

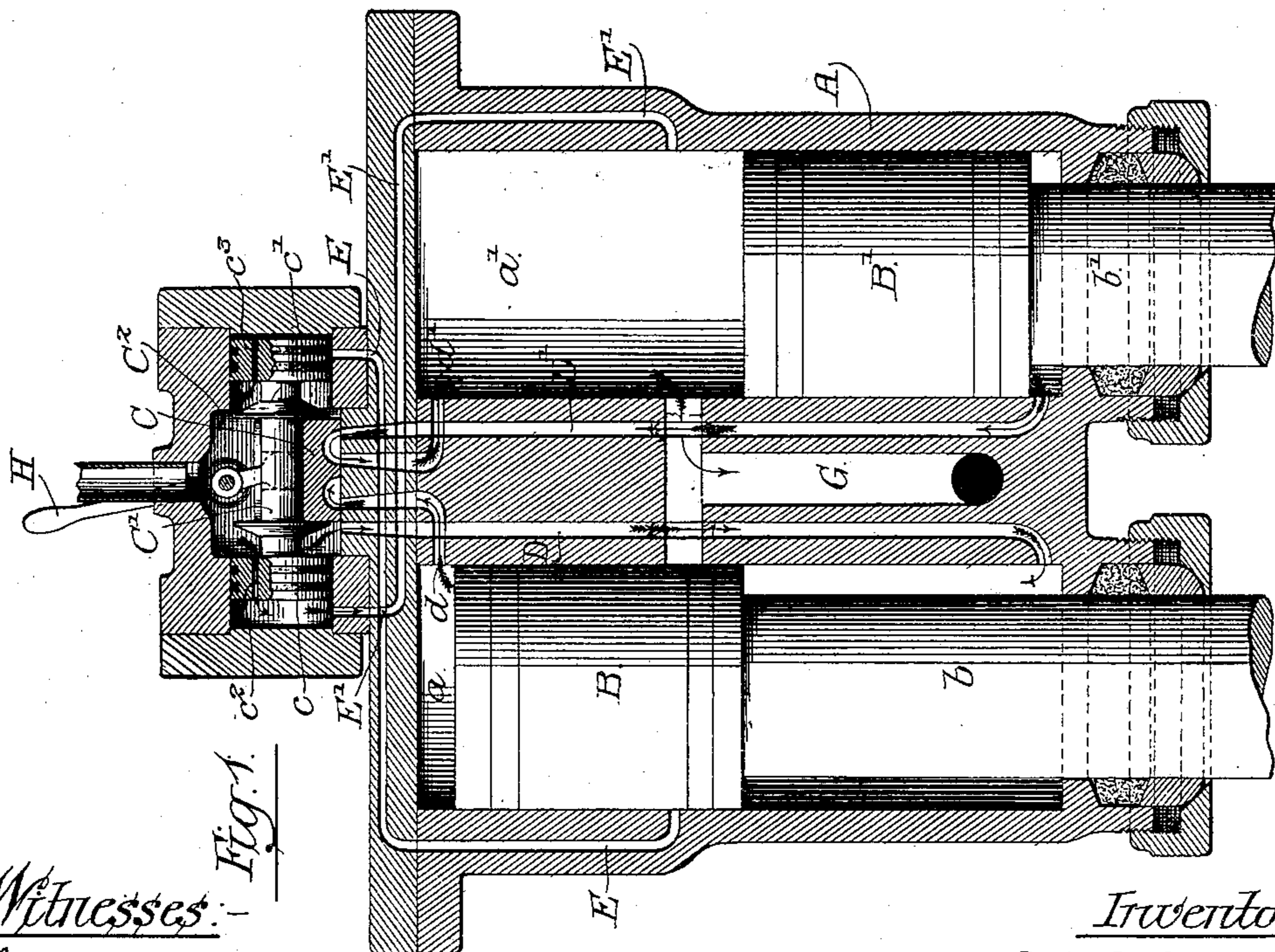
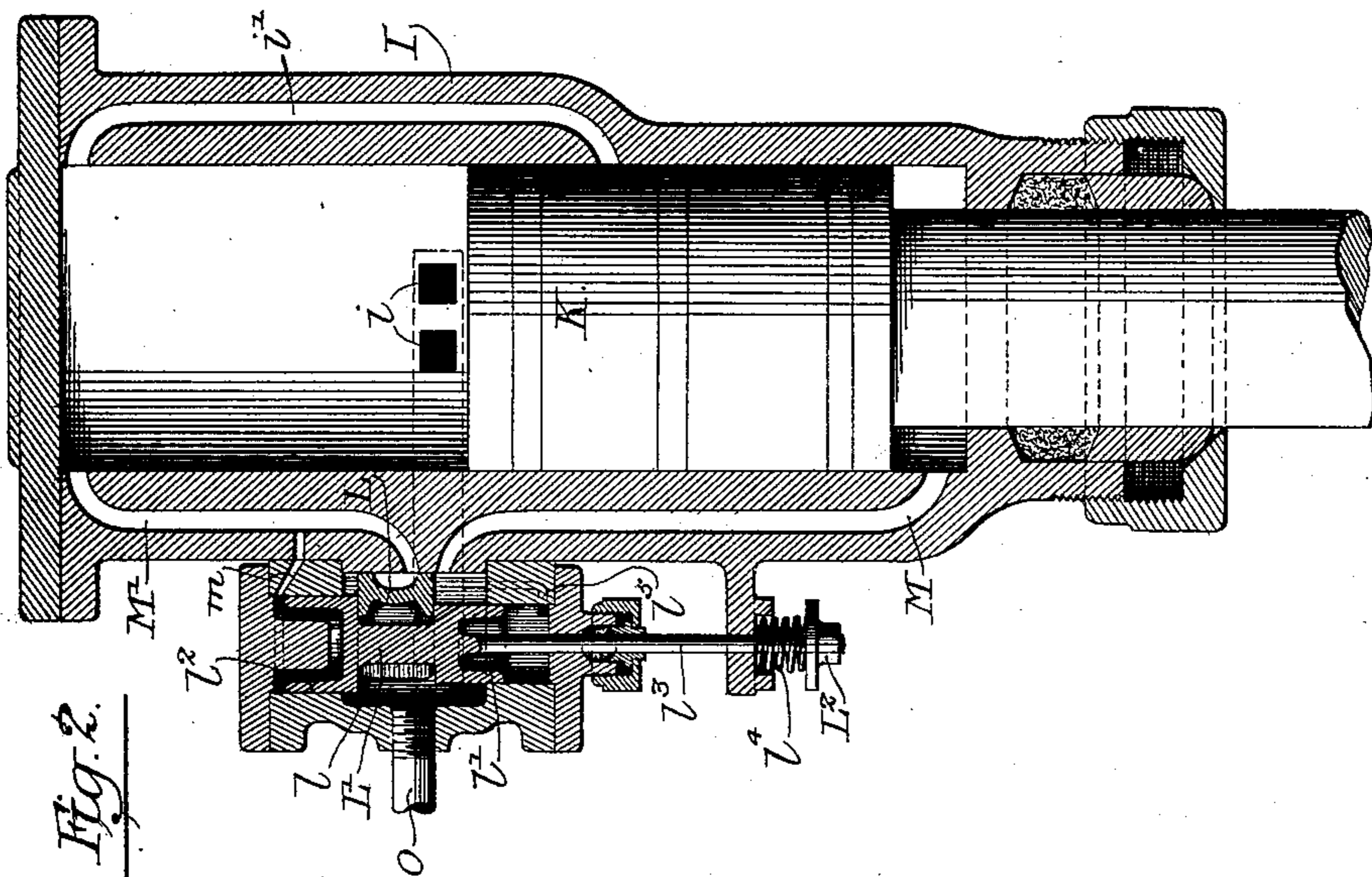
No. 608,422.

