

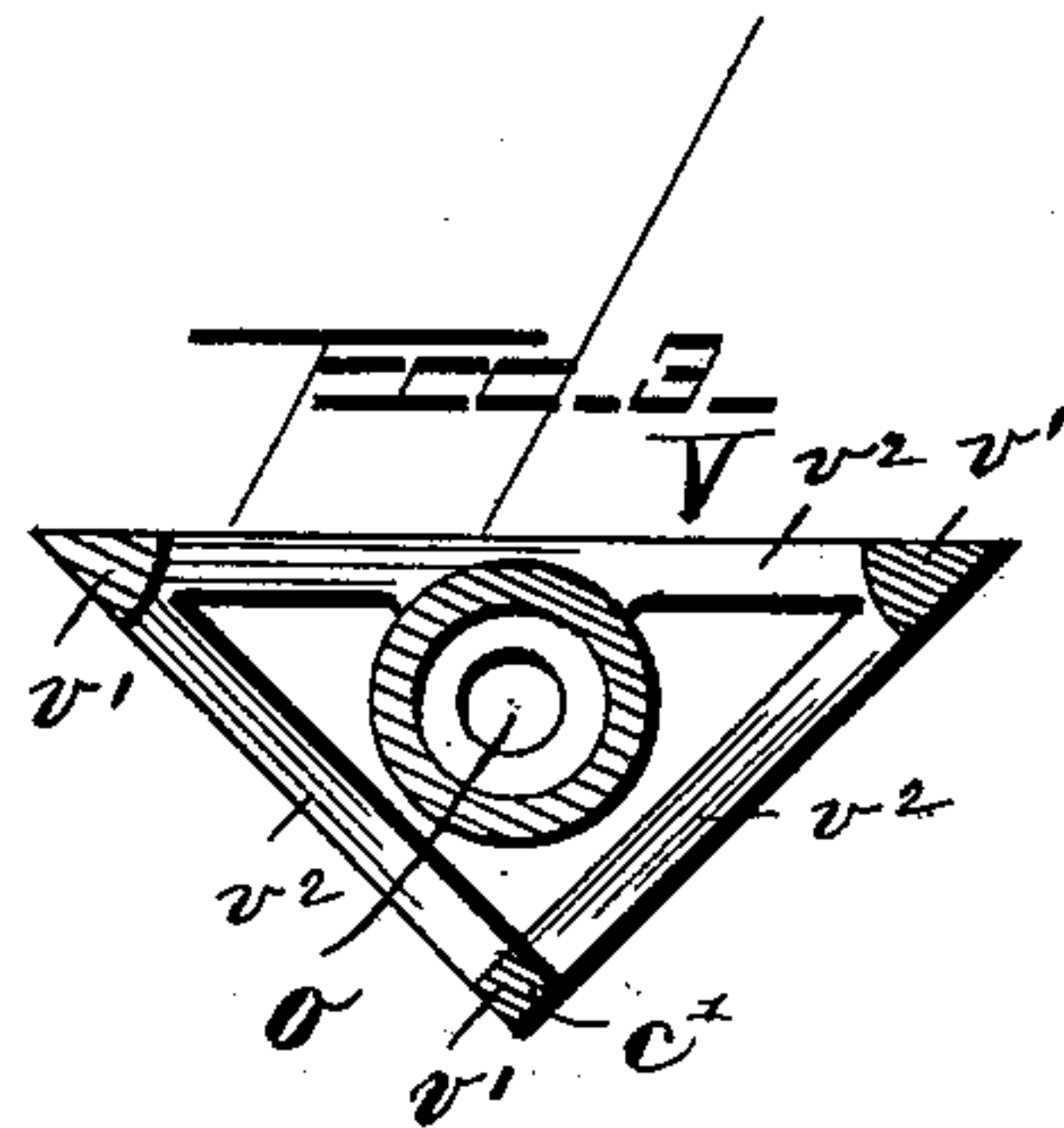
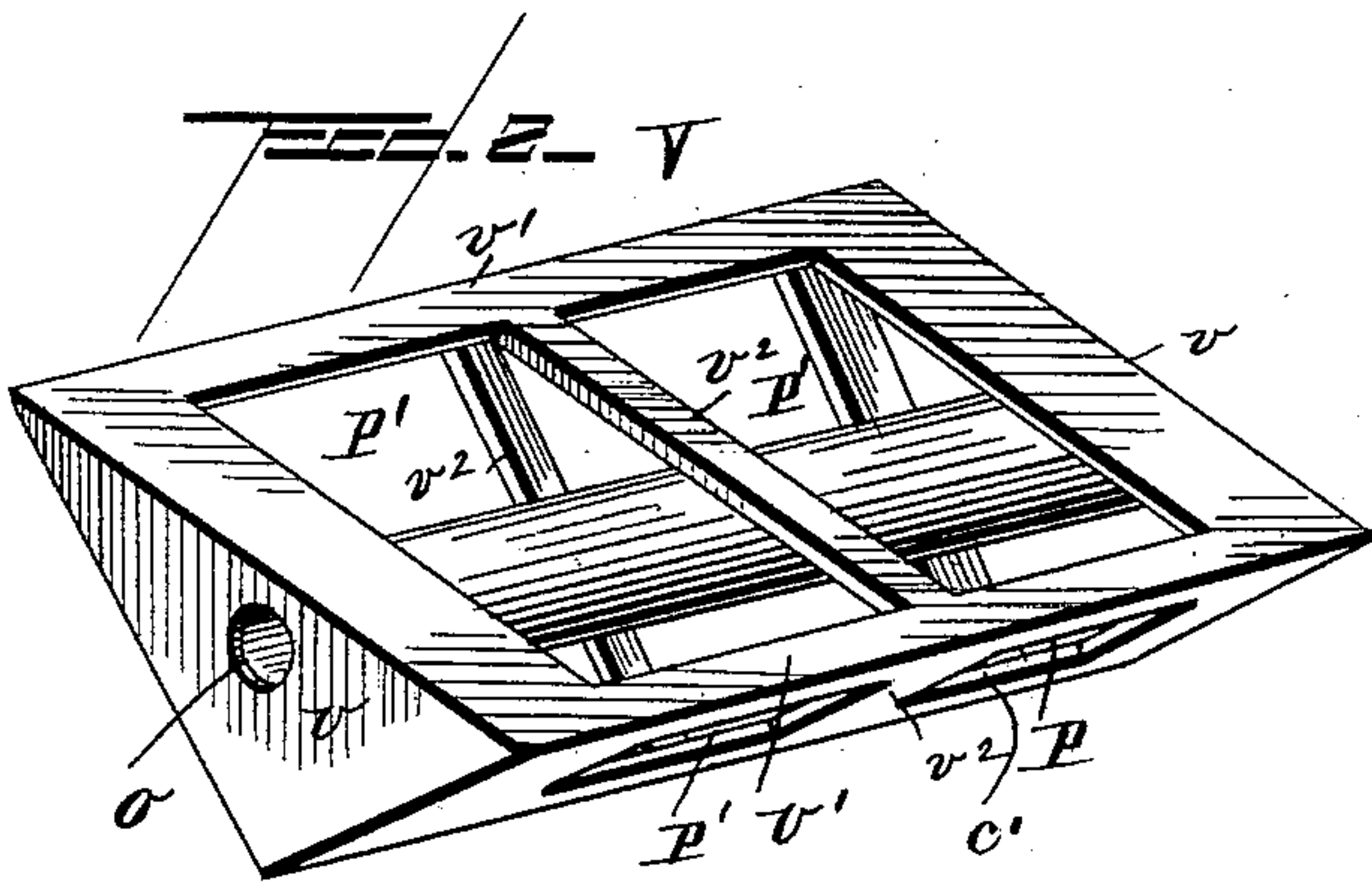
