Jan. 6, 1942. C. F. OSGOOD 2,268,573

ROCK DRILL

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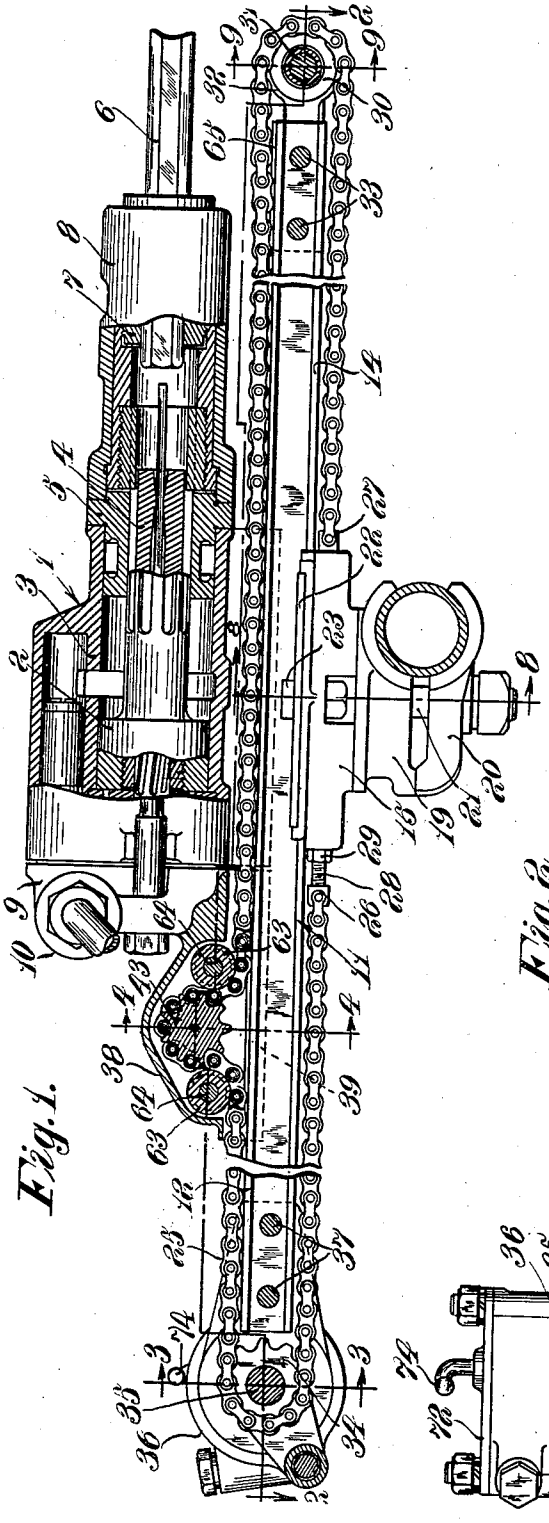


Fig. 1.

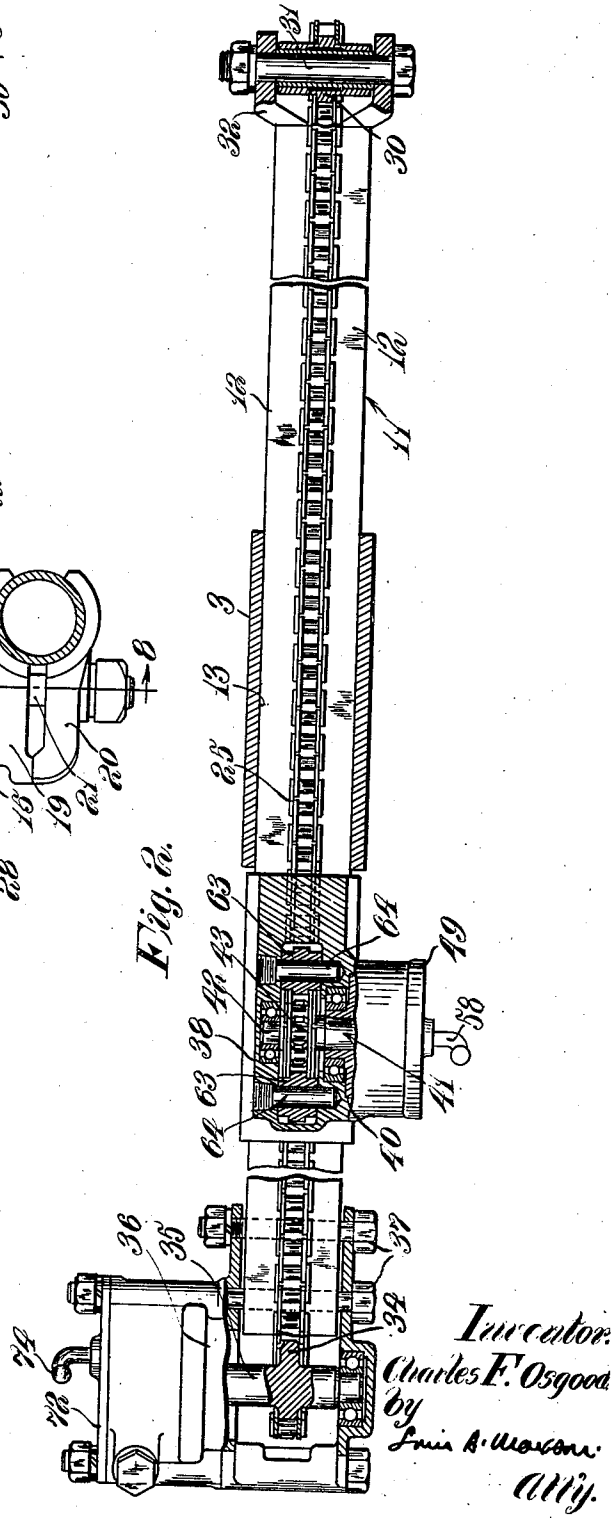


Fig. 2.

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Fig. 3.

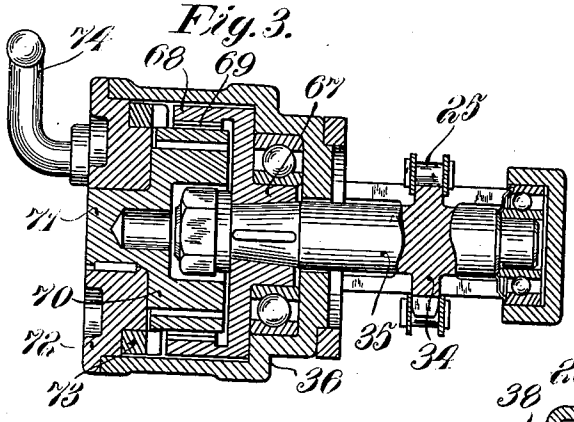



Fig. 9.