Patented Aug. 2, 1898.

D. COLE.  
STEAM ORE STAMP.

(Application filed May 3, 1897.)

(No Model.)



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# UNITED STATES PATENT OFFICE.

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## STEAM ORE-STAMP.

SPECIFICATION forming part of Letters Patent No. 608,422, dated August 2, 1898.

Application filed May 3, 1897. Serial No. 634,873. (No model.)

*To all whom it may concern:*

Be it known that I, DAVID COLE, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have  
5 invented certain new and useful Improvements in Steam Ore-Stamps, of which the following is a specification.

The object of my invention is to provide a simple, economical, and efficient ore-stamp;  
10 and the invention consists in the features, combinations, and details of construction hereinafter described and claimed.

In the accompanying drawings, Figure 1 is a longitudinal sectional elevation of the upper  
15 portion of a steam ore-stamp constructed in accordance with my improvements, preferably showing the ports and passages for the admission of fluid-pressure in diagrammatic form; and Fig. 2, a modified form of my im-  
20 provement, showing the same as applied to a single cylinder and stamp-piston.

My invention relates particularly to that class of steam ore-stamps in which a battery, consisting of two cylinders and stamp-pistons,  
25 is arranged to be controlled by the operation of a single valve. In this particular it is usual to use the controlling-valve to admit and exhaust the fluid-pressure; and my invention has for its principal object the providing  
30 of a controlling-valve to govern the admission of the fluid-pressure only while the stamp piston or pistons in their operation control the exhaust directly without the intervention of other means.

