

(No Model.)

2 Sheets—Sheet 1.

C. P. HOLST.

VALVE GEAR.

No. 323,935.

Patented Aug. 11, 1885.

Fig. 1.

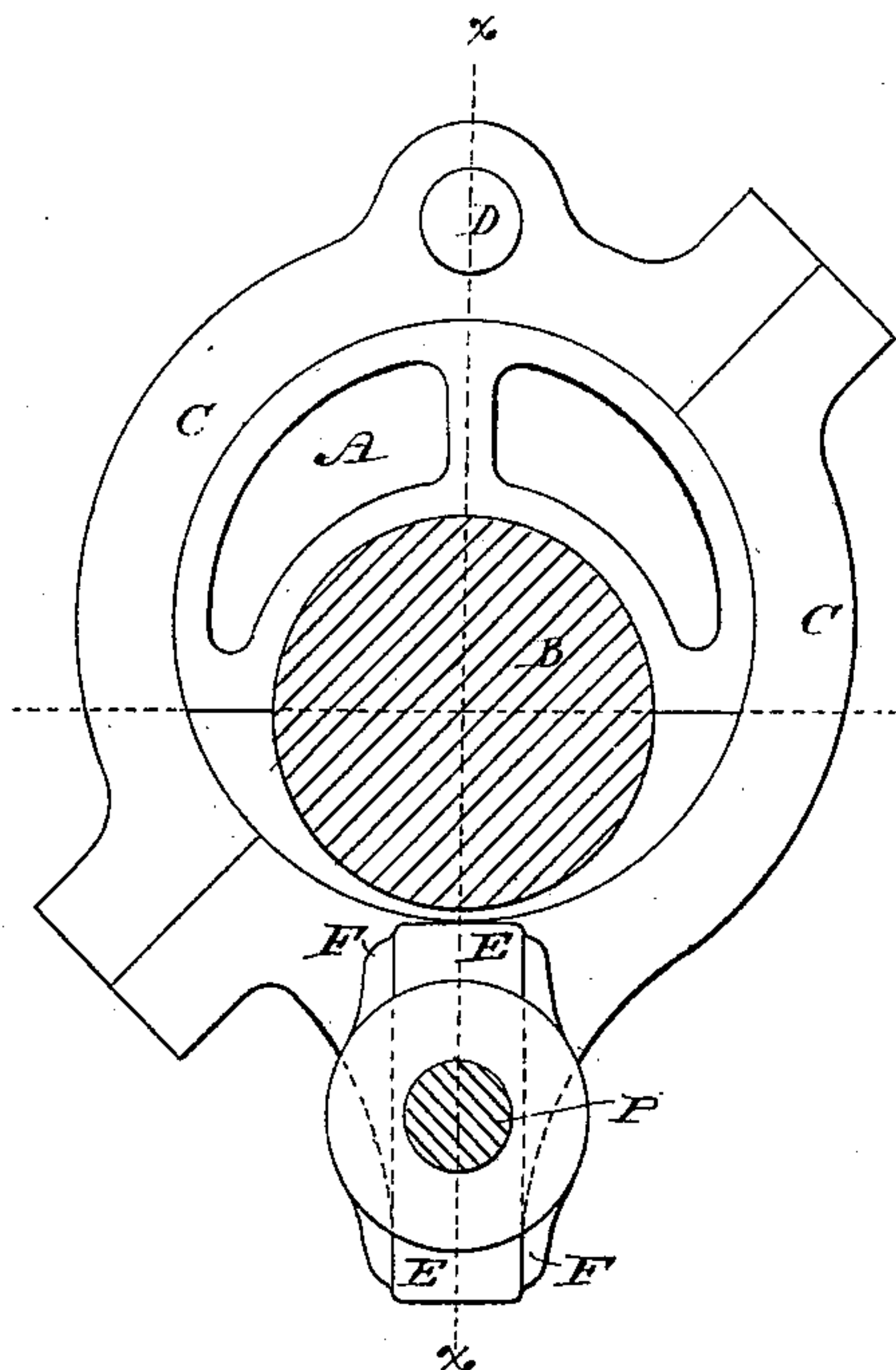


Fig. 2.