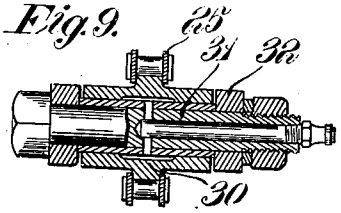



Fig. 4.

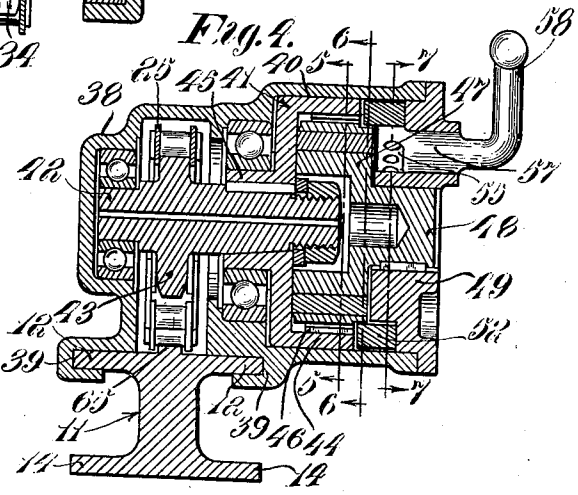



Fig. 5.

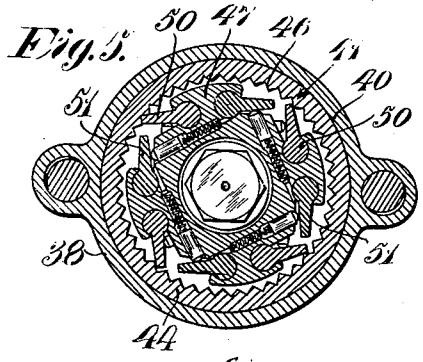



Fig. 6.

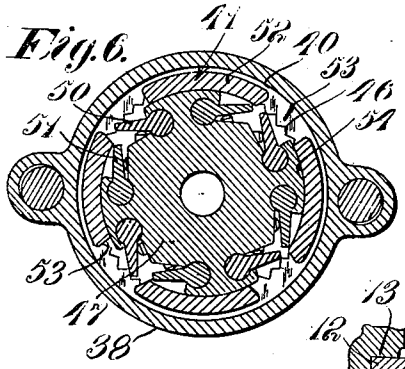



Fig. 7.

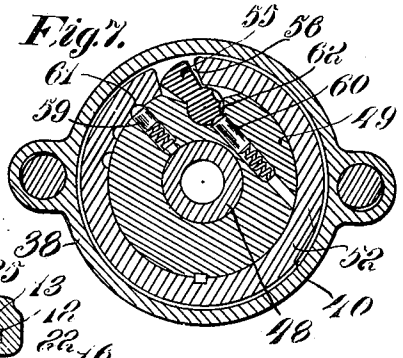
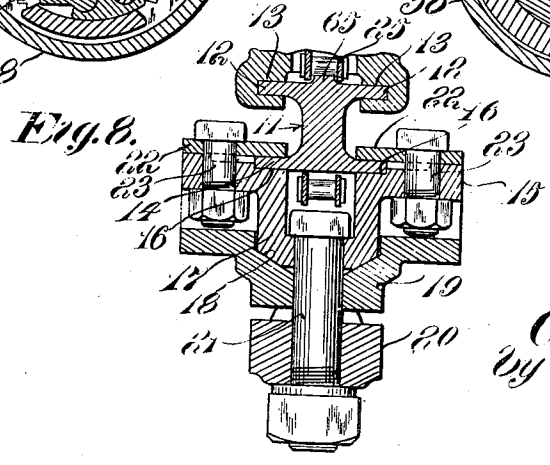



Fig. 8.




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ROCK DRILL

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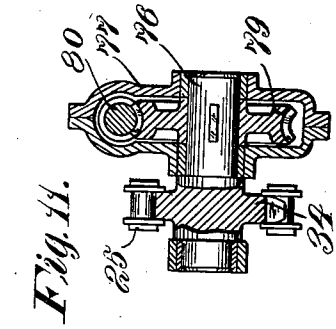


Fig. 11.

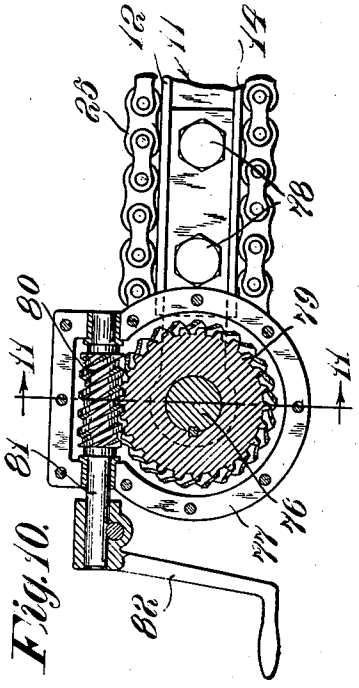


Fig. 10.

