

(No Model.)

2 Sheets—Sheet 1.

A. BLAHA.  
VALVE GEAR FOR STEAM ENGINES.

No. 408,452.

Patented Aug. 6, 1889.

Fig. 2.

Fig. 1.

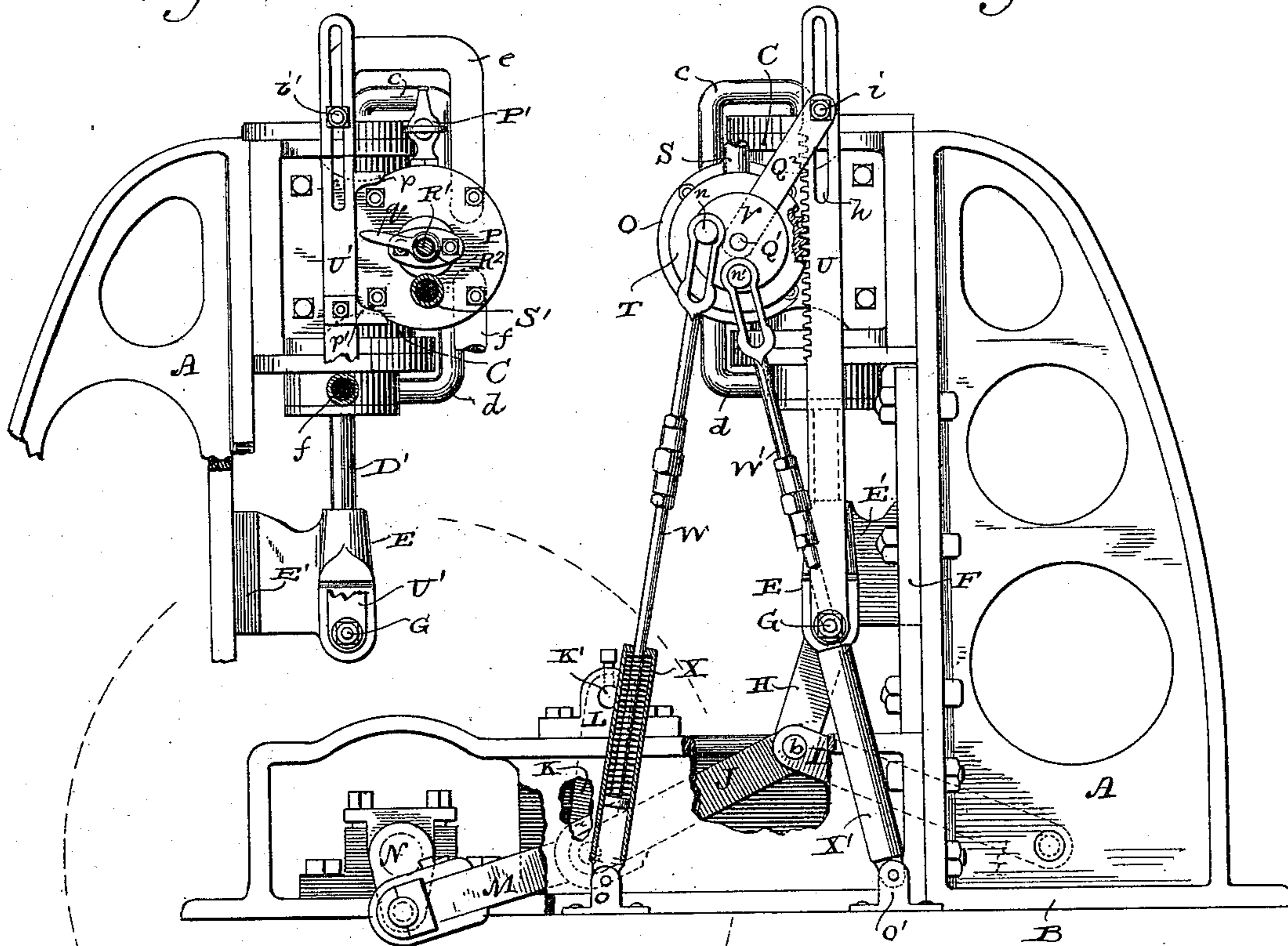
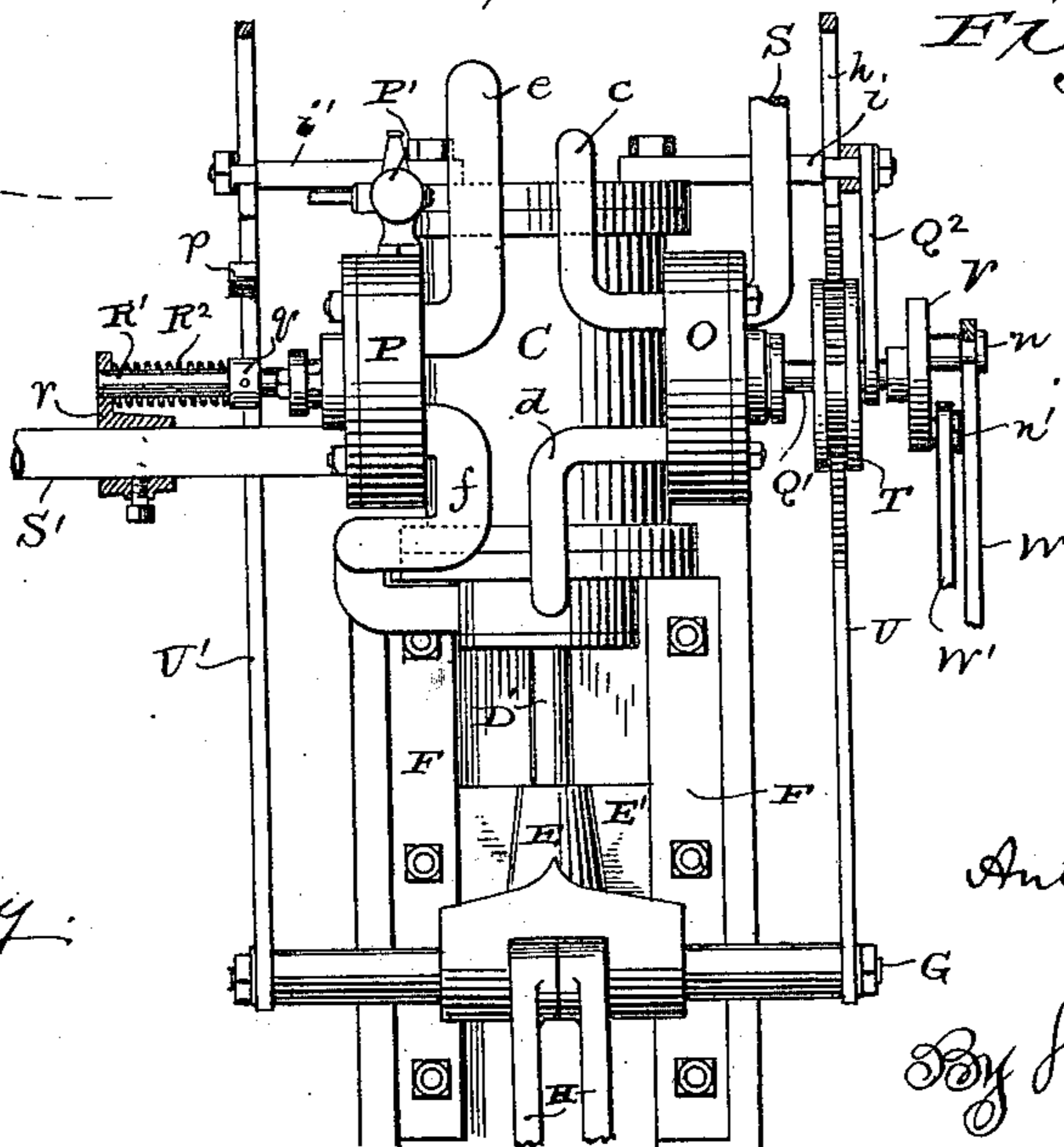


Fig. 3.



