

(No Model.)

W. CULBERTSON.

VALVE GEAR FOR REVERSING ENGINES.

No. 300,349.

Patented June 17, 1884.

Fig. 1.

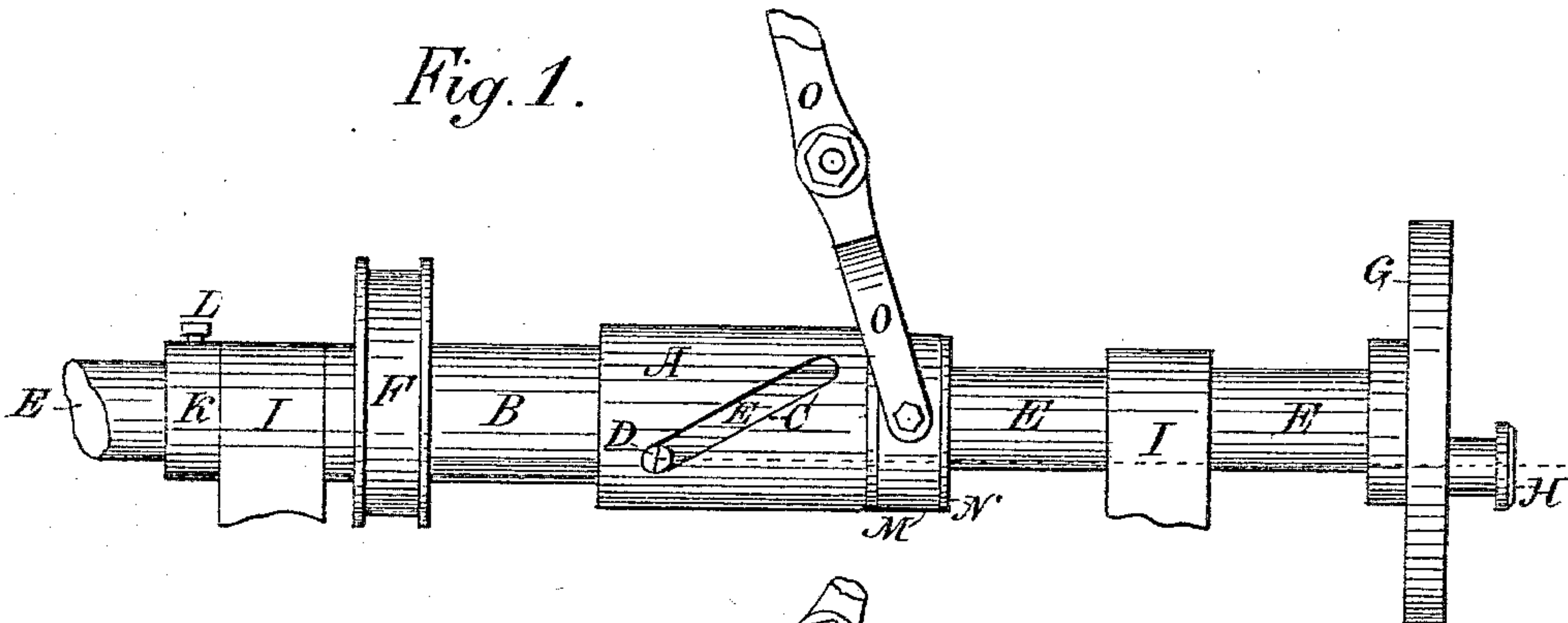


Fig. 2.

