

(No Model.)

2 Sheets—Sheet 1.

J. M. WORTH.
REVERSING VALVE GEAR.

No. 559,018.

Patented Apr. 28, 1896.

Fig. 1.

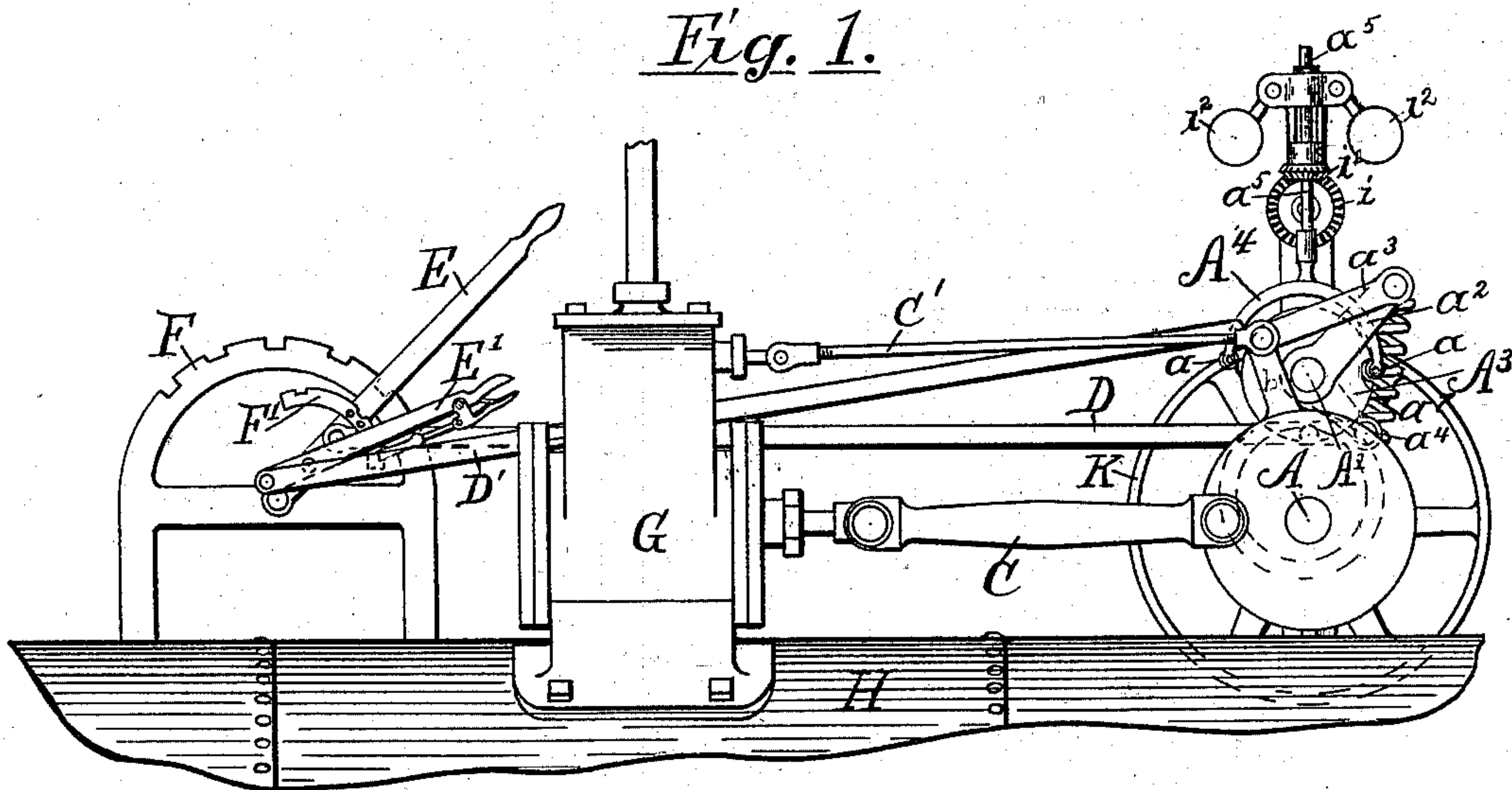


Fig. 2.

