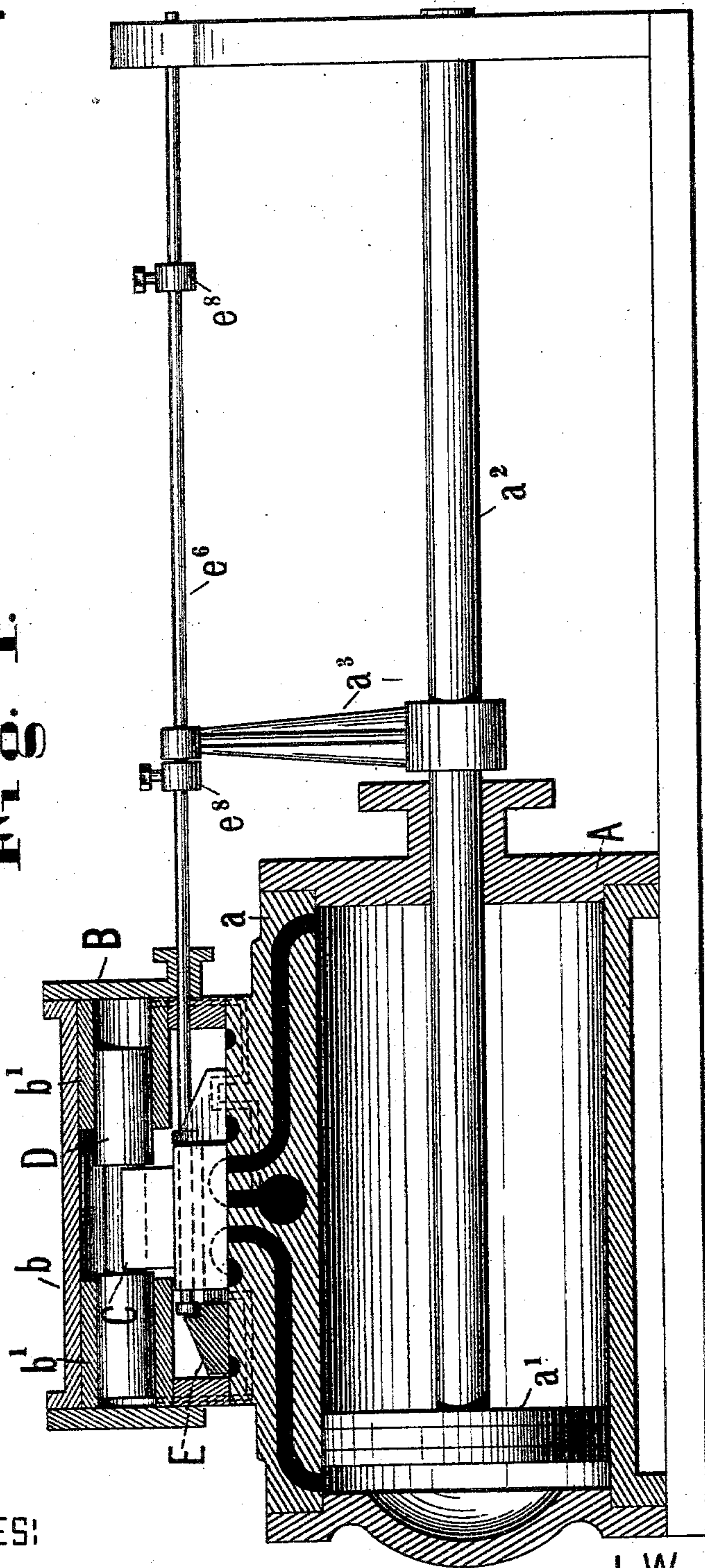


3 Sheets—Sheet 1.

No. 283,359.

Patented Aug. 14, 1883.

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S. S. West

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ATTYS

(No Model.)

3 Sheets—Sheet 2.

J. W. RUSSELL.
STEAM ACTUATED VALVE.

No. 283,359.

Patented Aug. 14, 1883.

Fig. 2.