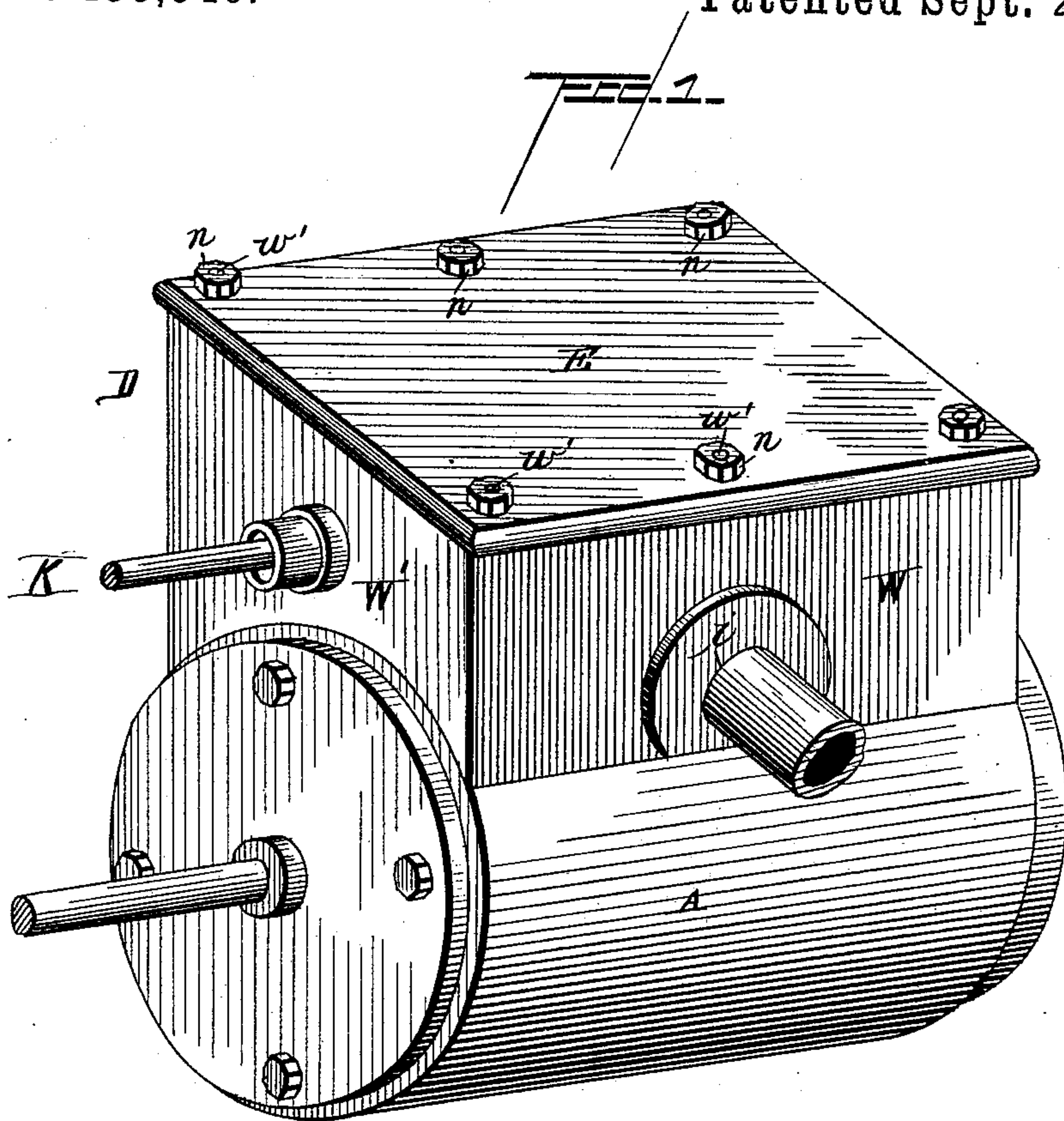
(No Model.)

