CARL SCHUMANN. ROCK DRILLING MACHINE.

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Fig. 1.

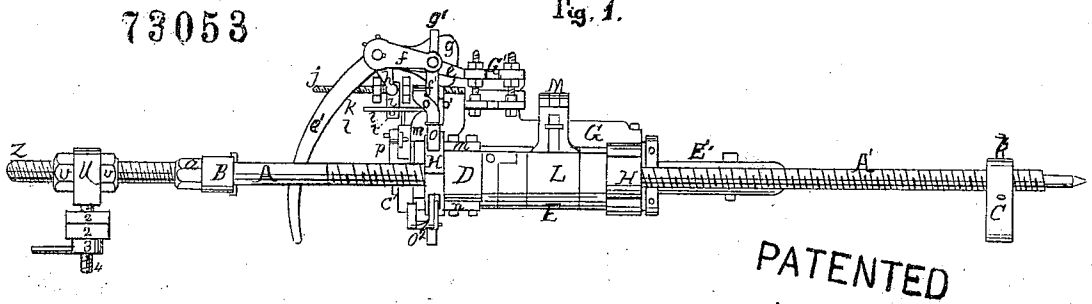

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Fig. 2.

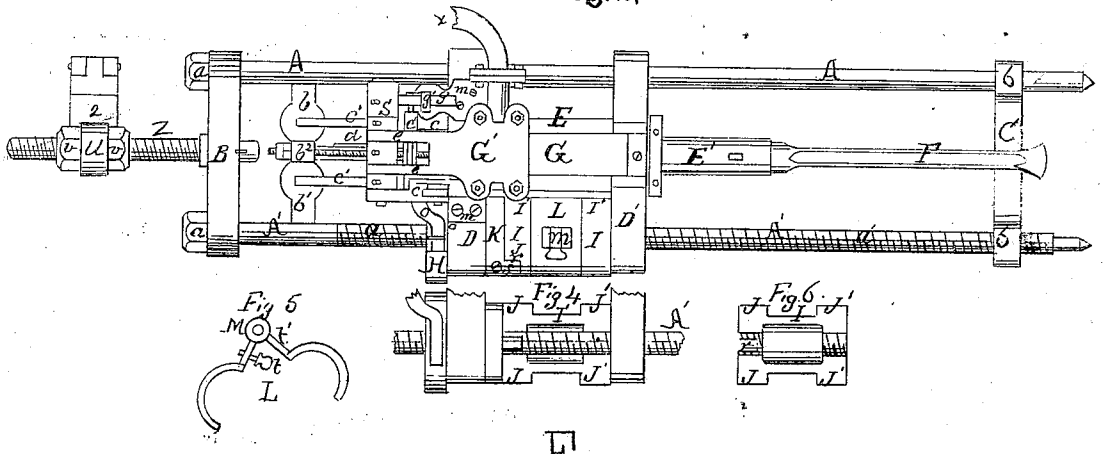


Fig. 5



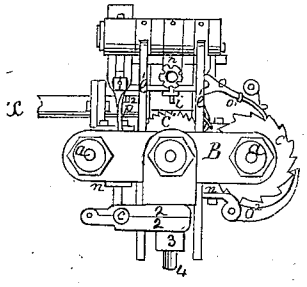
Fig. 4



Fig. 6



Fig. 3.



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# United States Patent Office.

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*Letters Patent No.* 73,053, *dated January* 7, 1868.

## IMPROVED ROCK-DRILLING MACHINE.

The Schedule referred to in these Letters Patent and making part of the same.

TO ALL WHOM IT MAY CONCERN:

Be it known that I, CARL SCHUMANN, of Freiberg, in the Kingdom of Saxony, have invented a new and useful Improvement in Rock-Drills to be worked by compressed air or steam; and I do hereby declare the following to be a full and correct description of the same, whereby any one skilled in the art to which my invention appertains will be enabled to understand and construct the same, reference being had to the accompanying drawings, making part of this specification, and in which—

Figure 1 is a side elevation of my improved rock-drill.

Figure 2 is a plan view, and

Figure 3 an end view of the same.

Figures 4, 5, and 6 are detail views of parts of the same.

Similar letters of reference indicate corresponding parts in the several figures.

The nature of my invention consists in novel means by which the drill is rotated at every stroke, and also moved forward as the hole which is being drilled becomes deeper.

