

J. BRANDON.
VALVES FOR ROCK-DRILLS.

No. 174,768.

Patented March 14, 1876.

Fig. 1.

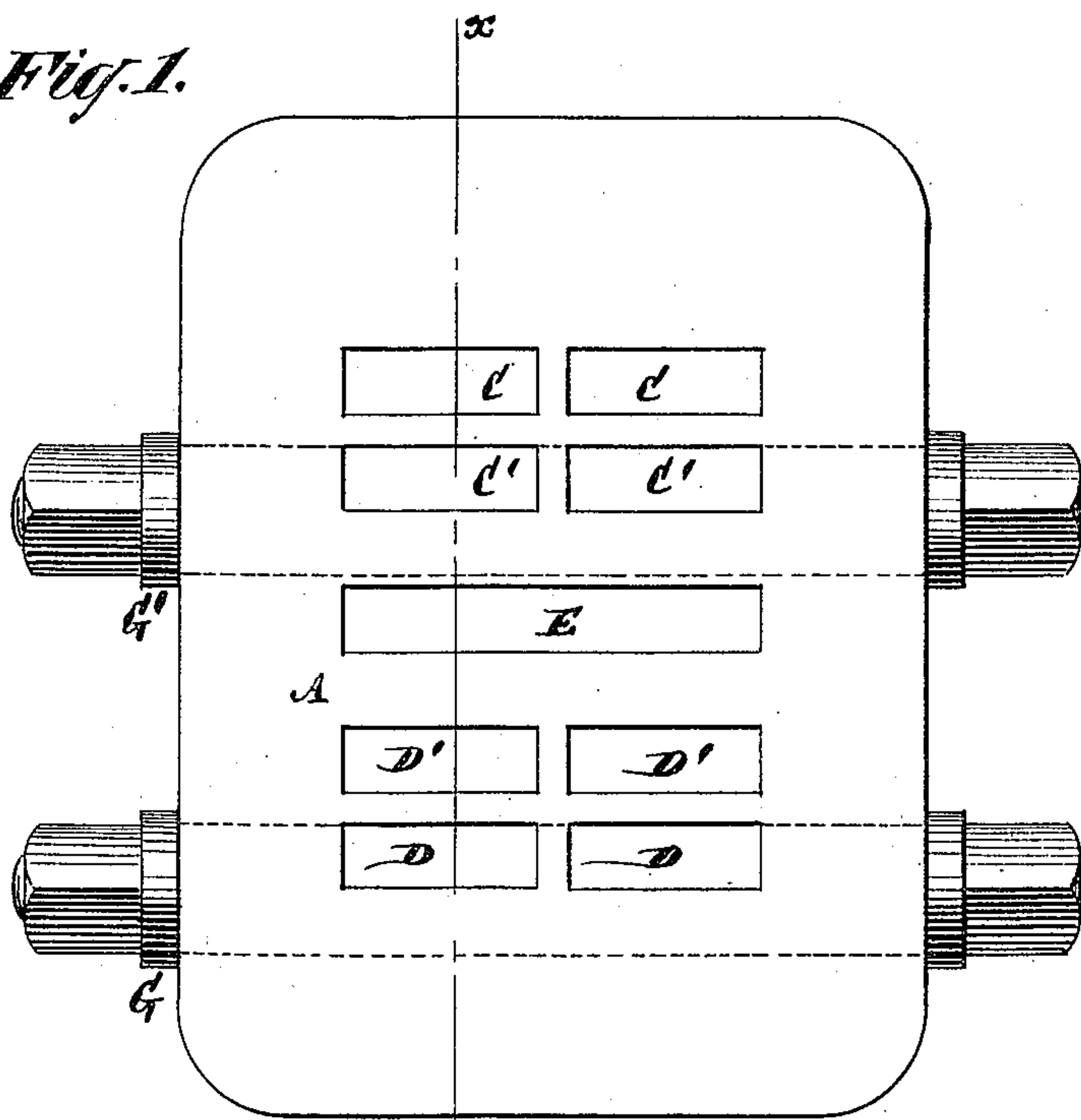


Fig. 2.