35 Other objects of the invention will appear from the following description and an examination of the drawings.

In illustrating and describing my improvements I will only illustrate and describe those  
40 parts which I consider to be new, taken in connection with so much that is old as will enable those skilled in the art to understand the same and practice the invention, leaving out of consideration other and well-known mechanisms which if described here would only  
45 tend to confusion and ambiguity.

In describing a steam stamp-mill constructed in accordance with my improvements I will first describe one form to which my improve-  
50 ments are applicable—viz., a mill comprising a battery of two cylinders having movable

stamp-pistons therein, as shown particularly in Fig. 1. In this form a casing A is provided having two cylindrical pressure-chambers *a*  
*a'*, in which stamp-pistons B and B' are re- 55  
ciprocatingly mounted, such stamp-pistons being provided with the usual stems *b b'*, to the bottom of which the shoes and other parts are attached. To admit fluid-pressure above and below such stamp-pistons directly and 60  
expansively, I provide a single controlling-valve C, having a piston-rod C' for moving the same, all of which are mounted in a valve-chest C<sup>2</sup>. This valve piston-rod is preferably provided with two pistons *c* and *c'*, between 65  
which the live steam at high pressure is admitted, so that such piston-rod is practically balanced. Each of the valve-pistons is provided with small longitudinal openings or passages *c*<sup>2</sup> and *c*<sup>3</sup>, adapted to admit a limited 70  
supply of fluid-pressure behind such pistons or between them and the valve-chest casing in opposition to each other, so as to actuate said rod, as more fully hereinafter described.

To admit fluid-pressure from the valve- 75  
chest to the cylinder, a passage D is provided, which leads to the pressure-chamber *a* below the stamp-piston, and a second passage *d*, that leads from the valve-chest to the cylindrical pressure-chamber *a* above such piston. A 80  
passage E leads from the cylinder-chamber *a* to the valve-chamber in a position to be covered and uncovered by the movements of the valve-piston *c'*, while the exhaust-passage G connects directly with both of the cylinder- 85  
chambers and is arranged to be covered and uncovered by the movements of both pistons, as will be more fully hereinafter described. A second passage D' connects the valve-chest with the cylinder-chamber *a'* at a point below 90  
the stamp-piston located therein, while a piston *d'* connects such chamber with the valve-chamber at a point above the stamp-piston. A passage E' also connects the cylindrical chamber *a'* with the valve-chest and is ar- 95  
ranged to be covered and uncovered by the movements of the valve-piston *c*, as will be hereinafter more fully described.

The operation of the parts is as follows: The valve-piston is arranged to be moved by 100  
a hand-lever H first to one side and then to the other. When the valve-piston is moved

to the position shown in the drawings, high fluid-pressure flows from the valve-chest through the passage D below the stamp-piston B and raises the same, as shown in Fig.

5 1. The exhaust is covered, as is also the passage E, that leads to the valve-piston chamber. Pressure flowing through the small inlets  $c^2$  and  $c^3$  and acting positively between the piston  $c'$  and the walls of the valve-chamber, such piston and valve are moved to the  
10 opposite position from that shown in the figure, so as to connect the cylinder-passages D and  $d'$ . Fluid-pressure then flows through such passages from below the piston B to  
15 above the same, where, acting expansively on the stamp-piston over the large and superficial area, it forces the same downwardly, being assisted by the weight of the parts. While this action is taking place, the passage D' is  
20 uncovered, so that high pressure flows below the stamp-piston B' and acts to raise the same to its upper limit of motion, covering the exhaust-port and the passage E'. When this passage is covered and the stamp-piston  
25 B is at its lowest limit of motion, it will be seen that the pressure between the valve-piston  $c'$  and the walls of the casing is allowed to expand or become less than between the walls of the casing and the valve-piston  $c$  to unbalance the rod and cause such pistons, with the  
30 slide-valve, to move back into the position shown in Fig. 1. At each reciprocation of the stamp-piston fluid-pressure is exhausted into the open air through the exhaust-pas-  
35 sage G.

Describing the modification shown in Fig. 2, a cylinder-casing I is provided in which a single stamp-piston K is reciprocatingly  
40 mounted. To admit high pressure below this piston and expansively above, a controlling-valve L is mounted in a suitable valve-chest  $L'$ . This valve is provided with a piston-valve rod  $L'$ , having pistons  $L'$  and  $L''$  of different superficial areas, while a rod  $L^3$  projects through  
45 the outer portion of the valve-casing and is provided with a coil-spring  $L^4$  to assist in the operations and form a cushion for the same. The cylinder-casing is provided with a passage M, that connects the chamber with the valve-  
50 chest below the stamp-piston, and with a second passage M', that connects the valve-chest with a point above the stamp-piston, both of which are arranged to be connected and disconnected by the movements of the slide or  
55 controlling valve. The valve-casing is provided with an escape-passage  $L^5$ , that leads from a point between the valve-piston head  $L'$  and the valve-casing to the outer air, though it may be connected with the exhaust-passage.  
60 A duct or passage  $m$  connects the space between the valve-piston head  $L^2$  with the passage M' for the purposes hereinafter described.