A A′, in the drawings, represent the two guide-pieces of the frame, passing through the head-piece B, and being held thereto by screw-nuts *a*. At the opposite ends the said guide-pieces pass through eyes in the bent cross-piece C, to which they are secured by pins *b*. The guide-piece A′ is provided with a screw-thread, *a′*, and both A and A′ have a longitudinal groove on their inner faces, in which grooves the ends of the guide *b′* move. D D′ represent cross-pieces, sliding on the guide-pieces A A′, and forming with their central parts the heads of the steam-cylinder E, the piston-rod E′ of which is provided with a socket for the reception of the rock-drill F. On the upper cylinder-head is formed a narrow neck, *c*, on which a ratchet-wheel, *c′*, plays loosely. The rear end of the piston-rod E′ passes through the neck *c* and ratchet-wheel *c′*, and is smaller in diameter than the front portion, and is provided with a shoulder, *d*, corresponding with a groove in the ratchet-wheel *c′*, so that when the latter is turned, the piston-rod E′ and drill F will be turned with it. The piston-rod E′, at its rear end, passes through the guide $b^1$, a shoulder on the rod resting against the under side of the eye $b^2$ of the guide, and a nut securing the rod on the opposite side. On the cylinder and the cross-pieces D D′ is arranged the valve-chamber G, the back plate, G′, of which is provided with two arms *e e*, which form a bearing for a shaft, *s*, to which are keyed or otherwise secured the two curved levers *e′ e′* A link, *f*, is connected to the guide-rod *f′*, and a lever, *g*, plays loosely in a slot in the guide-rod *g′*. An arm or lever, *h*, projects downwardly from the shaft *s*, and is formed with two ends or forks. The two curved levers *e′ e′* pass through slots in the guide *b′*, so that when the piston-rod E′ is forced backward, the levers *e′ g′* will be moved so as to turn the shaft *s*, to which they and the other levers and arms above specified are attached. The valve-rod *j* is provided with a screw-thread, and passes through a small bar, *i*, between the two forks of the arm or lever *h*. Two toothed wheels *k*, one above and one below the bar *i*, are provided with female-screw threads, so that they can be screwed up or down on the valve-rod *j*. These wheels are kept in position by means of the shoulders *l* on the bar *l′*, which catch in between the teeth of the wheels *k*. The bar *i* passes through a slot in the bar *l′*, and is held in position by a pin, *i′*. The guide-rods *f* and *g′* each pass through two guide-pieces *m* and *n*, two of each being on each side of the cross-piece D. Pivoted to the guide-rod *f′* is a pawl, *o*, held against a ratchet-wheel, H, by a spring, $o^1$, and pivoted to the guide-piece *n* is a pawl, $o^2$, also held by a spring, and which serves to retain the ratchet-wheel H in position after having been moved by the pawl *o*. Pivoted to the guide-piece *m*, through which the guide-rod *f′* passes, is a pawl, *p*, held in position by a spring, $p^1$, against the teeth of the ratchet-wheel *c′*, and pivoted on the guide-rod *g′* is pawl, $p^2$, also acted upon by a spring, which pawl $p^2$ operates the ratchet-wheel *c′*. I I′ are two semicircular hollow pieces, provided with two shoulders J J′, which shoulders, J, have each a mortised groove, *r*, into which fits a tongue, *s*, on the shoulder *k* of a cylinder, which passes through the cross-piece D, and on the other end of which is formed the ratchet-wheel H, bearing against the cross-piece D. The two pieces I I′ are retained in position by means of the circular clamp L, which is held in a closed state by the head of the thumb-screw *t*, the latter passing through the part *t*, and being turned until the clamp seizes the pieces I I′ tightly, and holds them firmly on the screw-thread *a′*, so that when the handle-part M of the clamp is turned outwardly, it will rotate the cylinder and ratchet-wheel H, they being held to the pieces

I I′ by means of the tongue *s* and groove *r*, and thus force the whole drilling-apparatus forward on the guide-pieces A A′. When turned inwardly, however, the clamp L slides over the surface of the pieces I I′, which are prevented from rotating by reason of the pawl $o^2$ preventing the ratchet-wheel H from turning.

