(No Model.)

H. C. SERGEANT.

DIRECT ACTING ENGINE.

No. 407,258. Patented July 16, 1889.

Fig. 1.

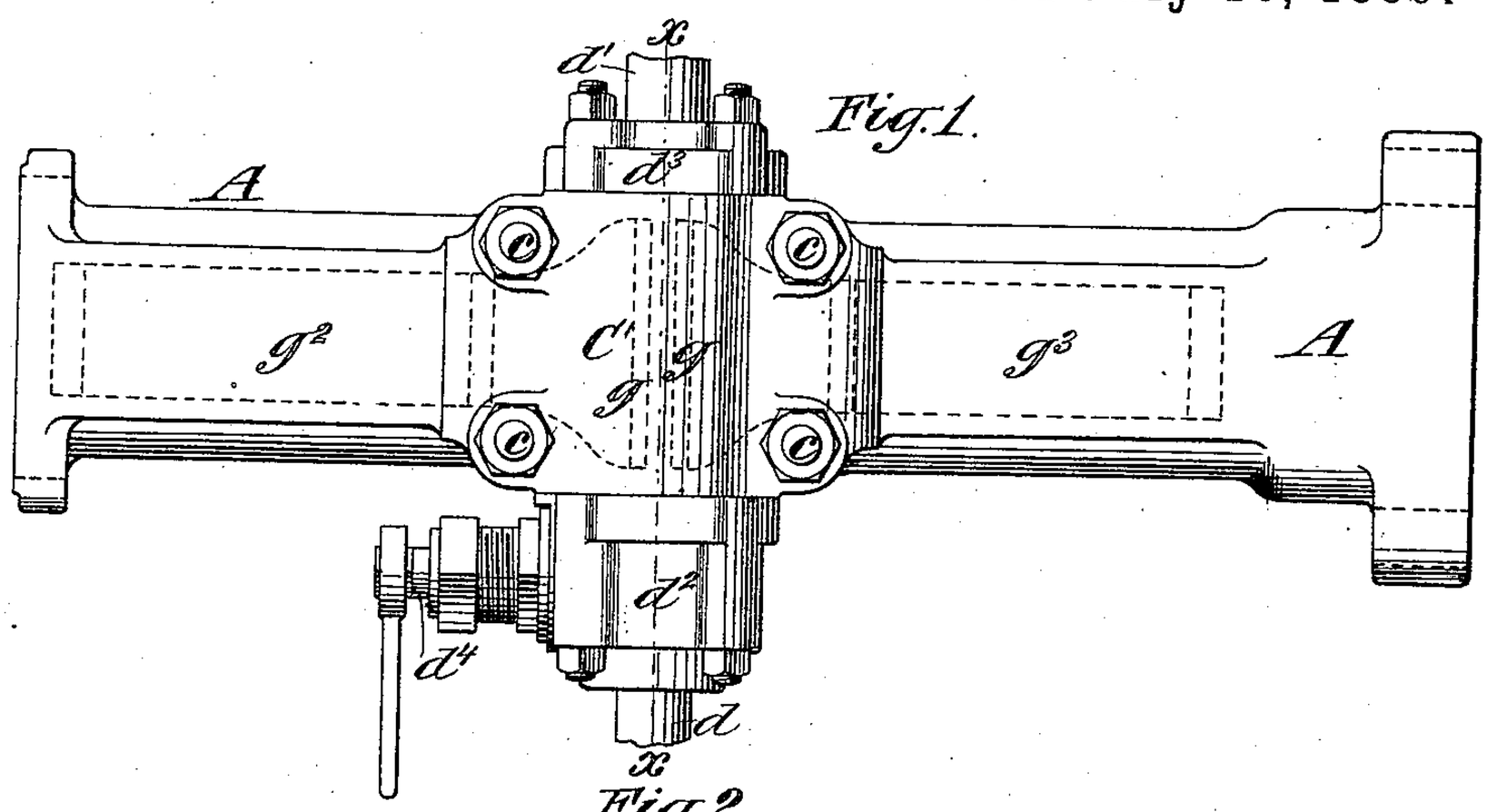


Fig. 2.