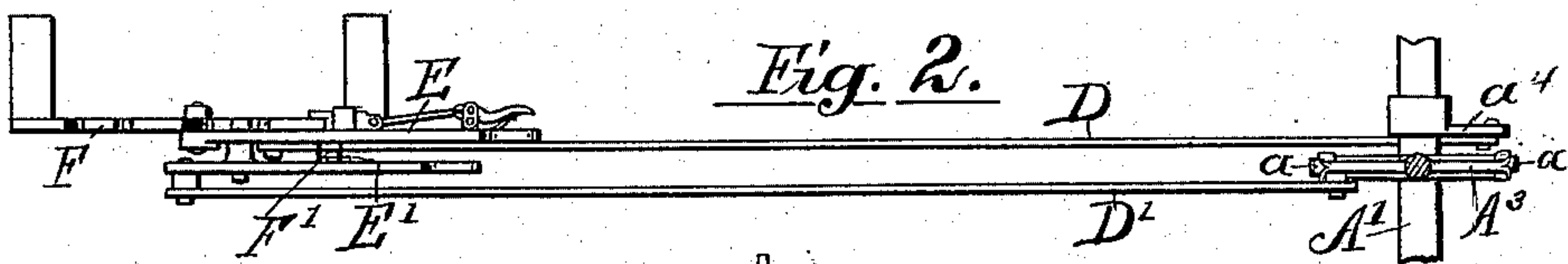
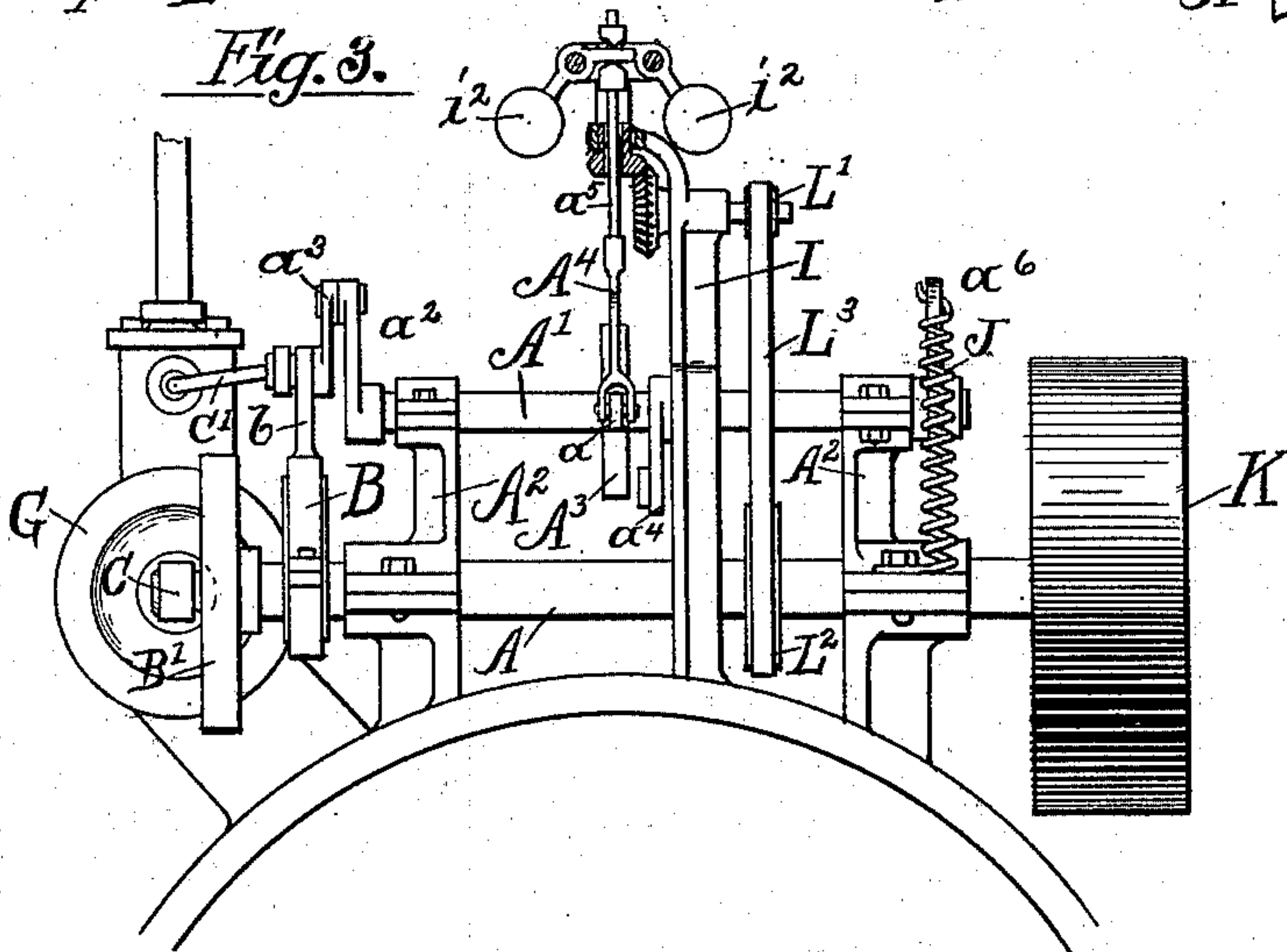