The operation of the machine is as follows: Condensed air or steam being admitted into the cylinder at *x*, the piston-rod is forced backward. The motion of the guide *b′* operates the levers *e′ e′*, which in turn operate the link *f*, so as to throw the guide-rod *f′* forward, and thereby operate the pawl *o* against the ratchet-wheel H, turning the same by one tooth. At the same time the lever *h* is lifted, and in turn lifts the valve-rod *j*, by means of the upper toothed wheel *k*, and thus operates the valve, whilst the lever *g*, moving forward in the slot of the guide-rod *g′*, pushes the same forward, thereby moving the pawl $p^2$ forward also, which slips over the teeth of the ratchet-wheel *c′*; this ratchet-wheel being held in position by the pawl *p*. When the piston-rod is forced forward, the levers *e′ e′* are moved in the contrary direction by the guide $b^1$. The link *f* draws back the guide-rod *f′*, which allows the pawl *o* to slip over the teeth around the ratchet-wheel H, until at the end of the movement it again catches against one of the teeth, the wheel being kept in position by the pawl $o^2$. The forked arms of the lever *h* are again depressed, and by operating on the lower toothed wheel *k*, move the valve-rod forward, so as to again operate the valve, and the lever *g*, moving backward in the slot of the guide-rod *g′*, draws the same backward as well as the pawl $p^2$, which latter rotates the ratchet-wheel *c′*, and with it, by reason of the shoulder *d*, corresponding with the groove in the ratchet-wheel *c′*, the piston-rod E′ and drill F. Ordinarily, when the rotation of the wheel H moves along the whole drilling-device sufficiently fast, the handle-part M of the clamp L will rest against the cylinder, but when it is desired to operate the drill faster than it can be done by the action of the levers and pawls, it is only necessary to operate the clamp, which, in moving it towards the valve-chest, slips over the pieces I I′; but in moving it away from the valve-chest, it will rotate the pieces I I′, and with them the ratchet-wheel H, and force the whole device forward regardless of the movement by the pawl-and-lever device. The valve-rod *j* can be adjusted to a shorter or longer stroke, by taking out the pin *i′* and removing the bar *l′*, which leaves the toothed wheel *k* free to be moved forward or backward to any position desired. By replacing the bar *l′*, so that the shoulders *l* will catch between the teeth of the wheels *k*, and replacing the pin *i′*, the wheels *k* are again in position to be operated on by the forked arms of the lever *h*. To the rear of the centre of the head-piece B is secured a screw-rod, *z*, upon which is arranged to slide freely a holder-piece, *u*, which is held in any desired position on the screw-rod *z* by means of nuts *v v*, placed one on either side of the said holder. On one side of the holder *u* projects a small screw-rod, 4, upon which is arranged a clamp, formed of two jaws 2 2, hinged together, as shown in fig. 3. In these jaws are transverse grooves, forming, when closed, a circular groove, 5. Outside of the said jaws is a nut, 3, by which the jaws are held in a closed position. The object of this device is to enable the drill to be held at any desired inclination, and allow it to be easily adjusted to different positions, either horizontally or vertically. The hole 5 in the clamp 2 2 is designed to grasp an iron rod or bar, by means of which the drill may be sustained at its rear portion.

The machine is designed to be held in a frame, provided with projecting bars or pins, so arranged as to admit of its being inclined upward or downward at its forward or drilling end, as circumstances require.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. Imparting a forward and rotating movement simultaneously to the valve-rod of a rock-drill, by means of the levers *e′ e′*, and their connections, substantially as described.

2. The rotating-device, consisting of the levers *e′ e′*, operated by means of the guide $b^1$, on the piston-rod E′, the link *f*, guide-rod *f′*, pawl *o*, pivoted on the guide-rod *f′*, pawl $o^2$, pivoted on the guide-piece *n*, and the guide-pieces *m n* and ratchet-wheel H, substantially as described.

3. The device for operating the valve-rod, consisting of the levers *e′ e′*, operated as described, the forked lever *h*, toothed wheels *k k*, screw-rod *j*, bar *i*, and bar *l′*, provided with shoulders *l*, substantially as described.

4. The device for rotating the piston-rod and rock-drill, consisting of the levers *e′ e′*, operated as described, lever *g*, slotted guide-rod *g′*, pawl *p*, pivoted to the guide-piece *m*, guide-pieces *m* and *n*, shoulder *d*, and the piston-rod E′ and slotted ratchet-wheel *c′*, substantially as described.

5. The combination of the pieces I I′ with the mortised shoulders J, cylinder K, with tongue *s*, clamp L, and ratchet-wheel H, operated substantially as set forth.

6. The arms *e e*, extending from the back plate G′ of the valve-chest G, forming the bearing of the main shaft of the device, substantially as described.

In testimony whereof, I have signed my name to this specification in the presence of two subscribing witnesses.

CARL SCHUMANN.

Witnesses:

FRIEDRICH ZUNTZPY,

H. T. FEIDNER.