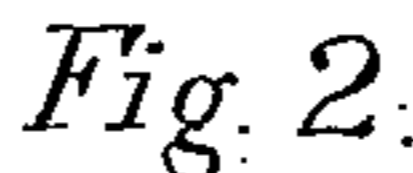
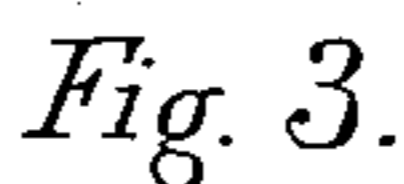
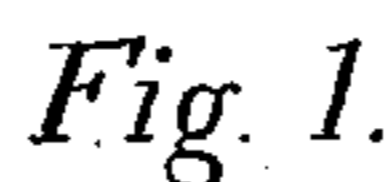


4 Sheets—Sheet 1.

No. 253,686.

Patented Feb. 14, 1882.



L. M. Hopkins.
Jno. L. Condon

Eugene R. Eaton,
Cyrus Tufts,
Knight Bros
Attys.

By

(No Model.)

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E. R. EATON & C. TUFTS.

STEAM PUMP.

No. 253,686.

Patented Feb. 14, 1882.

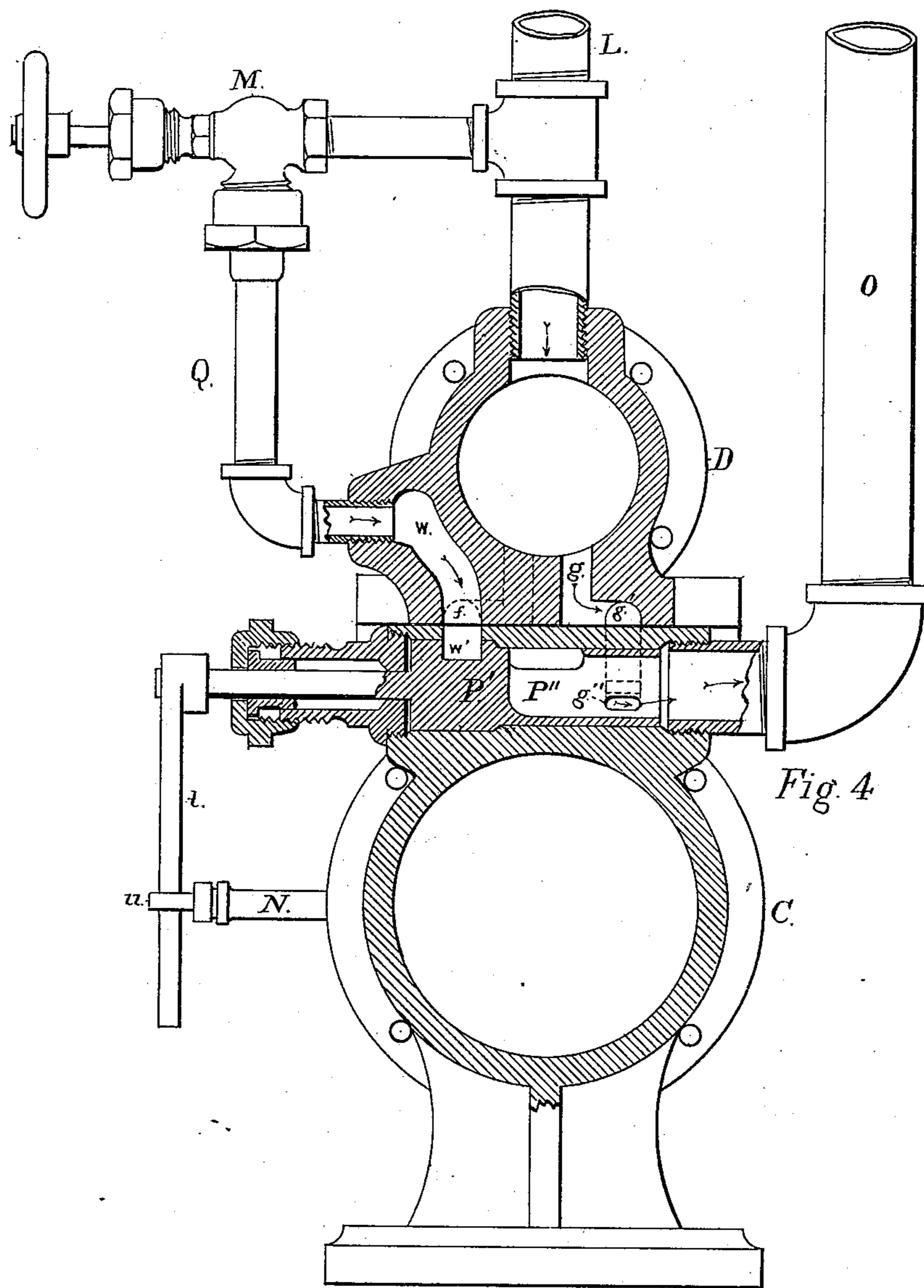


Fig. 4

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STEAM PUMP.

No. 253,686.