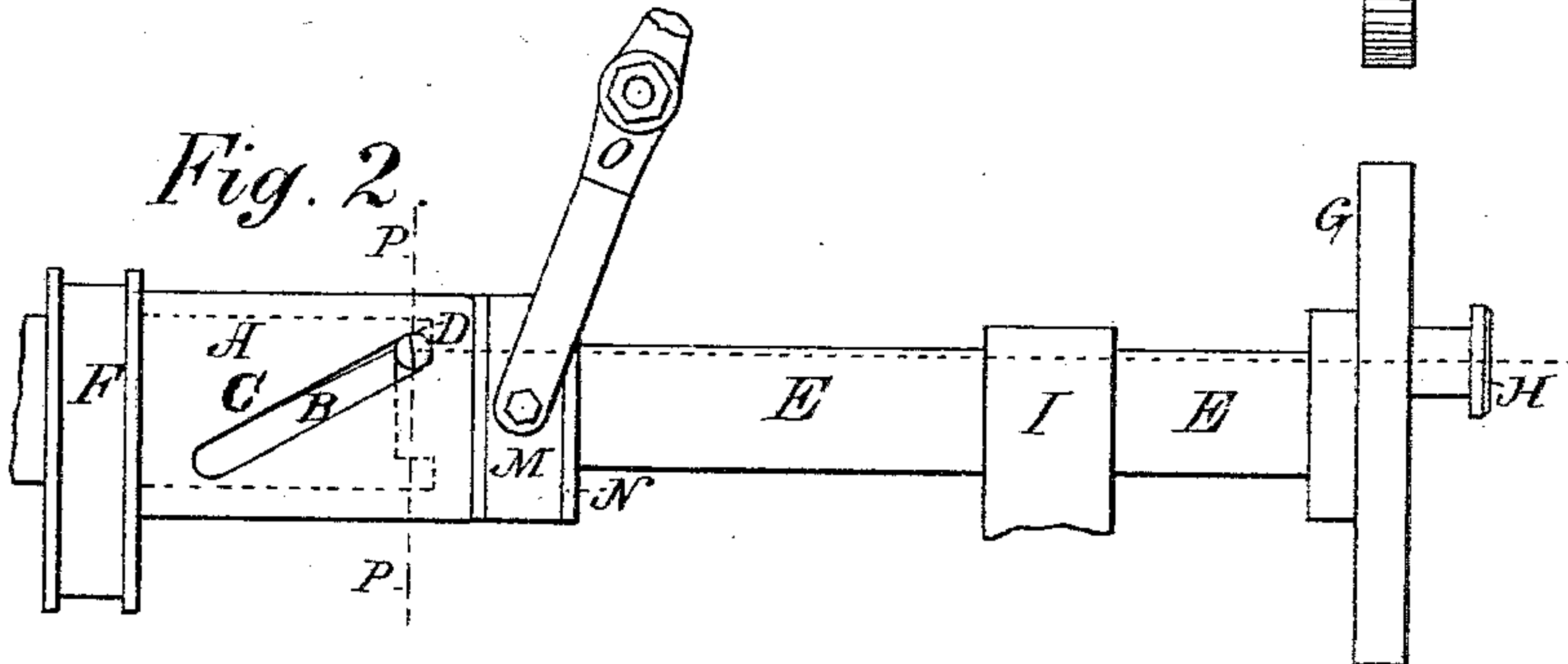


Fig. 3.

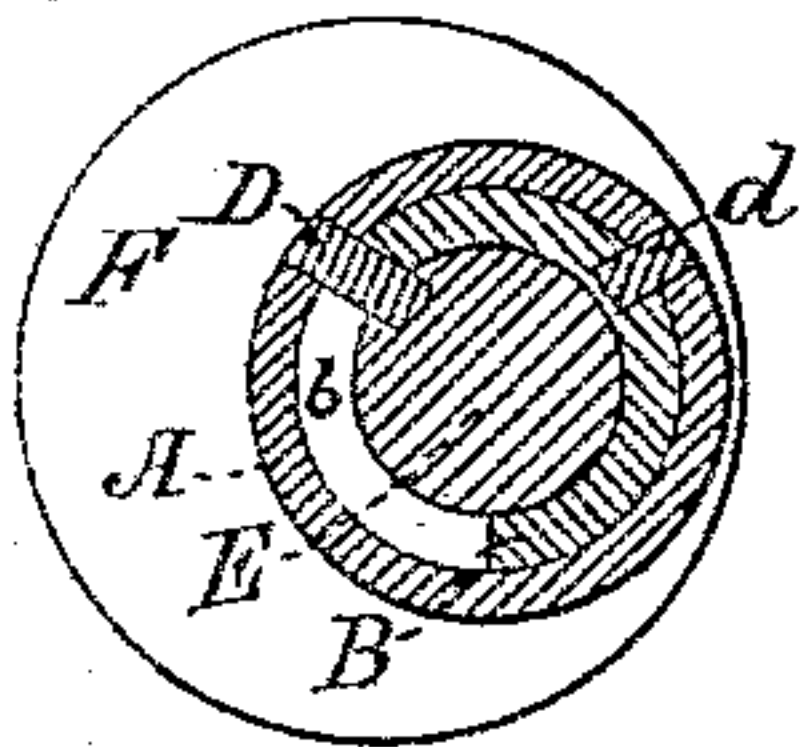


Fig. 4.