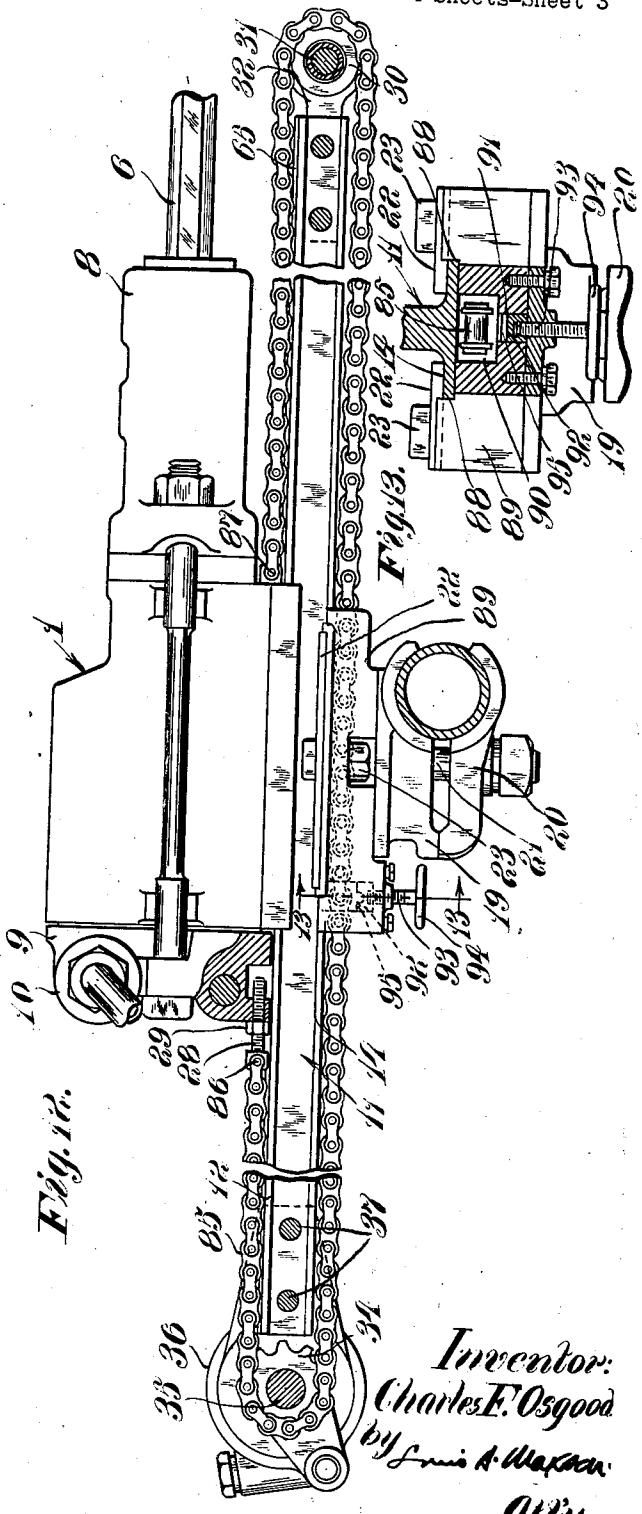


Fig. 12.



Fig. 13.

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ROCK DRILL

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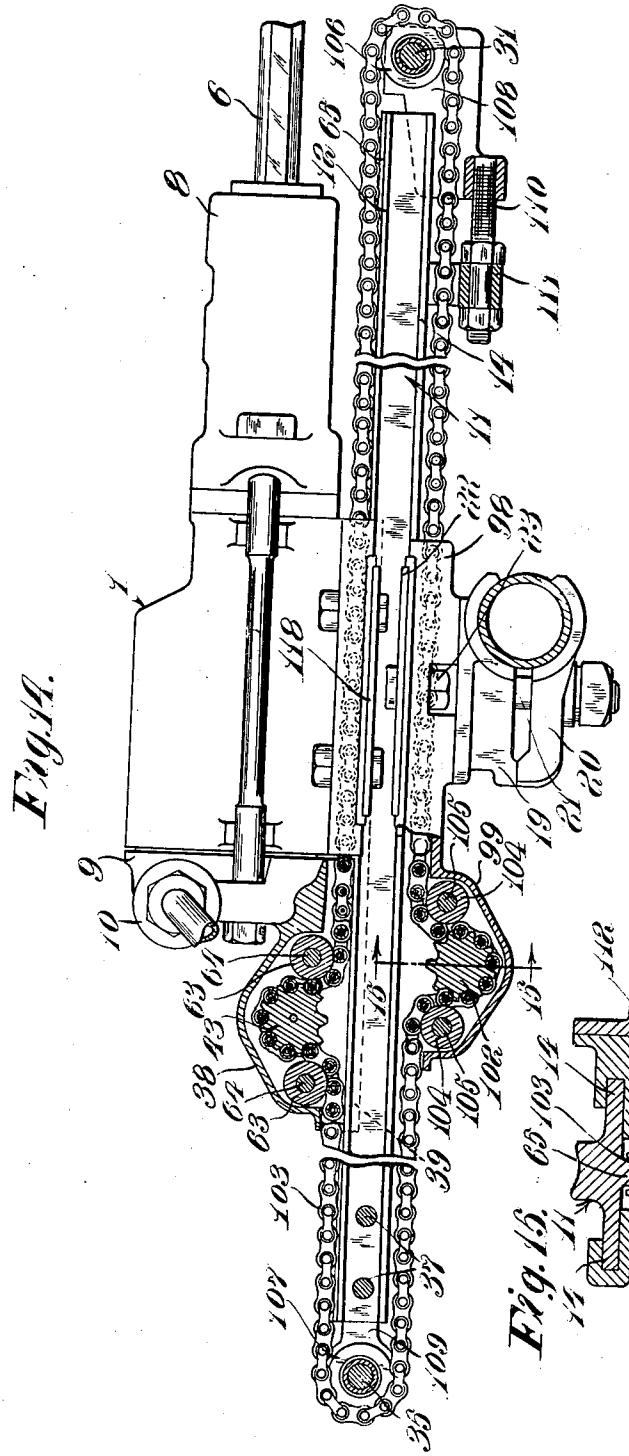


Fig. 4.

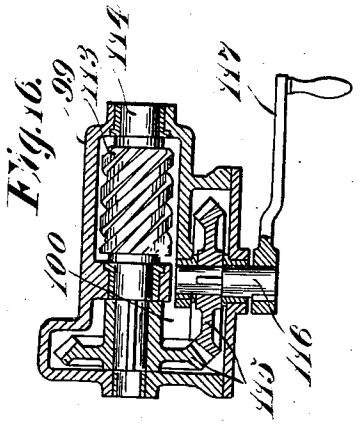


Fig. 6.

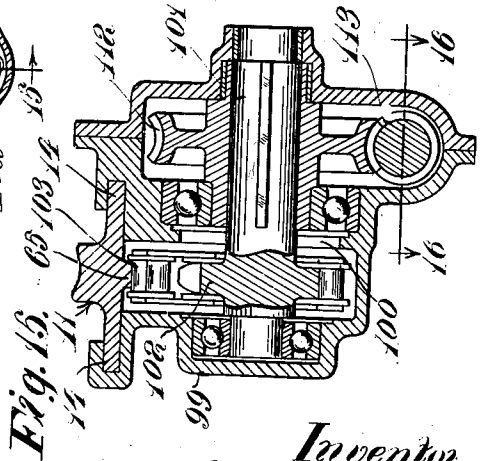


Fig. 5.

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Patented Jan. 6, 1942 2,268,573

# UNITED STATES PATENT OFFICE

2,268,573

## ROCK DRILL

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Application May 6, 1938, Serial No. 206,410

18 Claims. (Cl. 255—45)

This invention relates to rock drills, and more particularly, but not exclusively, to improvements in the supporting, guiding and feeding means for a hammer rock drill of the mounted drifter type.