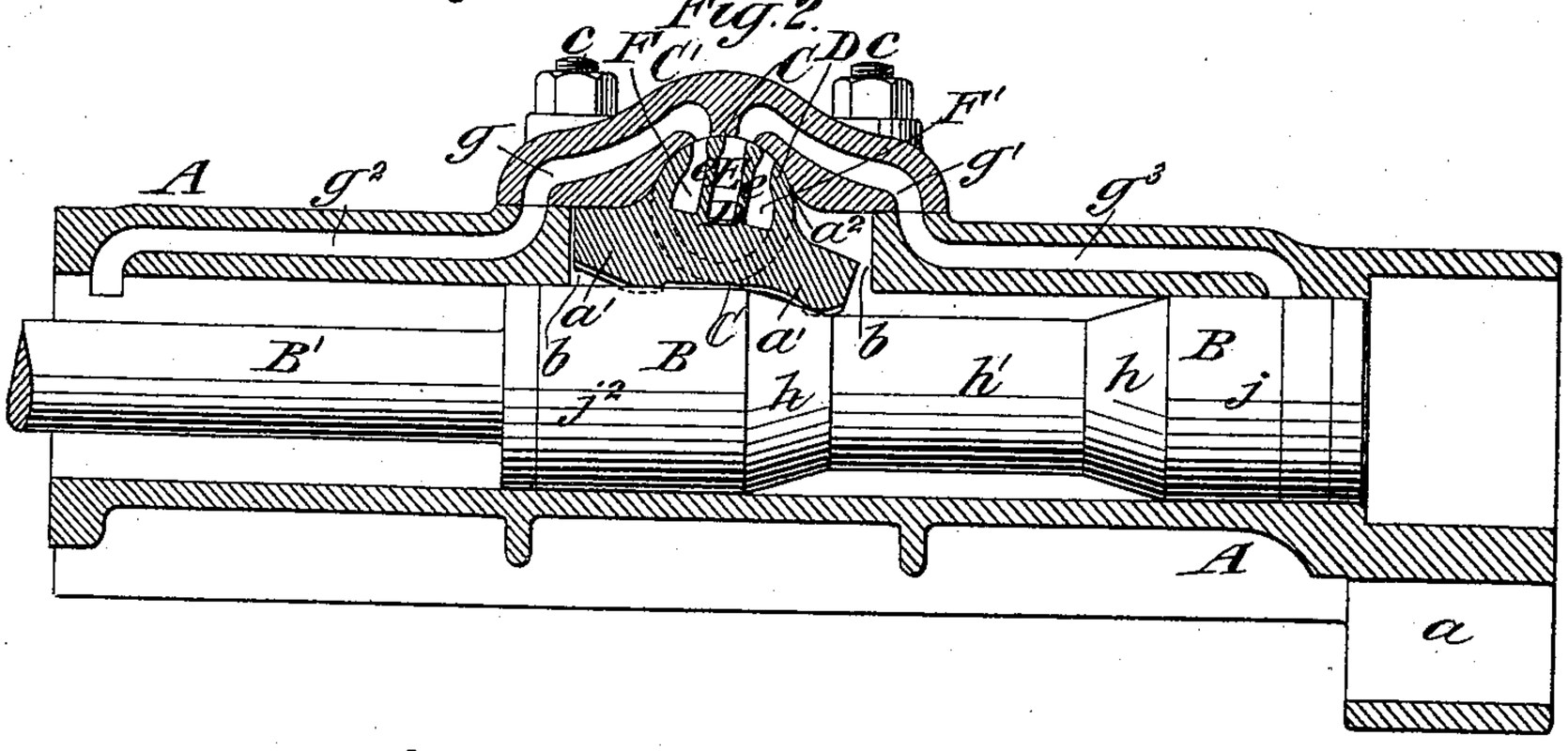


Fig. 3.