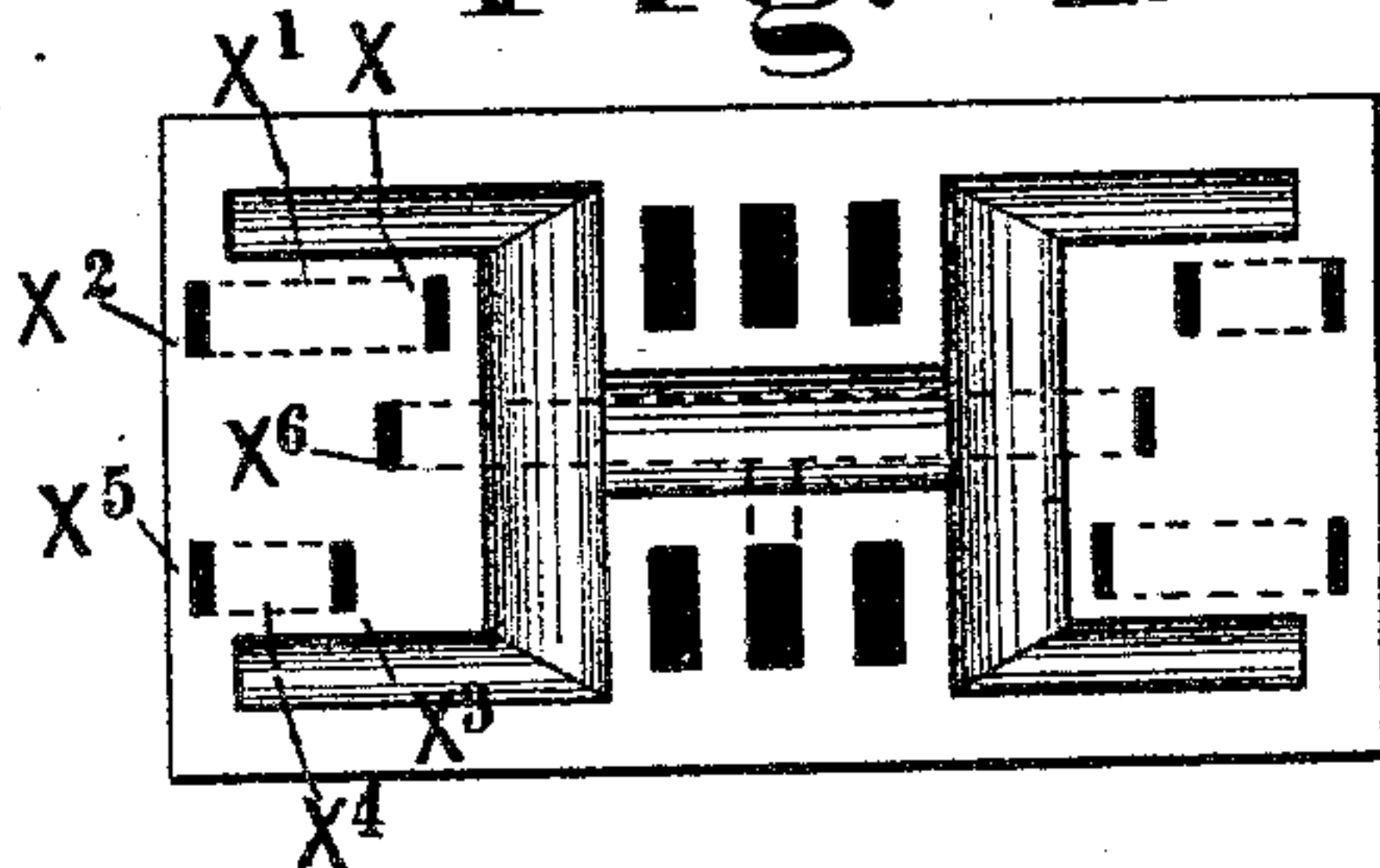


Fig. 3.

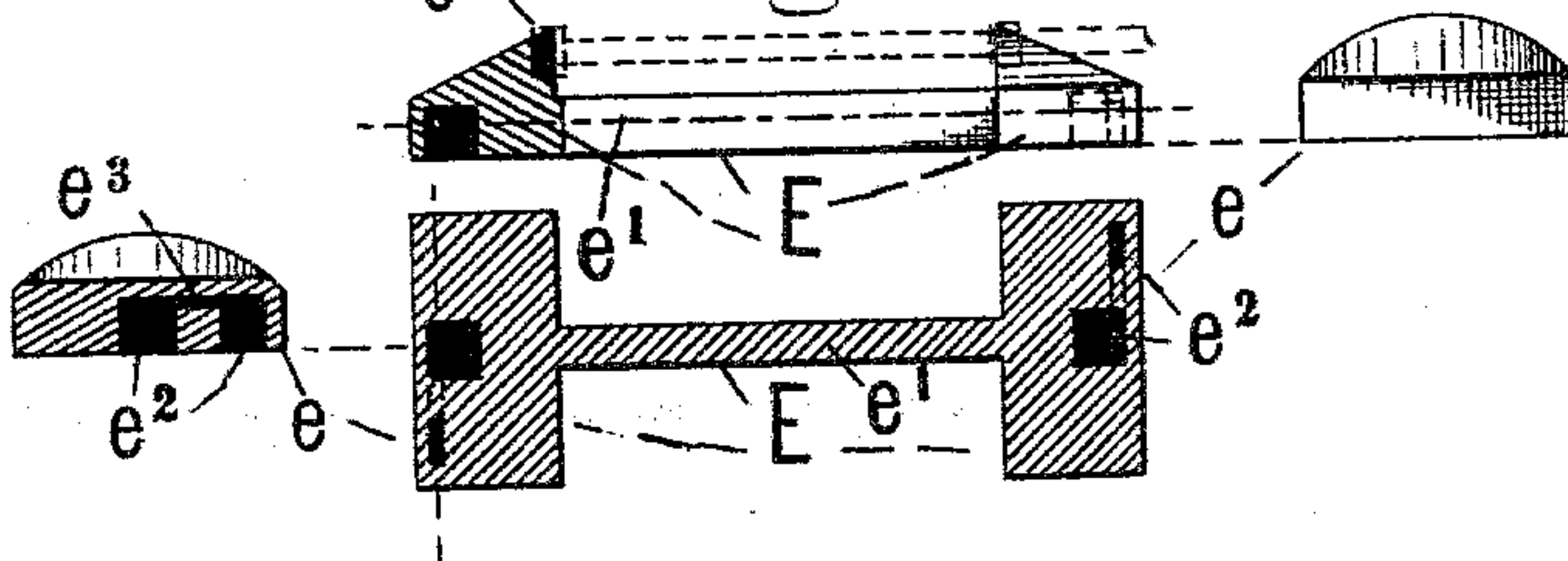


Fig. 7.

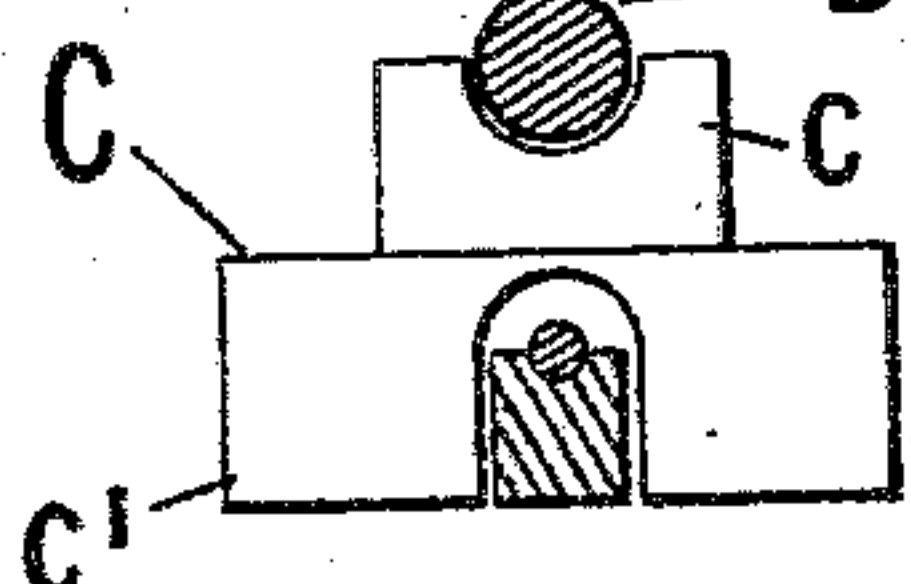


Fig. 8.