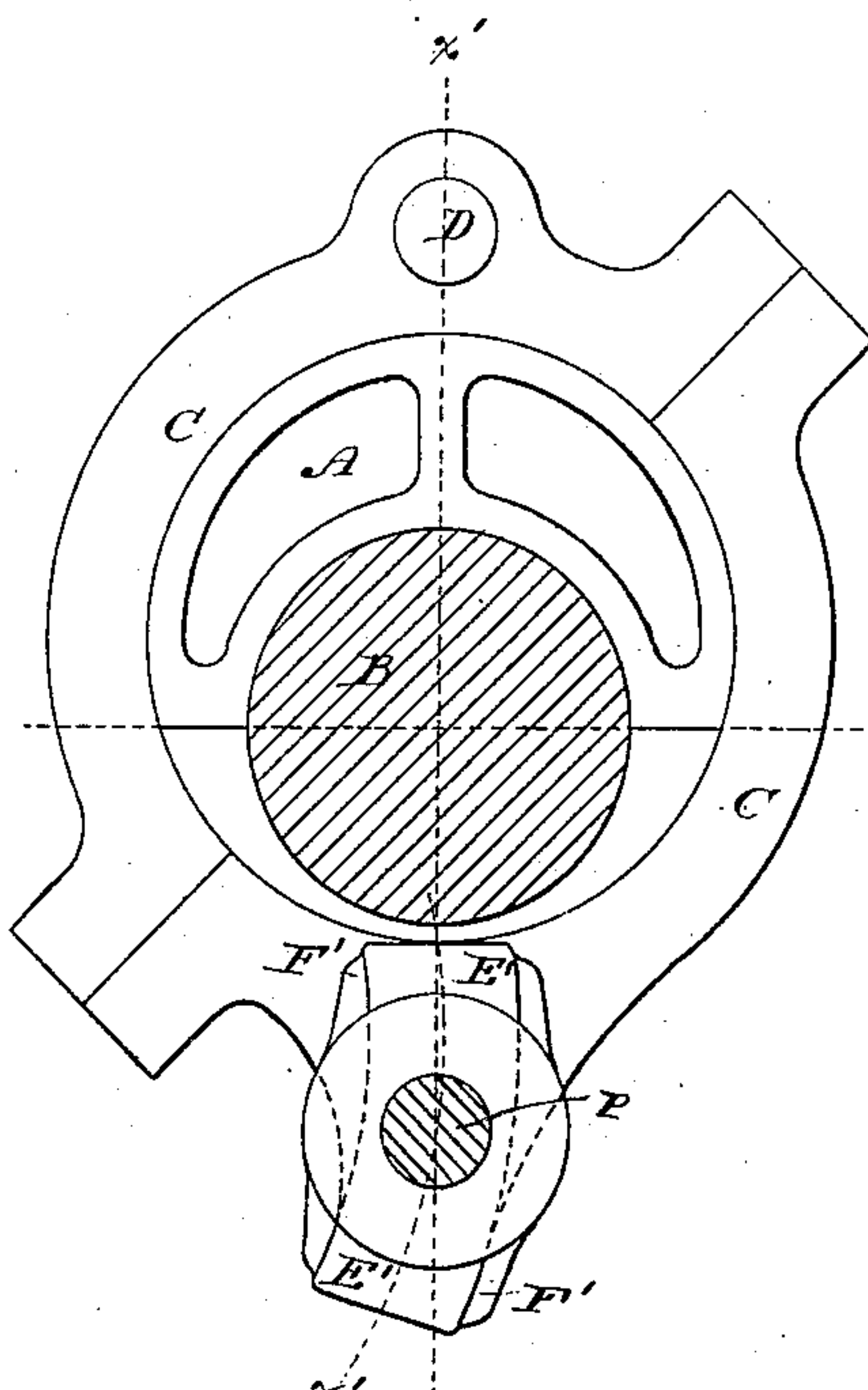


Fig. 3.