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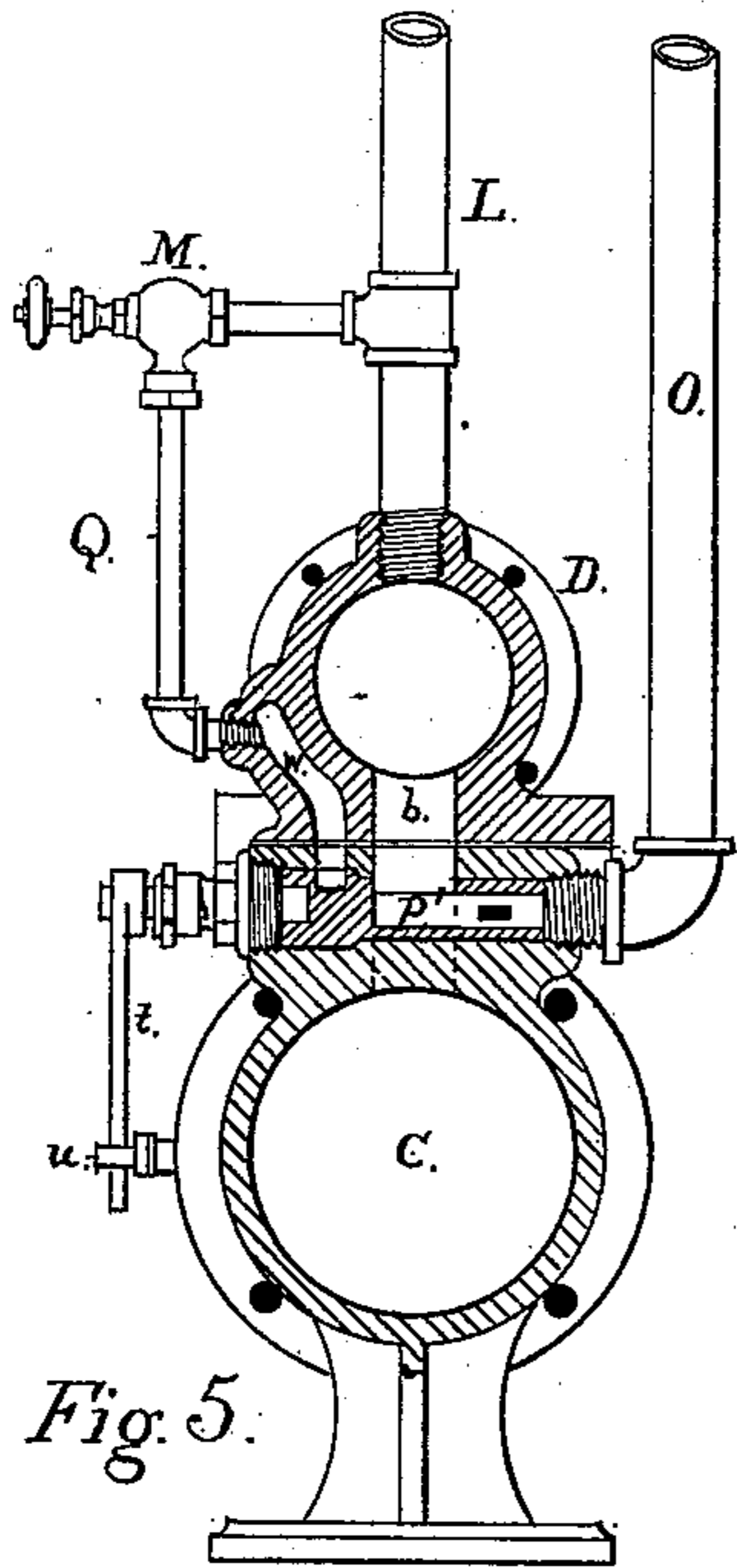


Fig. 5.

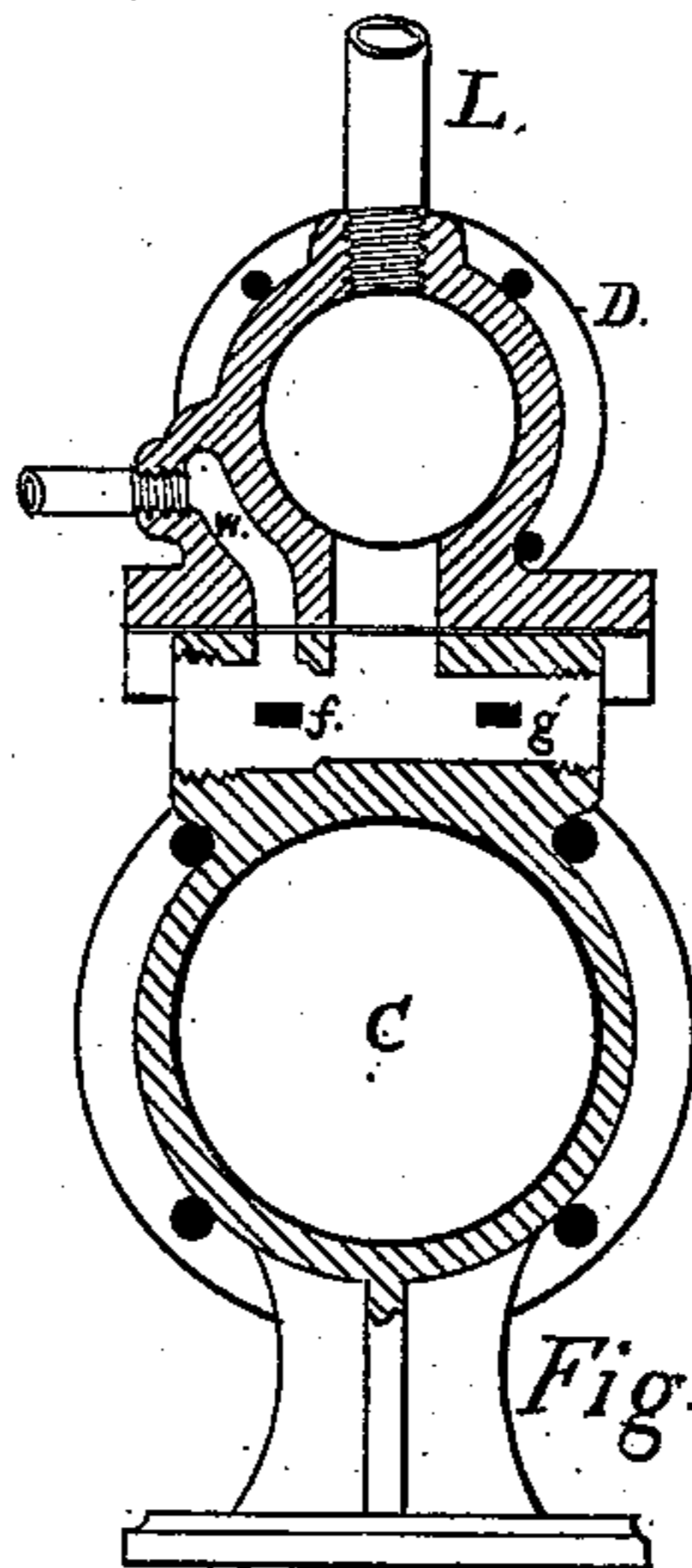


Fig. 6.