3 Sheets—Sheet 1.

T. M. REES & C. L. BURGERMEISTER.
BALANCED VALVE.

No. 435,546.

Patented Sept. 2, 1890.



Witnesses

Henry G. Dietrich
Wm. J. Little

Inventors:

T. M. Rees & C. L. Burgermeister
By their Attorney,
J. R. Little

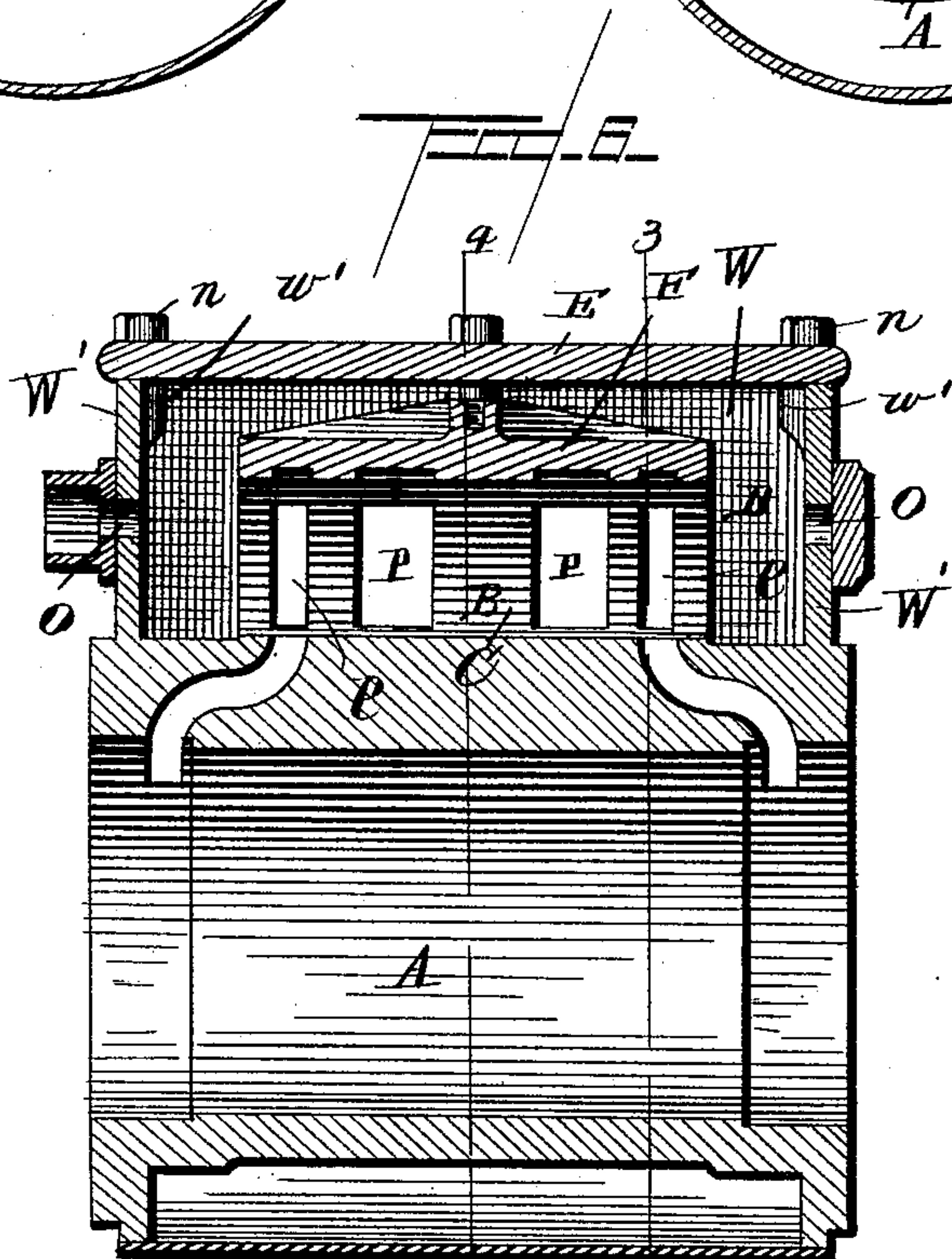