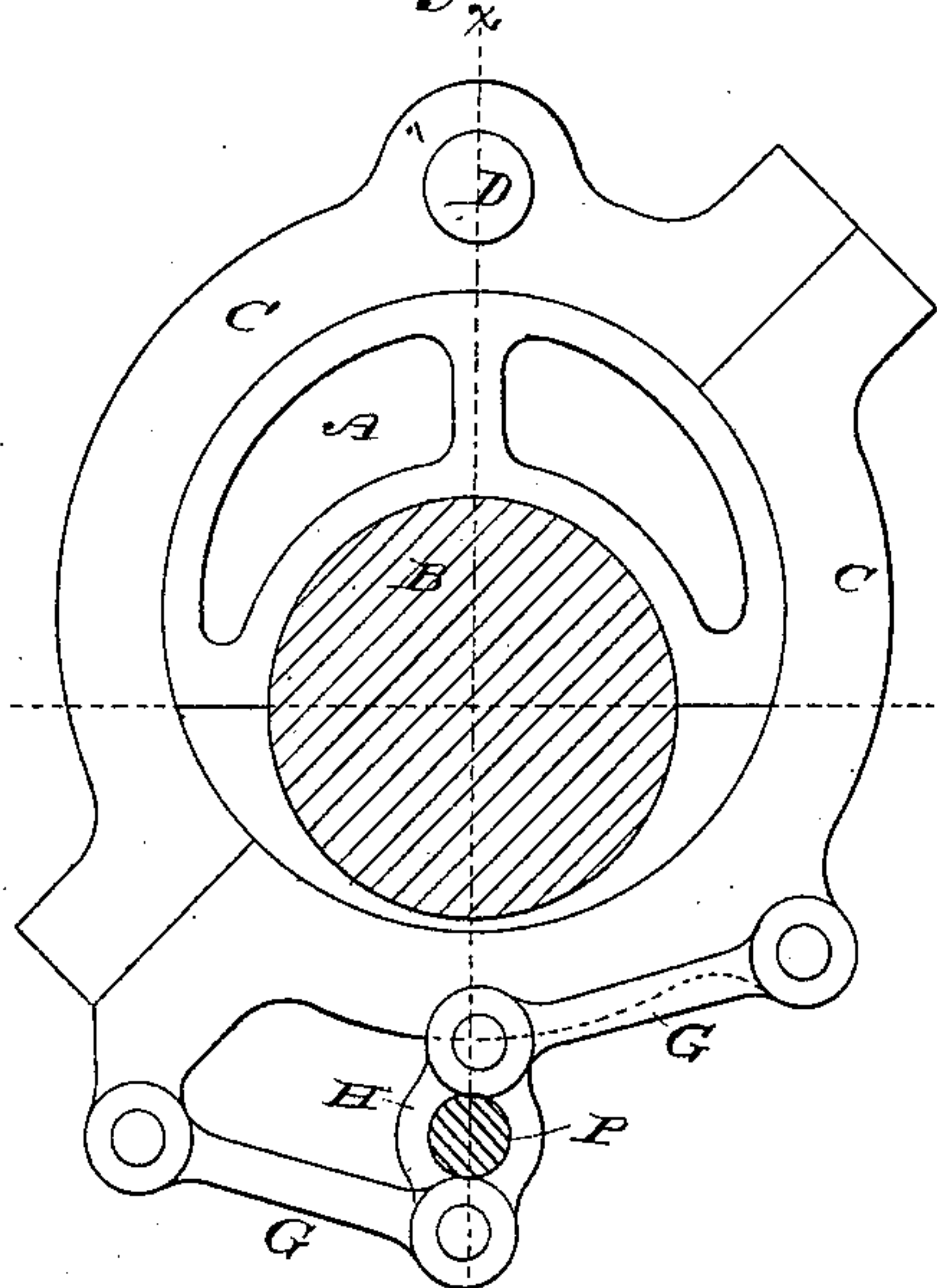