Fig. 3.



Witnesses.
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J. Milton Worth.
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Fig. 4.

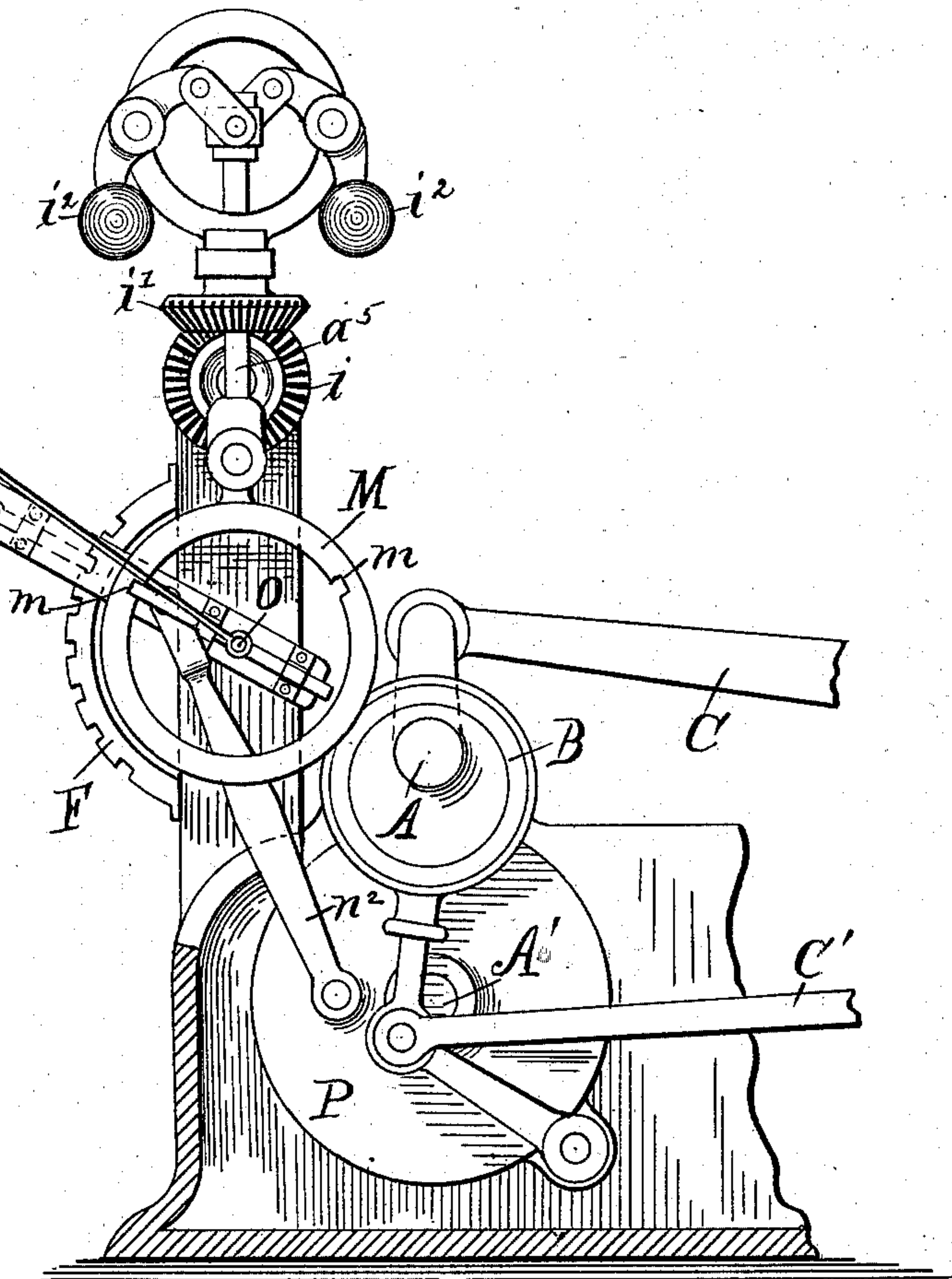


Fig. 5.