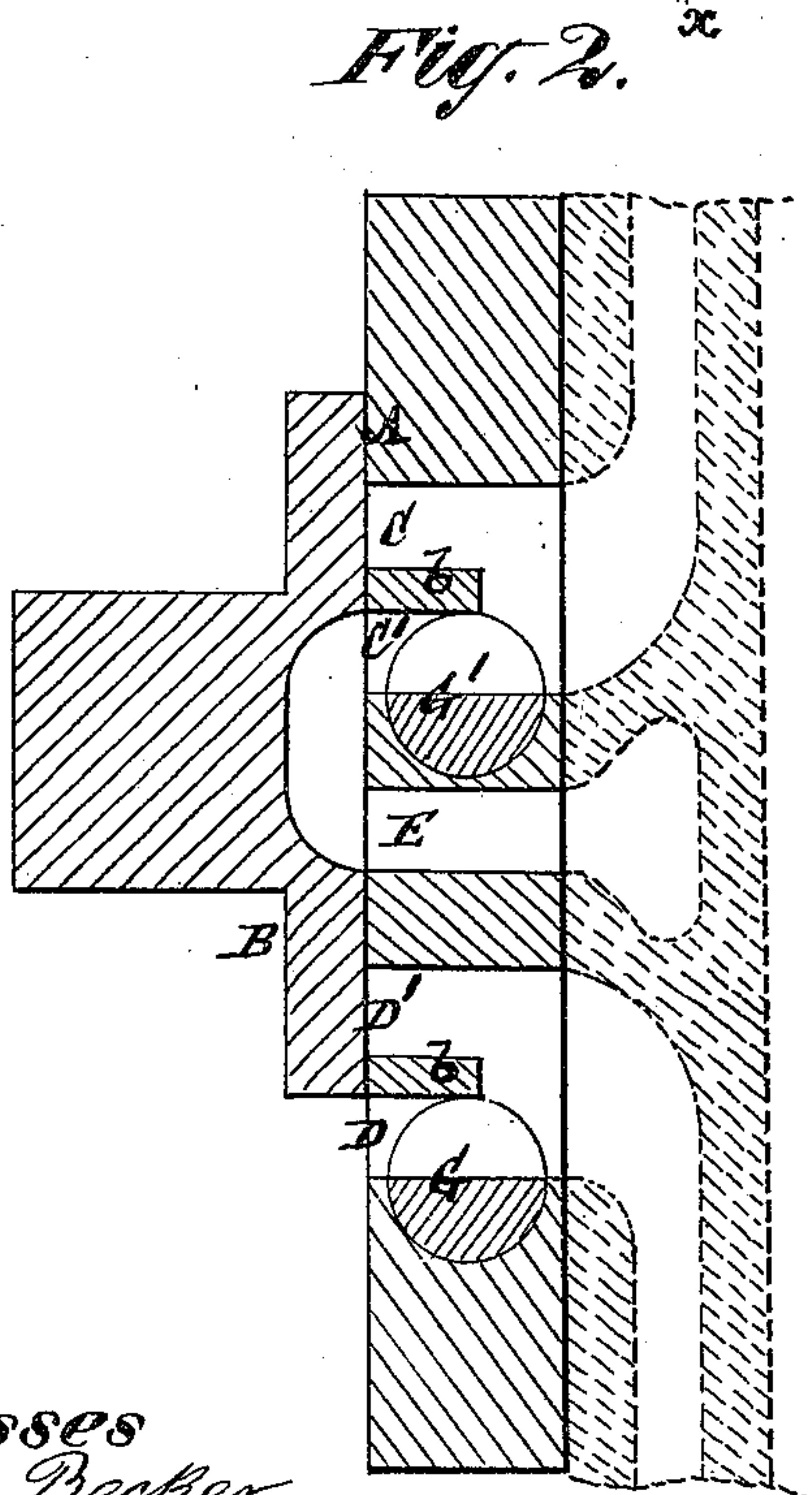
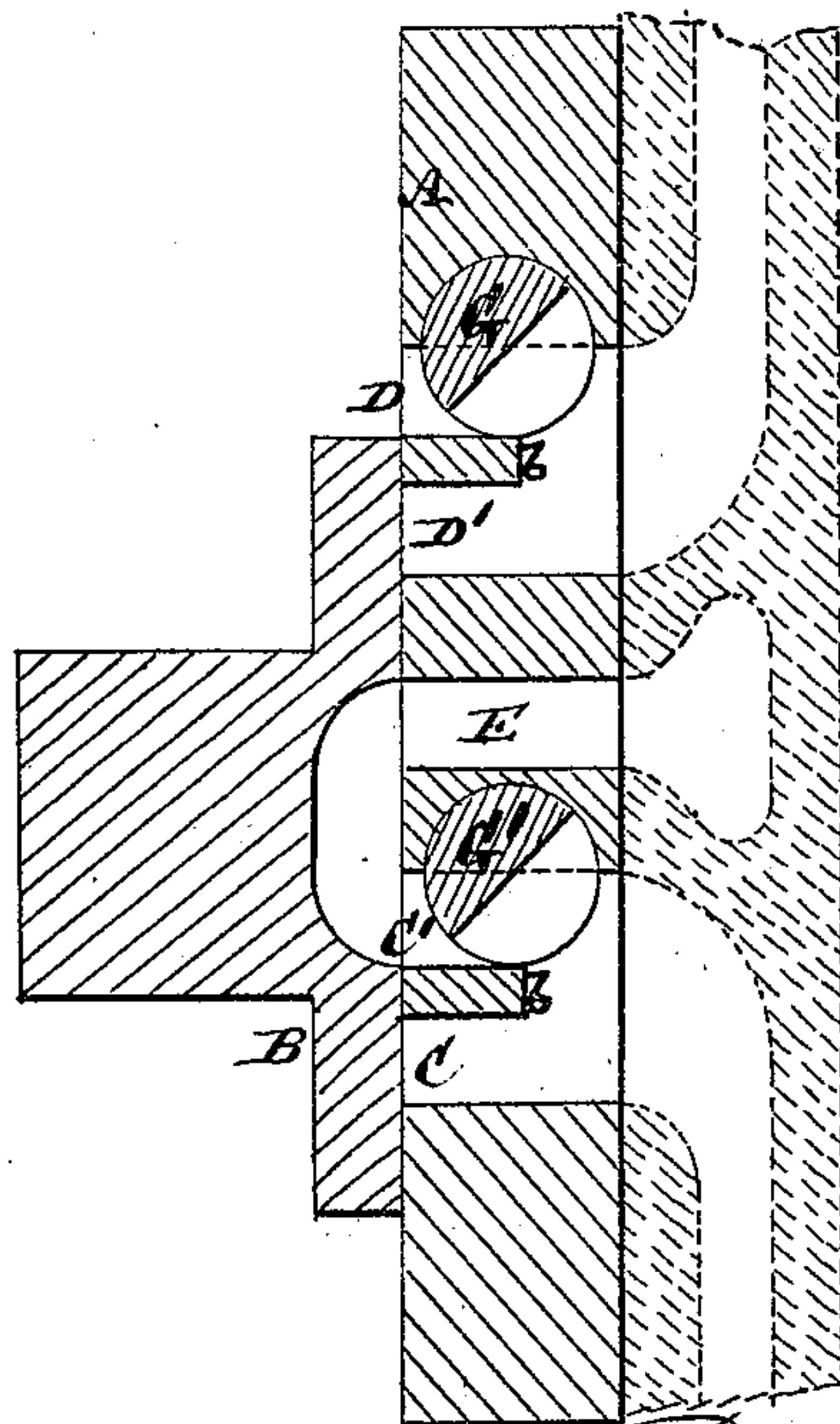