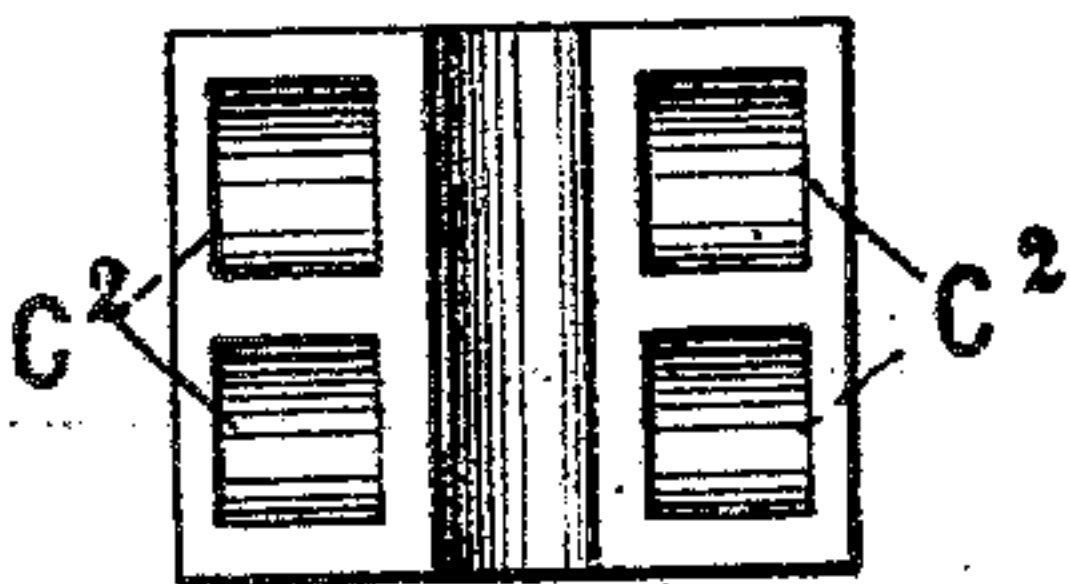


Fig. 4.