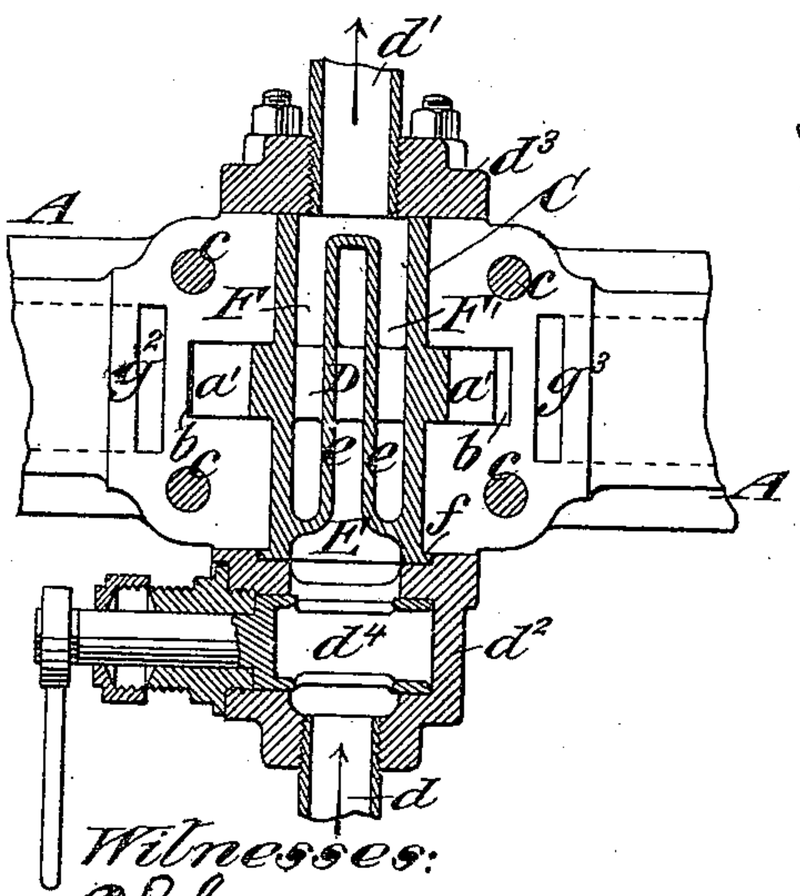
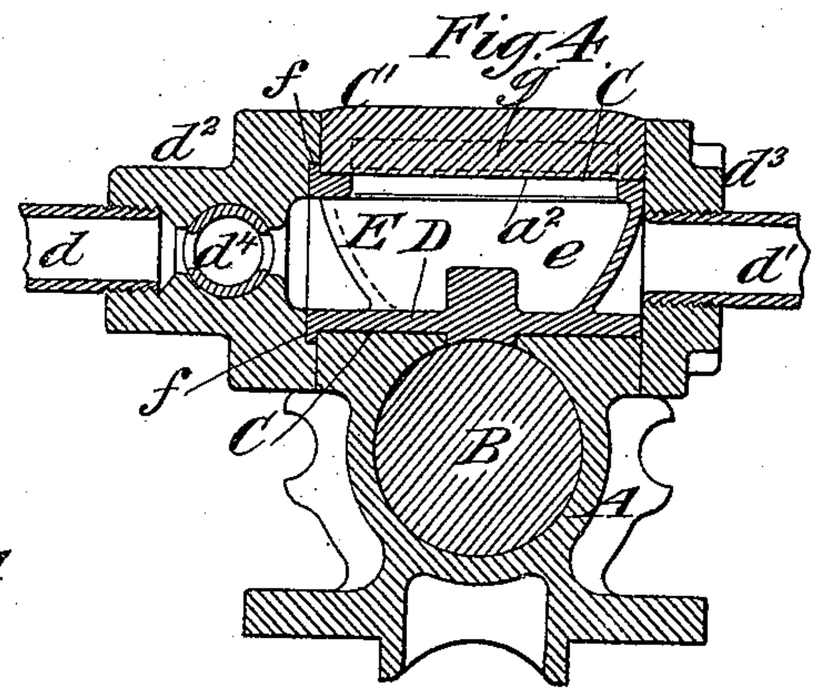