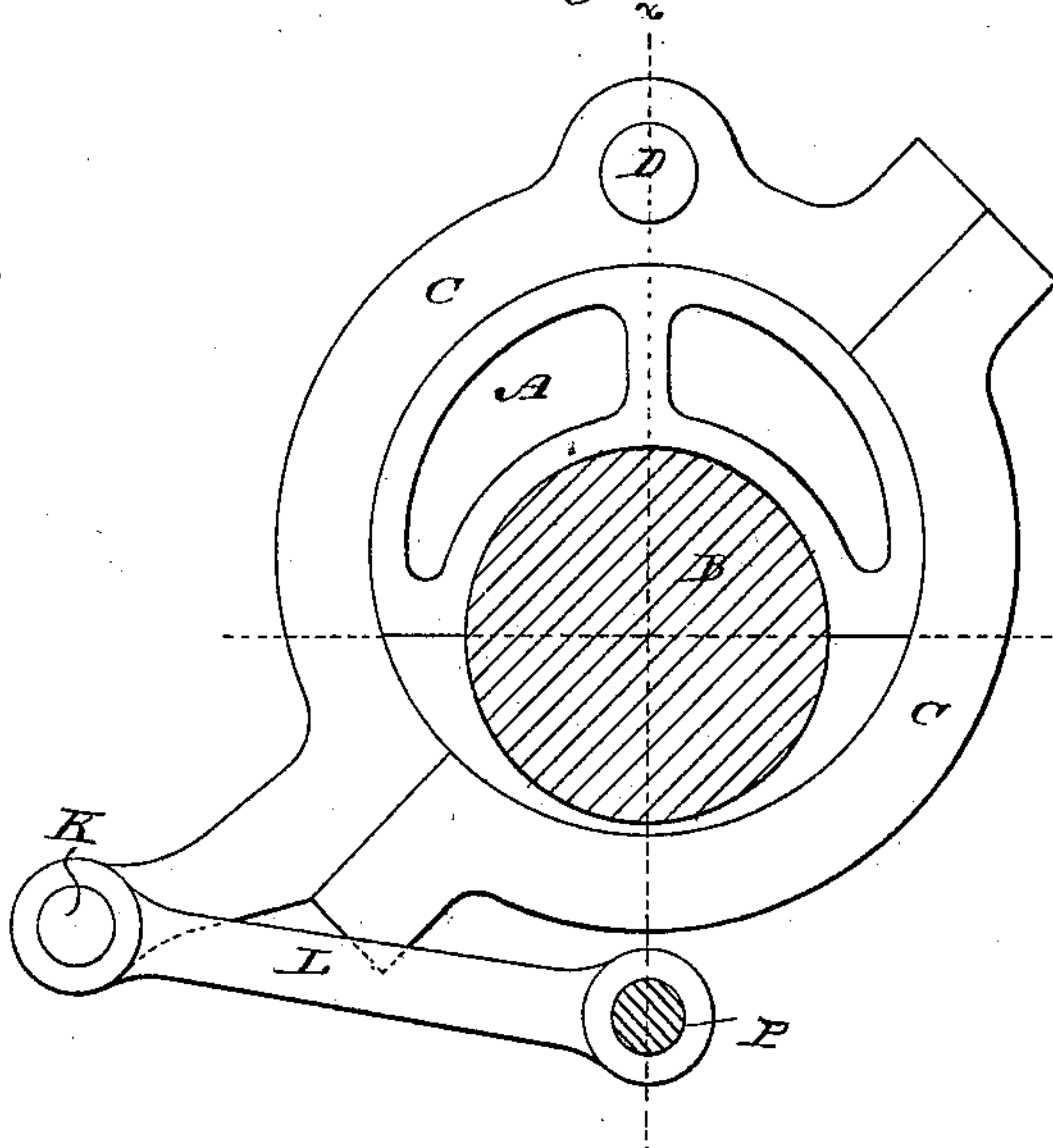