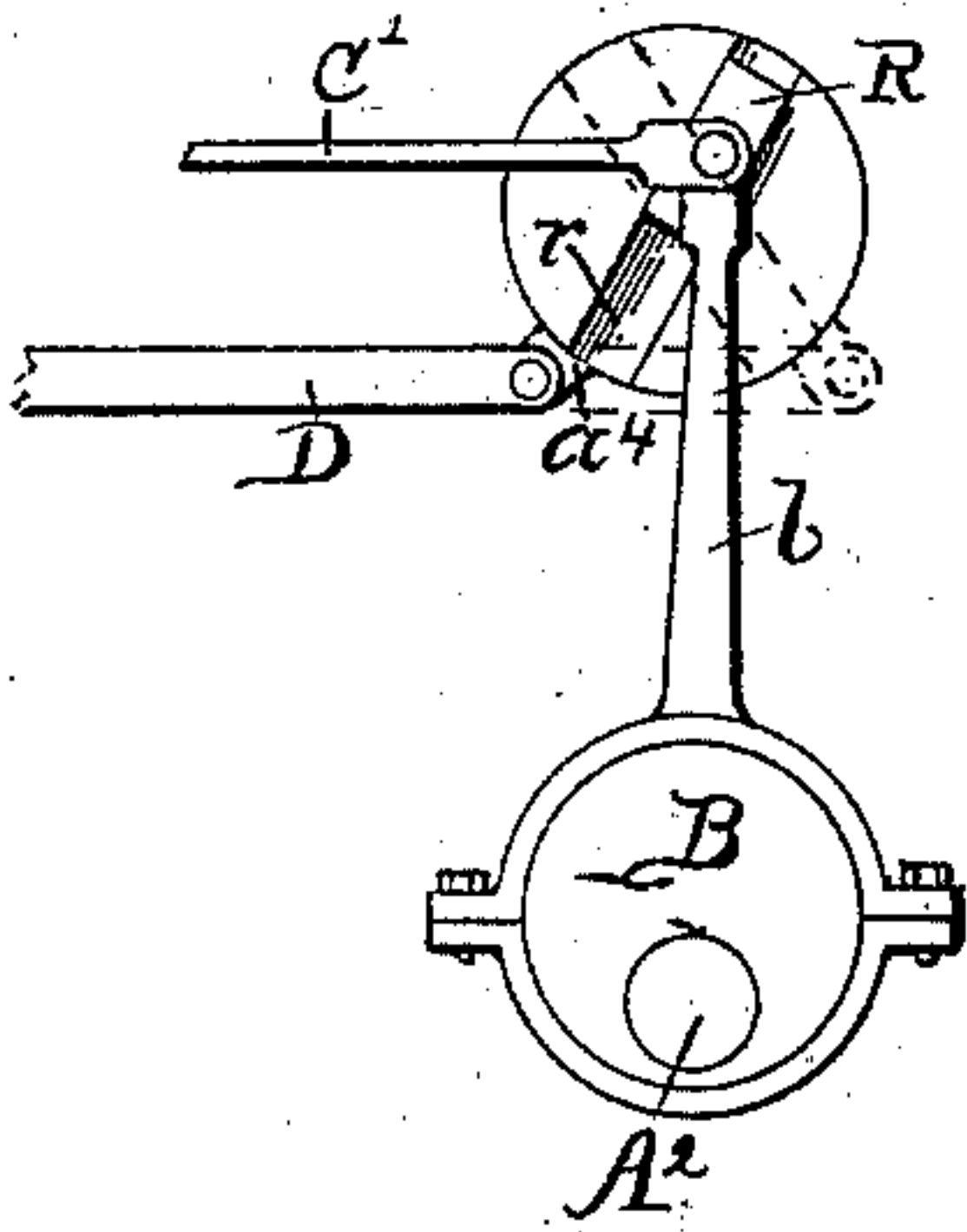


Fig. 7.

