

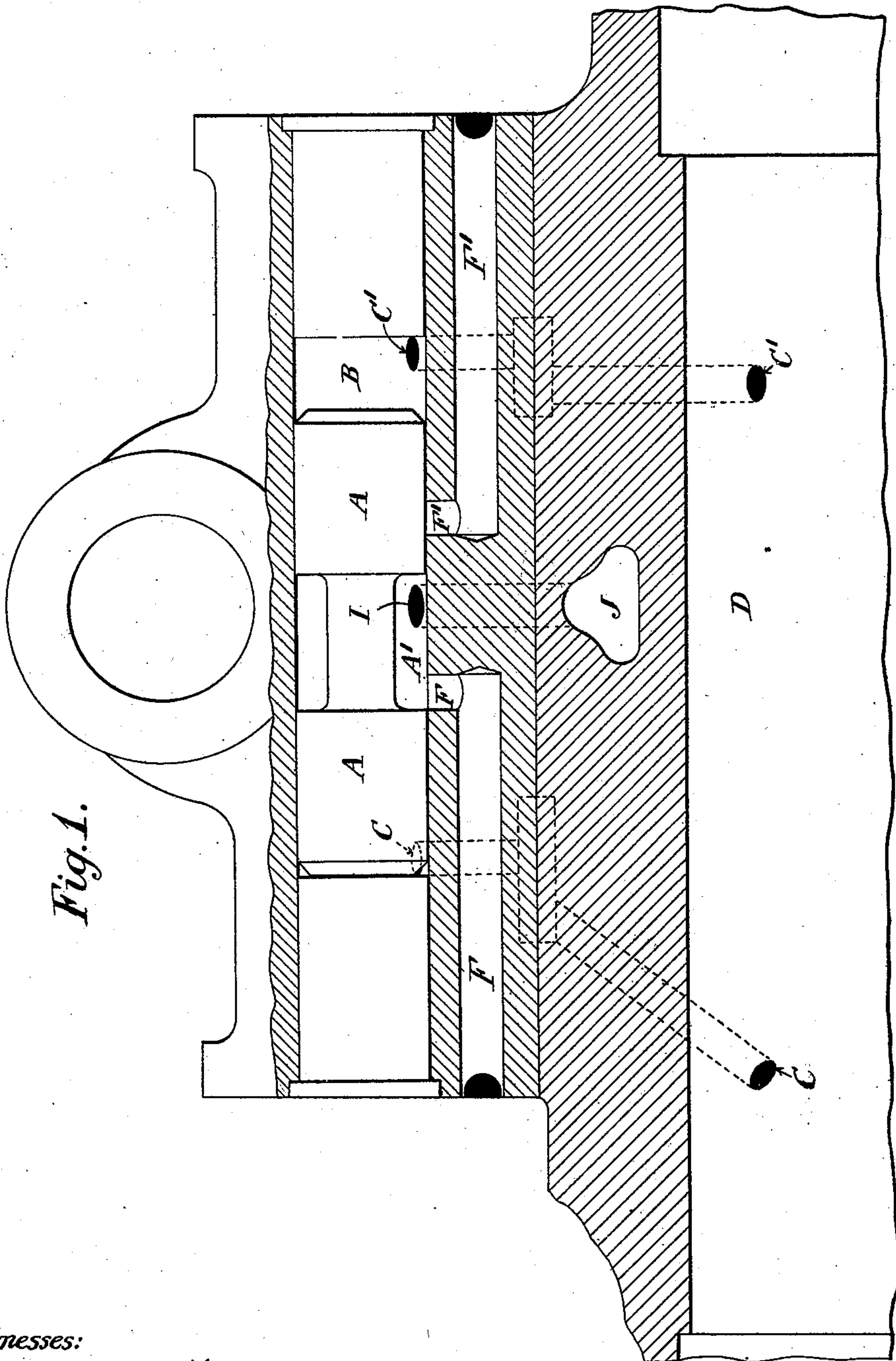
(No Model.)