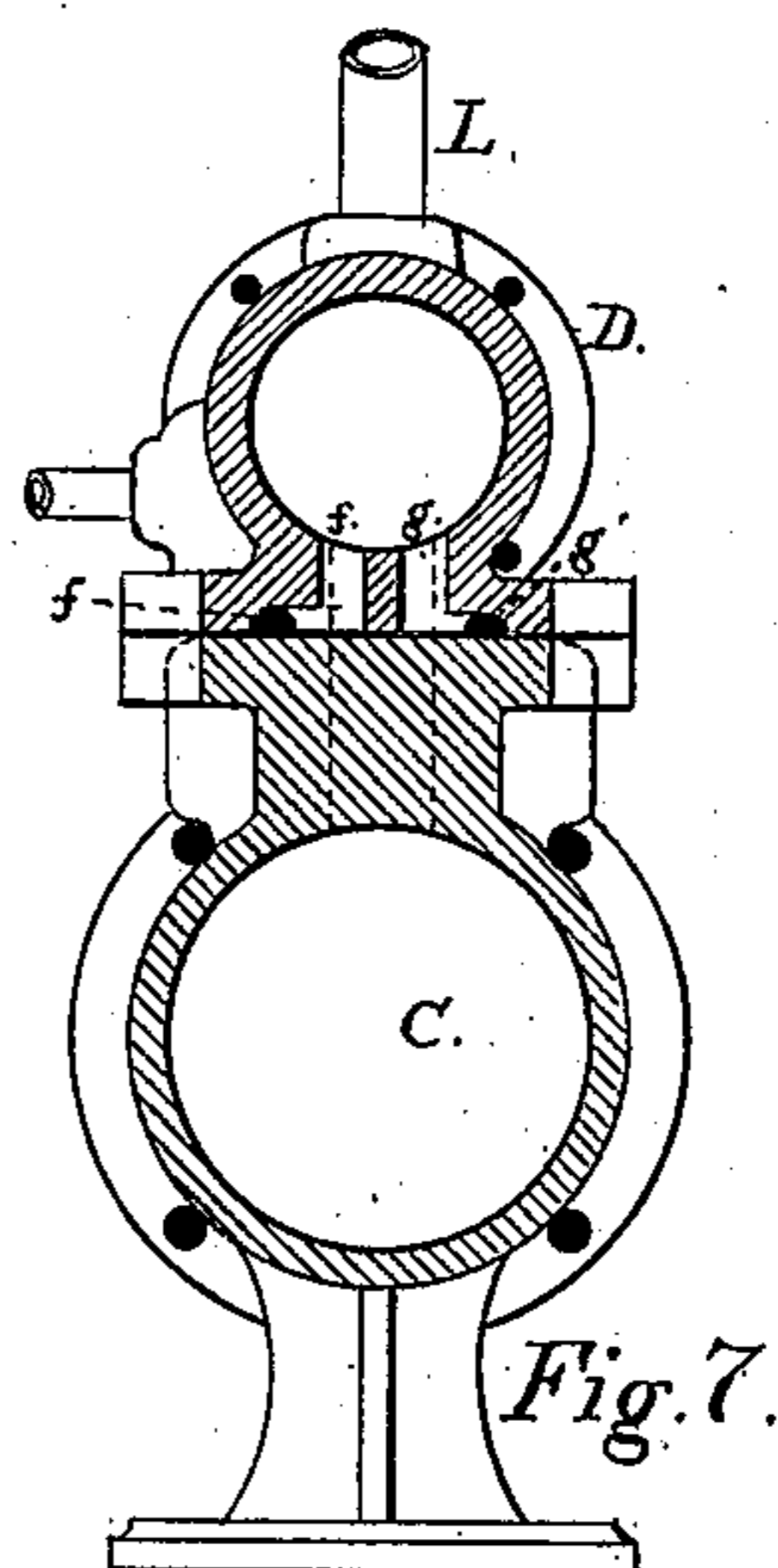


Fig. 7.

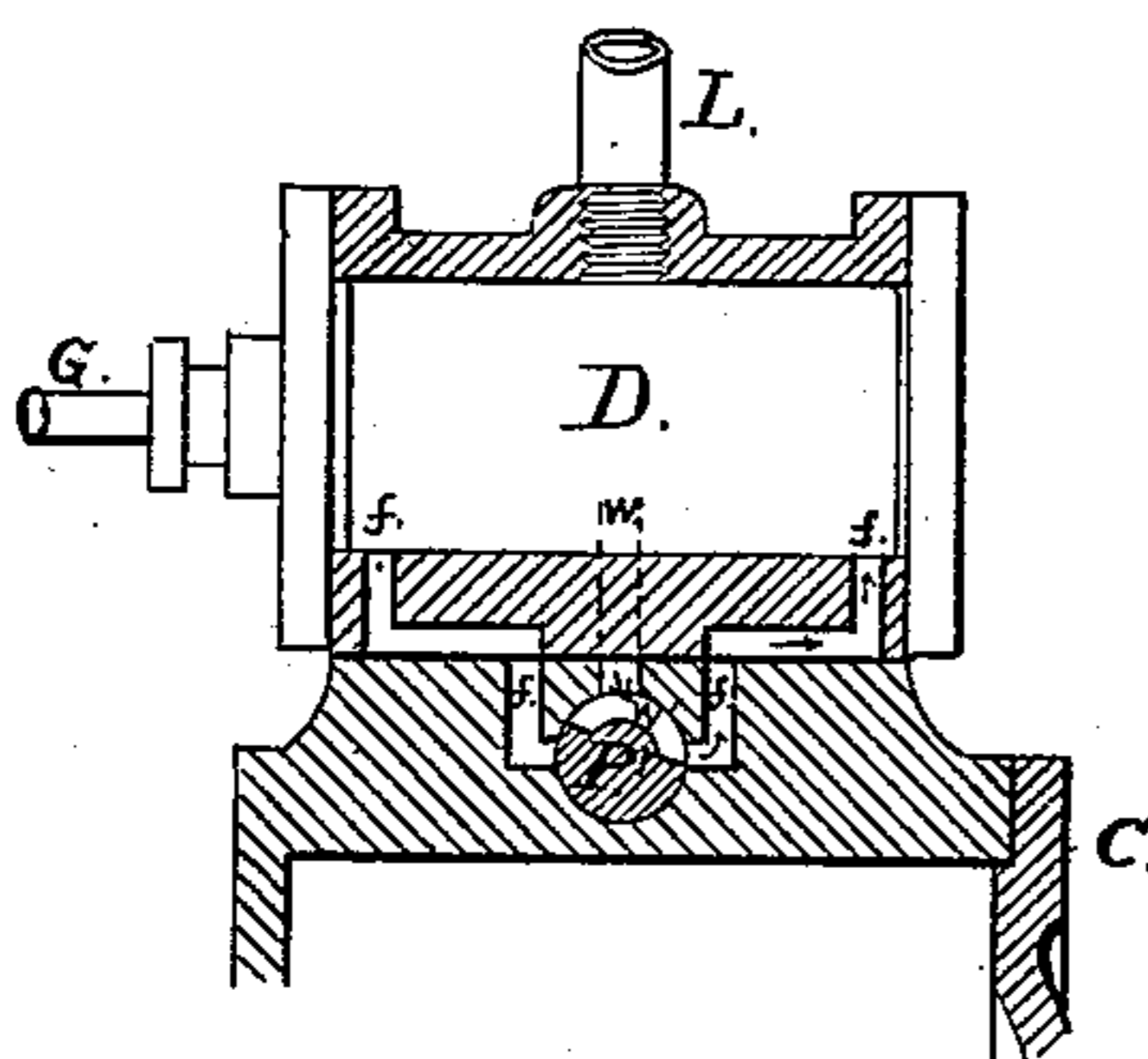


Fig. 8.