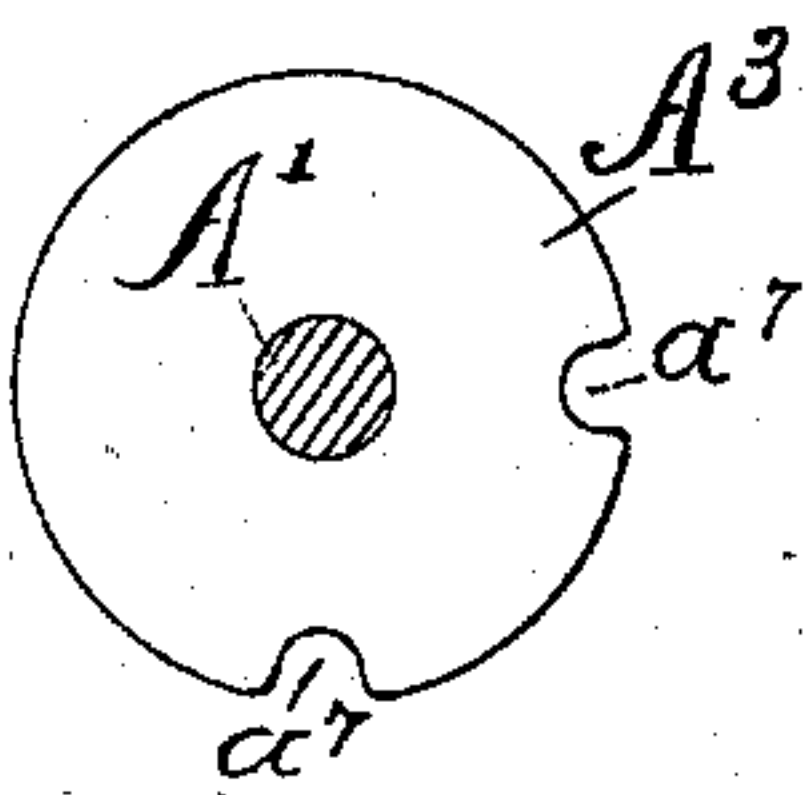
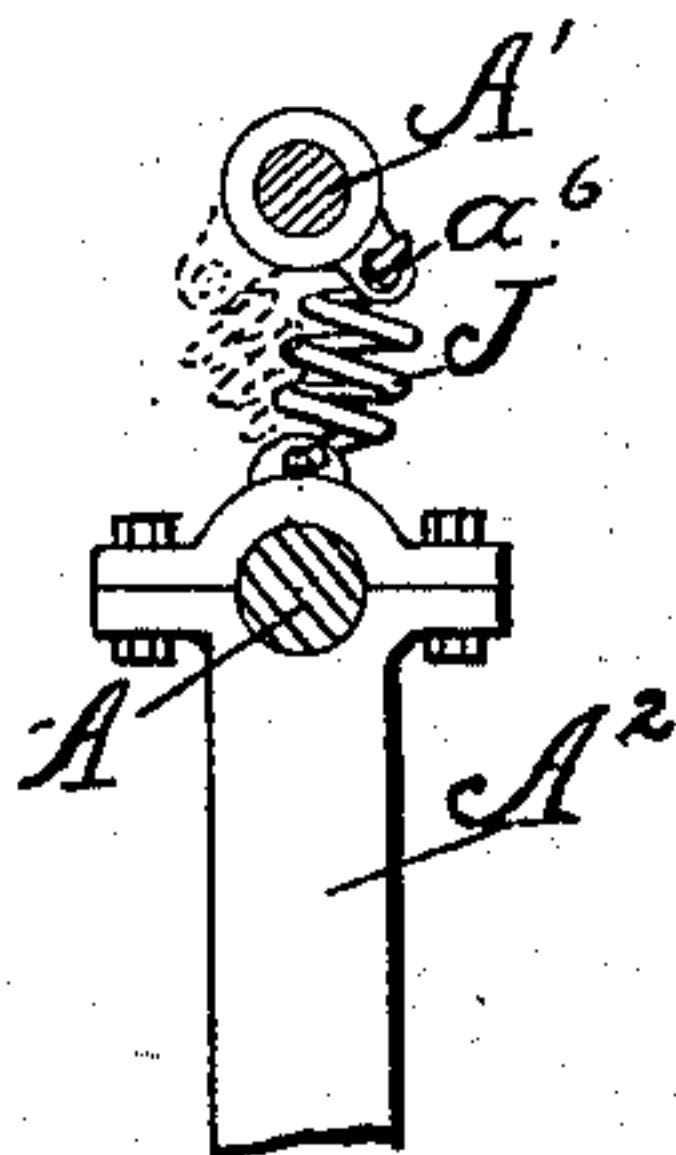


Fig. 6.



