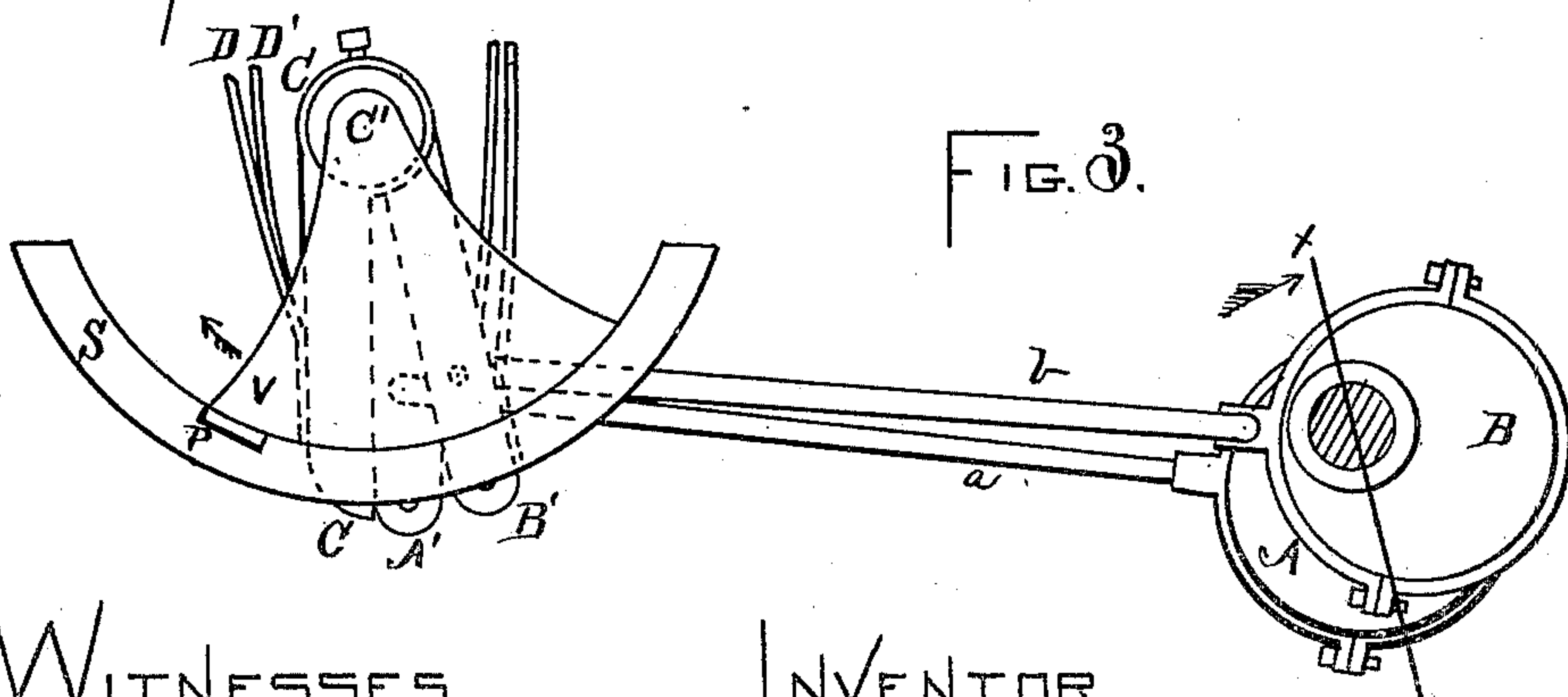
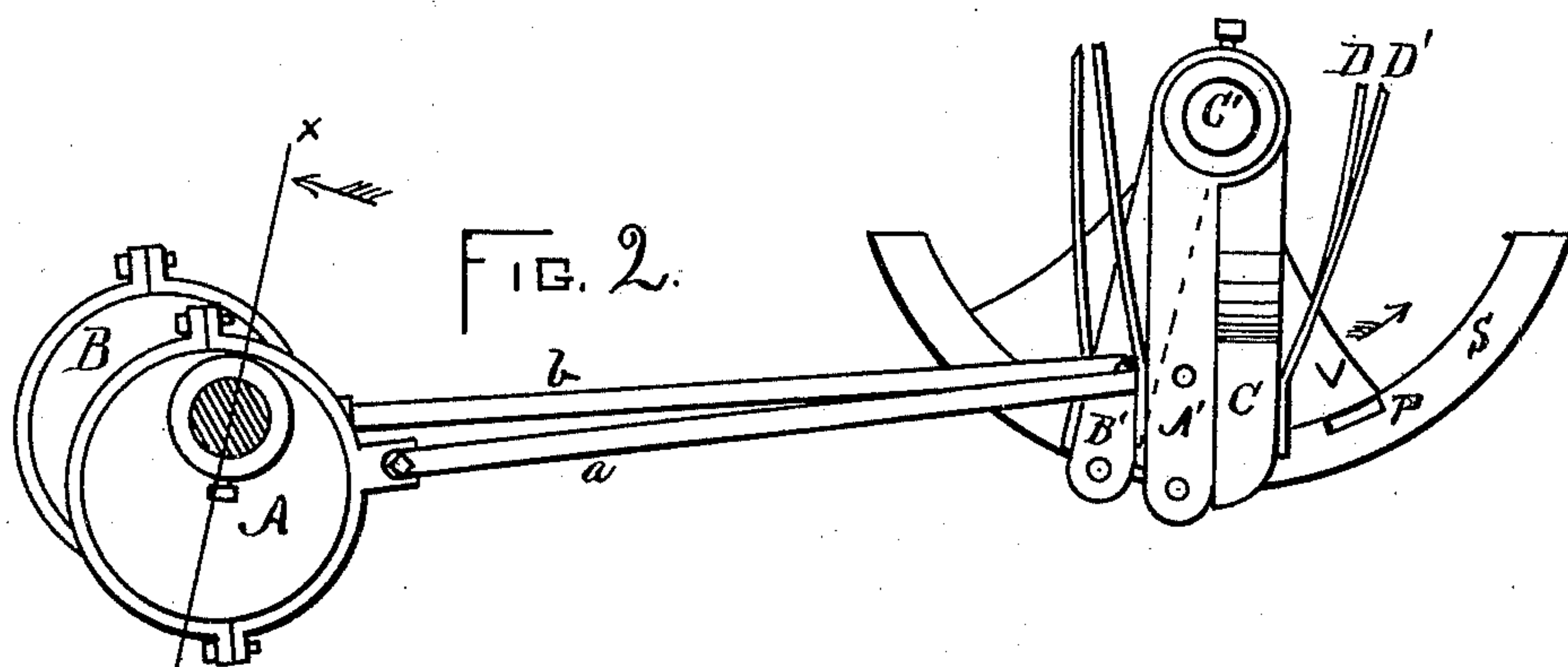