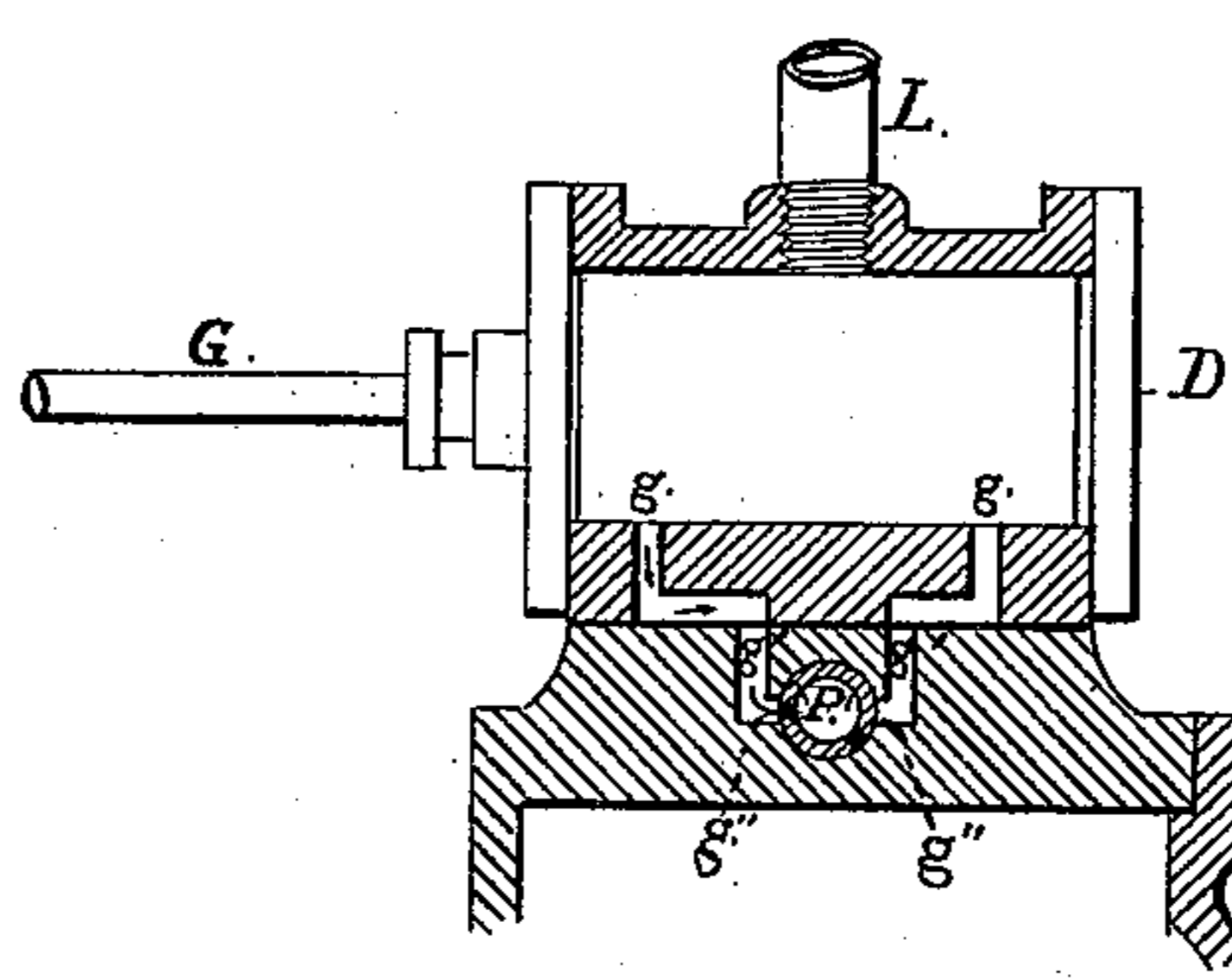


Fig. 9.

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No. 253,686.

Patented Feb. 14, 1882.

Fig. 10.

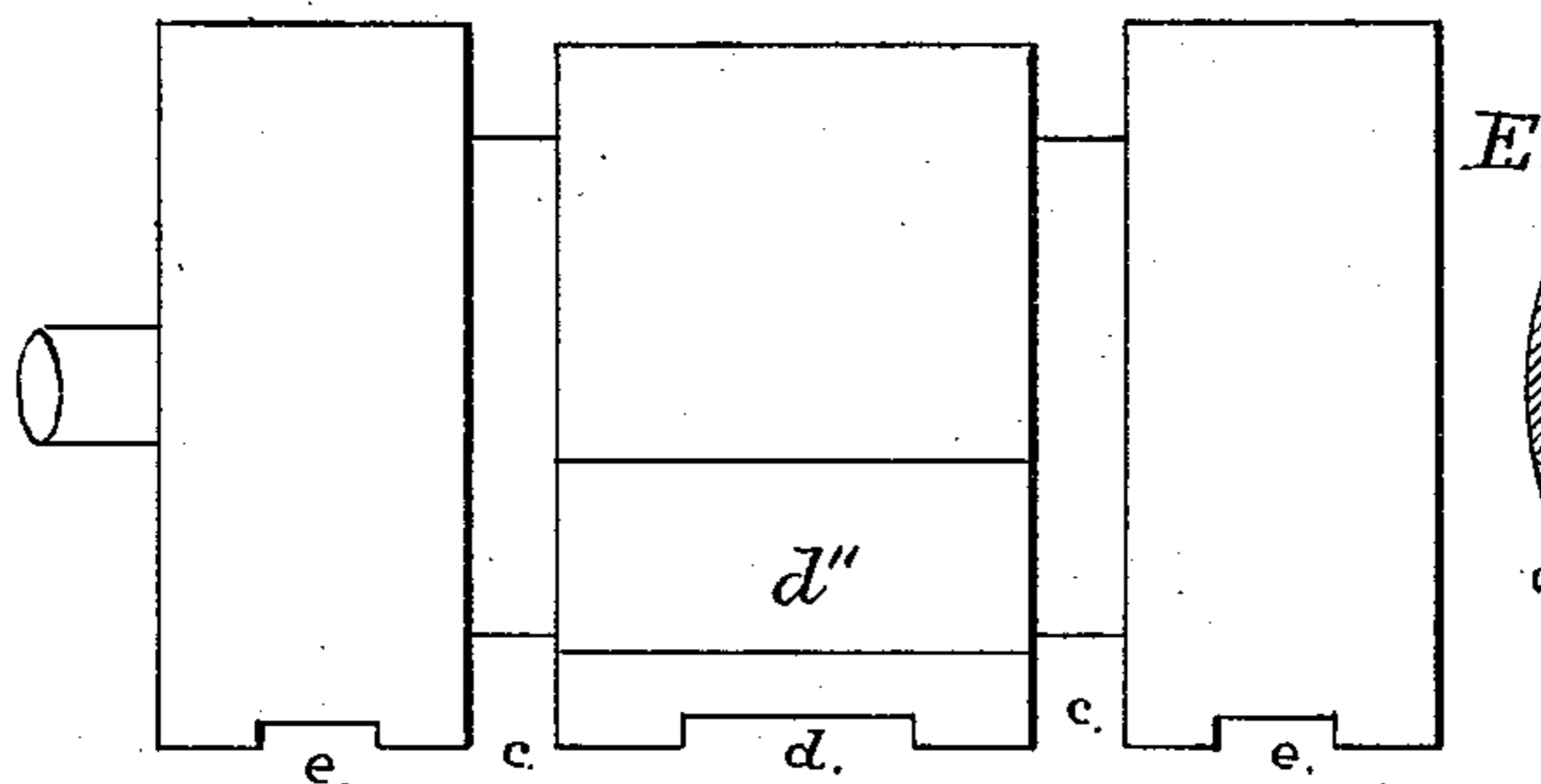


Fig. 11.