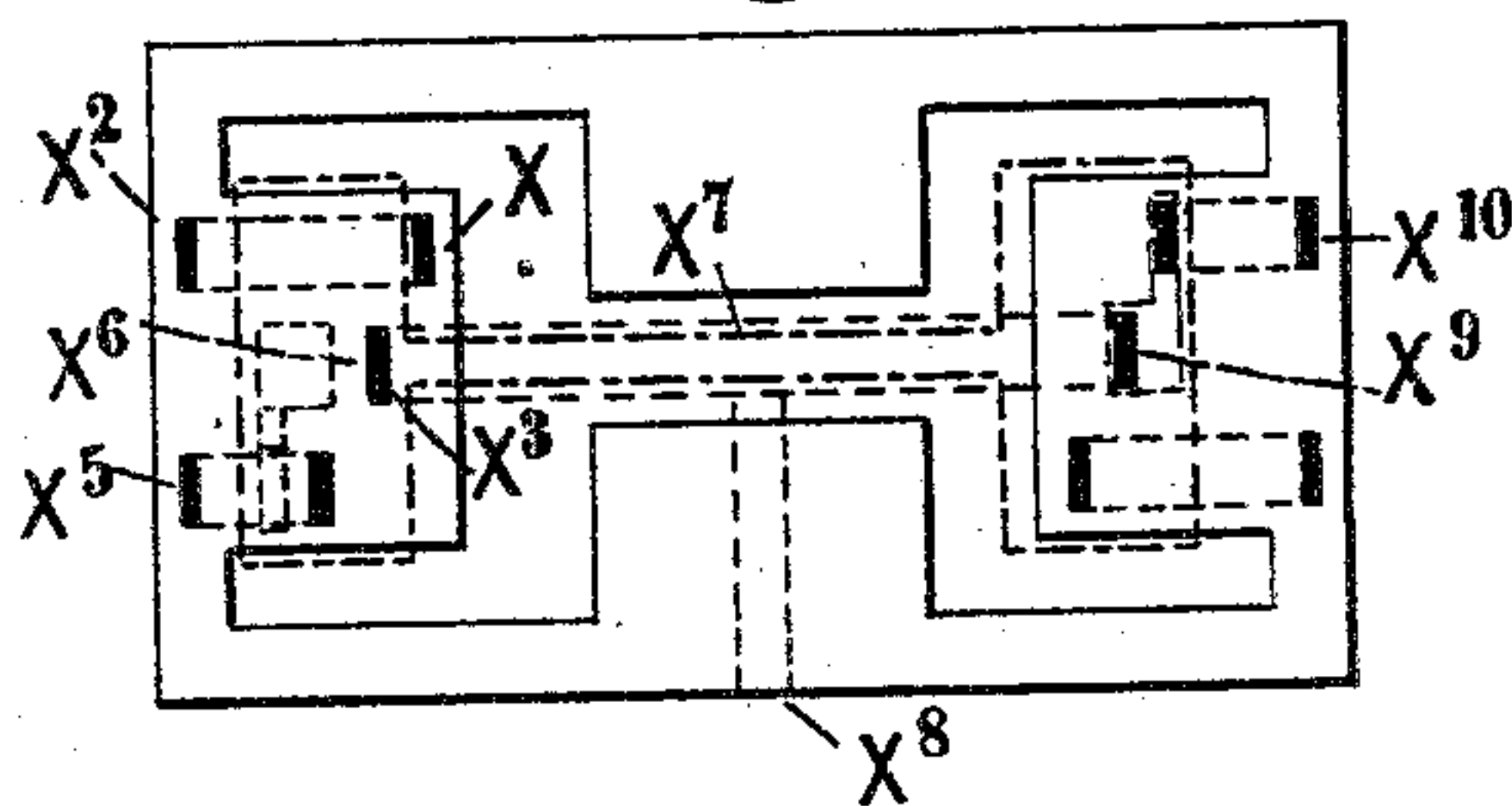


Fig. 9.

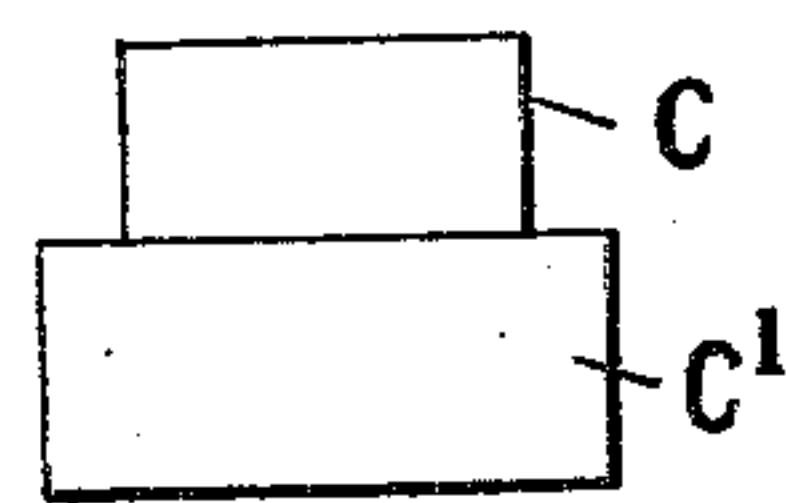


Fig. 10.

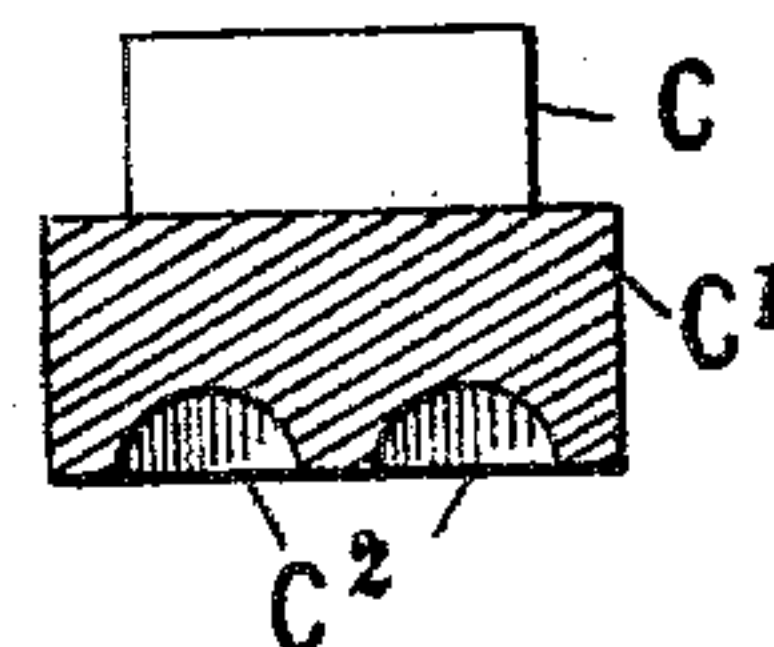


Fig. 5.