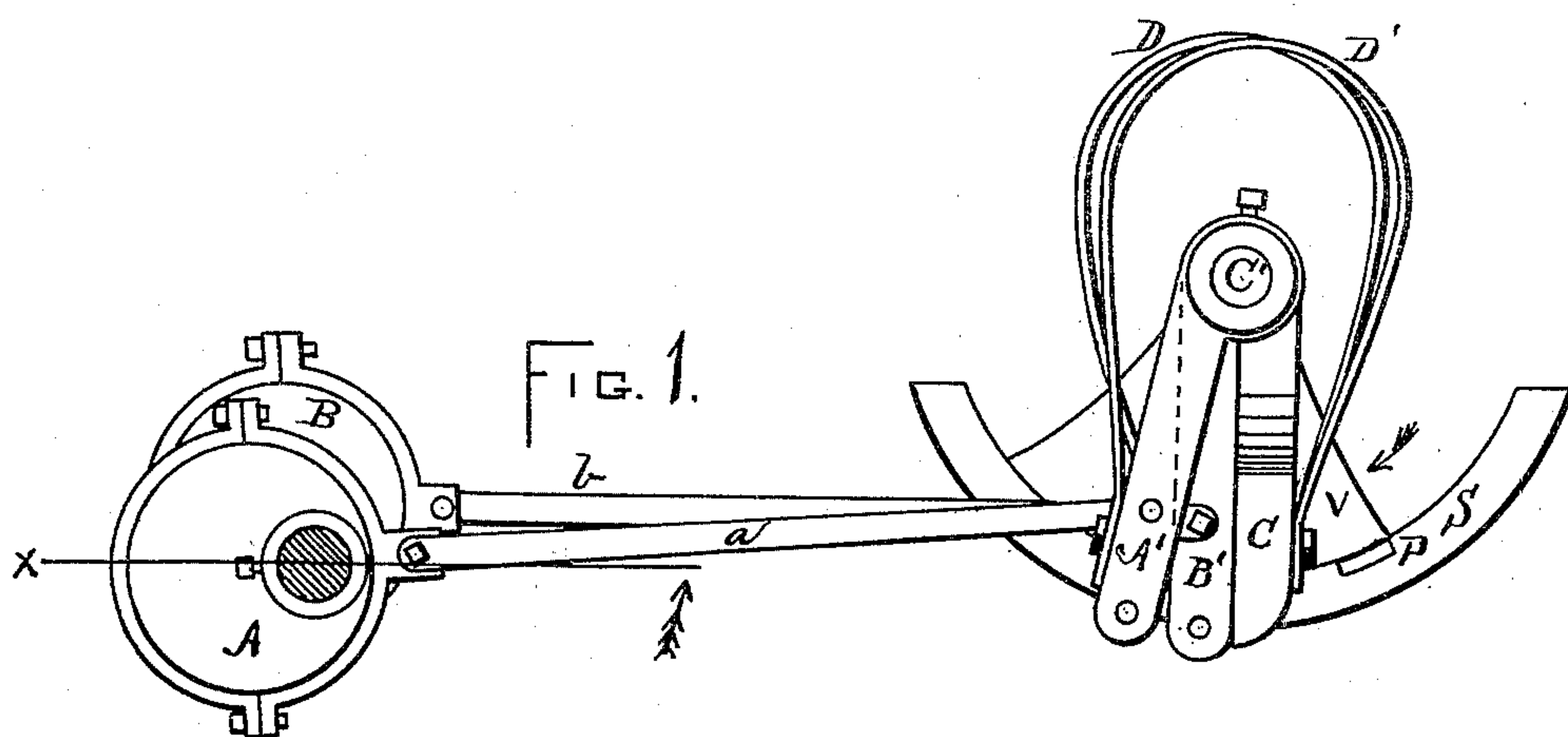