Fig. 4.



WITNESSES

INVENTOR

Ed. A. Newman,
Al. C. Newman,

Constantyn Pieter Holst,
By his Attorney

As. L. Ewin.

(No Model.)

C. P. HOLST.

2 Sheets—Sheet 2.

VALVE GEAR.

No. 323,935.

Patented Aug. 11, 1885.

Fig. 5.

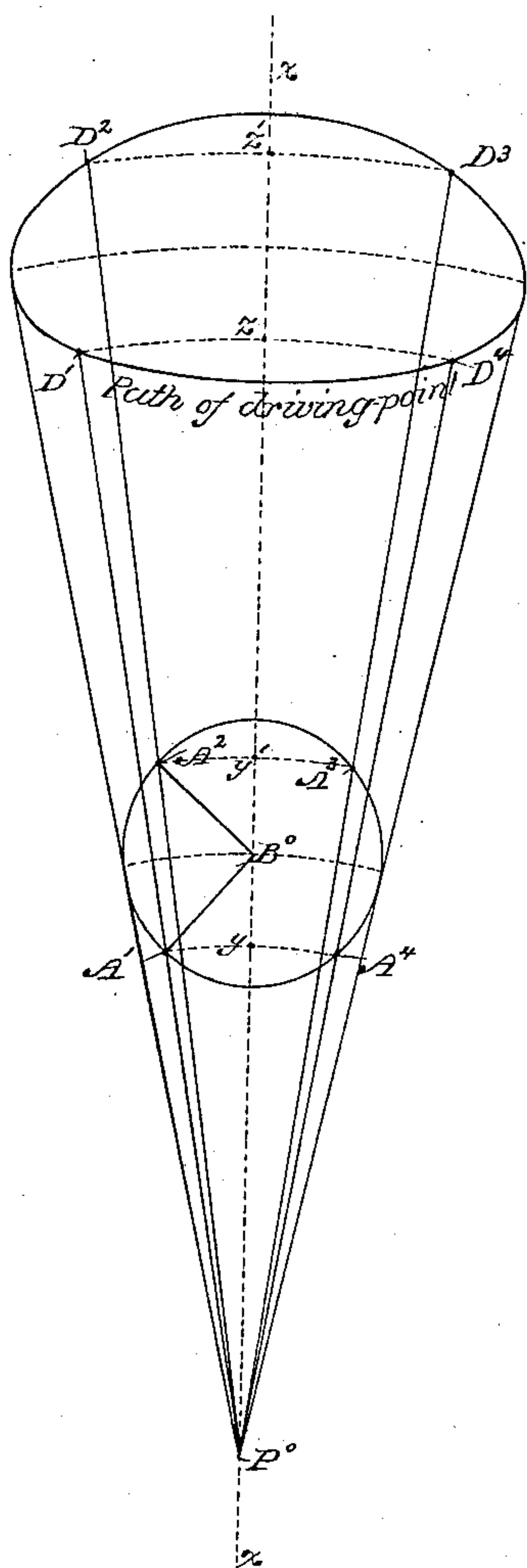
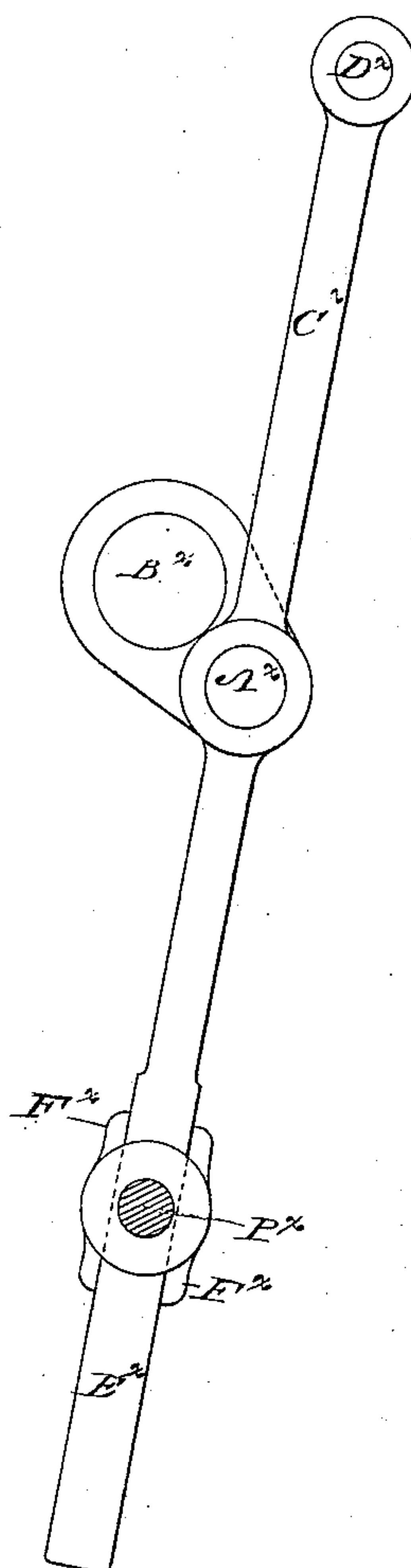