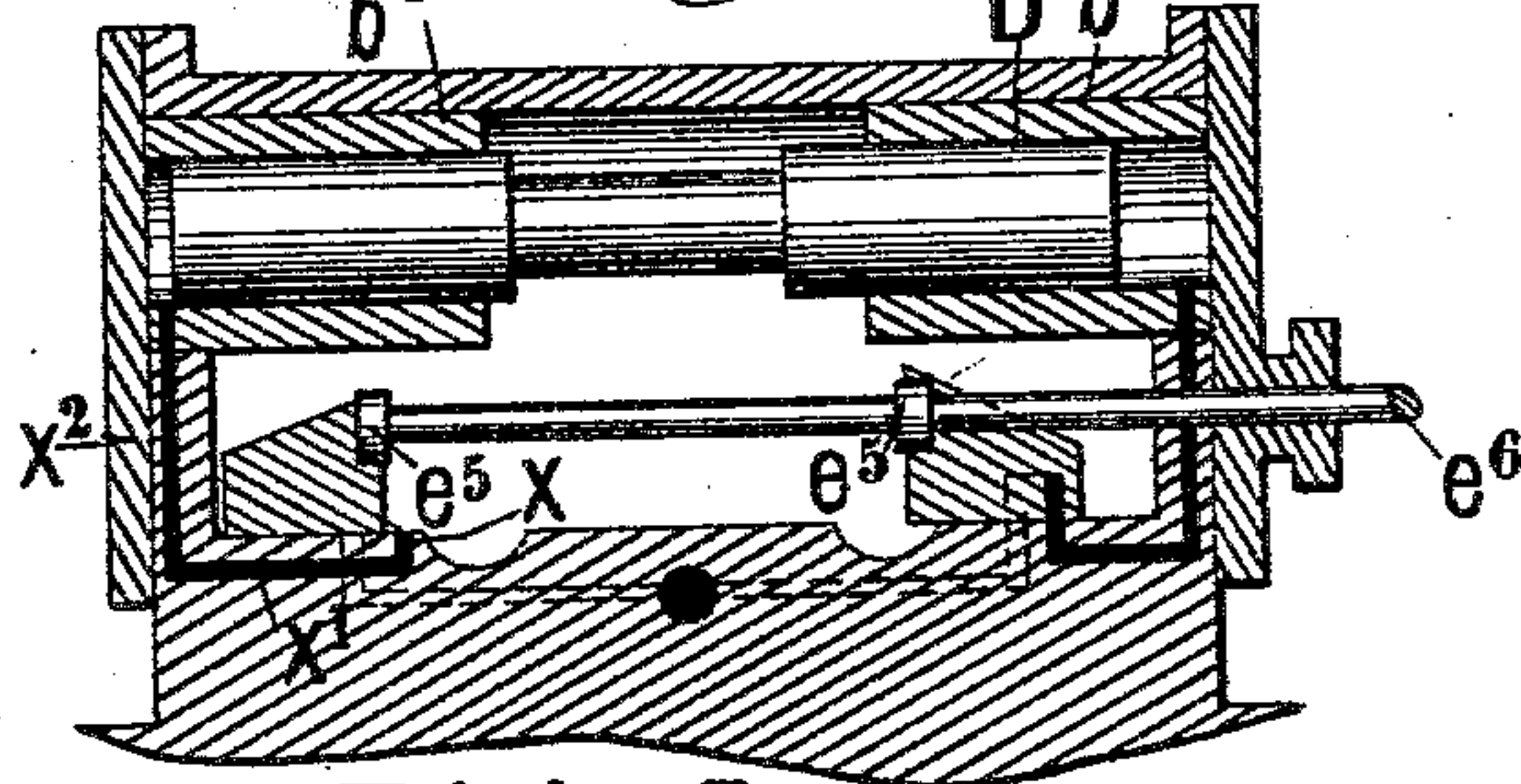
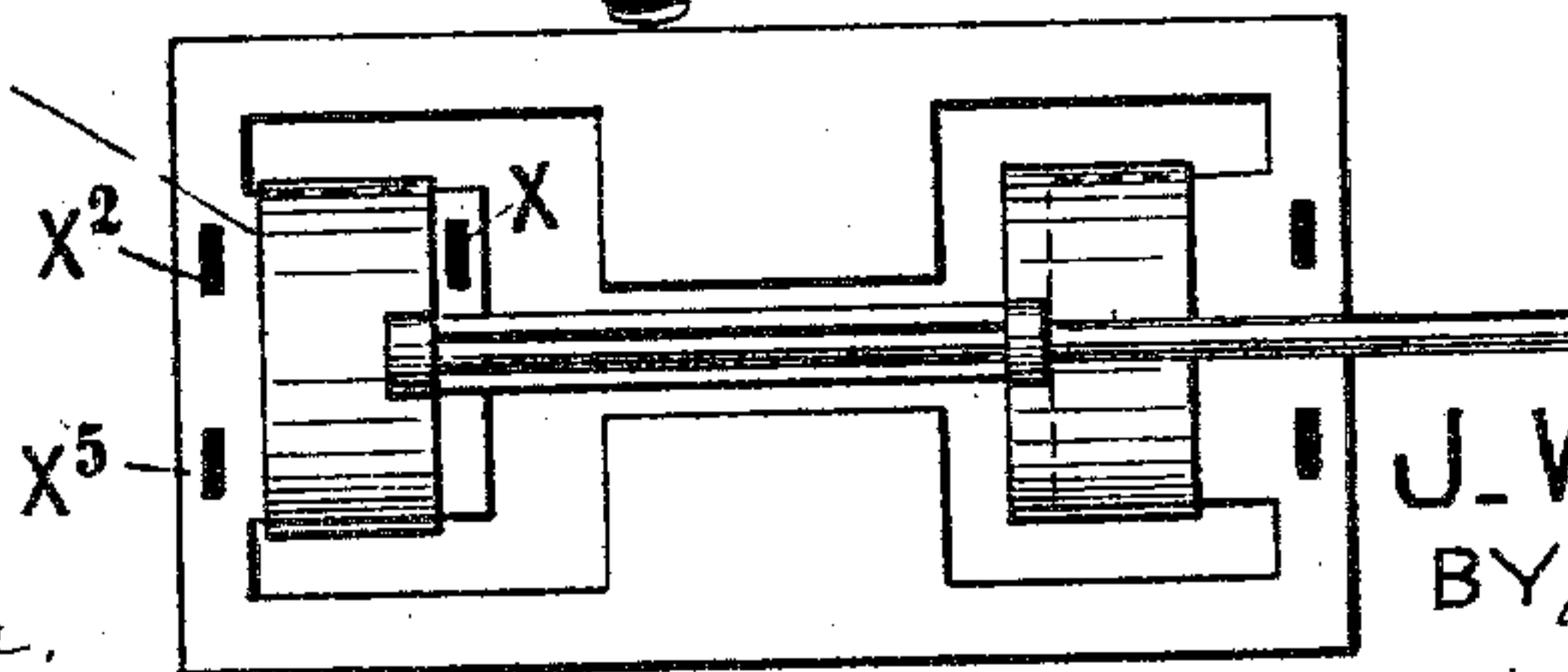


Fig. 6.



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(No Model.)

3 Sheets—Sheet 3.

J. W. RUSSELL.
STEAM ACTUATED VALVE.

No. 283,359.

Patented Aug. 14, 1883.

Fig. 11.