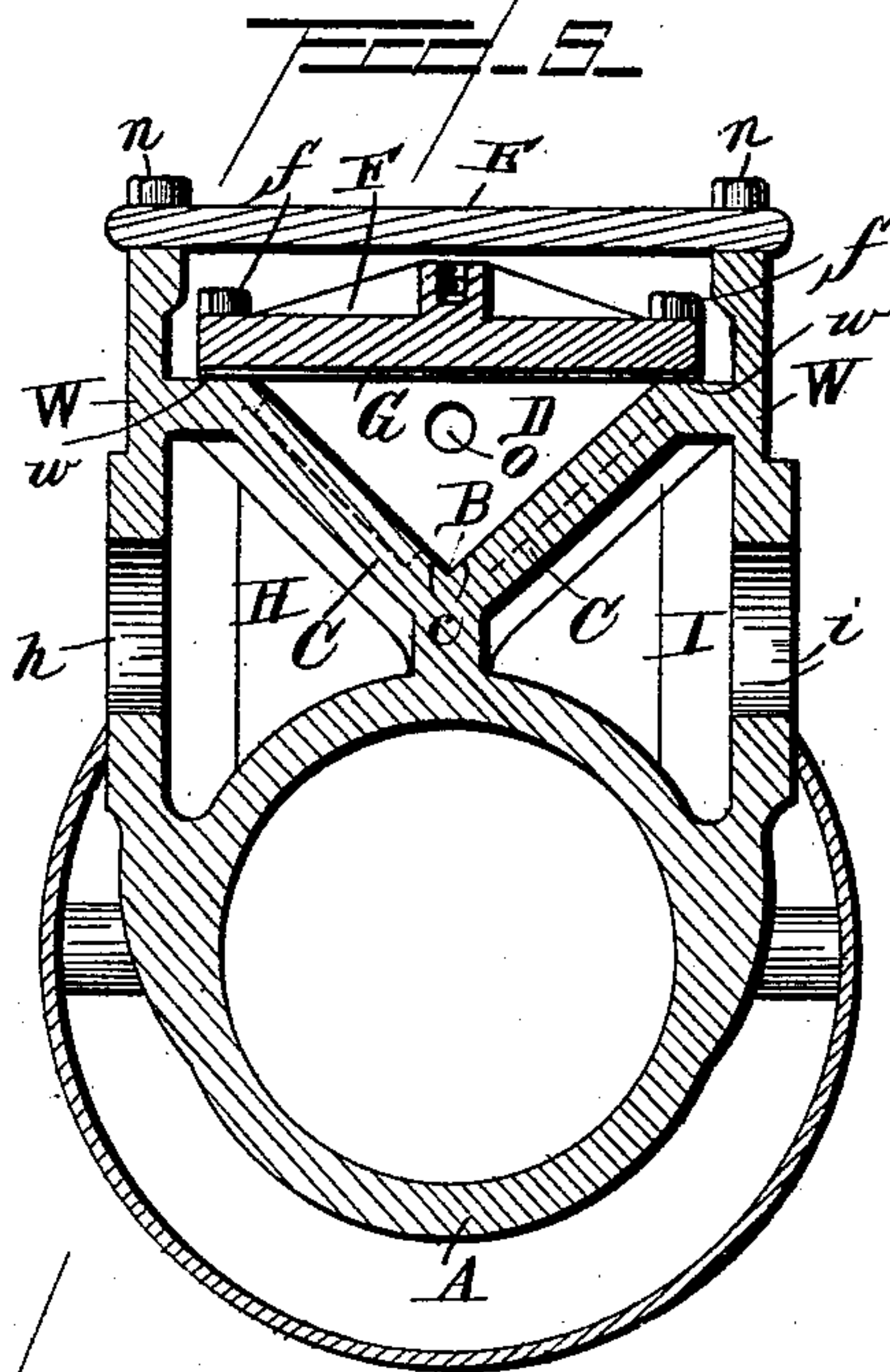
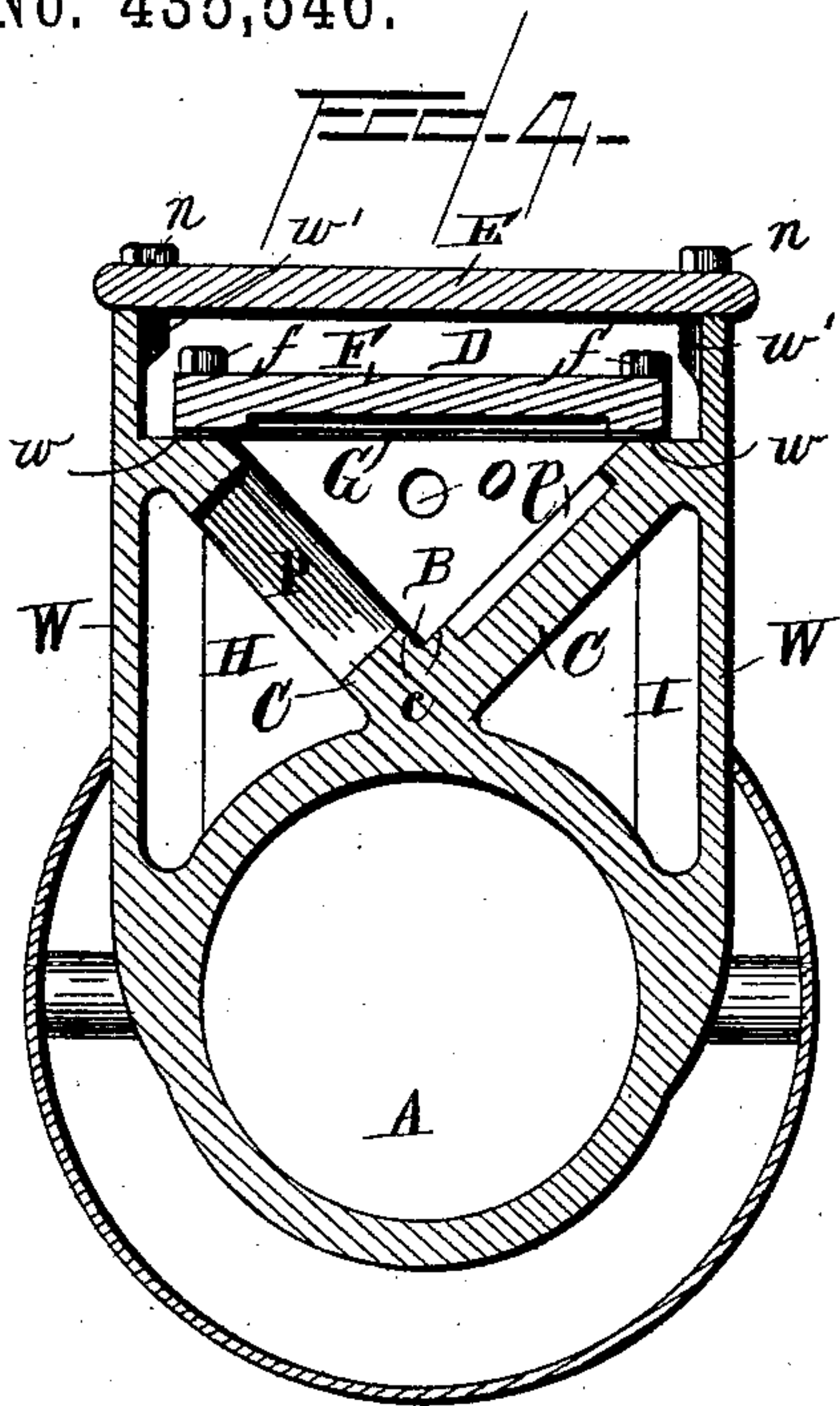
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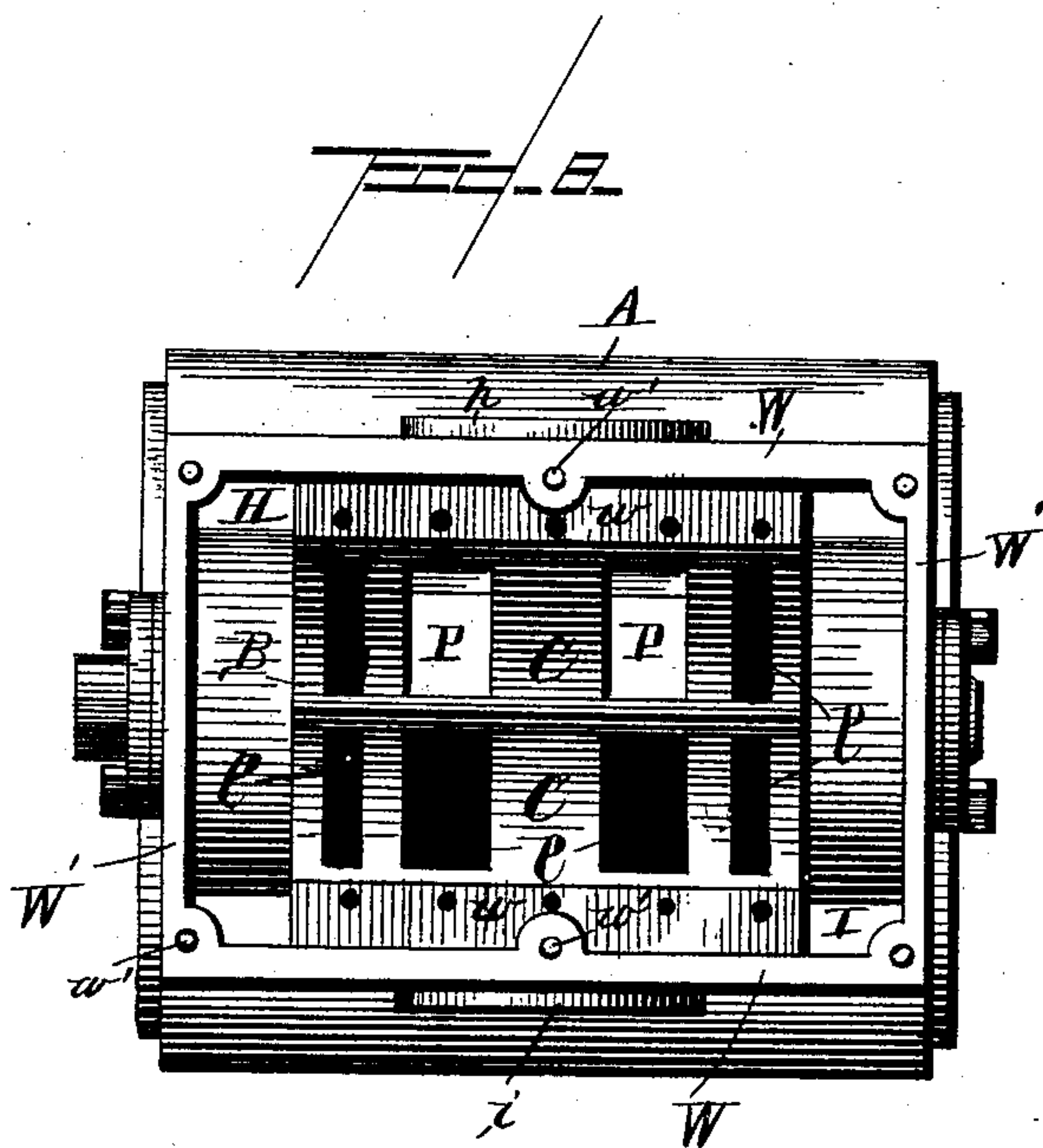