Fig. 4.



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UNITED STATES PATENT OFFICE.

HENRY C. SERGEANT, OF NEW YORK, N. Y., ASSIGNOR TO THE INGERSOLL-SERGEANT ROCK DRILL COMPANY, OF SAME PLACE.

DIRECT-ACTING ENGINE.

SPECIFICATION forming part of Letters Patent No. 407,258, dated July 16, 1889.

Application filed October 19, 1888. Serial No. 288,589. (No model.)

To all whom it may concern:

Be it known that I, HENRY C. SERGEANT, of New York, in the county and State of New York, have invented a new and useful Improvement in Direct-Acting Engines, of which the following is a specification.

My improvement is applicable to direct-acting engines generally, but is more particularly intended for rock-drills; and the invention relates to the valve and its operating mechanism, whereby steam, air, or other motive fluid is admitted to and exhausted from the ends of the main cylinder alternately.

I will describe in detail a direct-acting engine embodying my improvement, and then point out the novel features in claims.

In the accompanying drawings, Figure 1 is a plan or top view of a direct-acting engine embodying my improvement. Fig. 2 is a longitudinal section thereof. Fig. 3 is a horizontal section through the valve, showing the cap of the valve-chest removed. Fig. 4 is a vertical section taken on the line *x x*, Fig. 1.

Similar letters of reference designate corresponding parts in all the figures.

In the drawings I have only shown the main cylinder and piston and the valve-chest and valve, as these are the only parts to which my invention broadly relates, and the remaining portions of the machine may be similar to rock-drills of a well-known type.

A designates the main cylinder, constructed with a socket *a*, adapted to receive the nut with which the feed-screw engages, whereby a drill of a rock-drill is advanced to its work.

B designates the main piston, from which extends the piston-rod B′, to which the drill or bit is secured in any well-known manner.

C designates a valve-chest formed partly in the main cylinder and partly in a cap C′, secured upon the main cylinder, as here shown, by means of bolts *c*.

D designates a valve. As here shown the valve is cylindrical and is seated upon a valve-seat a^2, having an arc-shaped surface corresponding to the arc of the cylindric valve and formed wholly within the cap C′. The portion of the valve-chest formed within the main cylinder has arc-shaped surfaces receiving the valve, and in which the valve may be turned or rocked. The sides of the valve are provided with tappets *a′*, by which the valve may be caused to be turned or rocked in the manner presently to be described. These tappets are received within recesses *b*, formed in the main cylinder and in which they may be moved. The portions of the cap C′ outward of the tappets *a′* constitute stops for the tappets, preventing a too extended turning or rocking of the valve. It will be observed that the axis of the valve is transverse to that of the main cylinder.

The cylinder A is provided upon one side with an ingress-port *d* and upon the opposite side with an egress-port *d′*. These ports are arranged in hollow projections d^2 d^3, secured to or formed with the cylinder. Combined with the ingress-port *d* is a throttle-valve d^4, by which the supply of steam or other fluid to the valve may be controlled.

E designates an ingress-passage for steam or other fluid formed in the valve. This passage is in open communication near one end with the ingress-port *d*, but its other end is closed. The side walls of this passage are formed by substantially parallel partitions *e*, which extend to and are coincident with the periphery of the valve, as is shown more clearly in Fig. 2.