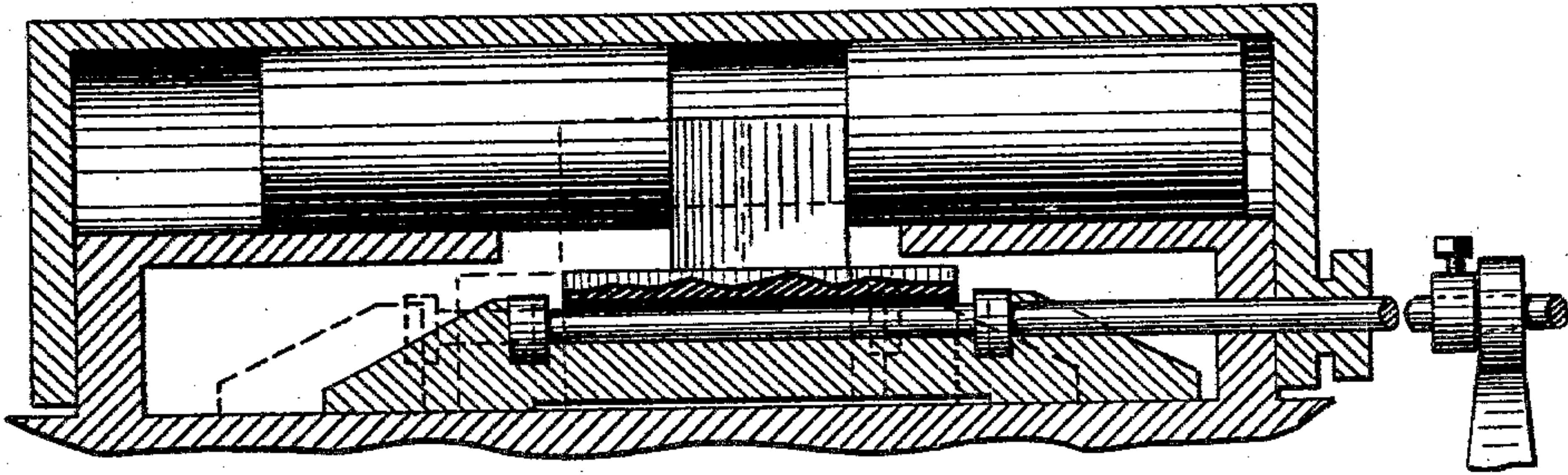


Fig. 12.

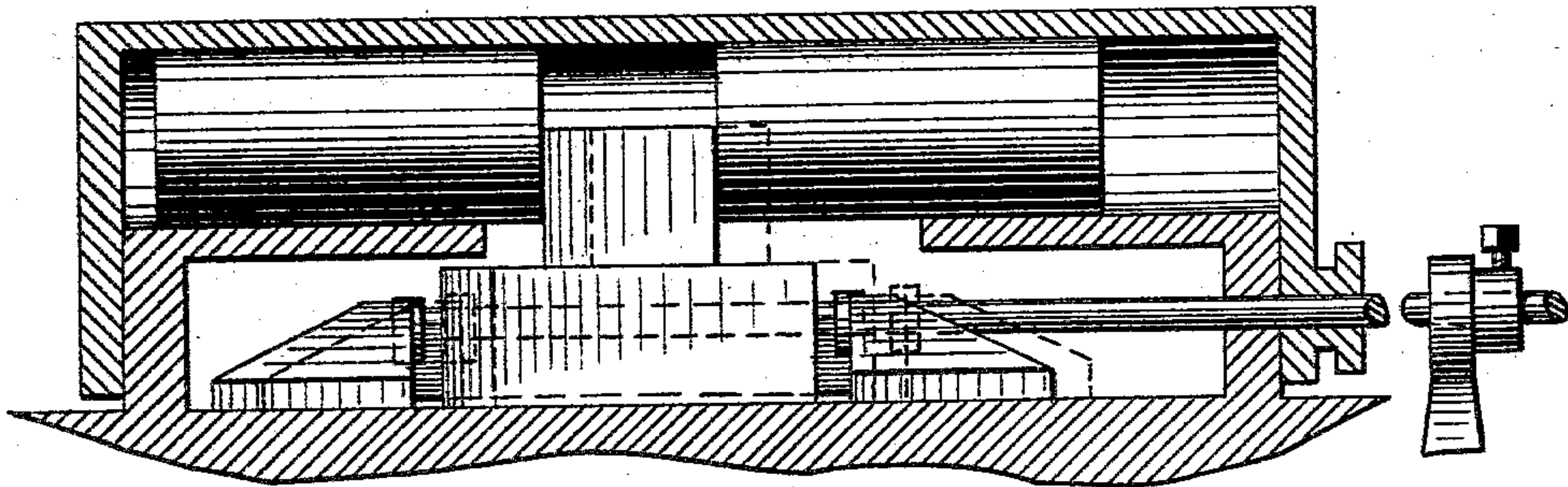


Fig. 13.