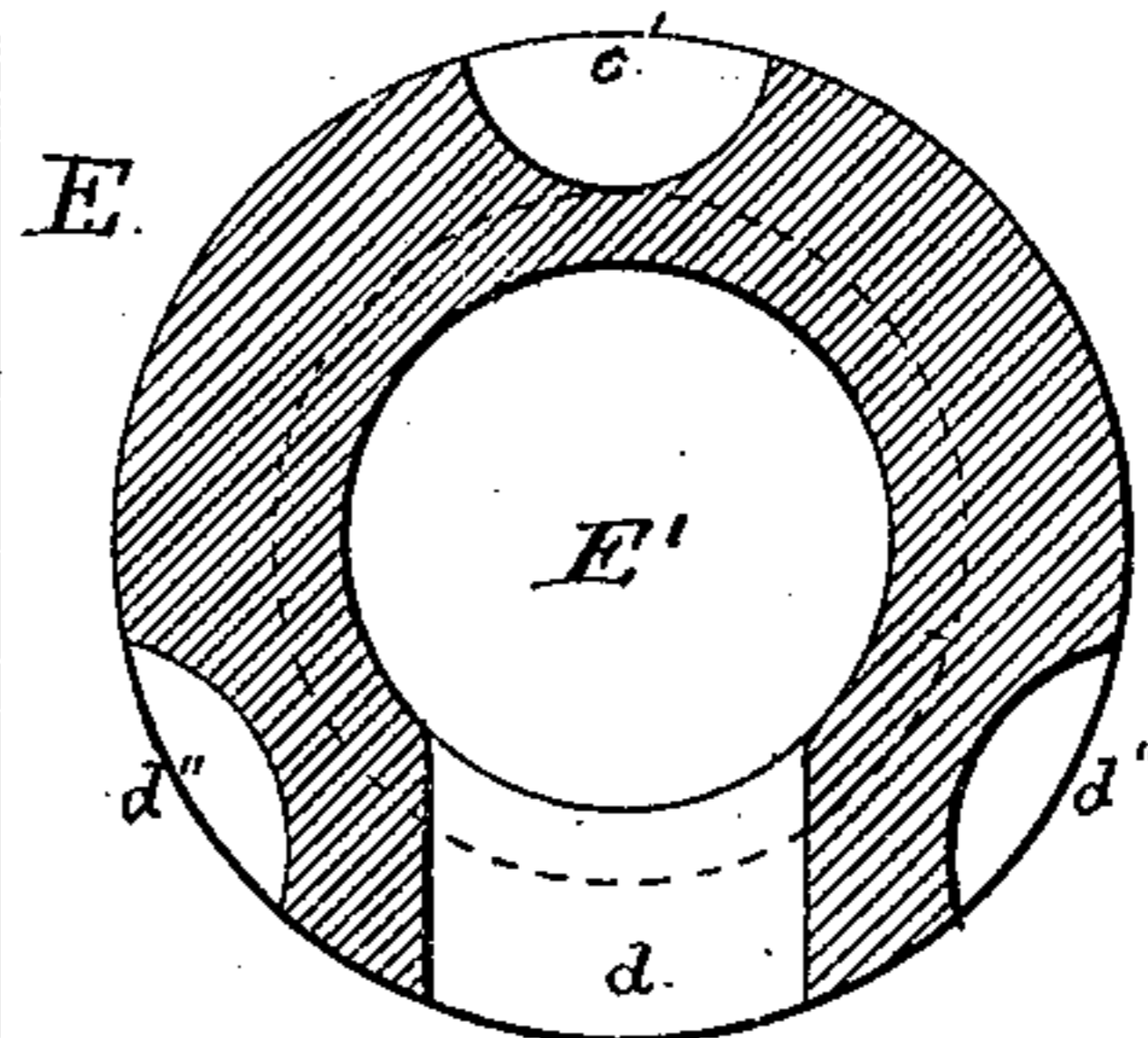


Fig. 12.

