(No Model.)

R. STEPHENS.

ROCK DRILL.

No. 345,606. Patented July 13, 1886.

Fig. 1

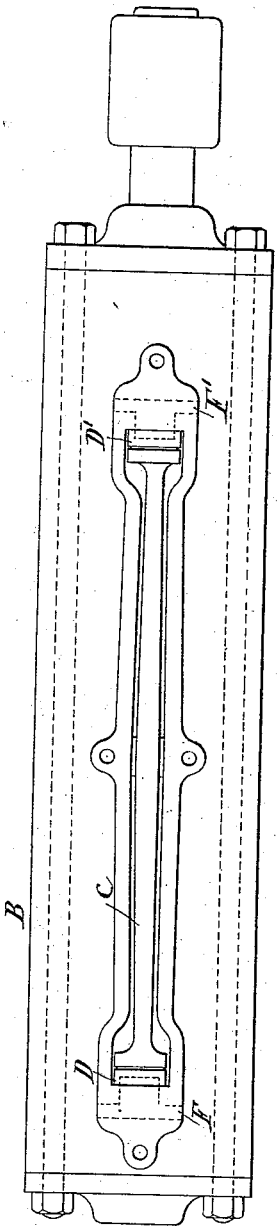
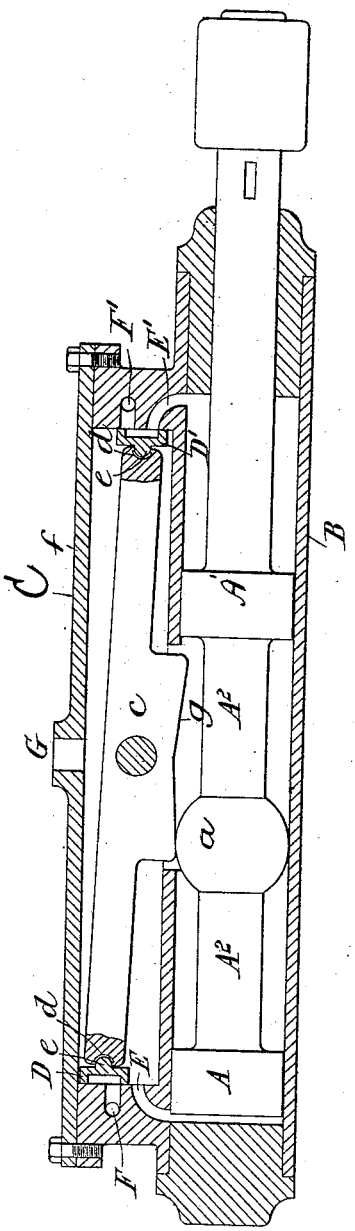


Fig. 2



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UNITED STATES PATENT OFFICE.

RICHARD STEPHENS, OF ILLOGAN, COUNTY OF CORNWALL, ENGLAND.

ROCK-DRILL.

SPECIFICATION forming part of Letters Patent No. 345,606, dated July 13, 1886.

Application filed December 16, 1885. Serial No. 185,807. (No model.) Patented in England February 17, 1885, No. 2,201.

To all whom it may concern:

Be it known that I, RICHARD STEPHENS, a subject of the Queen of Great Britain, residing at Illogan, in the county of Cornwall, England, have invented new and useful Improvements in Rock-Drill Machines, of which the following is a specification.

This invention relates to improvements in rock-drill machines, the said improvements consisting in the employment of a lengthened cam or tappet of a particular form, which enables the machine to dispense with lengthy ports for the receiving and disposing of air or other motive power, thus saving traveling time to the said air, and enabling the machine to run faster, the said tappet or cam being actuated gently and quickly by a ball or spherical enlargement on the piston, in placing the valves at or near the end of the receiver, so as to shorten the length of the passages or ports through which the air or motive power is supplied to the machine, thereby saving time in the supply and exhaust, and allowing of quicker and more direct and therefore more effective feeding of the machine; and as the valves are made single valves, and placed so that they move freely either at the ends or sides of the said tappet or cam they further assist in the economizing of air and allow of the shortened ports being used; and, further, the valves being placed at the ends of the cylinder or receiver enables me to use the said valves and tappet in the manner hereinafter described.