In operation, the parts being in the position shown in Fig. 2, high pressure is admitted  
65 from the valve-chest through the passage M to a point below the stamp-piston, causing such piston to rise and close an exhaust-port

$i$  and compressing the low pressure of steam above such ports, so as to act as a cushion and overbalance the direct pressure until the lower  
70 part of the piston passes above the opening of the passage  $i'$  to admit pressure above the piston-head expansively. The pressure above the piston-head being compressed to a point that equals or overbalances the direct pres-  
75 sure a portion of it is forced through the passage M' and the by-pass  $m$  to the space between the valve-piston head  $L^2$  and the valve-casing, overcoming the direct pressure in the valve-  
80 chest on the larger superficial area of such piston and forcing the piston to the other limit of its motion, thereby causing the controlling-valve to move and connect the pas-  
85 sages M and M'. When such passages are connected, the high pressure below the stamp-piston flows to a point above the same and, acting expansively on the larger superficial  
90 area of the upper portion of the stamp-piston, forces it down to the position shown in the figure. When such stamp-piston has reached its lower limit of motion, the exhaust-open-  
95 ings are uncovered and the pressure above and below the piston permitted to exhaust into the open air. At the same time the pressure which has been compressed between the  
95 valve-piston head  $L^2$  and the valve-casing is allowed to exhaust, and the direct pressure in the valve-chest, acting on the larger superficial area of such piston, causes it to move  
100 again to the position shown in the figure, thereby admitting pressure directly beneath the stamp-piston.

The adjustable collar or nut  $L^2$  on the valve rod or stem, taken in connection with the helical coiled spring  $L^4$ , acts as a cushion and  
105 as tension mechanism to properly balance the action of the valve or regulate the same. A pipe O is used to connect the valve-chest with some suitable source of pressure-supply. It  
110 will be understood that the passage  $i'$  is a by-pass and is not necessary to the complete operation of the mechanism, but may be dispensed with or used to suit different circumstances or conditions.

While I have described my invention in  
115 two forms in which it may be embodied, and minutely as regards details, I do not desire to be limited thereto unduly any more than is pointed out in the claims. On the contrary,  
120 I contemplate all proper changes in form, construction, and arrangement, the omission of parts and substitution of equivalents as circumstances may suggest or necessity render expedient.

I claim—

1. In a steam ore-stamp, the combination  
125 of a cylinder provided with a reciprocating stamp-piston, the cylinder having passages leading to points above and below the stamp-piston, a controlling-valve arranged to connect and disconnect the above-named ports  
130 and passages in the cylinder so as to admit high pressure below the stamp-piston and low pressure above the same, and a port or

passage in the cylinder communicating with the upper portion of the cylindrical chamber which forms the low-pressure chamber and so arranged as to be covered by the piston during the larger portion of its upward stroke and uncovered as the piston nears the lower limit of its stroke to exhaust the pressure at low pressure, substantially as described.

2. In a steam ore-stamp, the combination of a cylinder provided with a reciprocating stamp-piston and inlet and outlet passages, the outlet of fluid being controlled by the movements of the reciprocating piston, and a controlling-valve arranged to cover and uncover the passages so that high fluid-pressure is admitted below the stamp-piston and low pressure above the stamp-piston to reciprocate the same, a valve-rod provided with piston mechanism for moving the controlling-valve, the cylinder being provided with passages leading from the cylinder-chamber to such piston mechanism and adapted to be covered and uncovered by such piston mechanism, so that the movements of the stamp-piston causes the overbalancing of the valve-piston mechanism and shifts the valve from one position to the other, substantially as described.

3. In a steam ore-stamp, the combination of a casing having at least two cylindrical chambers, a stamp-piston in each of such

chambers, a valve-chest having passages connecting with each cylinder above and below the stamp-pistons, a controlling-valve adapted to cover and uncover connect and disconnect such passages so as to admit high pressure below the stamp-pistons and expansively above the same to reciprocate the parts, the cylinder-casing having an exhaust-passage that connects each of the cylinder-chambers with the outer air, the exhaust of fluid through the same being controlled by the movements of the reciprocating pistons, a valve piston-rod provided with two pistons—one located at each end portion thereof and having longitudinal openings which connect the high-pressure portion of the valve-chest with a space between such piston-heads and the valve-chest to admit a limited supply of fluid-pressure in connection with passages in the valve-chest and casing which connect with the cylinder-chambers and are adapted to be covered and uncovered by the stamp-pistons and which act to overbalance the pressure on such valve-rod pistons and shift the valve-rod from one side to the other to reciprocate the stamp-pistons alternately, substantially as described.

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Witnesses:

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