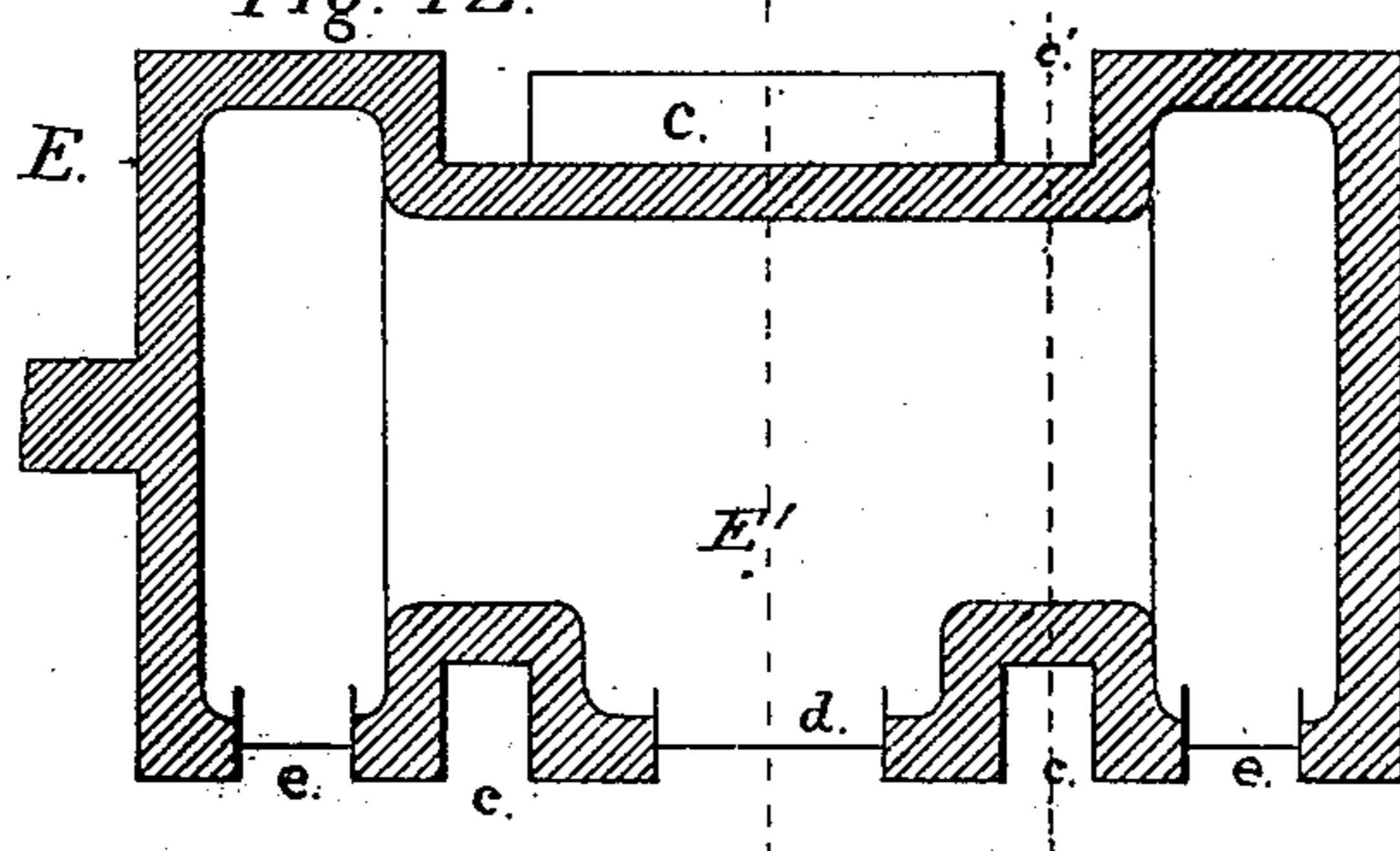


Fig. 13.

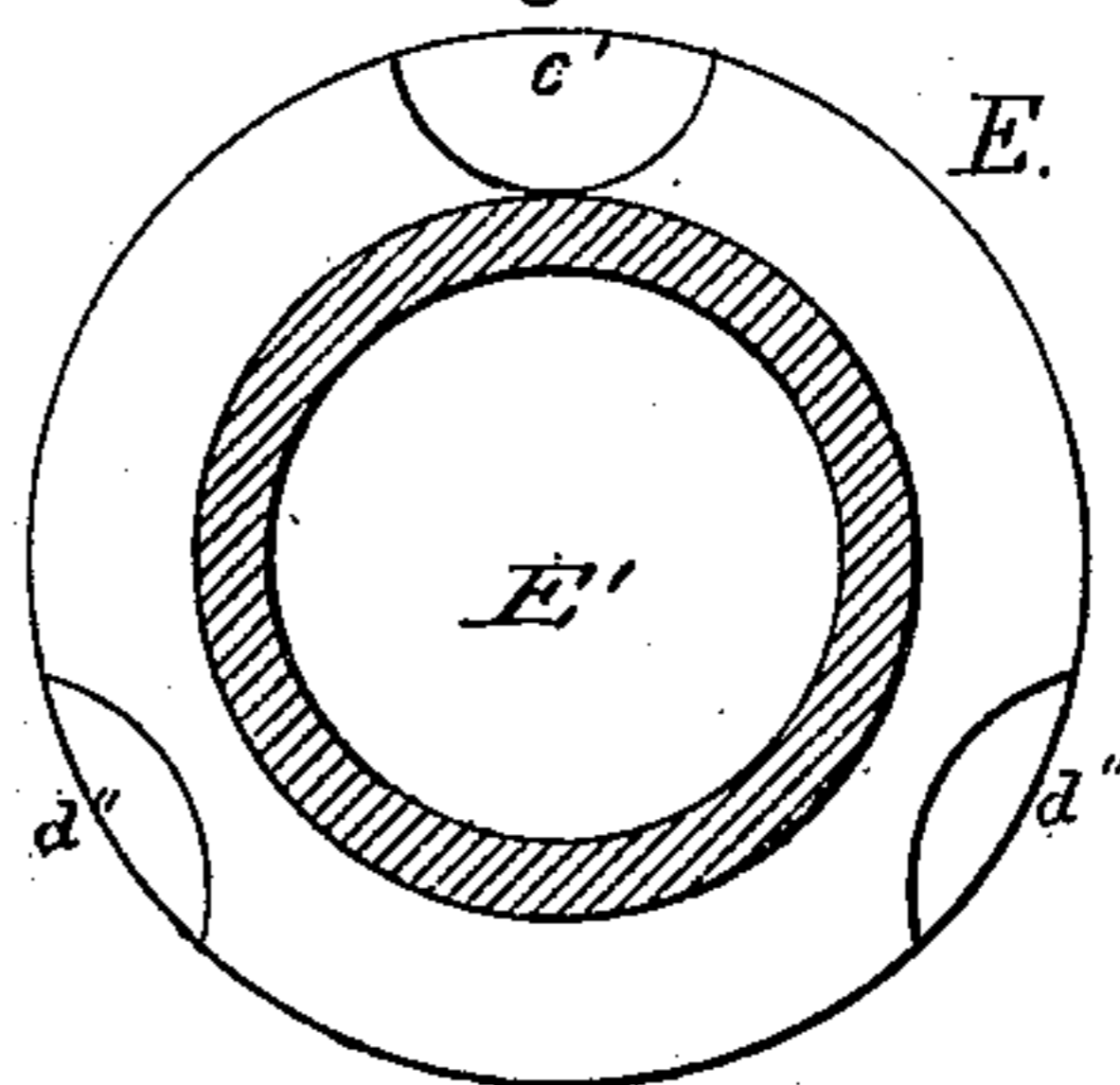


Fig. 14.

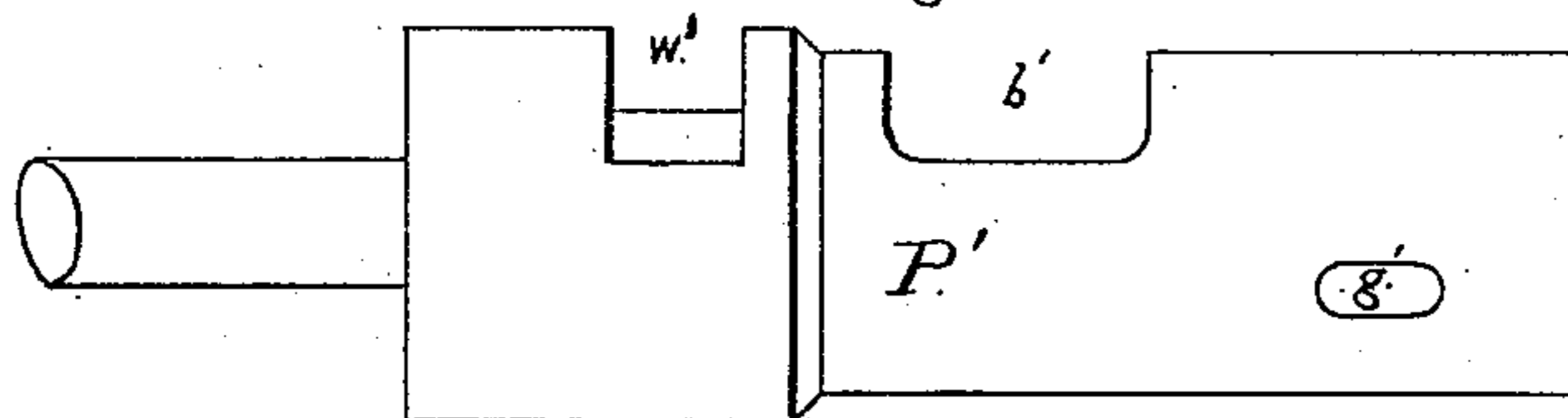


Fig. 15.