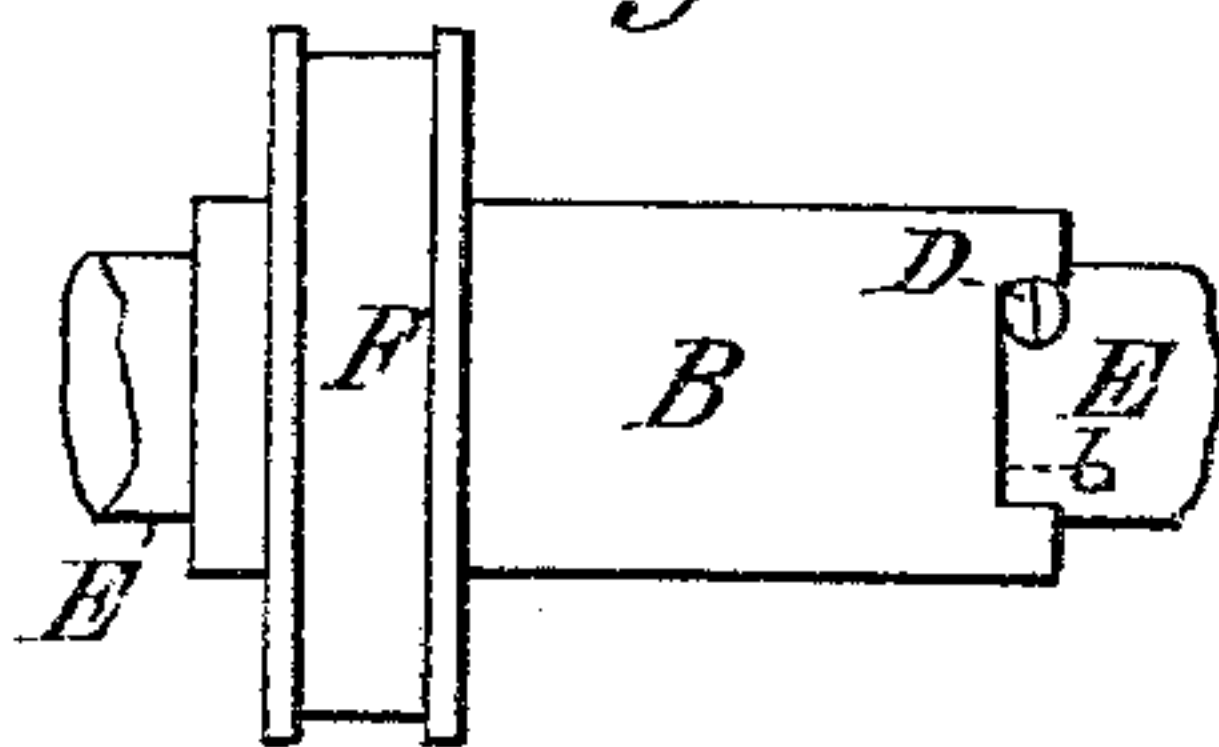


Fig. 5.