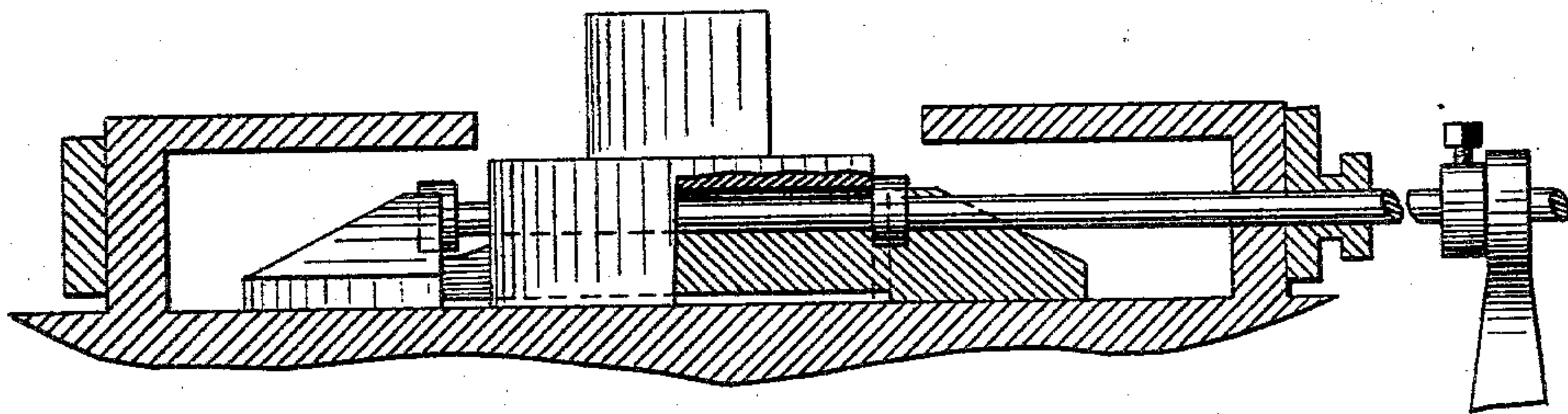
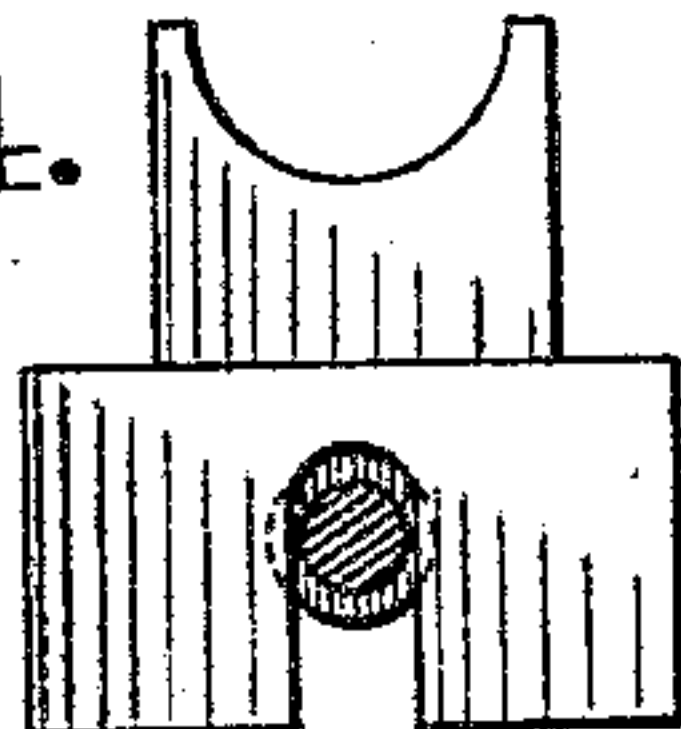


Fig. 14.



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UNITED STATES PATENT OFFICE.

JOHN W. RUSSELL, OF SOUTH HADLEY FALLS, ASSIGNOR TO THE VALLEY MACHINE COMPANY, OF EAST HAMPTON, MASSACHUSETTS.

STEAM-ACTUATED VALVE.

SPECIFICATION forming part of Letters Patent No. 283,359, dated August 14, 1883.

Application filed February 23, 1883. (No model.)

To all whom it may concern:

Be it known that I, J. W. RUSSELL, of South Hadley Falls, county of Hampshire, and State of Massachusetts, have invented new and useful Improvements in Steam-Actuated Valves for Steam-Pumps; and I do hereby declare that the following is a full and exact description of the same, reference being had to the accompanying drawings, and to the letters of reference marked thereon.

This invention relates to that class of steam-pumps in which the main valve of the steam-cylinder is primarily moved by an auxiliary steam-actuated piston governed by an auxiliary valve; and it consists, mainly, in the combination of the valve-rod for actuating the auxiliary valve with the main valve, the construction being such that when the steam-actuated piston fails from any cause to move the main valve the valve-rod of the auxiliary valve will act directly upon the same and give it positive movement.

It consists, further, in certain specific details of construction, which, with the foregoing, will be fully described hereinafter.

In the drawings, Figure 1 represents a side elevation of the steam end of my pump, with the steam-chest and cylinder in section for the purpose of showing the interior construction; Fig. 2, a plan view of the horizontal extension *a* of the steam-cylinder; Fig. 3, various views of the auxiliary valve and its parts; Fig. 4, a plan view of the horizontal extension of the steam-cylinder with the auxiliary valve in position, the latter being represented in dotted lines; Fig. 5, a sectional elevation of the valve-chest; Fig. 6, a plan view of the horizontal extension *a* of the cylinder with the auxiliary valve in position; Figs. 7, 8, 9, and 10, various views of the main valve detached; Figs. 11, 12, and 13, side views, partially in section, illustrating the relation existing between the auxiliary valve and valve-rod and the main valve; and Fig. 14, an end view of the main valve with the valve-rod in position.

To enable others skilled in the art to make and use my invention, I will proceed to describe fully its construction and manner of operation.

A, Fig. 1, represents a steam-cylinder of the usual well known construction, which is provided with a proper horizontal extension, *a*, having the ordinary steam-passages leading to the ends of the cylinder and the ordinary exhaust-opening into the atmosphere.

a' represents the piston, and *a''* the piston-rod, which is provided with the tappet-arm *a'''*, as shown.

B represents the valve-chest, consisting of the outer cylindrical portion, *b*, having a base portion adapted to be secured in any proper manner to the extension *a* of the cylinder, and two inner cylindrical portions, *b'* *b'*, of reduced area, which portions form the steam-chambers of the valve-piston hereinafter referred to.

C represents the main valve, having a shank portion, *c*, with a semicircular recess or saddle, adapted to receive the central portion of the valve-piston D, and a base portion divided into two similar parts, *c'* *c'*, each of which is provided with a bearing-face adapted to rest upon the corresponding bearing-face of the valve parts of the cylinder, as shown. Each of these parts also is provided with two exhaust-recesses, *c''* *c''*, in the manner well understood. By thus dividing the base portion, space is afforded for the rod of the auxiliary valve at the center of the main valve, as shown in Fig. 14. By means of this specific construction, it is possible, when the valve-rod is employed to move the main valve, to apply the power in the direct line of resistance. Space is thus afforded also for the web of the auxiliary valve, as shown in Fig. 7. By means of this specific construction, it is possible to locate the main and auxiliary parts in close proximity to each other and in the same horizontal plane.