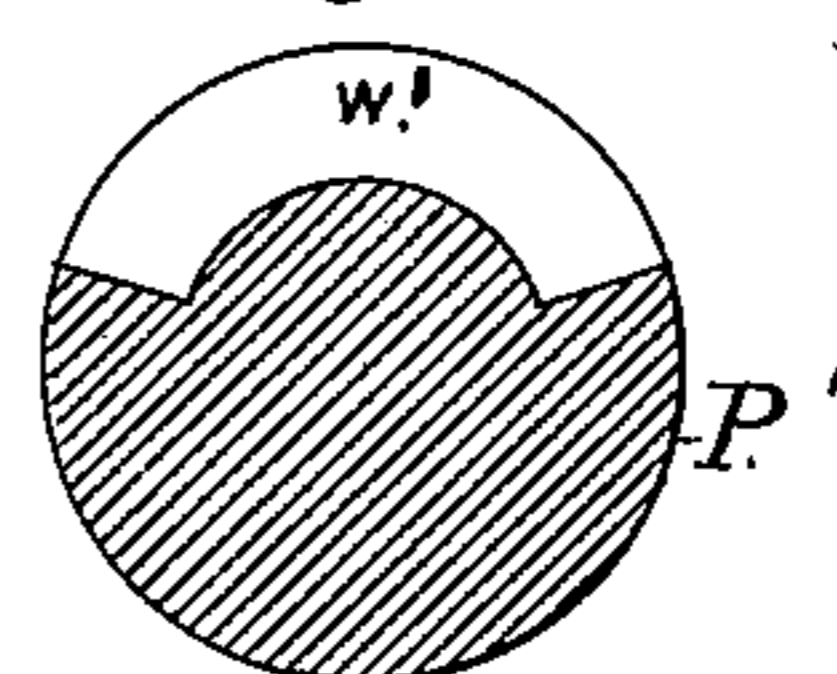


Fig. 16.

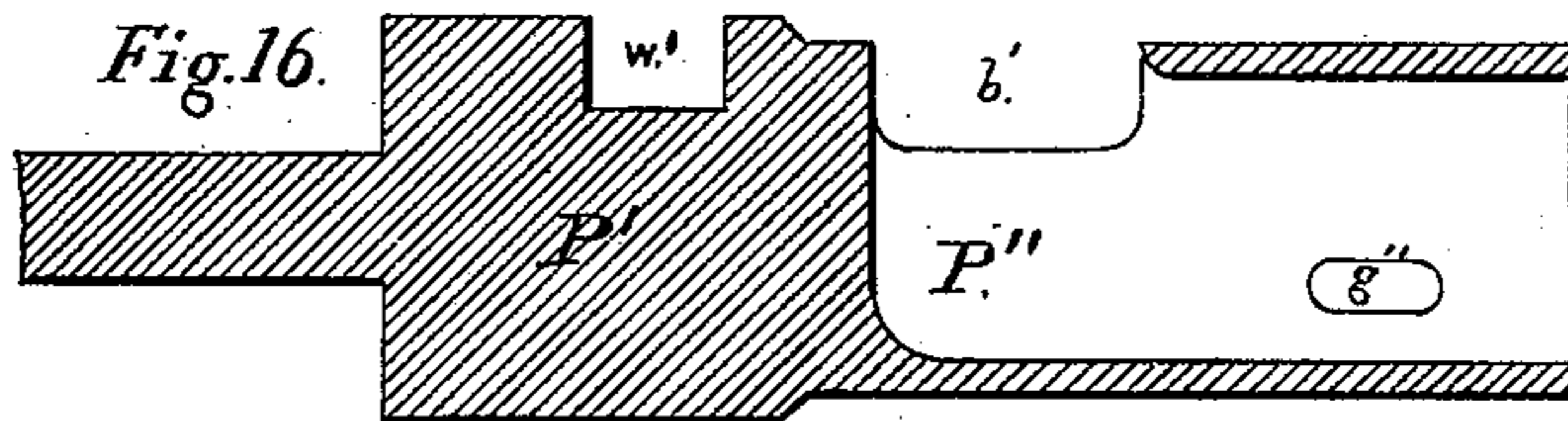
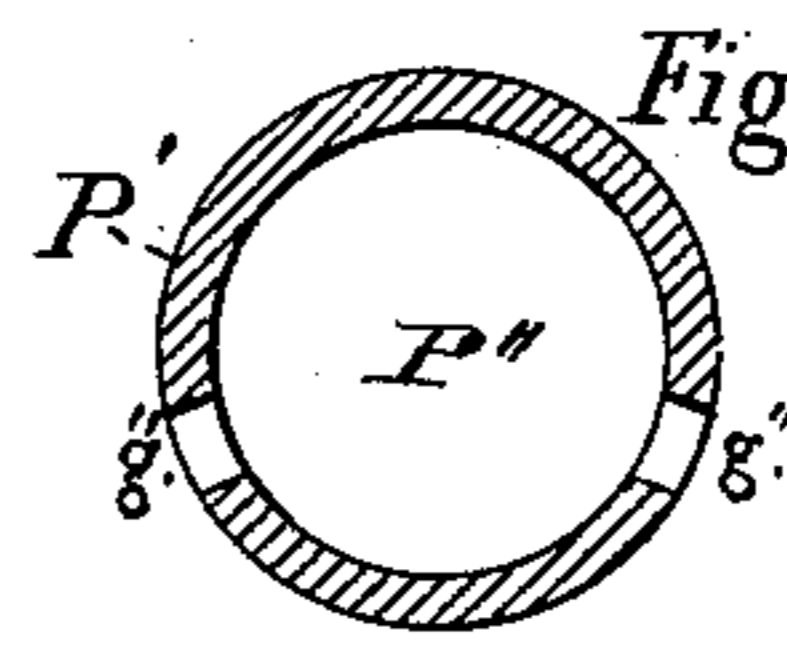


Fig. 17.



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UNITED STATES PATENT OFFICE.