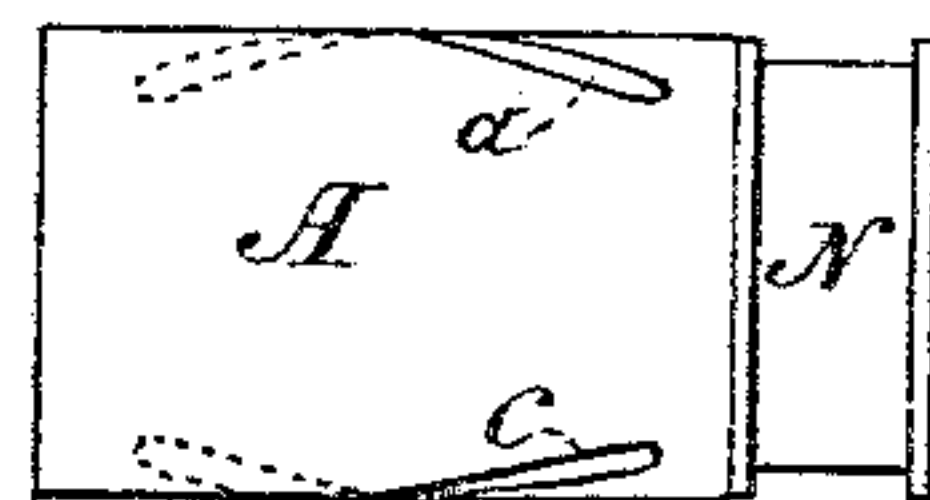
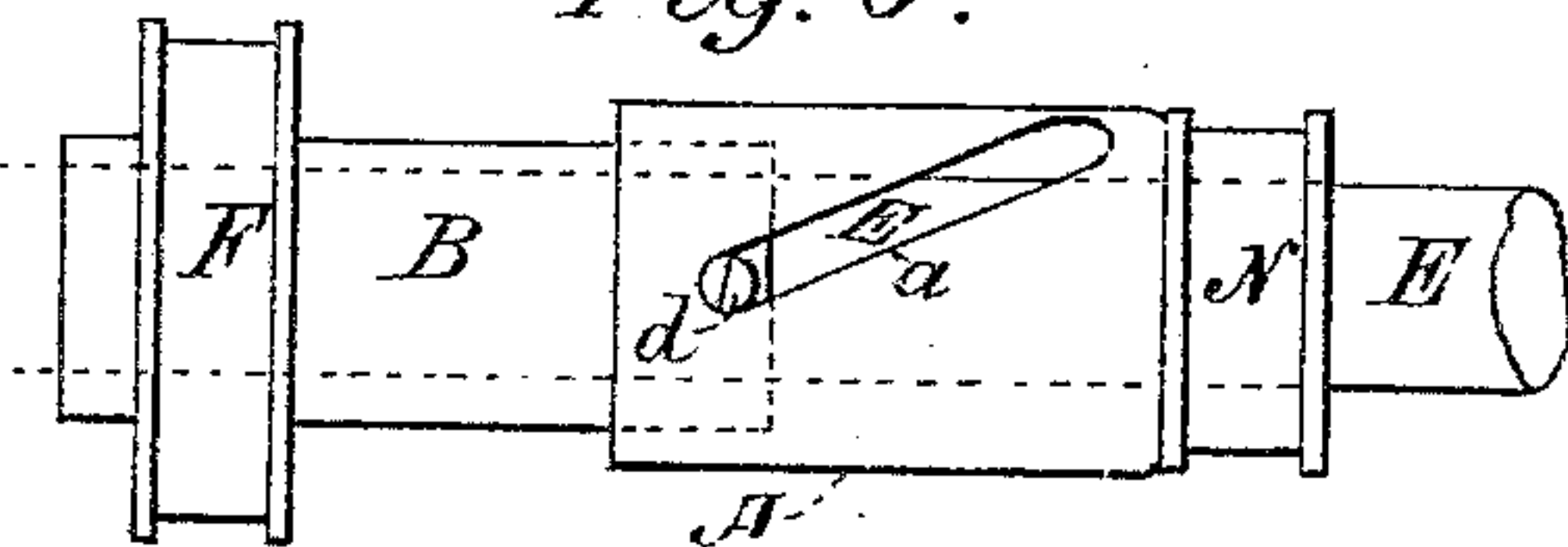


Fig. 6.



Witnesses:

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UNITED STATES PATENT OFFICE.

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VALVE-GEAR FOR REVERSING ENGINES.

SPECIFICATION forming part of Letters Patent No. 300,349, dated June 17, 1884.

Application filed December 15, 1883. (No model.)

To all whom it may concern.

Be it known that I, WILLIAM CULBERTSON, a citizen of the United States, residing at Indianapolis, in the county of Marion and State of Indiana, have invented a new and useful Valve-Gear for Reversing Steam-Engines, which has never been patented to me, or to others with my knowledge or consent, in any country, and which, according to my knowledge and belief, has not been in public use or on sale in the United States at any time prior to this application, and of which the following is a specification.

My invention relates to improvement in valve-gear for reversing steam-engines by a sleeve with two opposite slots sliding on another sleeve which revolves on the main shaft and carries the eccentric far enough to remove the valve to the opposite center, which is a little more than one-third ($\frac{1}{3}$) revolution.

The objects of my invention are, first, to produce a valve-gear for reversing steam-engines that shall consist of less machinery than any one now in use, and which shall have fewer wearing parts, with less liability to breakage, and capable of being handled with the greatest ease; second, to produce a valve-gear for reversing steam-engines that shall have no gear-wheels, no babbitted bearings, and which shall not catch upon the shaft; third, to produce a valve-gear for reversing steam-engines, in which the breakage of any part will not disable the entire machinery; fourth, to produce a valve-gear for reversing steam-engines which will require no special machinery in its construction, and no specially-skilled labor, either in its construction or in setting it, and which shall be applicable to any sort of reversible engine; fifth, to produce a valve-gear for reversing steam-engines, in the construction of which opposite motions so balance the strain put upon the parts at the moment of reversing that the strain upon such parts is greatly reduced. I attain these objects by the mechanism illustrated in the accompanying drawings, in which—

Figure 1 is a top view of the entire machine, which shows a position which gives a forward motion to the engine. Fig. 2 is a top view of the entire machine, showing it in a position giving a backward motion to the engine. Fig.