5 Sheets—Sheet 1.

A. W. & Z. W. DAW.
VALVE FOR PERCUSSION ROCK DRILLS.

No. 531,587.

Patented Dec. 25, 1894.



Witnesses:
S. M. Dorsett,
L. F. Abell

Inventors:
A. W. Daw
Z. W. Daw
J. B. Jones
Attorney.

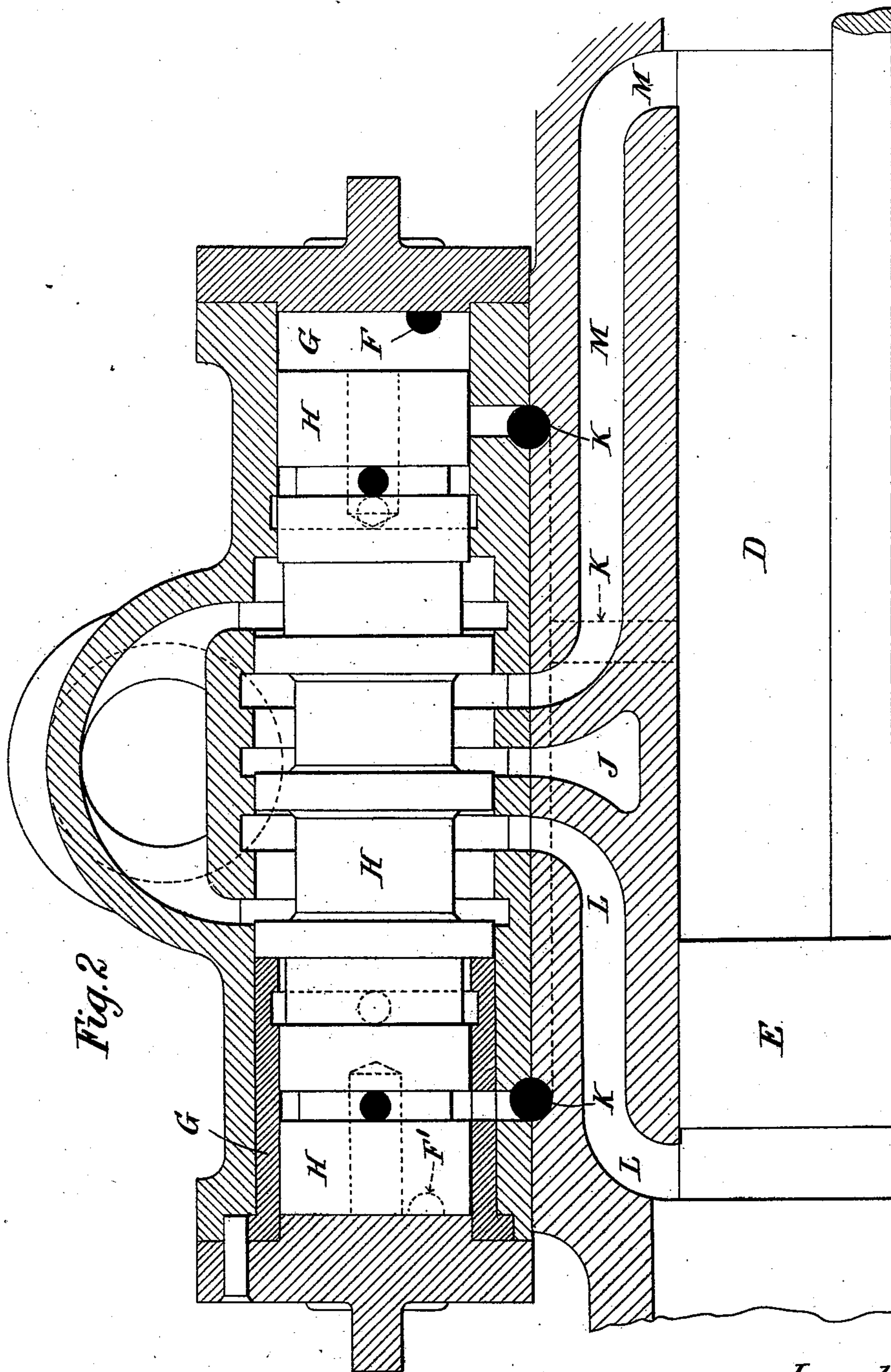
(No Model.)