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UNITED STATES PATENT OFFICE.

JAMES MILTON WORTH, OF CHICAGO, ILLINOIS.

REVERSING VALVE-GEAR.

SPECIFICATION forming part of Letters Patent No. 559,018, dated April 28, 1896.

Application filed May 31, 1892. Renewed November 8, 1895. Serial No. 568,367. (No model.)

To all whom it may concern:

Be it known that I, JAMES MILTON WORTH, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a certain new and useful Improvement in Reversing Valve-Gear, of which the following is a description, reference being had to the accompanying drawings, forming part of this specification.

The object of my invention is to improve combined governors and automatic cut-off and reversing mechanisms for steam-engines. I am aware that many devices exist for accomplishing this; but none so effectually and perfectly as does my device. I have shown it in the preferred form as mounted on a horizontal boiler such as is in use for traction-engines. I also show a modified form as applied to stationary engines.

The object of a governor or automatic cut-off and reversing mechanism is well known and need not be particularly described.

Similar letters of reference indicate corresponding parts.

Figure 1 is a side elevation of my device, showing fragment of horizontal boiler, ordinary block slide-valve, and cylinder. Fig. 2 is a plan view of the levers by which my device is operated and controlled, also disk-levers and segments, the fork or Y and the rollers attached to the fork, and also small section of shafting. Fig. 3 is a front elevation of my device, showing relative position of parts. Fig. 4 is a side elevation of a modified form of my invention as applied to stationary engines and in operation very similar to that shown in Figs. 1, 2, and 3. Fig. 5 is a detached view of another style of the disk and surrounding parts. Fig. 6 shows a detached view of the shaft A', the crank-arm a^6 , and the spring J. Fig. 7 is an enlarged view of the disk shown in Figs. 1, 2, and 3.

It will be seen that I have mounted in suitable bearings A² a main or crank shaft A, upon which is mounted the eccentric B, the fly-wheel K, and pulley L.

Above and parallel with A is another shaft A', mounted in bearings similar to or forming a part of the same used for A. Mounted on the extreme left end of A' is the crank-arm a^2 , to which is pivoted the link a^3 , to which

in turn is pivoted the eccentric-arm b and the valve-rod C'.

Mounted centrally on A' is the disk A³. Beyond A³ is another crank-arm a^4 , to which is attached the main operating-lever D, connected to the lever E, mounted on the segment F. Also mounted on A' is another arm a^6 , to which is attached the spring J. This spring tends at all times to force the shaft to such a position as to force the valve-actuating mechanism from a "center," thus turning on the steam.

Mounted in a suitable standard I, a little off the center of the boiler and directly over the shaft A' and disk A³, is a common geared ball-governor operated by the ordinary method—viz., pulleys and a belt.

To the governor stem or rod a^5 is attached a downwardly-projecting fork or Y A⁴, provided at the end of each arm with a roller a . This roller engages with the slots a^7 a^7 of the disk A³.

In Fig. 4 I show a ring instead of a fork, as shown in Figs 1, 2, and 3.

Attached to the fork A⁴ is a rod D', connected with the lever E', pivoted on and to the throttle E, engaging with the quadrant F', mounted on E.

The operation of my invention is easily understood.

It will be seen that so long as the lever E' is held in the position shown in the drawings the roller a of the fork A⁴ will be held in contact with the notch or slot a^7 of the disk A³, and the upward throw of the governor-balls w^2 will cause this disk A³ to turn downwardly until such time as the roller a leaves the slot or notch a^7 , thus releasing the control of the governor and allowing the disk A⁴ to return to its former position by means of the spring J and crank a^6 on the extreme end of the shaft A'.

It will be seen that as the disk A³ is revolved by means of the fork A⁴ and the governor thereto attached the arm a^2 will travel downwardly. To this arm a^2 is attached the valve-rod C' and the eccentric-stem b by means of the link a^3 . The downward motion of the arm a^2 will cause the longest distance of the eccentric to turn toward a vertical position, carrying with it the valve-rod C', thus

shortening the stroke of the valve and cutting off the supply of steam.