3 is a section through P P, marked in Fig. 2 by a dotted line. Fig. 4 is a view of the inside sleeve with eccentric. Fig. 5 is a view of the outside or sliding sleeve, showing a portion of both slots and place for the collar to connect with the quadrant-lever. Fig. 6 is a view showing both sleeves with inside revolving sleeve in an opposite position to that shown in Fig. 4.

Similar letters refer to similar parts throughout the several views.

A is the outside or sliding sleeve. B is the inside or revolving sleeve. C represents the slot moving on pin in main shaft. *a* is the opposite slot, which slides on pin *d*, screwed in the revolving sleeve B. D is a pin screwed in the main shaft, on which slot C is sliding, and carries the outside sleeve a little over one-sixth ($\frac{1}{6}$) of a revolution. *b* is a recess cut out in sleeve B, about one-third ($\frac{1}{3}$) of the circumference of the sleeve and the size of the pin in main shaft, to give room for the pin by a revolving motion, and give it at the same time a stop. *d* is a pin screwed in the revolving sleeve, and sliding in slot *a*, which causes a revolution of the other one-sixth ($\frac{1}{6}$) of a circle and completes the reverse motion. E is the main shaft. F is the eccentric on sleeve B, and carries the strap which connects with the valve on the engine. G is the crank. H is the wrist-pin in crank. I I are main bearers carrying the main shaft E. K is a temporary collar on the main shaft. L is a set-screw in collar K. M is a loose collar carrying the quadrant-connection. N is the space on sleeve A to receive collar M. O is the lever. The dotted line running from pin D to wrist-pin H simply shows their respective positions. The dotted line P P refers to Fig. 3.

The machine consists of two simple sleeves—one sliding upon the other in such a way that the reverse motion is obtained by two simple inclined slots in the outside sleeve running in opposite directions—one sleeve working on a pin set in the main shaft, (see D in Fig. 3,) the other working on a pin set in the inside sleeve. (See *d*, Fig. 3.) Thus in Fig. 1 a short movement of the lever O, which is attached to the quadrant-lever, moves the outside sleeve, A, toward the eccentric F. The movement of the outside sleeve, A, on pin D, which

is set in the main shaft in the slot C, causes a little more than one-sixth ($\frac{1}{6}$) revolution of the circle. At the same time the movement of the inside sleeve, B, on pin d , which is set in the sleeve B in slot a , running in opposite direction from slot C, (for position of slots see Fig. 5,) also causes a revolution of one-sixth ($\frac{1}{6}$) of the circle. The effect of the combined motion is to cause a total movement of a little more than one-third ($\frac{1}{3}$) of a revolution of the eccentric F around the main shaft of the engine. Thus by a simple movement of a trifle more than one-third ($\frac{1}{3}$) of the revolution of the eccentric F the entire motion of the engine is reversed.

The two cylindrical sleeves A and B, Fig. 1, which work upon the two pins D and d , Fig. 3, can be made of any weight and strength without any interference with their working capacity. The two pins D and d , upon which the sleeves A and B work, are set—one in the main shaft and the other in the inside sleeve—and may, like the sleeves themselves, be of any weight, size, or strength without interfering in any way with the working of the machine.

These pins and the sleeves receive the only strain put upon the machine. When the engine is reversed, all parts of the machine are at rest and run with the main shaft. The bal-

ancing of the opposite motions which put the strain upon the two pins at the moment of reversing is such that the strain is so greatly reduced that a very small force may reverse any engine, and notches are unnecessary in the quadrant to make the lever stand in any position desired.

The machine may be set anywhere upon the main shaft convenient for the action of the engine, and may be connected by any valve-gearing whatever.

What I claim, and desire to secure by Letters Patent, is—

1. The combination, with the shaft of the engine and the sleeves A and B, the latter and the eccentric made in one piece, of the pins D d and the slots a and C, all arranged as shown and described.

2. The combination, in a valve-gear, of the shaft and the sleeves A and B with the pins D d and the slots a C, said slots being inclined in opposite directions, whereby the eccentric is shifted by a slight movement of the outer sleeve, substantially as shown and described.

WILLIAM CULBERTSON.

Witnesses:

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HERVEY B. FATOUT.