H. R. BARNHURST.  
Valve Gear for Steam Engine.

No. 232,800.

Patented Oct. 5, 1880.



WITNESSES.

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# UNITED STATES PATENT OFFICE.

HENRY R. BARNHURST, OF ERIE, PENNSYLVANIA.

## VALVE-GEAR FOR STEAM-ENGINES.

SPECIFICATION forming part of Letters Patent No. 232,800, dated October 5, 1880.

Application filed February 20, 1880.

*To all whom it may concern :*

Be it known that I, HENRY R. BARNHURST, a citizen of the United States, residing at Erie, in the county of Erie and State of Pennsylvania, have invented certain new and useful Improvements in Valve-Gears for Steam-Engines; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to letters or figures of reference marked thereon, which form a part of this specification.

The object of my invention is to provide in the valve-gear of a steam-engine a variable cut-off.

My invention consists in the arrangement of mechanism in the valve-gear of an oscillating or slide valve of a steam-engine which shall operate in such a manner that the valve is permitted to open by one eccentric at a fixed point in relation to the stroke, and is closed by the action of another eccentric, which is movable upon the shaft, and may be variably adjusted or controlled by a governor upon the shaft or elsewhere in such a manner as to determine the point of closing said valve, which will be according to the difference of the angular advance of the two eccentrics.

By my device the one valve is alternately under the control of the two eccentrics. I use a spring or some equivalent device to open the valve, one of the eccentrics acting to permit it to open, but the valve is closed by the other eccentric.