Fig. 6.



Witnesses:

Ed. A. Newman.
Al. C. Newman.

Inventor.

CONSTANTYN PIETER HOLST

By his Attorney

R. L. Ewin.

UNITED STATES PATENT OFFICE.

CONSTANTYN PIETER HOLST, OF AMSTERDAM, HOLLAND, ASSIGNOR OF ONE-HALF TO JOHN R. PLANTEN, OF BROOKLYN, NEW YORK.

VALVE-GEAR.

SPECIFICATION forming part of Letters Patent No. 323,935, dated August 11, 1885.

Application filed February 9, 1885. (No model.) Patented in England July 15, 1884, No. 10,180.

To all whom it may concern:

Be it known that I, CONSTANTYN PIETER HOLST, a subject of the King of the Netherlands, residing at Amsterdam, in Holland, have invented a new and useful Improvement in Valve-Gears for Steam-Engines and other Motors, (patented in Great Britain by Letters Patent No. 10,180, dated July 15, 1884,) of which the following is a specification.

This invention relates as an improvement to those mechanisms for actuating the distributing-valves of reciprocating engines or motors which comprise as an element of each an eccentric or pair of eccentrics fast on the main shaft of the engine or motor, or an equivalent thereof, such as a crank or crank-pin revolving in fixed relation to the driving-crank of the engine or motor.

The present invention consists in an improved valve-gear or valve gear mechanism, hereinafter set forth, having a single eccentric or crank or crank-pin, and adapted to work with a very short eccentric-rod or connecting-rod, and at the same time adapted to correct in a peculiar and effective way the irregular working of the single eccentric or crank or crank-pin as means for actuating such valves, the object being to obtain perfect symmetry in the distribution of the steam or other piston-impelling fluid by a simple and compact valve-gear.

According to this invention there is given to the eccentric-rod or its equivalent a motion similar to that of the piston-rod in an oscillating-cylinder engine instead of the ordinary motion which is similar to that of the connecting-rod in a beam-engine. In other words, instead of guiding, as usual, some point on the eccentric-rod or its equivalent through a straight or curved line, I guide a straight or curved line on or in the eccentric-rod or its equivalent through a point fixed relatively to the engine-framing. Said straight or curved line in my valve-gear is a continuation of a straight "center line" passing through the center of the eccentric or crank or crank-pin; and at the other extremity of said center line, or, in other words, diametrically opposite to said guiding-point, the driving-point of the eccentric-rod or its equivalent is formed by a