Fig. 3.



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IMPROVEMENT IN VALVES FOR ROCK-DRILLS.

Specification forming part of Letters Patent No. **174,768**, dated March 14, 1876; application filed August 30, 1875.

To all whom it may concern:

Be it known that I, JAMES BRANDON, of the city, county, and State of New York, have invented certain new and useful Improvements in Valves for Rock-Drills; and I do hereby declare that the following is a full, clear, and exact description of the same, reference being had to the accompanying drawing, which forms part of this specification.

The object of this invention is to adapt one and the same rock-drill to drill either upward or downward, or at any desired intermediate angle. Ordinarily, or as rock-drills have heretofore been constructed, the same have more especially been adapted either to up or down drilling, but not to both. Thus rock-drills which have been applicable to drilling downward, have not been generally applicable to mining or tunneling operations, in which drilling upward has been required. This will be best explained by the fact that steam or other power rock-drills, constructed to drill downward, are inapplicable to drill upward, as necessary in certain mining or tunneling operations, for the reason that when said drills are turned to drill upward they have the weight of the piston and of the drill to retard the force of the blow striking the rock, and when the valve is reversed and the steam or other propelling agent is admitted to carry the drill and piston back to make another blow, the weight of the piston and drill helps to accelerate their speed, so that there is danger of the piston striking the cylinder-head. On the other hand, when the drill is required to drill downward, and the piston and drill are up ready to descend to strike the blow, steam admitted to the piston will cause it and the drill to descend with an accelerated velocity, by reason of the weight of the piston and drill, and in the next up-stroke of the piston and drill said piston and drill will have a retarding effect by reason of their weight.