An object of this invention is to provide an improved rock drill supporting, guiding and feeding means whereby the drill hammer motor may be supported, guided and fed in an improved manner. Another object is to provide an improved adjustable supporting and guiding means for a drill hammer motor whereby with an extremely compact structure a relatively long range of feed is obtained. A further object is to provide an improved adjustable drill guide and automatic feeding means wherein elements of the guide-adjusting means cooperate with elements of the feeding means in an improved manner. A still further object is to provide an improved automatic drill-feeding means operated by a vibratory action set up within the drill hammer motor incident to the operation of the latter. Another object is to provide an improved feeding means of the automatic vibration-controlled type associated with improved adjustable supporting and guiding means for the drill hammer motor. A still further object is to provide an improved drill supporting, guiding and feeding means which embodies a guide on which the drill hammer motor is guided and has an improved sliding supporting structure for the guide together with improved automatic feeding means for feeding the hammer motor relative to the guide, and associated means, either automatically or manually operated, for feeding the guide relative to the supporting means. Yet another object is to provide an improved rock drill supporting, guiding and feeding means which is not only rugged and durable in construction, but which is also simple in design and inexpensive in construction. These and other objects and advantages of the invention will, however, hereinafter more fully appear.

In the accompanying drawings there are shown for purposes of illustration several forms which the invention may assume in practice.

In these drawings:

Fig. 1 is a central, longitudinally extending, vertical sectional view, with parts shown in elevation, of a rock drill constructed in accordance with one illustrative embodiment of the invention.

Fig. 2 is a longitudinally extending horizontal sectional view taken substantially on line 2—2 of Fig. 1, with parts shown in plan.

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

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

Fig. 5 is a detail cross sectional view taken on line 5—5 of Fig. 4.

Fig. 6 is a detail cross sectional view taken on line 6—6 of Fig. 4.

Fig. 7 is a detail sectional view taken on line 7—7 of Fig. 4.

Fig. 8 is an enlarged vertical sectional view taken substantially on line 8—8 of Fig. 1.

Fig. 9 is an enlarged vertical sectional view taken on line 9—9 of Fig. 1.

Fig. 10 is a detail sectional view showing a modified form of construction.

Fig. 11 is a cross sectional view taken on line 11—11 of Fig. 10.

Fig. 12 is a view similar to Fig. 1, showing another illustrative embodiment of the invention.

Fig. 13 is a detail vertical sectional view taken on line 13—13 of Fig. 12.

Fig. 14 is a view similar to Figs. 1 and 12, showing a further illustrative embodiment of the invention.

Fig. 15 is an enlarged vertical sectional view taken substantially on line 15—15 of Fig. 14.

Fig. 16 is a detail horizontal sectional view taken on line 16—16 of Fig. 15.

In the several illustrative embodiments of the invention, the improved supporting, guiding and feeding means is shown associated with a drill hammer motor, generally designated 1, herein of a conventional design, comprising a pressure fluid actuated hammer piston 2 reciprocably mounted in a motor cylinder 3. The hammer piston has a striking bar 4 extending through a bore in the front cylinder head 5 and adapted to deliver impact blows to the shank of a drill steel 6. The drill steel has its shank mounted, in a conventional manner, in a chuck 7 supported within a front chuck housing 8 secured to the front end of the motor cylinder. The rear end of the motor cylinder has secured thereto a rear head block 9 having arranged thereon a conventional throttle valve mechanism 10, for controlling the supply of motive fluid to the motor cylinder for effecting reciprocation of the hammer piston. As the construction and mode of operation of a drill hammer motor of the type disclosed are well known to those skilled in the art, further description thereof is herein considered unnecessary.

In the illustrative embodiment of the invention shown in Figs. 1 to 9, inclusive, a drill guide

frame is generally designated 11, and is herein preferably in the form of an I-beam having lateral top flanges 12, 12 providing longitudinal guides along which the drill hammer motor 1 is slidably guided, the hammer motor preferably having longitudinal guideways 13 formed integral with the motor cylinder 3 and slidingly engaging the guides 12. Engaging the lateral bottom flanges 14 of the I-beam is a trunnion support 15 having guideways 16, 16 receiving the I-beam flanges 14 and having a conical trunnion portion 17 swivelled in a socket 18 formed within a bottom clamp 19, the latter adapted to be suitably clamped by a clamp member 20 and a cooperating clamping bolt 21 to a column or bar, in a well known manner. The bolt 21 serves not only to tighten the clamp parts, but also to secure the trunnion support within its swivel socket. The top plates 22 of the guideways 16 are adapted to be tightened by bolts 23 for clamping the I-beam to the bottom trunnion support. Manifestly, when the clamping bolts 23 are loosened, the I-beam 11 may be slid longitudinally within the guideways on the trunnion support relative to the latter into any desired guiding position and thereafter firmly clamped in adjusted position.

The improved automatic feeding means, operated by a vibratory action set up within the drill hammer motor incident to the operation of the latter, in this illustrative construction, includes a control chain 25 having its top and bottom run portions respectively overlying and underlying the I-beam 11, and the control chain is arranged in vertical planes extending longitudinally of the I-beam midway between the sides of the latter, in the manner shown in Fig. 8, and has its ends fastened at 26 and 27, respectively, to the opposite ends of the trunnion support 15, as shown in Fig. 1. The connection of the chain at 26 to the trunnion support is preferably adjustable to permit tightening of the chain, and the fastening means comprises a screw 28 threaded within an opening in the rear trunnion support and provided with a lock nut 29, while the connection at 27 is permanent. The control chain 25 is guided at the forward end of the I-beam by a vertical guide roll 30 journaled on a bearing sleeve supported by a transverse bolt 31 secured to a bracket 32, herein attached as by bolts 33 to the forward end of the I-beam, and is guided at the rear end of the I-beam by a vertical chain sprocket 34 formed on a horizontal shaft 35 suitably journaled in a casing 36, the latter being attached as by bolts 37 to the rear end of the I-beam. Arranged in the casing 36 is a feed control means, to be later explained, for controlling the direction of rotation of the chain sprocket 34 and for at times locking the chain sprocket against rotation. Formed integral with the rear head block 9 of the hammer motor 1 is a sliding frame 38 having guideways 39, similar to the guideways 13 on the hammer motor cylinder, for slidably receiving the top flanges 12 of the I-beam. If desired, the drill hammer motor may be supported entirely by the sliding frame 38, and the guideways 13 on the hammer motor cylinder may be omitted in an obvious manner. The sliding frame 38 is in the form of a casing and is provided with an internal chamber 40 within which a feed control means, generally designated 41, is arranged. Arranged in the casing chamber is a horizontal shaft 42 suitably journaled in ball bearings and having an integral chain sprocket 43, as shown in Fig. 4. The control means 41 comprises a rotatable ratchet ring 44 having a hub 45 keyed to the shaft 42, the ratchet ring having internal ratchet teeth 46. Arranged concentrically within the ratchet ring 44 is a stationary pawl carrier 47 having a stub shaft 48 keyed to a detachable cover plate 49 of the casing. This pawl carrier carries reversible spring-pressed pawls 50 and 51 (Figs. 5 and 6) engageable with the ratchet teeth 46 for controlling the direction of rotation of the chain sprocket 43 and for at times locking the chain sprocket against rotation. The pawls are herein preferably eight in number, four for controlling the direction of rotation of the sprocket 43 in one direction and four for controlling the direction of rotation of the sprocket in the opposite direction. For selectively rendering the sets of pawls 50 and 51 effective, a shifter annulus 52 is rotatably mounted within the casing chamber on a circular projection of the cover plate 49, and this annulus has recesses or slots 53 (Fig. 6) to permit the pawls to move into engagement with the ratchet teeth, and an internal peripheral surface 54 of the annulus is engageable with the pawls for pressing the latter inwardly into their released position. The shifter annulus is movable into an intermediate position wherein the recesses 53 permit both sets of pawls 50 and 51 to move into engagement with the ratchet teeth, thereby to lock the ratchet ring, and consequently the chain sprocket 43, against rotation. For moving the shifter annulus 52 into its different positions, a lever 55 (Fig. 7) projects within a slot 56 in the annulus, and this lever is secured to a control shaft 57 rotatably mounted in the casing cover plate and having an operating handle 58. Spring-pressed plungers 59 and 60 (Fig. 7) mounted within bores in the casing cover plate 49 are respectively engageable with notches 61 and 62 on the annulus and control shaft respectively, for locking the parts in their different adjusted positions. The chain sprocket 43, as shown most clearly in Fig. 1, engages the chain 25, and guide rolls 63 journaled on horizontal shafts 64 supported within the sliding frame 38, guide the chain through the open bottom of the sliding frame and relative to the chain sprocket. The control chain 25, as above mentioned, has its upper run lying on the top of and extending longitudinally along the I-beam, and the latter has an upstanding ledge-like projection 65 extending longitudinally along the top surface of the I-beam and with which the chain engages for guiding the chain to maintain the latter in longitudinal alinement with the I-beam.