5 Sheets—Sheet 2.

A. W. & Z. W. DAW.
VALVE FOR PERCUSSION ROCK DRILLS.

No. 531,587.

Patented Dec. 25, 1894.



Witnesses:

S. M. Dorsett,
L. F. Abell

Inventors:

A. W. Daw
Z. W. Daw
By F. C. Jones,
Attorney.

(No Model.)

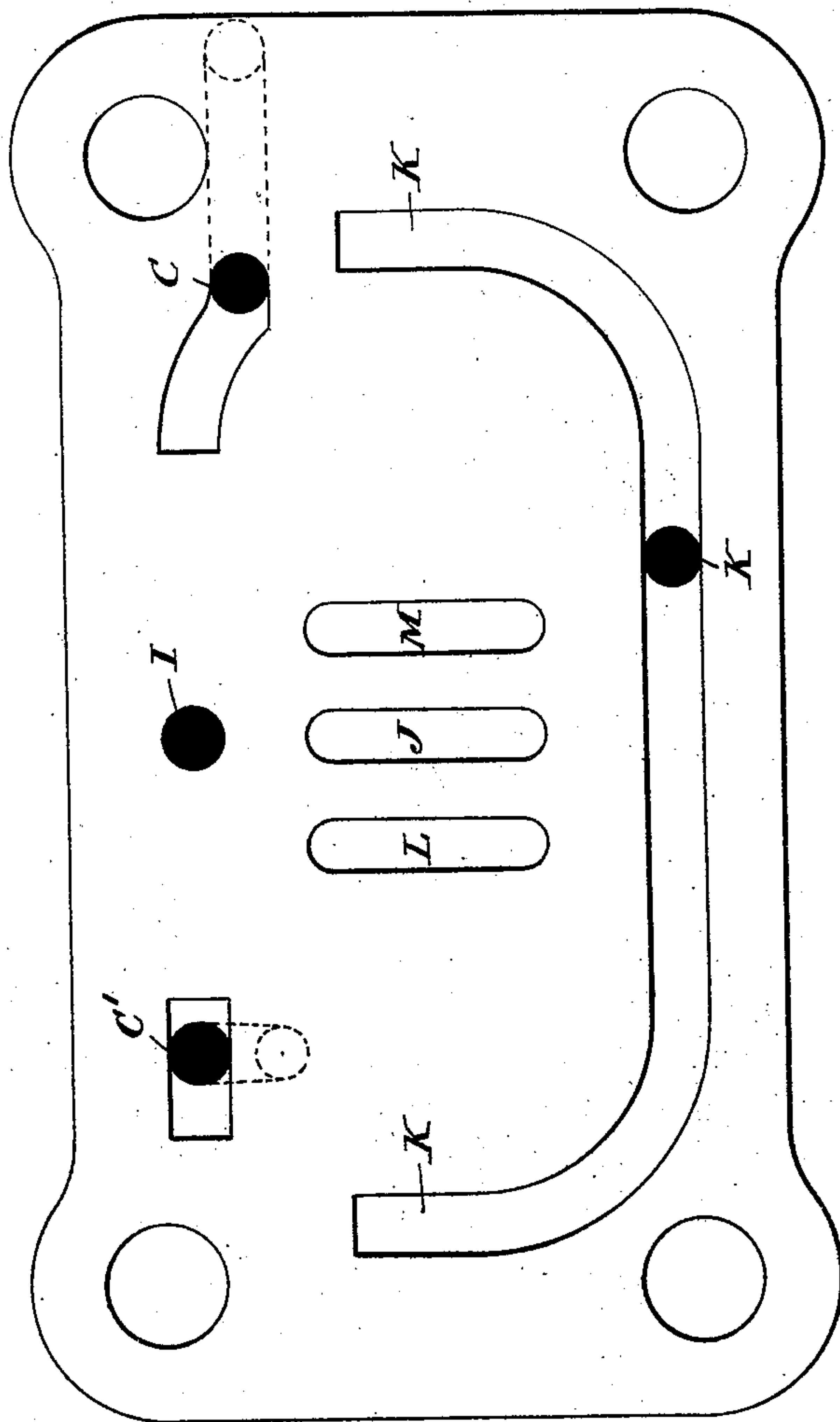
5 Sheets—Sheet 3.