D represents the valve-piston before referred to, consisting of a solid cylinder having a recessed central portion adapted to fit the saddle of the main valve, as before described, and enlarged end portions adapted to fit the cylindrical portions *b'* *b'* of the valve-chest, as before described. Sufficient space is afforded in the steam-chambers of the valve-piston to permit the necessary longitudinal movement of the piston when the same is acted upon by

the steam-pressure, as will be hereinafter described.

E represents the auxiliary valve, consisting of two segmental portions, $e e'$, united by the web portion e' , as shown. This auxiliary valve, it will be observed, does not cover the main valve, nor does it lie beneath it; but its segmental portions are located in close proximity to the ends of the main valve in the same horizontal plane, the segmental portions themselves being united by a web extending through the recess of the divided main valve, as shown in Fig. 7. By means of this location of the valve in the hottest part of the chest, the condensation of the steam carried to the auxiliary piston is effectually prevented.

$e^2 e^2$ represent exhaust-recesses of different area united beneath the surface by a passage-way, e^3 , as indicated in dotted lines, Fig. 3.

$e^4 e^4$ represent recesses in the upper face of the valve, adapted to receive the collars $e^5 e^5$ of the valve-rod e^6 , and e^7 a groove in the top of the web e' , adapted to fit this portion of the valve-rod which lies upon the same.

$e^8 e^8$ represent tappets upon the valve-rods, which are adjustably secured to the valve-rod at the proper points by means of set-screws, as shown.

x represents an auxiliary port in the horizontal extension a of the cylinder, at one end of the same, which communicates, by a passage, x' , beneath the surface, with a vertical passage, x^2 , opening above into the steam-chamber of the valve-piston, as shown. x^3 also represents an auxiliary port in the horizontal extension a of the cylinder, which communicates, by a passage, x^4 , beneath the surface, with a vertical passage, x^5 , opening above into the steam-chamber of the valve-piston. x^6 also represents an auxiliary port in the horizontal extension a , which communicates, by a passage, x^7 , beneath the surface, with the exhaust-passage x^8 , as shown. The ports $x x^3 x^6$, it will be observed, are not located in the same transverse line, but on different lines, so that each occupies a different position relatively to the valve which moves over them. A set of auxiliary ports and passages like those described is located, of course, at the opposite end of the cylinder, in the manner well understood.

The operation is substantially as follows: If the auxiliary valve is in the position shown in Figs. 4 and 6, the following effect will be produced when steam is admitted into the chest: The auxiliary port x alone being exposed in this position of the auxiliary valve, it follows necessarily that the steam will enter therein and pass through the passages described to the chamber of the valve-piston, and consequently drive the latter to the other end of the cylinder. By this movement of the valve-piston, the main valve attached thereto is shifted to close one port and open the other, in the manner well understood. The ports $x^3 x^6$, at the

same end of the cylinder as the port x , are covered when the valve is in this position, so that no steam passes through them. The port x^9 , however, at the opposite end of the cylinder, which corresponds with the port x^3 at this end, now communicates with the vertical passage x^{10} , leading from the steam-chamber of the valve-piston, and also, by means of the exhaust-recess in the valve and its connecting-passages, with the exhaust-passages $x^7 x^8$. In consequence of this relation of parts, therefore, proper provision is made for the exhaust at one end when steam is admitted at the other. The proper movements of the auxiliary valve, it will be understood, are communicated to it, after the pump has been started, by the contact of the tappet-arm a^3 of the piston-rod with the tappets $e^8 e^8$ upon the valve-rod e^6 , in the manner well understood. This action of the auxiliary valve, as has been before described, admits steam to the valve-chest for the purpose of actuating the valve-piston to shift the main valve. When this operation is properly performed, as indicated in Figs. 11 and 12, the valve-rod has no connection whatever with the main valve, its normal function being to give movement only to the auxiliary valve. When, however, from any cause, the valve-piston fails to start, the collar e^5 of the valve-rod is caused in the movement of the latter to strike the main valve, as indicated in Fig. 13, and carry the same to its proper place. This collar, it will be observed in Fig. 14, is applied to the valve at its center in the direct line of resistance, so that all tendency to twist or strain the rod is avoided. When it is understood that the main valve is moved under full pressure, the importance of a direct application of power will be appreciated.

Some of the advantages of the described construction are as follows: By constructing the main valve with a divided base and locating the valve-rod in the space resulting therefrom, it is possible to apply the power exerted by the valve-rod to move the main valve in the direct line of resistance. By locating also the web of the auxiliary valve in the space formed by the division of the main valve, it is possible to arrange the main and auxiliary ports in close proximity and in the same horizontal plane.

Having thus fully described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In combination with the main valve having a divided base, and a valve-rod extending through the divided base, the auxiliary valve with central web, the web portion only of the auxiliary valve being located in the recess of the main valve, and the segmental portions $e e'$ at each end in the same horizontal plane.

2. In combination with a valve-rod having collars $e^5 e^5$, an auxiliary valve attached to the valve-rod, and a main valve not attached to the valve-rod, but having its ends located at right

angles to the line of movement of the valve-rod, in close proximity thereto, and not in contact therewith, the construction being such that when the parts have their normal and proper operation the valve-rod does not actuate the main valve, but when the valve portion fails to move the main valve the same is actuated directly by the valve-rod.

This specification signed and witnessed this 20th day of February, 1883.

JOHN W. RUSSELL.

Witnesses:

STEPHEN HALEY,
FRED H. MORRILL.