My invention consists in a combination of throttle-valves with the inlet and outlet ports of the main valve—that is to say, a throttle or cut off valve applied to the one supply or inlet port of the main valve leading to the one end of the cylinder, with the other supply-port fully open or unthrottled, and a throttle or cut-off valve applied to the exhaust-passage

from the opposite ends of the cylinder to that which has its supply throttled, while the other exhaust port or passage remains unthrottled.

I do not restrict myself to any particular construction of main valve, or ports controlled by it, and which may be either single or in duplicate, nor yet to any particular construction of the throttle or cut-off valves, but prefer rolling valves for the latter.

Figure 1 represents a face view of valve-seat, with duplicate throttle or cut-off valves, applied in accordance with my invention, and as adapted to a main valve of ordinary **D** construction. Fig. 2 is a longitudinal section of the same on the line *xx*, with the main valve applied when the drill is operating in a downward direction; and Fig. 3 a similar view of like parts when the drill is operating in an upward direction.

A is the valve-seat, and B an ordinary **D**-valve fitted to slide thereon. C C' are ports leading to the one end of the drill-cylinder, and D D' ports leading to the opposite end of said cylinder. These ports C C' and D D', which may be transversely divided by partitions *b*, are respectively one, so far as their connections with reverse ends of the cylinder are concerned, but when throttle-valves, as hereinafter described, are used, then the openings C D are purely supply-ports to opposite ends of the cylinder, and the openings C' D' exhaust-ports from corresponding ends of the cylinder, which exhaust-ports are put in communication alternately by the valve B with a main exhaust-port or outlet, E, and the ports C D are alternately uncovered by the valve to pass the steam or other propelling agent to the piston. G G' are cut-off or throttle valves, which are here shown of a rolling construction. The one, G, of these throttle-valves is applied to the inlet-port D, and the other throttle-valve, G', to the exhaust-port C' in the valve-seat. When the drill is used for drilling downward, then the throttle-valves G G' may be turned so that they are inoperative, as regards throttling the ports D C', and the valve B operates in the usual manner, to give a full supply of steam through the port C, for the purpose of giving the blow by forcing the piston down, and in due course to admit steam through the port D to cushion the piston and

lift it from the blow. This open condition of the ports D and C' is illustrated in Fig. 2.

When it is required to drill upward with the same rock-drill or machine, then the port D becomes the upper inlet and the port C' the lower inlet or exhaust passage in the valve-seat, and the throttle-valves G G', or either of them, are more or less closed by hand, so that while steam will be freely admitted by the port C to raise the drill-piston to the blow, and the exhaust-port D' will be open to exhaust the steam from the opposite side of the piston during such stroke, a reverse action takes place as regards the operation of the ports, which control the downward movement of the piston and drill. Thus, as represented in Fig. 3, the partial closing of the valves G G' will serve to contract the supply through the upper port D, and escape of the waste or cushioning steam from the reverse side of the piston through the port C', when the piston is moving downward or away from the blow, whereby there will be no danger to the cylinder-head from the piston and drill in their descent striking the same, and when their weight is not used to strike the blow. It is not absolutely necessary that both of the valves G G' should be used, or more or less closed when

the machine is drilling upward, inasmuch as the closing of either valve under many circumstances would suffice, but a more satisfactory control is obtained by using both valves, and by the two the down or back movement of the piston and drill may be regulated from a dead stop to a quick speed. The valves G G', too, may also be very advantageously employed when drilling at an intermediate angle from the horizon, either up or down. In certain cases such valves G G' might be used when drilling directly downward, but their use then will not be generally needed.

I claim—

The combination, with the valve-seat and main valve, of duplicate cut-off or throttle-valves, the one of which is applied to the inlet port or passage connecting with the one end of the drill-cylinder, and the other to the outlet port or passage connecting with the opposite end of said cylinder, and both of which are adjustable to suit reversed or intermediate position of the drill, essentially as described.

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