A. W. & Z. W. DAW.
VALVE FOR PERCUSSION ROCK DRILLS.

No. 531,587.

Patented Dec. 25, 1894.

Fig. 3.



Witnesses:

S. M. Dorsett,
L. F. Abell

Inventors:

A. W. Daw,
Z. W. Daw,
By J. C. Jones
Attorney.

(No Model.)

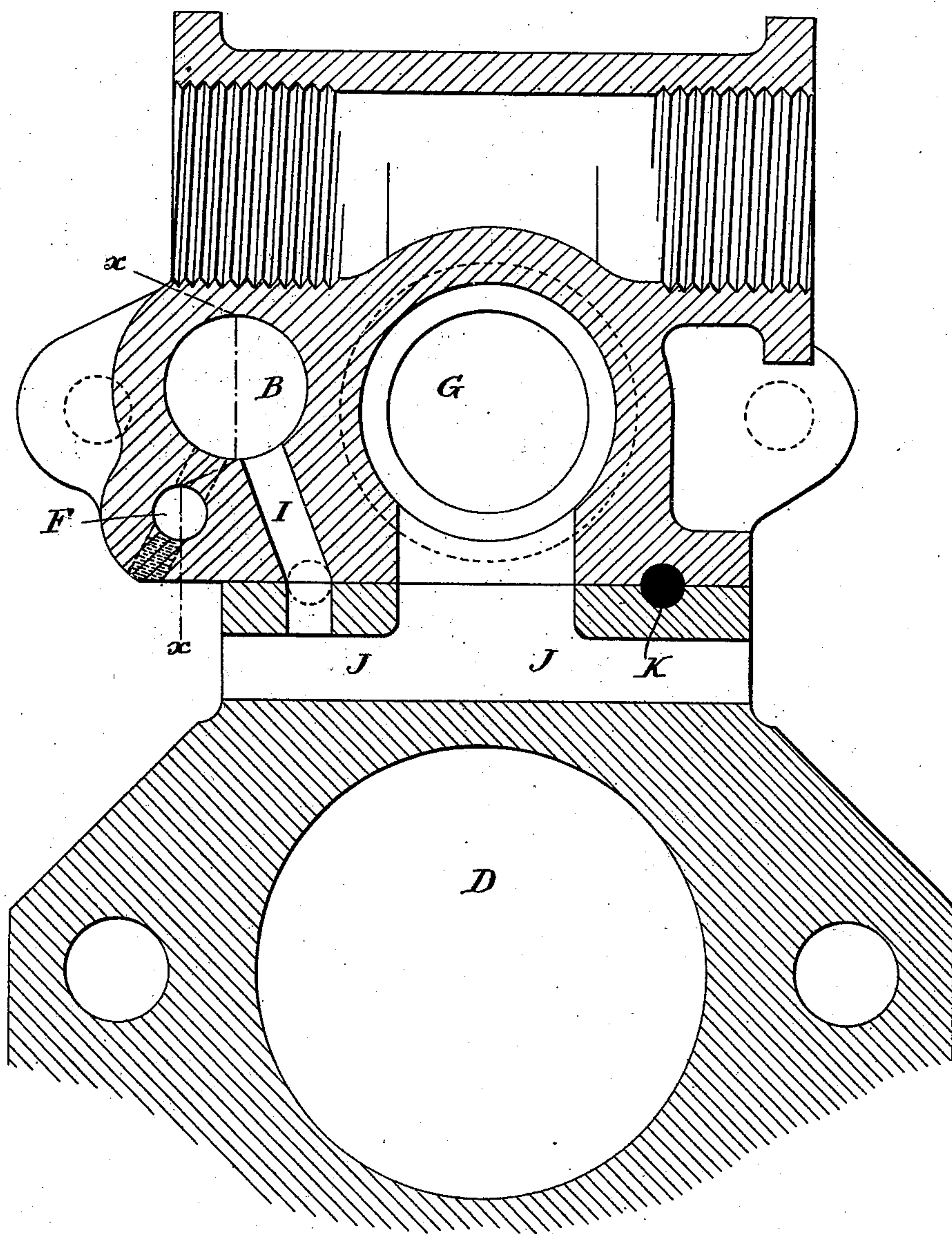
5 Sheets—Sheet 4.