EUGENE R. EATON AND CYRUS TUFTS, OF COLUMBUS, OHIO, ASSIGNORS
OF ONE-THIRD TO DANFORTH H. ROYCE, OF SAME PLACE.

STEAM-PUMP.

SPECIFICATION forming part of Letters Patent No. 253,686, dated February 14, 1882.

Application filed October 18, 1881. (No model.)

To all whom it may concern:

Be it known that we, EUGENE R. EATON and CYRUS TUFTS, both of Columbus, Franklin county, Ohio, have invented new and useful Improvements in Steam-Pumps, of which the following is a specification.

Our improvements comprise a mode of enabling proper steam-induction and the balancing of the piston by an arrangement hereinafter described of balance grooves or ports.

In the accompanying drawings, Figure 1 is a partially-sectioned elevation of a steam-pump embodying our invention. Fig. 2 is a top view of the steam-cylinder after removal of the steam-chest. Fig. 3 is an inverted plan of steam-chest. Fig. 4 is a transverse sectional elevation of steam-cylinder and steam-chest with the interposed auxiliary valve, into which the exhaust-ports are shown opening. Fig. 5 is a section of same members, taken on the vertical line of exhaust-port *b*, and showing the general exhaust as taking place through cavity of the auxiliary valve. Fig. 6 is a transverse sectional elevation of steam-cylinder and steam-chest after removal of the auxiliary valve. Fig. 7 is a transverse sectional elevation of steam cylinder and chest in the plane of the inlet and exhaust ports, where they enter and leave the said chest. Fig. 8 is a longitudinal sectional elevation of the steam-cylinder and chest on the line of the admission-ports, showing steam being admitted to right hand of chest by means of cavity in valve. Fig. 9 is a similar section on line of exhaust-ports, showing steam being exhausted from left-hand end of chest through auxiliary passages *g g'* and auxiliary ports *g''*. Fig. 10 is a side elevation of main steam-valve, showing the annular steam-ports and the exhaust-ports. Fig. 11 is a transverse section of the same in the plane of the central exhaust-port, and showing the three balancing-cavities. Fig. 12 is an axial section of the steam-valve. Fig. 13 is a transverse section of steam-valve in the plane of one of the annular steam-ports. Fig. 14 is a side elevation of the auxiliary valve. Fig. 15 is a transverse section of the same in the plane of the live-steam port. Fig. 16 is a vertical axial section of the auxiliary valve. Fig.

17 is a transverse section of the same in the plane of the exhaust-ports.

A may represent a pump-barrel of customary or any suitable form, to which the steam-cylinder C is firmly united in axial alignment in the accustomed manner of direct-acting steam-pumps, as shown in Fig. 1. B is the water-valve chest. D is the steam-valve chest, preferably of cylindrical form, as shown. E represents the steam-valve proper, fitting the bore of chest D, and enough shorter than it to permit the desired play or stroke of the said valve within the same. F is the water-valve, preferably of the represented D form, and associated with customary supply and discharge passages, *P o m l k*. The pump-valve rod G connects by right and left adjusting-nut *n* with steam-valve rod G'.

All the above-described parts may be of common construction and require no more specific description.

L represents the main steam-supply pipe, which pipe communicates with steam-chest D at the mid-length of the latter, and by branch pipes U and Q with auxiliary steam-passage W, and thence with the auxiliary steam-cavity W' in the periphery of the auxiliary valve P'.

M may represent any convenient form of throttle to regulate the supply of steam to the auxiliary passages.

As in all so-called "direct-acting" steam-pumps, the pump-piston I and the steam-piston J are rigidly coupled by means of a rod, H, common to both. A cross-head, N, adjustably attached to piston H, has a rod, *r*, whose remote extremity traverses a guide-eye, *v*.

Projecting from rod *r* are tappets *u u'*, which, near the conclusion of the respective forward and backward strokes of the pistons, alternately take part in striking an arm, *t*, that projects from auxiliary valve P', and by so doing operate to reverse the same.

f f' are auxiliary steam-passages, of which one set communicates with each end of steam-valve chest, so as to admit steam alternately to either end of chest as the auxiliary valve is oscillated.

g g' are auxiliary exhaust-passages, of which one set communicates with the steam-valve

chamber D at some distance from its end and the other with said chamber at a corresponding distance from the other end. The purpose of locating these auxiliary exhaust-passages at some distance from the extreme ends of the steam-valve chamber is to insure the imprisonment of a certain portion of steam as the valves approach the terminations of their strokes, and by so doing provide a steam-cushion that effectually prevents the collision of the valves against the heads of their respective chambers. The said steam-passages and exhaust-passages are formed partly in the crown of the steam-cylinder and partly in the bottom of the steam-valve chest, as clearly shown in Figs. 1, 2, 3, 4, 7, 8, and 9. Auxiliary exhaust-ports g'' in the auxiliary valve P' communicate alternately with the exhaust-passages g' , and, permitting steam to exhaust into chamber P'' , allow it to discharge into the escape-pipe O.

The steam-valve proper, E, has two annular grooves, c , connected by three equidistant longitudinal valleys, $d'' d'' c'$, of which valley c' on the zenith of the valve communicates with the steam-pipe L. From valley c' live steam flows into the grooves c and passes alternately from one or other of them into the appropriate steam-port a of the steam-cylinder as the steam-valve E reaches the respective termini of its strokes. At the same instant an exhaust-port, e , of said valve, at the remote extremity thereof, comes into communication with the other port, a , of the steam-cylinder, and permits the escape of steam from said cylinder through ports $b b'$ into the chamber P''

and thence into the escape-pipe O. It will thus be seen that the chamber P'' of auxiliary valve P' does service as the common passageway both of the main and auxiliary exhausts. The supplementary valleys d'' secure an equal steam-pressure on all sides of the valve.

We claim as new and of our invention—

1. In a steam-driven water-pump, the steam-valve proper, E, of piston form, having adjustable rigid connection $G G'$ with the pump-valve, and having the central chamber, E' , with the exhaust-ports $e e d$, and having the exterior circumferential and longitudinal steam-passages $c c c' d'' d''$, substantially as described.

2. In combination with auxiliary valve P' , having the auxiliary steam-cavity W, and having the central cavity, P'' , with main and auxiliary exhaust-ports b' and g'' , the auxiliary steam-ducts $f f'$, communicating with the extreme ends of valve-chamber D, and the auxiliary exhaust-ducts $g g'$, communicating with the said chamber at some distance from its extremities, substantially as described.

3. The combination of the steam-valve E and the auxiliary valve P' , having the auxiliary steam-cavity W, and having the central cavity, P'' , with main and auxiliary exhaust-ports b' and g'' , as set forth.

In testimony of which invention we hereunto set our hands.

EUGENE R. EATON.
CYRUS TUFTS.

Attest:

GEO. H. KNIGHT,
A. C. SHATTUCK.