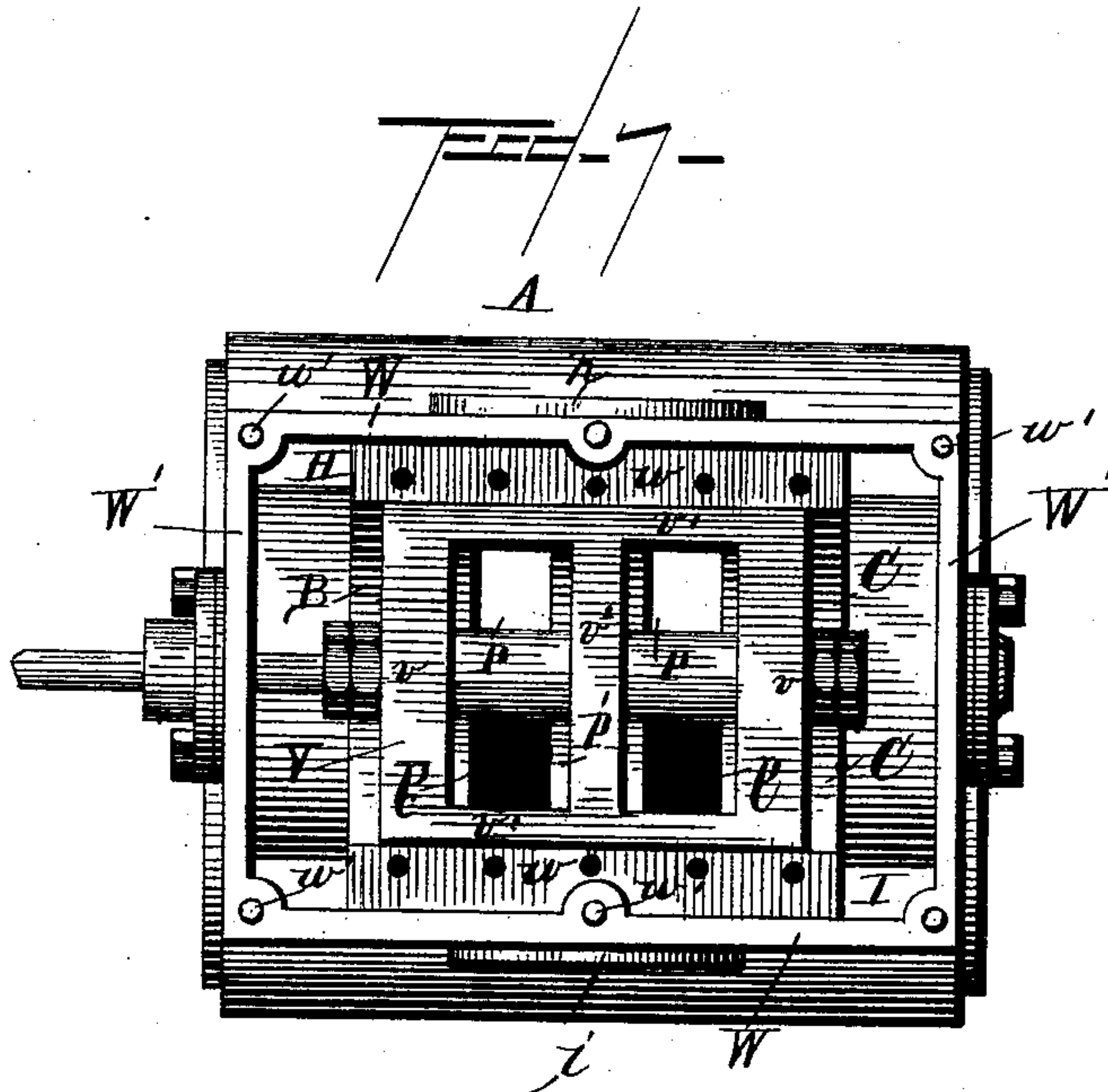
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UNITED STATES PATENT OFFICE.