Now referring to the feed control means arranged in the casing 36 at the rear end of the I-beam, it will be observed that the shaft 35 of the sprocket 34 is keyed to the hub 67 (Fig. 3) of a ratchet ring 68, the latter having internal ratchet teeth 69. Arranged concentrically within the ratchet ring 68 is a pawl carrier 70 having a stub shaft 71 keyed to a detachable cover plate 72 of the casing 36. As the structure of this control means, including the elements 68 and 70, is similar to that of the control means 41 shown in Fig. 4, further illustration of the same is herein considered unnecessary. As in the control means 41, the pawl carrier 70 carries reversible spring-pressed pawls engageable with the ratchet teeth 69 for controlling the direction of rotation of the chain sprocket 34 and for at times locking the chain sprocket against rotation. One set of pawls controls the direction of rotation of the sprocket 34 in one direction and

another controls the direction of rotation of the sprocket in the opposite direction. As in the control mechanism 41, a shifter annulus 73 is rotatably mounted in the casing bore on a circular projection of the cover plate and has recesses or slots to permit the pawls to move into engagement with the ratchet teeth, and an internal surface engageable with the pawls for pressing the latter inwardly into their released position. When the shifter annulus 73 is in its intermediate position, the recesses permit both sets of pawls to move into engagement with the ratchet teeth 69, to lock the ratchet ring, and consequently the chain sprocket 34, against rotation. The shifter annulus 73 is provided with a moving means similar to that shown in Figs. 4 and 7, including a handle 74, and similarly has spring-pressed plungers for locking the parts in their adjusted position.

The mode of operation of the embodiment of the invention above described is as follows: The I-beam 11 may be set up at the working face by clamping the trunnion support 15 by the trunnion clamp on a bar or column, and the I-beam 11 is suitably clamped in position by the clamping plates 22. When the I-beam is in the desired location, the operator may manipulate the control handle 74 of the shifter annulus 73 to move the latter into a position wherein the chain sprocket 34 is locked against rotation by the pawls, thereby to hold the control chain 25 stationary with respect to the I-beam. The operator may then manipulate the control handle 58 of the shifter annulus 52, to move the latter into a position wherein the reverse-feed-effecting pawls are in engagement with the ratchet teeth, so that the control sprocket 43 is free to rotate in a clockwise direction as viewed in Fig. 1, thereby permitting sliding movement of the drill hammer motor 1 rearwardly along the I-beam. When the hammer motor is in its rearmost position on the I-beam, the operator may reverse the position of the shifter annulus 52 to render active the forward-feed-effecting pawls and may then manipulate the throttle valve mechanism 10 to effect the supply of motive fluid to the drill hammer motor 1 to effect operation of the latter, thereby to actuate percussively the drill steel 6. When the drill hammer motor is running, to effect percussive actuation of the drill steel, the reciprocatory movement of the hammer piston 2 causes, due to the sudden reversal in the direction of movement of the piston, vibratory or recoil movements of the hammer motor alternately in opposite directions longitudinally thereof, resulting in alternating tendencies of movement of the hammer motor forwardly and rearwardly with respect to the I-beam 11, in the manner well understood by those skilled in the art. Movement of the hammer motor in the rearward direction is checked automatically by the ratchet and pawl mechanism, the active pawls 50 engaging the ratchet teeth 46, automatically checking reverse rotation of the chain sprocket 43, while permitting the chain sprocket to rotate freely in a forward-feed-effecting direction. When the shifter annulus 52 is in the position shown in Fig. 6, the control sprocket 43 is free to rotate in a counter-clockwise direction as viewed in Fig. 1, relative to the then stationary control chain 25, thereby permitting forward feeding movement of the hammer motor along the I-beam, the control chain, as the hammer motor moves forwardly, effecting such counter-clockwise rotation of the control sprocket. Reverse rotation of the control sprocket 43 is checked automatically by the pawls 50 engaging the teeth of the ratchet ring 44, thereby to prevent rotation of the control sprocket in a clockwise direction as viewed in Fig. 1. It will thus be seen that as the hammer piston 2 of the hammer motor reciprocates within the hammer cylinder 3, to actuate percussively the drill steel 6, the jars imparted by the hammer piston, due to the sudden reversals in the direction of movement thereof, cause the hammer motor to jump step by step in a forward feeding direction along the I-beam, thereby feeding the drill steel toward the work. When the operator manipulates the handle 58 of the shifter annulus 52, the latter may be rotated to effect release of the pawls 50 from the ratchet teeth and to permit the pawls 51 to move into engagement with the ratchet teeth. When the parts are in this reversed position, the control sprocket 43, as viewed in Fig. 1, is free to rotate in a clockwise direction, so that as the hammer piston rapidly reciprocates within the motor cylinder, to actuate percussively the drill steel, the control sprocket 43 is free to rotate in a reverse-feed-effecting direction relative to the then stationary control chain 25, due to the jars set up by the hammer piston, the active pawls 51 releasing automatically to permit free rotation of the control sprocket in the reverse-feed-effecting direction as the motor moves rearwardly along the I-beam and to check automatically rotation of the control sprocket in the opposite direction, i. e. the counter-clockwise direction as viewed in Fig. 1. When the hammer motor reaches its extreme limit of forward feed, the operator may manipulate the control handle 58 of the shifter annulus 52 to move the latter into its intermediate position wherein both sets of pawls 50 and 51 are free to engage the ratchet teeth; and as a result, the control sprocket 43 is locked against rotation. The operator then manipulates the control handle 74 of the shifter annulus 73 to move the latter into a position wherein the forward-feed-effecting pawls of the pawl carrier 70 engage the teeth of the ratchet ring 68, and the operator then releases the I-beam clamping plates 22 to permit sliding movement of the I-beam relative to the trunnion support 15; and when the hammer motor is again operating, the vibrations set up within the hammer motor incident to the operation thereof, effect, through the control chain 25, rotation of the control sprocket 34 in a clockwise direction as viewed in Fig. 1; and as a result, the I-beam is automatically fed in a forward direction relative to the trunnion support 15. When the I-beam is in its foremost guiding position with respect to the trunnion support, the operator clamps the I-beam to the trunnion support by tightening the bolts 23 of the clamping plates 22, and the shifter annulus 73 is again moved into its intermediate position wherein both sets of pawls engage the teeth of the ratchet ring to hold the control sprocket 34 against rotation. The hammer motor 1 is then moved rearwardly into a new feeding position on the I-beam, and again fed forwardly along the control chain by the vibratory action of the hammer motor. When the drilling operation is completed, the operator again locks the control sprocket 43 against rotation and manipulates the handle 74 to move the shifter annulus 73 to a position to permit the reverse-feed-effecting pawls to engage the teeth of the ratchet ring 68,