A. W. & Z. W. DAW.
VALVE FOR PERCUSSION ROCK DRILLS.

No. 531,587.

Patented Dec. 25, 1894.

Fig. 4.



Witnesses:

S. M. Dorsett,
L. F. Abell

Inventors:

A. W. Daw
Z. W. Daw
By *F. C. Jones*
Attorney

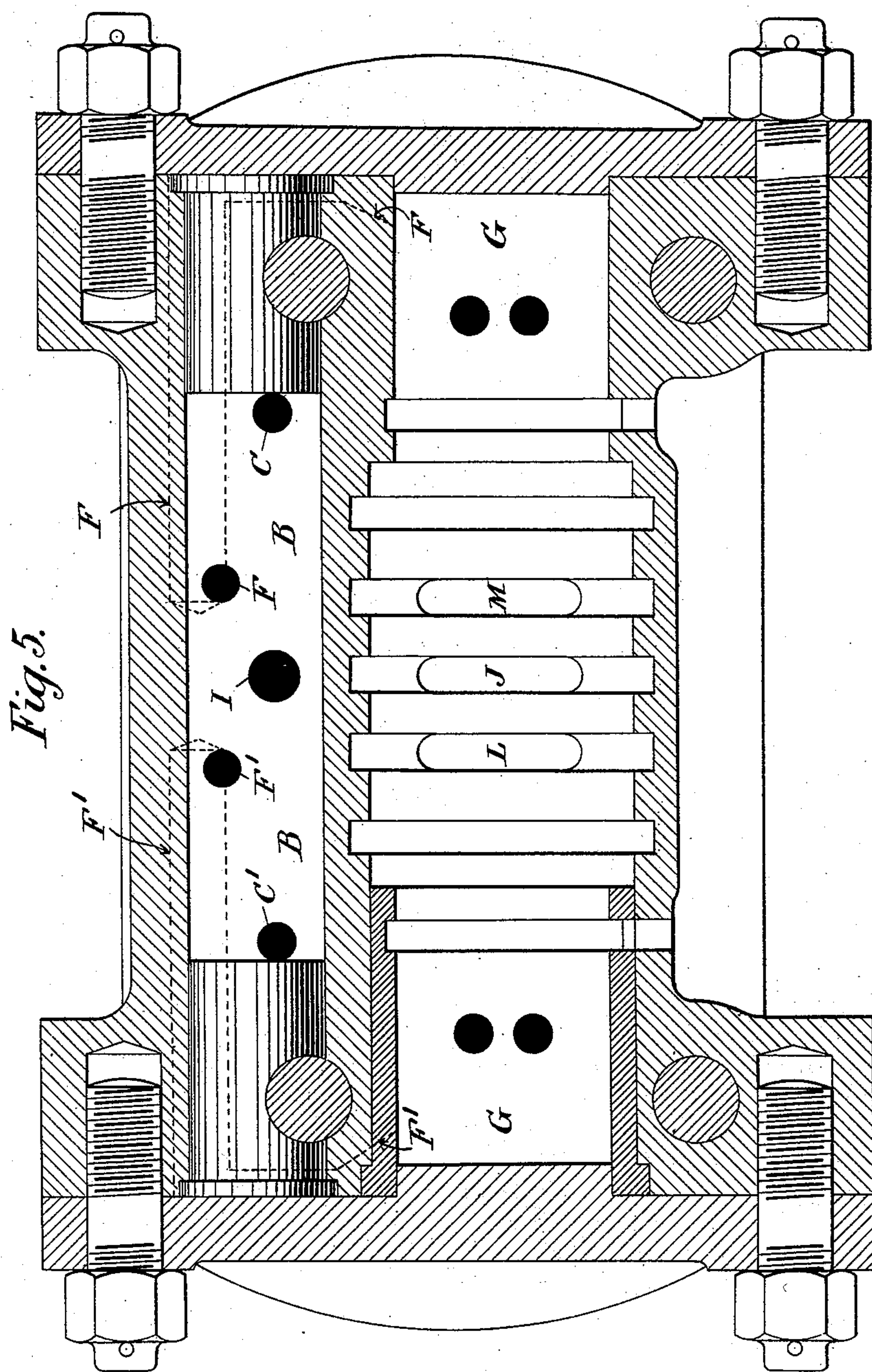
(No Model.)