THOMAS M. REES AND CHRISTIAN L. BURGERMEISTER, OF PITTSBURG, PENNSYLVANIA; SAID REES AND BURGERMEISTER ASSIGNORS TO SAID REES.

BALANCED VALVE.

SPECIFICATION forming part of Letters Patent No. 435,546, dated September 2, 1890.

Application filed August 2, 1889. Serial No. 319,532. (No model.)

To all whom it may concern:

Be it known that we, THOMAS M. REES and CHRISTIAN L. BURGERMEISTER, citizens of the United States, residing at Pittsburg, in the county of Allegheny and State of Pennsylvania, have invented certain new and useful Improvements in Balanced Valves; and we do hereby declare that the following is a full, clear, and exact description of the invention, which will enable others skilled in the art to which it appertains to make and use the same.

Our invention relates to an improved balanced slide-valve, in which the valve is held upon its seat by a suitable pressure-plate and the steam exhausted from each end of the cylinder through the valve-chest. In valves of this general class great difficulty has been experienced in properly balancing the valve and providing a suitable adjustment to compensate for the wear of the parts. Moreover, most of these devices are constructed of a number of parts more or less complex, which go to make a more or less complicated valve and one which is liable to get out of order. Now our invention is intended to remedy all these defects and provide a valve having great length of port, and one which is light, efficient, and durable.

Our invention is applicable to all styles of slide-valve engines, its object being to provide a valve that will permit steam to pass entirely around the same and across the cap-plate or cover, whereby the valve is perfectly balanced and a pressure is had equaling the pressure in the cylinder.

With these objects in view our invention consists of a slide-valve, prismoidal or triangular in cross-section, seated upon an angular valve-seat having suitable inlet, outlet, and blind ports, and a cap-plate or cover rigidly secured to the upper edges of the valve-seat, adapted to bear upon the valve and hold it in place on its seat.

Our invention consists, further, in certain details of construction and novel combination of parts, as will be more fully hereinafter set forth, and pointed out in the claims.

In the accompanying drawings, forming a part of this specification, Figure 1 is a perspective view of the cylinder and valve-chest.

Fig. 2 is a perspective view of our improved slide-valve as seen when detached from the valve-chest. Fig. 3 is a transverse section of the same. Fig. 4 is a transverse section of the cylinder, valve-seat, and chest, taken on the line 3 3 of Fig. 5. Fig. 5 is a transverse sectional view of the cylinder, valve-seat, and cap-plate, taken on the line 4 4 of Fig. 5. Fig. 6 is a central vertical longitudinal section of the improved device. Fig. 7 is a top plan view, the top-cover and cap-plate being removed and the valve upon its seat. Fig. 8 is a similar plan view, the valve being detached.

Referring to the drawings, in which similar letters of reference indicate similar parts, A indicates the cylinder, which is of the usual and well-known construction and provided with the usual steam-passages. The valve-seat B is formed integral with the cylinder, and consists of the oblique sides C C, arranged at an angle to each other, and which meet at their lower ends directly over the longitudinal center of the cylinder.

At each side of the cylinder B are attached the vertical walls W W, said walls being preferably formed integral with the sides of the cylinder and extending vertically upward and at points level with the top of the valve-seat. The side walls W W are connected with the sides of the seat by suitable webbing w w. From the points where the side walls and the valve-seat are united the vertical walls are carried upward a suitable distance, as shown, and at each end of the cylinder upright walls W' W' are cast integral therewith and with the walls W, thus forming the valve-chest D, and to the upper interior edges of the walls W and W' are connected the lugs or bolts w', threaded at their upper ends and adapted to pass through the apertures formed in the edges of the top cover E, said top cover being held down by the nuts n n, threaded upon the bolts w'.

In each of the end walls W' W' are formed the circular openings O O, through which the valve-rod passes, said rod being provided with suitable packing arranged upon the exterior of the openings. It will thus be seen that the cylinder, valve-seat, and chest are cast

integral and at a very small cost. The inclined sides C C of the valve-seat are provided with a series of ports P P, arranged at suitable intervals, and opposite the ports P P are arranged the blind ports *p*, and at the juncture of the sides are arranged the strips *c c*, the purpose of which will appear farther on.

With a valve-seat constructed as described we use our improved form of valve V, which is prismoidal or triangular in cross-section, and consists of the end pieces *v v*, triangular in shape, the connecting bars or strips *v' v'*, connecting the said end pieces, and the cross-pieces *v² v²*, extending from one connecting-bar to another and adapted to close the ports of the valve-seat when desired.