The improved machine is constructed of a cylinder and receiver or valve-chest, the one placed at the side of the other, and communicating by ports or channels, as hereinafter described, and a piston, the two ends of which are connected by a rod, on which rod is formed a ball or spherical enlargement. In the receiver or valve-chest is placed a tappet or cam with long arms, into or on the ends of which cam or tappet or into or on the sides of which are cut or placed niches or projections or other appliances for connecting the valves (which have corresponding projections) with the said cam or tappet. At each end of the valve-chest and receiver are the ports or air-channels, for the purpose of conducting the air to the cylinder and actuating the piston, and also for the purpose of receiving the exhaust-air from the said cylinder.

In order to enable my invention to be fully understood, I will proceed to describe the same, by reference to the accompanying drawings, in which—

Figure 1 represents a side elevation of a rock-drilling machine, constructed according to my invention, the valve-chest cover being removed, and Fig. 2 represents a central horizontal section of the same.

Similar letters of reference refer to similar parts in both the figures of the drawings.

A A′ represent the piston, and A^2 the rod connecting the ends of the same. *a* is the ball or spherical enlargement, formed on the piston-rod A^2.

B represents the cylinder, on the side of which is formed the valve-chest and receiver C.

c is the tappet or cam having an unequal surface, preferably of two similar inclines, as shown, and having at each end an arm or extension for operating the valves, and *d* are the niches formed in the ends of the same.

e are the projections on the valves D D′, which projections correspond and engage with the niches *d*.

E E′ are the ports or air-channels at each end of the valve-chest and receiver C, for the purpose of conducting the air or other motive fluid to the cylinder B and piston A A′.

F F′ are the exhaust-ports for the purpose of receiving the waste-air from the cylinder B after the same air has been utilized.

In the cover *f* of the valve-chest, is formed an aperture, G, for receiving the air or other motive power.

The mode of working the improved machine is as follows: Compressed air, steam, gas, or other motive fluid being introduced into the machine through the aperture G, the motive fluid will spread itself through the receiver or valve-chest C, and one of the ports E being open, as shown at the left-hand side of Fig. 2, the motive fluid will rush through the said port into the cylinder B, and act upon the end A of the piston. The effect of this is to force the piston A A′ toward the opposite end of the cylinder at the same time the ball *a* will

slide along the unequal surface or side *g* (shown in Fig. 2) of the tappet or cam *c*, and so raise the opposite end of the tappet to which is affixed the valve D′. This will have the effect of admitting the motive fluid from the end of the receiver through the port or channel E′, and which, by acting on the end A′ of the piston, will drive the piston A A′ back to its former position. The said backward movement, however, will again, by means of the said ball *a* and tappet or cam *c*, actuate the opposite valve, D, and the piston A A′ will thus again be returned, and so on. At each stroke of the piston A A′ the air that has been used to effect its previous stroke will, by the raising of one end of the tappet, and consequently the valve to which it is attached, be allowed to escape from the end of the cylinder in which it is contained into the port E or E′ at the said end, and thence through the exhaust-port F or F′, out of the machine.

Having now particularly described and ascertained the nature of my said invention, and in what manner the same is to be performed, I declare that what I claim is—

1. In a rock-drill machine, a pivoted cam or tappet having arms extending from both ends of the same, and provided at the extremities of these arms with niches, or their described equivalents, for actuating the valves, combined with a piston having a ball or spherical enlargement, all substantially as and for the purposes hereinbefore set forth.

2. In a rock-drill machine having short ports to insure rapid action, the combination, with a longitudinal lever having a tappet central of its length, of valves located at or near the ends of the receiver and actuated alternately by each end of said lever, and serving in connection with such ports to shorten the length of passage through which the air or motive power is supplied to the machine, substantially as and for the purposes hereinbefore set forth.

3. In a rock-drill, in combination with a pivoted tappet having the long arms or extensions and the double inclines, as set forth, single valves arranged to move freely either at the ends or sides of said arms and operated by such tappet or cam, thereby assisting in the economizing of air and allowing of the shortened ports being used, substantially as shown and described.

4. In a rock-drill, the combination of cylinder B, the piston-rod A^2, having the spherical enlargement *a*, the pivoted tappet or cam *c*, having the extensions or arms, the valves D D′, actuated by such arms, valve-chest or receiver C, short ports E E′ at the end of such chest, and exhaust-ports F F′, all substantially as set forth.

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Witnesses:

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