My device is capable of much diversity as to form, but its operation will always be substantially as generally defined above.

In the accompanying drawings I have illustrated the device as connected with one of the oscillating valves of a Corliss engine, the valve and seat being only sufficiently shown to clearly show the working of a valve when my invention is attached thereto.

In the drawings, Figure 1 is an elevation of my valve-gear, and shows the position of parts when the valve is about to open the port. Fig. 2 is a like view, but shows the position as when the valve has just closed. Fig. 3 is a reverse view with parts in same position as in Fig. 2.

The line *x* represents the position of the crank and the arrow the direction of revolution of the crank. The arrow on the valve shows its direction of movement.

A and B are the two eccentrics on the crank-shaft. *a* and *b* are the eccentric-rods. C' is the valve-stem; V, the valve; S, the valve-seat; P, the port. C is a crank-plate extending from the valve-stem C'. A' and B' are false cranks, and are loosely pivoted on the valve-stem C', and are connected with the eccentric-rods *a* and *b* respectively. D D are springs, which operate upon the crank C to open the valve when permitted to do so, by the eccentric B drawing back the false crank B'.

In Fig. 1 the eccentric B is shown as about to draw back the false crank B' and permit the springs D to open the valve, and when this occurs the valve will move in the direction of the arrow in that figure until the eccentric A advances the false crank A' and checks its movement and turns it back. In Fig. 2 this is shown to have taken place, and the device has advanced so as to close the valve over the port. The eccentric A will continue to advance the valve in the direction of the arrow shown in Fig. 2 throughout the remainder of the movement in that direction, when the false crank B' will have advanced so as to come in contact with the crank-plate C. The false crank B' will then, in proper time, recede so as to permit the valve to return and open the port, during which time the false crank A' has moved back, and is again advancing to act upon the crank-plate C and move the valve to the cut-off. Thus it will be seen that the two eccentrics alternately control the valve. The time at which the false crank A' advances to move the valve to close the induction-port depends upon the position of said eccentric upon the shaft, and this can be adjusted to suit, or it may be automatically regulated by a governing device, and thus is the cut-off variable.

In place of placing the crank-plate C and the false cranks A' B' on the stem of the valve, they may be placed on the shaft of a face-plate and connecting-rods be used to connect with the valves.

In place of the springs D shown any form of spring may be used, or the equivalent of a spring. And if it is found in any form of valve



that the pressure of steam upon the valve tends to overcome the action of the spring, an equivalent of a spring in the form of a live-steam piston-chamber may be used, which  
5 would obviate that difficulty.

By suitable modifications, which will readily suggest themselves to a skilled mechanic, my device may be applied to any form of valve.

In such engines as are constructed so as to  
10 open the valve by the pressure of steam upon the same, as a puppet or piston valve, no spring or equivalent thereof will be required.

What I claim as new is—

1. In the valve-gear of a steam-engine, the  
15 combination of a fixed and a variable eccentric upon the crank-shaft, and means, substantially as shown, whereby the steam-valve of the engine is alternately under the control of said eccentrics during each revolution of the crank-  
20 shaft, for the purposes mentioned.

2. The mechanical movement herein shown, consisting of a shaft with a fixed and a variable eccentric thereon, a second shaft having

a crank-plate rigidly attached thereto, and two false cranks loosely collared thereon, which  
25 latter are connected with said eccentrics respectively, and alternately act upon said crank-plate during the revolution of the former shaft, and thereby oscillate the latter shaft within an arc which may be varied in length as the  
30 variable eccentric is adjusted, substantially as set forth.

3. In a steam-engine which has a valve provided with means whereby it will open automatically when permitted so to do, the combi-  
35 nation therewith of a variable and a fixed eccentric upon the crank-shaft, which alternately control the action of said valve, substantially as set forth.

In testimony whereof I affix my signature  
40 in presence of two witnesses.

HENRY R. BARNHURST.

Witnesses:

JNO. K. HALLOCK,  
FRANK H. BALL.