In a valve constructed of a light framework, as described, it will be seen that very long ports P P' will be formed on all sides of the valve. In each of the end pieces is formed an aperture *o*, and surrounding said aperture is formed a tube extending from one end piece to the other through the entire length of the valve, connecting and bracing the end pieces, said tube and end pieces being preferably cast integral, as are also the connecting-bars and cross-pieces, thus forming a valve of a single piece which is light and durable. The lower connecting-bar has its lower edges formed with strips *c' c'*, corresponding with those formed on the valve-seat, and said strips serve to prevent any leakage of steam when the parts become slightly worn. The triangular valve V is the same shape throughout its entire length, and the angle formed by the juncture of the lower sides is the same as the angle of the valve-seat, so that the valve will set snugly upon its seat and no undue escape of steam take place. A stationary cap-plate F is arranged over the valve, resting upon the webbing *w*, to which it is securely bolted by means of bolts *f*, and between the under side of the cap-plate and webbing is secured a joint strip of copper or other substance G, that may be moved to adjust the cap to the upper and contiguous surface of the valve, and thus compensate for any differences produced by wear of the parts or for other purposes.

In casting the valve-seat, side walls, end walls, and cylinder integral it will be seen that two chambers H and I are formed—one on each side of the valve-seat—and opening into these chambers are the openings *h* and *i*, respectively, through which the steam is admitted and exhausted. The valve-rod K is connected with the valve by passing through the tube, as shown. The piston is secured within the cylinder in any well-known manner, and any form of securing attachment between the valve and valve-rod may be employed.

The operation of our invention is as follows: Steam being admitted to the chamber H by the opening *h* and under pressure, it will immediately find its way to the valve V through the side openings or ports P in its

seat, and pass entirely around the valve, providing an equal pressure on all sides thereof, and from thence the steam will enter the cylinder A through such openings leading thereinto as may be uncovered at that time, and after acting on the engine the position of the valve is changed in such a manner as to close the ports through which the steam first entered the cylinder and opening that end of the cylinder to the exhaust-chamber through which the dead steam is allowed to escape. At the same instant the opposite end of the cylinder is opened for the reception of live steam, which in completing its task is allowed to escape while the reverse end of the cylinder is taking steam. By means of the strips *c* and *c* all leakage of parts at the angle of the triangular valve is prevented, and by means of the very thin copper strips or joints all wearing of parts can be quickly compensated.

From the above it will be seen that our invention possesses all the merits of the piston-valve, with none of its defects, and is as cheap and durable as any form of slide-valve. The steam being admitted inside and the exhaust-steam let out at the end, the valve, as is seen, is perfectly balanced under all conditions. The working of the device can also be inspected by removing the top cover.

The peculiar construction of the valve permits a great length of port; hence a great area at minimum valve travel. It is extremely light, can be easily adjusted against wear, and it cannot be seriously jacketed by exhaust-steam.

Having thus described our invention, what we claim as new is—

1. In a slide-valve, the combination, with the valve-box triangular in cross-section, of a valve playing therein triangular in cross-section and of equal sectional area throughout its length and having an unbroken wearing-surface from end to end, substantially as set forth.

2. In a slide-valve, the combination, with the valve-box triangular in cross-section and provided with inlet and outlet ports and with continuous wearing-strips at the point of juncture of the sides of said box, of a valve playing in the latter triangular in cross-section and of equal sectional area throughout its length and having a continuous wearing-surface provided with wearing-strips, and an adjustable cover for said box, substantially as and for the purpose set forth.

3. In a slide-valve, the combination, with the cylinder, vertical walls extending above the same, and walls diverging from a common point above the cylinder and intersecting the vertical walls and provided with ports, said walls forming an angular valve-seat and longitudinal chambers thereunder, for the purpose set forth, of an angular valve playing upon said seat, and an adjustable cover above the valve, substantially as and for the purpose set forth.

4. In a slide-valve, the combination, with the steam-chest comprising the side and end walls and the top, of the divergent interior walls intersecting the side walls and forming
5 an angular valve-seat and longitudinal chambers thereunder, for the purpose described, said valve-seat and chambers being connected by ports, an angular valve playing on said seat and having a continuous wearing-surface,
10 and a cover disposed over the valve, substantially as and for the purpose set forth.

5. The herein-described slide-valve, comprising the angular seat B, chambers H I, located thereunder, the valve V, adjustable
15 cover F, and the inlet, outlet, and blind ports, all arranged and adapted to operate substantially as and for the purpose set forth.

6. The herein-described slide-valve triangular in cross-section and of equal sectional area throughout its length, said valve comprising the longitudinal corner-strips, the
20 central and end cross-pieces connecting the same, the end plates at the extreme ends of the longitudinal strips, and the centrally-disposed tube connecting said end plates, substantially as and for the purpose set forth.
25

In testimony whereof we affix our signatures in presence of two witnesses.

THOMAS M. REES.

CHRISTIAN L. BURGERMEISTER.

Witnesses:

GEO. JOHNSTON,

J. N. HUTCHISON.