and upon release of the clamping plates 22 and continued running of the hammer motor, the I-beam is fed in a rearward direction within its guideways on the trunnion support 15. If desired, both ratchet and pawl mechanisms for the control sprockets 34 and 43 may be rendered active so that simultaneous feed of the hammer motor relative to the I-beam and of the I-beam relative to the trunnion support in either of opposite directions is possible. It will thus be seen that with an extremely compact structure an extensible supporting and guiding means is provided whereby the relatively long feeding range of the hammer motor is made possible.

In the modification of the invention shown in Figs. 10 and 11, the feed control means associated with the control sprocket 34 is eliminated, and the control sprocket 34 is formed integral with a shaft 76 journaled within bearings supported within a casing 77 attached as by bolts 78 to the rear end of the I-beam 11. Keyed to the shaft 76 is a worm wheel 79 with which meshes a worm 80 fixed to a shaft 81 suitably journaled within bearings supported within the casing 77. Secured to the worm shaft 81 is a handle 82 whereby the control sprocket 34 may be rotated through the worm gearing 79, 80. The teeth of the worm gears are self-locking, so that if rotation of the gearing by the control handle is discontinued, the gear teeth lock automatically the control sprocket 34 against rotation. By the provision of this mechanism, the I-beam, when the clamping plates 22 are released, may be slid manually into different drill-guiding positions within its guideways relative to the trunnion support 15 by rotation of the control sprocket 34 through the worm gearing 80, 79. When rotation of the control sprocket is discontinued, the worm gear locks the control sprocket against rotation, thereby to hold the control chain 25 stationary; and the hammer motor may then be fed automatically in the manner described above, either forwardly or rearwardly along the I-beam. The worm gearing may also be operated to effect manual adjustment of the control chain 25 into different positions relative to the I-beam. Otherwise this form of the invention is the same as that above described, and therefore further description of the mode of operation thereof is considered unnecessary.

In the illustrative embodiment of the invention shown in Figs. 12 and 13, the hammer motor, guide frame, trunnion support and the control means for the control sprocket 34 are essentially the same as those described above. In this construction, the control sprocket 34 engages a control chain 85 similar to the control chain 25, but, in this instance, fastened at its ends at 86 and 87 respectively to the rear head block and motor cylinder of the drill hammer motor 1. As in the form of the invention disclosed in Fig. 1, the connection at 86 is adjustable to permit tightening of the control chain, while the connection at 87 is permanent. The I-beam 11 has its lateral bottom flanges 14 guided in guideways 88 in a trunnion support 89, and clamping plates and clamping bolts, similar to the plates 22 and bolts 23, are employed for clamping the I-beam in its different adjusted guiding positions relative to the trunnion support. The trunnion support has a longitudinal passage 90 extending therethrough beneath the bottom of the I-beam 11, and the bottom run portion of the control chain 85 extends along the bottom of the I-beam through the passage 90. Mounted in a guiding recess 91 in the trunnion support 89 is a chain lock 92 having an operating screw 93 provided with a handle 94. This chain lock 92 has projecting teeth 95 adapted to interlock with links of the chain 85 to lock the latter against movement relative to the trunnion support. This embodiment of the invention operates in substantially the same manner as those above described in that the drill hammer motor 1 and I-beam 11 are independently adjustable along their respective guideways, the main difference herein being that a single ratchet and pawl control means is employed for effecting such independent adjustments. When the I-beam 11 is clamped to the trunnion support 89 by the clamping plates 22 and the chain lock 92 is released and the operator manipulates the control handle of the shifter annulus to move the latter into a forward-feed-effecting position, the hammer motor may be fed, by its vibratory action, along the guides of the I-beam. The I-beam may also be adjusted by the same vibratory action of the hammer motor simply by releasing the clamping plates for the I-beam and connecting the chain lock 92 to hold the control chain stationary relative to the trunnion support 89, the jars set up within the hammer motor effecting feed of the I-beam longitudinally along its guideways relative to the trunnion support into the desired drill-guiding position. By reversing the shifter annulus of the control means, the hammer motor and I-beam may, of course, be fed independently in the reverse direction. Otherwise, this embodiment of the invention is similar to those above described.