F F′ designate passages for the steam or other fluid, which are in open communication with the egress-port *d′*. These passages do not communicate with the passage E. The ends of the passages F F′ adjacent to the ingress-port *d* are closed and their other ends open to the rear of the closed end of the passage E into the egress-port *d′*. Their walls are formed upon one side by the shell of the valve and upon the other side by the partitions *e*. It will be seen that the valve D bears snugly against one of the portions d^3 and that near its other end it is provided with a circumferential flange *f*, fitting a suitably-formed recess in the other of the portions d^2 and bearing upon its inner surface against the cylinder A and the cap C′. By this means steam-tight bearings are provided for the ends of the valve. These bearings are maintained steam-tight by the pressure of steam from the ingress-port *d*.

The cap C′ is provided with oppositely-extending passages *g g′*, and the shell of the

cylinder A with oppositely-extending passages g^2 g^3. The passages g g^2 communicate near one of their ends and the passages g' g^3 communicate near one of their ends. The other ends of the passages g^2 g^3 open into the interior of the cylinder A, and the distance between these latter openings is greater than the length of the piston B.

Owing to the rocking of the valve D the passages g' g^3 will be brought alternately into communication with the passages E F′ of the valve, and the passages g g^2 will be brought alternately into communication with the passages E F of the valve. The rocking of the valve is effected by means of the piston B, which is shown as provided inward of its ends with oppositely-inclined surfaces h and between the inclined surfaces h with a straight portion h' of less diameter than the heads of the piston.

During the movements of the piston to and fro the tappets a' of the valve contact with the inclined surfaces h' of the piston, and thus cause the rocking of the valve. When the valve is rocked into such a position that the passage E is in communication with the passages g' g^3, steam will be admitted behind a head j of the piston to force the piston outwardly. At the same time steam which was behind a head j^2 on the piston will be exhausted through passages g^2 g F and the egress-port d'.

When the valve is rocked so that the passage E communicates with the passages g g^2, an inverse action takes place, and steam is admitted behind the head j^2 to force the piston inwardly and exhaust from behind the head j.

It will be seen that by my improvement all the passages for conveying steam from the valve to the cylinder are arranged in the cap C′, and that not only does the pressure exerted by the piston upon the valve tend to hold the valve to its seat, but that steam-pressure within the cylinder also tends to accomplish the same result. It will be seen, also, that in order to remove the valve D it is but necessary to take off the cap C′.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. The combination, with an oscillating valve provided with tappets and a passage whereby steam is received at one of its ends and two passages by which steam is discharged at the other of its ends, of a cylinder in which said valve is partly arranged, a cap removably secured to the cylinder and provided with an arc-shaped seat for the valve, passages within the said cap for conveying steam or other fluid to and from the cylinder and adapted to be brought alternately into communication with the passages in the valve, and stops for the tappets of the valve upon said cap, substantially as specified.

2. The combination, with a cylinder, of a cylindric valve arranged in said cylinder so as to be oscillated therein, and provided with a passage whereby steam is received at one end of the valve and two passages by which steam is ejected at the other end of the valve, oppositely-arranged tappets upon the valve, a piston within the cylinder having oppositely-extending inclined surfaces inward of its heads and a straight portion intermediate of the inclined surfaces of less diameter than the said heads, and a cap removably secured to said cylinder and provided with passages for conveying steam behind the heads of the piston and with a seat for the valve, substantially as specified.

3. The combination, with a cylinder, of a cylindric oscillating valve arranged with its axis transverse to the axis of the cylinder and adapted to receive steam or other fluid at one end and eject it from the other end, a cap removably secured to said cylinder and provided with steam-passages adapted to communicate with the said valve, said valve having bearings at its ends, whereby leakage is prevented from the supply to the exhaust, oppositely-arranged tappets on the valve, and a piston within the cylinder provided with inclined surfaces adapted to contact with said tappets during the movements of the piston, substantially as specified.

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