5 Sheets—Sheet 5.

A. W. & Z. W. DAW.
VALVE FOR PERCUSSION ROCK DRILLS.

No. 531,587.

Patented Dec. 25, 1894.



Witnesses:

S. M. Dorsett,
L. F. Abell

Inventors:

A. W. Daw
Z. W. Daw

By

R. C. Somes

Attorney.

UNITED STATES PATENT OFFICE.

ALBERT WILLIAMS DAW AND ZACHARIAS WILLIAMS DAW, OF LONDON,
ENGLAND.

VALVE FOR PERCUSSION ROCK-DRILLS.

SPECIFICATION forming part of Letters Patent No. 531,587, dated December 25, 1894.

Application filed April 13, 1894. Serial No. 507,386. (No model.) Patented in England June 13, 1893, No. 11,607.

To all whom it may concern:

Be it known that we, ALBERT WILLIAMS DAW and ZACHARIAS WILLIAMS DAW, mining engineers, subjects of the Queen of Great Britain, residing at Mansion House Chambers, No. 11 Queen Victoria Street, in the city and county of London, England, have invented certain new and useful Improvements in and connected with Valves for Percussive Rock-Drills, and Direct-Acting Pumps and Engines, (for which we have obtained a British patent, No. 11,607, dated June 13, 1893,) of which the following is a specification.

The present invention relates to the employment of an auxiliary valve for controlling the exhaust of the pistons which actuate the main valve for governing the supply and exhaust passages for actuating the main piston of reciprocating engines, such auxiliary valve being itself actuated by passages controlled by the main piston. For this purpose an auxiliary valve is arranged to work in a cylinder the opposite ends of which are connected by passages leading to near the opposite ends of the cylinder in which the piston of the reciprocating engine works, and which piston in its to and fro movements opens and closes such passages, so that when one side of such main piston is open to exhaust, the corresponding end of the auxiliary valve cylinder is also open to exhaust, while the opposite end of the auxiliary valve cylinder is through the other passage open to the supply which is then acting on the opposite side of the main piston. The auxiliary valve is thus shot over from one end of its cylinder to the other, and in its movement shuts a passage leading to one end of the cylinder in which the main valve works, while it opens a second passage leading to the opposite end of the main valve cylinder to the main exhaust.

The construction of the main valve and the arrangement of the ports or passages for actuating same may be similar to that set forth in the specification of our prior United States Patent No. 456,801, dated July 28, 1891, but the passages connecting the ends of the main valve cylinder with the passages leading to the ends of the main piston cylinder will not be necessary, as the connection with the exhaust in the present arrangement will be ef-

fectured through the auxiliary valve cylinder. It will however be readily understood that the main valve may be constructed and actuated in any other suitable manner instead of that described in the specification of such prior patent.

In the accompanying drawings Figure 1 is a longitudinal vertical section through the auxiliary valve and main cylinder of a reciprocating engine, taken on the line x, x , Fig. 4. Fig. 2 is a central longitudinal vertical section through the main valve and main cylinder of such engine, the main valve being arranged and actuated in the manner set forth in the specification of our prior patent above referred to. Fig. 3 is a plan view of the face of the main cylinder. Fig. 4 is a transverse section through the auxiliary and main valves and the main cylinder, and Fig. 5 a horizontal section through the auxiliary and main valves.