laterally-projecting pin or its equivalent, having its center in said center line. The eccentric-rod or its equivalent is thus caused to act as a lever of varying length, being shortest when the eccentricity is toward said guiding-point, and longest when the eccentricity is in the opposite direction, and said driving-point has consequently an elliptical path determined as to short diameter by the throw of the eccentric or crank or crank-pin, and as to long diameter by the distances of said guiding-point and said driving-point in opposite directions from the eccentric center, these distances to be chosen or calculated upon the basis of the ratio of the length of connecting-rod to length of eccentric radius and length of crank. Said guiding-point and said driving-point never require to be shifted in use, and the former is fixed, as aforesaid, or stationary.

Two sheets of drawings accompany this specification as part thereof.

Figure 1 of these drawings is a face view of an eccentric mechanism of a preferred form embodying this invention; and Figs. 2, 3, and 4 are like views of three other substantially similar mechanisms illustrating modifications. Fig. 5, Sheet 2, is a diagram drawn to a scale of two diameters from Figs. 1 to 4, inclusive, and illustrating the mode of operation common to all. Fig. 6 is a view similar to Fig. 1, for example, on the same scale as Fig. 5, showing the same principle embodied in a crank mechanism.

Like letters of reference indicate the same or equivalent parts in the several figures.

In each of the figures on Sheet 1, A represents an ordinary eccentric keyed fast on an engine-shaft, B. C represents an eccentric-strap embracing said eccentric, and adapted in this case to operate without any eccentric-rod. D represents a laterally-projecting pin on said eccentric-strap, forming its driving-point; and P represents a stud-pin, bolt, or the like, fixed relatively to the engine-frame as to location, and forming a fixed guiding-point or fulcrum, upon which said eccentric-strap oscillates under the action of the eccentric.

In Fig. 6, Sheet 2, A* represents a crank as

the equivalent of an eccentric; B^x , the engine-shaft; C^x , a rod and strap, the latter embracing the crank-pin of said crank; D^x , the driving-point; P^x , the fixed guiding-point or fulcrum, upon which the rod and strap C^x in this case oscillates under the action of the crank A^x .

In Fig. 5, Sheet 2, $A^1 A^2 A^3 A^4$ represent the center of the eccentric or crank-pin in four positions. B^0 represents the shaft-center. $D^1 D^2 D^3 D^4$ represent the driving-point in its positions corresponding with those of the eccentric or crank center, and P^0 represents the fixed fulcrum, through which the guide of the eccentric-strap or the rod and strap works to and fro, and upon which the same oscillates, as aforesaid. $B^0 A^1 B^0 A^2 B^0 A^3 B^0 A^4$ consequently represent the invariable "eccentric radius" which points toward P^0 when the piston is on the top center. Supposing the piston to occupy successively two symmetrical positions in its downstroke, as illustrated at $y \approx y' z'$, then $B^0 y$ equals $B^0 y'$; but, owing to the finite length of the connecting-rod, $A^2 y'$ is greater than $A^1 y$, and for the upstroke $A^3 y'$ is greater than $A^4 y$; but in general $D z$ equals $A y$ multiplied by the quotient of $D P$ divided by $A P$, and since $A^2 P^0$ is greater than $A^1 P^0$, and likewise $A^3 P^0$ is greater $A^4 P^0$, the second factor decreases while the first increases, making the product $D z$ the same for all four positions. Consequently $D^1 z$, $D^2 z$, $D^3 z$, and $D^4 z$ are equal, if the leading proportions be well chosen, and a symmetrical distribution of the steam or other piston-impelling fluid is thus secured. For the production of this effect it is absolutely essential that the points D and P shall be diametrically opposite each other, as evidenced by the diagram.

To provide at once for said oscillating motion and for the movement of the eccentric strap or rod and strap toward and away from said fixed fulcrum, various mechanical devices may be employed. It is only considered necessary that the center line, x , common to said guiding point or fulcrum, the eccentric and said driving-point shall be straight, that the motion of the eccentric-strap or its equivalent shall follow, or substantially follow, this line, and that said guiding point or fulcrum and said driving-point shall be diametrically opposite or at the respective extremities of said center line, x . I have shown several devices which fully illustrate the principle.