The illustrative embodiment of the invention shown in Figs. 14, 15 and 16 is essentially the same as that disclosed in Fig. 10, with the exception that the control means for the chain sprocket which enables manual adjustment of the I-beam, is mounted on the trunnion support on which the I-beam is slidably guided. The drill hammer motor and the automatic vibration-controlled feeding means for feeding the hammer motor along the I-beam are identical to those shown in Fig. 1, and therefore like reference characters are employed to designate like parts. The trunnion support 98, which corresponds to the support 15, in this instance has an integral casing 99 having a chamber 100 in which is arranged a horizontal, transversely extending shaft 101 suitably journaled in the casing walls. Formed integral with the shaft 101 is a chain sprocket 102 engaging an endless control chain 103 arranged similarly to the control chain 25 described above. Guide rolls 104 journaled on horizontal shafts 105 supported within the casing 99 guide the chain through the open top of the casing and relative to the chain sprocket. The control chain is guided by vertical guide rolls 106 and 107 journaled on brackets 108 and 109 attached to the opposite ends of the I-beam 11. To permit tightening of the endless control chain 103, the front guide roll 106 has its bracket 108 slidably mounted on the bottom I-beam flanges 14, and an adjusting screw device 110 engaging a lock 111 fixed to the I-beam is provided for adjusting the guide roll bracket. Keyed to the sprocket shaft 101 is a worm wheel 112 with which meshes a worm 113 fixed to a longitudinally extending horizontal shaft 114, the latter con-

nected through bevel gearing 115 to a right angle shaft 116, likewise suitably journaled within the casing 99 and to which a handle 117 is secured. A clamp 118 on the drill hammer motor, as shown in Fig. 14, is provided for locking the hammer motor against longitudinal movement relative to the I-beam. When it is desired to adjust the I-beam 11 into different drill-guiding positions relative to the drill support 98, the sprocket 43 of the automatic feeding means is locked against rotation by the pawls 50 and 51, and the hammer motor is locked by the clamp 118 against movement relative to the I-beam, and the operator may then rotate the chain sprocket 102 through the bevel and worm gearings, to actuate the control chain, thereby to effect longitudinal movement of the I-beam in the desired direction along its guideways on the trunnion support. If desired, the clamp 118 may be released and, with the control sprocket 43 locked against rotation, the sprocket 102 may be rotated to move the drill hammer motor into different positions relative to the I-beam, it being understood that at that time the I-beam is held against movement relative to the trunnion support. The teeth of the worm gearing are self-locking so that when rotation of the sprocket 102 is discontinued, the worm gears lock automatically the sprocket 102 against rotation. It will be evident that the manually operable gearing for rotating the sprocket 102 may be substituted by the automatic control means shown in Fig. 3, so that the adjustment of the I-beam may be effected automatically by the vibrations set up within the hammer motor incident to the operation of the latter, in the manner disclosed in Fig. 1. Otherwise, this embodiment of the invention is similar to those above described.

As a result of this invention, it will be noted that an improved rock drill supporting, guiding and feeding means is provided whereby the drill hammer motor may be supported, guided and fed in an improved manner. It will further be noted that by the provision of the adjustable supporting and guiding means for the drill hammer motor, a relatively long range of feed is obtained while a substantially compact supporting and guiding structure is retained. It will further be noted that by the provision of the automatic drill feeding means operated by a vibratory action set up within the drill hammer motor incident to the operation of the latter, the hammer motor may not only be fed automatically along its guideway on the drill-guiding frame, but also the drill-guiding frame may be adjusted automatically into different drill-guiding positions. Other uses and advantages of the improved rock drill will be clearly apparent to those skilled in the art.

While there are in this application specifically described several forms which the invention may assume in practice, it will be understood that these forms of the same are 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. A rock drill comprising, in combination, a hammer motor for percussively actuating a drill steel, a guide along which said motor is longitudinally movable, a support on which said guide is guided for longitudinal adjustment into different guiding positions relative thereto, means operated by said motor for automatically feeding said motor along said guide, means operated by said motor for automatically adjusting said guide relative to said support, and means operable at will for selectively rendering said motor-feeding means and said guide-adjusting means effective.

2. A rock drill comprising, in combination, a hammer motor for percussively actuating a drill steel, a guide along which said motor is longitudinally movable, a support on which said guide is guided for longitudinal movement into different guiding positions relative thereto, means operated by said motor for automatically feeding said motor along said guide, means for rendering said automatic feeding means ineffective during guide adjustment, and means operative when the automatic feeding means is ineffective and embodying an element of said automatic feeding means for adjusting said guide longitudinally relative to said support.

3. A rock drill comprising, in combination, a hammer motor for percussively actuating a drill steel, a guide along which said motor is longitudinally movable, a support on which said guide is guided for longitudinal adjustment into different guiding positions relative thereto, means operated by said hammer motor for automatically feeding said hammer motor along said guide while the latter remains stationary as regards longitudinal adjustment relative to said support, and means operative when said automatic feeding means is inoperative and embodying an element of said automatic feeding means for adjusting said guide longitudinally relative to said support.

4. A rock drill comprising, in combination, a hammer motor for percussively actuating a drill steel, a guide along which said motor is longitudinally movable, a support on which said guide is guided for longitudinal adjustment into different guiding positions relative thereto, means operated by said hammer motor for automatically feeding said hammer motor along said guide while the latter remains stationary as regards longitudinal adjustment relative to said support, and means operative when said automatic feeding means is inoperative and embodying an element of said automatic feeding means for adjusting said guide longitudinally relative to said support, said guide-adjusting means likewise being automatic and operated by said hammer motor.

5. A rock drill comprising, in combination, a hammer motor for percussively actuating a drill steel, a guide along which said motor is longitudinally movable, a support on which said guide is guided for longitudinal adjustment into different guiding positions relative thereto, releasable means for locking said guide against longitudinal adjustment relative to said support, means operated by said hammer motor for automatically feeding said hammer motor relative to said guide when the latter is locked against longitudinal adjustment relative to said support, and means embodying an element of said automatic feeding means and operative when said locking means is released and said automatic feeding means is inoperative for adjusting said guide longitudinally relative to said support.

6. A rock drill comprising, in combination, a drill steel actuating motor of the hammer type in which longitudinal vibrations in opposite directions occur incident to the operation of the motor, a guide along which said motor is longi-

tudinally movable, a support on which said guide is guided for longitudinal adjustment into different guiding positions relative thereto, means operated by said vibratory action of said motor for automatically feeding said motor along said guide, means operated by said vibratory action of said motor for automatically adjusting said guide relative to said support, and means operable at will for selectively rendering said motor-feeding means and said guide-adjusting means effective.

7. A rock drill comprising, in combination, a drill steel actuating motor of the hammer type in which longitudinal vibrations in opposite directions occur incident to the operation of the motor, a guide along which said motor is longitudinally movable, a support on which said guide is guided for longitudinal adjustment into different guiding positions relative thereto, means operated by said vibratory action of said motor for automatically feeding said motor along said guide while the latter remains stationary as regards longitudinal adjustment relative to said support, and means operated by said vibratory action of said motor and embodying an element of said automatic feeding means for automatically adjusting said guide relative to said support.

8. A rock drill comprising, in combination, a hammer motor for percussively actuating a drill steel, a guide on which said motor is guided, a support on which said guide is adjustably guided, and means operated by said hammer motor for selectively feeding said hammer motor along said guide and adjusting said guide longitudinally relative to said support, said guide remaining stationary as regards adjustment relative to said support during feeding of said motor along said guide, and said motor feeding means being inoperative to effect motor feed during guide adjustment.

