideways along which said rock drill is slidably guided, feed pistons reciprocable in said cylinders, a piston rod connecting said pistons for movement in unison and passing through a packed opening in said intermediate head, connections between said pistons and said rock drill including cables connected to the remote ends of said pistons and passing freely through openings in said outer heads, the openings through which said cables pass venting the remote ends of said cylinders to atmosphere, and means for supplying motive fluid selectively to the adjacent ends of said cylinders for effecting movement of said pistons in one direction or the other thereby to effect feeding of the rock drill in either of opposite directions along said tie rod guideways.

6. In a rock drilling mechanism, the combination with a rock drill, of feeding mechanism for said drill comprising a central trunnion support, aligned feed cylinders mounted on the opposite sides of said support, the latter forming an intermediate head for the adjacent ends of said cylinders, outer heads for the remote ends of said cylinders, parallel tie rods extending longitudinally of said cylinders along the sides of the latter for securing said outer heads, cylinders and intermediate support in assembled relation, said tie rods forming longitudinal guideways along which said rock drill is slidably guided, feed pistons reciprocable in said cylinders, a piston rod connecting said pistons for movement in unison and passing through a packed opening in said intermediate head, connections between said pistons and said rock drill including cables connected to the remote ends of said pistons and passing freely through openings in said outer heads, the openings through which said cables pass venting the remote ends of said cylinders to atmosphere, pulleys journaled on said outer heads for guiding said cables as the latter extend outwardly through said outer head openings, and means for supplying motive fluid selectively to the adjacent ends of said cylinders for effecting movement of said pistons in one direction or the other thereby to effect feeding of the rock drill in either of opposite directions along said tie rod guideways.

7. In a rock drilling mechanism, the combination with a rock drill, of feeding mechanism for said drill comprising a central trunnion support, aligned feed cylinders mounted at the opposite sides of said support, the latter forming an intermediate head for the adjacent ends of said cylinders, heads for the remote ends of said cylinders, parallel tie rods extending longitudinally of said cylinders for securing said heads, cylinders and trunnion support in assembled relation, said

said trunnion support, feed pistons reciprocable in said cylinders respectively, a piston rod connecting said pistons for movement in unison and passing through a packed opening in said intermediate head, connections between the opposite sides of said pistons and said rock drill, constant vent means for the remote ends of said cylinders, and means for supplying motive fluid to the adjacent ends of said cylinders for effecting movement of said pistons in one direction or the other thereby to effect feed of the rock drill in either of opposite directions.

8. In a rock drilling mechanism, the combination with a rock drill, of a feeding and guiding structure for said drill comprising a central trunnion support, aligned feed cylinders mounted at the opposite sides of said support, the latter forming an intermediate head for the adjacent ends of said cylinders, outer heads for the remote ends of said cylinders, parallel tie rods extending longitudinally of said cylinders for securing said heads, cylinders and support in assembled relation and forming guideways along which the rock drill is slidably guided, feed pistons reciprocable in said cylinders, a piston rod connecting said pistons for movement in unison and passing through a suitable packed opening in said intermediate head, cables connecting the opposite sides of said pistons to said rock drill, and pulleys mounted on said outer heads for guiding said cables.

9. In a rock drilling mechanism, in combination, a rock drill having longitudinal guide members, and feeding and guiding means for said drill comprising a pressure fluid actuated feeding motor having a plurality of cooperating motor parts and means for holding said motor parts in assembled relation, said holding means comprising guiding members extending longitudinally of said feeding motor and on which said drill guide members are slidably guided.

10. In a rock drilling mechanism, in combination, a rock drill, and feeding and supporting means for said drill comprising a central trunnion support, aligned feed cylinders, an intermediate head for said feed cylinders secured to said trunnion support and having a packed opening, said cylinders solely supported by said trunnion support through said intermediate head, means for securing said cylinders to said intermediate head, pistons reciprocable in said cylinders respectively, a piston rod connecting said pistons and extending through the packed opening in said intermediate head, means for supplying pressure fluid selectively to the adjacent ends of said cylinders to effect movement of said pistons in one direction or the other, and means for connecting said pistons to the rock drill.

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