In the gear represented by Fig. 1, the eccentric-strap C carries, diametrically opposite its driving-pin D , a short flange or guide-block, E , in the form of a prism, which may be integral with that part of the eccentric-strap to which it is applied, its sides being parallel to said center line. The parallel cheeks of a matching guide-piece, F , embrace said guide-block, and this guide-piece is pivoted upon said fixed fulcrum P so as to oscillate freely thereon, as well as to permit said guide-block to reciprocate freely there-through.

In the modification represented by Fig. 2, the eccentric-strap is provided with a curved guide-block, E' , and the fixed fulcrum with a matching curved guide-piece, F' , which may be sectors of circular rings, their curve x' being so chosen that it nearly coincides with said center line, x , so as not to materially affect the motion.

In the modification illustrated by Fig. 3, a pair of radius-rods, G , are connected by knuckle-joints at their outer ends with lugs on the eccentric-strap, and at their inner ends are connected in like manner with the respective ends of a link, H , having said fixed fulcrum as its center, illustrating the use of any parallel motion as a substitute for said straight guide-block and guide-piece $E F$, Fig. 1.

In the modification illustrated by Fig. 4, the eccentric-strap or an extension thereof is provided with a pin, K , which is connected by a link or links, L , directly to the fixed fulcrum P . This device produces the same effect as said curved guide-block and guide-piece $E' F'$, Fig. 2.

In the modification illustrated by Fig. 6, Sheet 2, the rod and strap C^x terminates at its lower end in a prismatic guide, E^x , substantially identical with said guide-block E , Fig. 1, embraced by the parallel cheeks of a matching guide-piece, F^x , pivoted upon said fixed fulcrum P^x , identical with the guide-piece F , Fig. 1.

It is obvious that the point P may be taken above or in any other convenient position relatively to the shaft, and that an eccentric-rod may be used in the same manner as the crank-rod shown in Fig. 6. I do not confine myself to minor mechanical details, as these may be varied according to circumstances; and I have not deemed it necessary to show devices extending the gear to the valve, because these form no part of my invention, and may vary widely in different engines or motors.

I am aware that it is not broadly new to pivot an eccentric-strap and to dispense with a distinct eccentric-rod, these features of my valve-gear, broadly considered, (the latter not absolutely essential,) being shown, for example, in Allen's expired patent in 1862, No. 35,071. Distinguishing features of my device are the employment of a fixed fulcrum, and its location diametrically opposite the driving-point.

Having thus described my said improvement in valve-gears for steam-engines and other motors, I claim as my invention and desire to patent under this specification—

1. In a valve-gear, a strap, or rod and strap, of an eccentric or crank, having a fixed fulcrum at a point diametrically opposite its driving-point, and connected with said fulcrum by suitable devices, substantially as herein described, for effecting perfect symmetry in the distribution of the steam or other piston-impelling fluid, in the manner set forth.

2. In a valve-gear, a strap, or rod and strap,

of an eccentric or crank, having a fixed fulcrum at a point diametrically opposite its driving-point, and connected with said fulcrum by a guide-block rigidly attached to the
5 former, and an oscillating guide-piece having said fixed fulcrum as its center, substantially as herein described, for the objects stated.

3. In a valve-gear, the combination, substantially as herein specified, of a fixed fulcrum, an eccentric fast on the engine-shaft, an
10 eccentric-strap carrying a driving-pin and pro-

vided, diametrically opposite to said driving-pin, with a straight guide-block, and a guide-piece within which said guide-block is free to reciprocate, and which in turn oscillates freely
15 on said fixed fulcrum, for the purposes set forth.

CONSTANTYN PIETER HOLST.

Witnesses:

D. ECKSTEIN,
A. S. DOCEN.