9. A rock drill comprising, in combination, a drill steel actuating motor of the hammer type in which longitudinal vibrations in opposite directions occur incident to the operation of the motor, a guide along which said motor is guided, a support on which said guide is adjustably guided, means operatively connected to said motor, guide and support and operated by said vibratory action of said motor for automatically feeding said motor along said guide, means operatively connected to said motor, guide and support and operated by said vibratory action of said motor for automatically adjusting said guide relative to said support, and means operable at will for selectively rendering said motor-feeding means and said guide-adjusting means effective.

10. A rock drill comprising, in combination, a drill steel actuating motor of the hammer type in which longitudinal vibrations in opposite directions occur incident to the operation of the motor, a guide along which said motor is guided, a support on which said guide is adjustably guided, means operated by said vibratory action of said motor for automatically feeding said motor along said guide, means operated by said vibratory action of said motor for automatically adjusting said guide relative to said support, and means operable at will for selectively rendering said motor-feeding means and said guide-adjusting means effective, said motor-feeding means including a feed control device mounted to move along said guide with said motor.

11. A rock drill comprising, in combination, a drill steel actuating motor of the hammer type in which longitudinal vibrations in opposite directions occur incident to the operation of the motor, a guide along which said motor is guided, a support on which said guide is adjustably guided, means operated by said vibratory action of said motor for automatically feeding said motor along said guide, means operated by said vibratory action of said motor for automatically adjusting said guide relative to said support, and means operable at will for selectively rendering said motor-feeding means and said guide-adjusting means effective, said motor-feeding means including a feed control device mounted to move along said guide with said motor, and said guide-adjusting means including an adjustment control device mounted on said guide to move with the latter.

12. A rock drill comprising, in combination, a drill steel actuating motor of the hammer type in which longitudinal vibrations in opposite directions occur incident to the operation of the motor, a guide along which said motor is guided, a support on which said guide is adjustably guided, means operated by said vibratory action of said motor for automatically feeding said motor along said guide, means operated by said vibratory action of said motor for automatically adjusting said guide relative to said support, and means operable at will for selectively rendering said motor-feeding means and said guide-adjusting means effective, said motor-feeding means including a feed control device mounted to move along said guide with said motor and said guide-adjusting means including an adjustment control device mounted on said guide to move with the latter, and a control element common to both motor feed and guide adjustment and with which said control devices both cooperate.

13. A rock drill comprising, in combination, a drill steel actuating motor of the hammer type in which longitudinal vibrations in opposite directions occur incident to the operation of the motor, a guide providing a longitudinal guideway along which said motor is guided, a support providing a longitudinal guideway on which said guide is guided for longitudinal adjustment, means operated by said vibratory action of said motor for automatically feeding said motor step by step along said guide, and means operated by said vibratory action of said motor and embodying an element of said automatic feeding means for automatically adjusting said guide step by step relative to said support.

14. A rock drill comprising, in combination, a drill steel actuating motor of the hammer type in which longitudinal vibrations in opposite directions occur incident to the operation of the motor, a guide along which said motor is guided, a support on which said guide is guided for adjustment longitudinally relative thereto, and means operated by said vibrations set up within said hammer motor for selectively feeding said hammer motor relative to said guide and adjusting said guide longitudinally relative to said support, said motor-feeding and guide-adjusting means including a control element guided on said guide and secured to said support and a rotatable control element mounted to move with said hammer motor along said guide and engaging said first mentioned control element.

15. A rock drill comprising, in combination, a drill steel actuating motor of the hammer type in which longitudinal vibrations in opposite directions occur incident to the operation of the motor, a guide along which said motor is guided,

a support on which said guide is guided for adjustment longitudinally relative thereto, and means operated by said vibrations set up within said hammer motor for selectively feeding said hammer motor relative to said guide and adjusting said guide longitudinally relative to said support, said motor-feeding and guide-adjusting means including a control element guided on said guide and secured to said support, a rotatable control element mounted to move with said hammer motor along said guide and engaging said first mentioned control element and a cooperating rotatable control element mounted on said guide and engaging said first mentioned control element.

16. A rock drill comprising, in combination, a drill steel actuating motor of the hammer type in which longitudinal vibrations in opposite directions occur incident to the operation of the motor, a guide along which said motor is guided, a support on which said guide is guided for adjustment longitudinally relative thereto, and means operated by said vibrations set up within said hammer motor for selectively feeding said hammer motor relative to said guide and adjusting said guide longitudinally relative to said support, said motor-feeding and guide-adjusting means including a control element guided on said guide and secured to said support, a rotatable control element mounted to move with said hammer motor along said guide and engaging said first mentioned control element, a cooperating rotatable control element mounted on said guide and engaging said first mentioned control element and means, one individual to each of said second and third mentioned control elements, for controlling the direction of rotation thereof.

17. A rock drill comprising, in combination, a drill steel actuating motor of the hammer type in which longitudinal vibrations in opposite directions occur incident to the operation of the motor, a guide along which said motor is guided, a support on which said guide is guided for adjustment longitudinally relative thereto, and means operated by said vibrations set up within said hammer motor for selectively feeding said hammer motor relative to said guide and adjusting said guide longitudinally relative to said support, said motor-feeding and guide-adjusting means including a control element guided on said guide and secured to said support, a rotatable control element mounted to move with said hammer motor along said guide and engaging said first mentioned control element, a cooperating rotatable control element mounted on said guide and engaging said first mentioned control element and means, one individual to each of said second and third mentioned control elements, for controlling the direction of rotation thereof and for at times locking said rotatable control elements against rotation.

18. A rock drill comprising, in combination, a drill steel actuating motor of the hammer type in which longitudinal vibrations in opposite directions occur incident to the operation of the motor, a guide along which said motor is guided, a support on which said guide is guided for adjustment longitudinally relative thereto, and means operated by said vibrations set up within said hammer motor for selectively feeding said hammer motor relative to said guide and adjusting said guide relative to said support, said feeding and adjusting means including a control element guided on said guide and secured to said support, said control element being common to both motor feed and guide adjustment, a rotatable control element mounted to move with said hammer motor along said guide and engaging said first mentioned common control element, and a rotatable control element mounted on said support and relative to which said guide is adjustable, said last mentioned control element engaging said first mentioned common control element.

CHARLES F. OSGOOD.

CERTIFICATE OF CORRECTION.

Patent No. 2,268,573. January 6, 1942.

CHARLES F. OSGOOD.

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction as follows: Page 1, second column, line 21, for "a" before "detail" read --an enlarged--; page 3, second column, line 24, strike out ", to actuate percussively the drill steel,"; page 4, first column, line 50, strike out the word "considered"; page 6, second column, line 49, claim 13, after "guide" and before the comma insert --while the latter remains stationary as regards longitudinal adjustment--; and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 21st day of April, A. D. 1942.

Henry Van Arsdale,
Acting Commissioner of Patents.

(Seal)