In the drawings A is the auxiliary valve constituting our invention, and which works in a cylinder B, from the opposite ends of which passages C, C', lead to near the opposite ends of the main cylinder D of the reciprocating engine, and are controlled by the main piston E of such cylinder, so that when one side of such piston is open to exhaust through the main valve (to be hereinafter described) the corresponding end of the auxiliary valve cylinder is also open to exhaust, while the opposite end of same will through the other passage, C or C', be open to the supply which is then acting on the opposite side of the main piston E, as soon as the latter in its travel uncovers such passage, and the auxiliary valve A will consequently be shot over from one end of its cylinder B to the other.

As will be seen in Fig. 1, the auxiliary valve A is formed with an annular groove A' in its center, while ports F, F', are formed in its cylinder B and lead respectively to the opposite ends of the main valve cylinder G, in which works the main valve H for controlling the supply and exhaust to the main cylinder D in which the main piston E reciprocates. (See Figs. 2 and 5.) The auxiliary valve cylinder B has also another passage I leading to the exhaust passage J, and the movement of valve A in its cylinder B alternately connects

such passage I with one or other of the passages F, F', leading respectively to the opposite ends of the main valve cylinder G, which is consequently brought open to exhaust.

5 In the drawings the main valve H is shown as being actuated by the movement of the main piston E controlling a port or passage K leading from near the center of the main piston cylinder D to near the opposite ends of the
10 main valve cylinder G, as shown by dotted lines in Fig. 2 and also shown in plan in Fig. 3, so that steam from that side of the piston E which is being acted upon, is at a certain point in its travel admitted to one end of the
15 main valve cylinder (the end of the passage K leading to the opposite end of such main valve cylinder being at that time closed by the main valve H) and the main valve is consequently shot over in its cylinder and reverses the con-
20 nection between the opposite sides of main piston E with steam and exhaust respectively, through the passages L, M and exhaust J in the well known manner. It will however be readily understood that such main valve H
25 may be actuated in any other suitable manner to that described.

What we claim as our invention, and desire to secure by Letters Patent, is—

1. In a reciprocating engine, the combina-
30 tion of a cylinder having a piston therein, a main valve cylinder, having a valve therein, and an auxiliary valve cylinder, also having a valve therein, supply ducts leading from near the opposite ends of said piston cylinder
35 to the opposite ends of said auxiliary valve cylinder, said ducts being controlled by said piston, supply ducts also leading from said piston cylinder to near the opposite ends of said main valve cylinder and being controlled
40 by said piston, exhaust ducts leading from

the ends of said main valve cylinder to the auxiliary valve cylinder, a main exhaust duct for said engine, and a passage connecting said main exhaust duct with said auxiliary valve cylinder, said main exhaust passage and said
45 main valve exhaust ducts being controlled by said auxiliary valve, substantially as described.

2. The combination with the main valve of reciprocating engines, of an auxiliary valve
50 having passages leading from the opposite ends of the cylinder in which such auxiliary valve works, respectively, to near the opposite ends of the main cylinder in which the main piston works, and which passages are
55 controlled by the movement of the piston, the movement of such auxiliary valve controlling other passages leading respectively to the opposite ends of the cylinder in which the main valve works so as to place such ends alter-
60 nately in connection with an exhaust passage through the ports of the main cylinder and through the main valve to the main exhaust, while the supply to the opposite ends of the main valve is controlled directly by the move-
65 ment of the main piston through passages leading from the two ends of the main valve cylinder to the main piston cylinder, substantially as described.

ALBERT WILLIAMS DAW.
ZACHARIAS WILLIAMS DAW.

Witnesses to the signature of the above-named Albert Williams Daw:

JONAS HÖILAND,
I. RÄINAAS.

Witnesses to the signature of the above-named Zacharias Williams Daw:

HARRY A. McLELLAN,
H. J. FERRY.