Should the lever E' be moved until it stands parallel with the lever E , it would throw the fork A^4 out of engagement with the disk A^3 , and thus release the governor of all control of the valve. When the lever E' is placed in the last-named position relative to the lever E , the action of the valve is controlled wholly by the lever E and its connections.

The manner of reversing the action of the valve will be easily understood. It will be seen if the lever E be moved to a position relative to the segment F directly opposite to that shown in Fig. 1 it will cause the crank-arm a^4 to pass to the opposite angle to that shown in the drawings, thus throwing the eccentric-stem b past the center, thus reversing the action of the valve.

In Fig. 4 the governor is operated by the same method as shown in Figs. 1 and 2 and need not be particularly shown. Instead of the disk and fork as used in the device as shown in Figs. 1, 2, and 3 I use a ring M , provided with the notches m m , with which the double-acting latch n of the lever N engages. This lever also serves as a throttle, working on the pivot O and engaging with the segment P . n' corresponds to D' in Figs. 1 and 2; n^2 to D . P is the disk that takes the place of the several crank-arms shown in Figs. 1, 2, and 3.

In Fig. 5 I have shown a detached view of another style of disk, the valve being operated by means of a sliding block traveling in the slot R . This disk takes the place of and does away with the arms a^2 a^3 .

Fig. 6 shows a detached view of the shaft A' , crank-arm a^6 , and the spring J in their preferred form.

In Figs. 1 and 2 I show the crank-arm a^6 and the spring J as being much longer, and used in this form would require a similar arm and spring set diametrically opposite to act in case of reverse. This complicates the mechanism and is the less desirable form to that shown in Fig. 6.

In Fig. 7 I show a detached view of the disk A^3 (shown in Figs. 1, 2, and 3) that the notches or slots a^7 may be more easily understood.

For the purpose of illustration I have used a ball-governor, but I do not wish to be understood as confining myself to any particular style of governor, as a fly-wheel governor or any easily-adapted one might be used.

It will be seen that the reverse mechanism can be used without regard to the governor, or the governor can be in use while the reverse is left at any desired position, or they can be used conjointly.

Having thus fully described my invention, I claim—

1. In a reversing valve-gear, the combination with the valve and valve mechanism, a governor having a forked stem constructed to actuate the valve mechanism by means of a slotted disk, a shaft, a crank and a link, said governor being thrown in and out of operation by means of a lever, as E' , mounted on a reversing-lever, as E , and acting in conjunction with or independent of the reversing mechanism, substantially as shown.

2. In a reversing valve-gear, the combination with the valve and valve mechanism, the reversing mechanism, consisting of a lever, as E , means, as shown, whereby the reversing mechanism is connected to the valve, and a governor having a forked stem engaging with a disk mounted on a shaft and imparting motion to said shaft either independently of or in conjunction with the reversing mechanism, substantially as set forth and shown.

3. In a reversing valve-gear, the governor, and means for communicating the action of the governor to the valve, in combination with the means for throwing the governor in and out of operation, and the reversing mechanism, all constructed and operated substantially as shown and described.

4. In a reversing valve-gear, the combination with the disk, slots or notches a^7 , the rollers a a , the lever D' and the shaft A' , substantially as and for the purpose set forth and shown.

5. In a reversing valve-gear, the combination with a governor substantially as shown, the shaft A , shaft A' , the fork A^4 , the disk A^3 , the crank-arms a^2 a^4 a^6 , the lever or rod D , the rod D' , the throttle E , the lever E' , the segment F , and the quadrant F' , substantially as and for the purpose set forth.

6. In a reversing valve-gear, the combination with the valve and valve-operating mechanism, the reversing mechanism, the automatic governor, the shaft A' , the crank a^2 , the link a^3 , the crank a^6 and the spring J , substantially as and for the purpose set forth.

7. In a reversing valve-gear for steam-engines, the combination with the throttle E , the lever E' , the segment F , the quadrant F' , the rod D , the rod D' , the fork A^4 , the governor, consisting of the balls $i' i'$, the bevel-gear $i i$, the rod a^5 , the pulleys L L^2 , the belt L^3 and standard l and the shaft A' , substantially as and for the purpose set forth.

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Witnesses:

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