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Fig. 4.

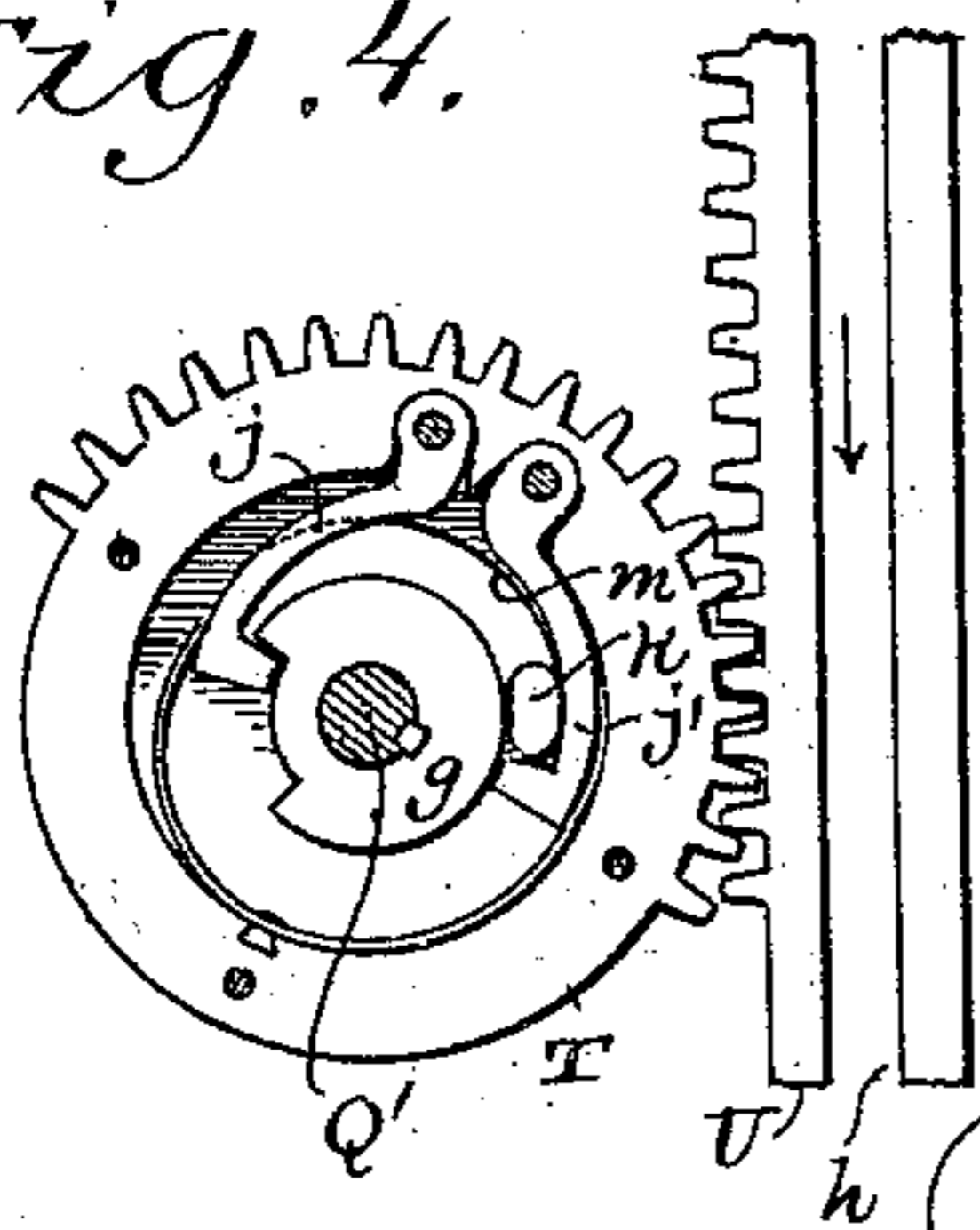


Fig. 6.

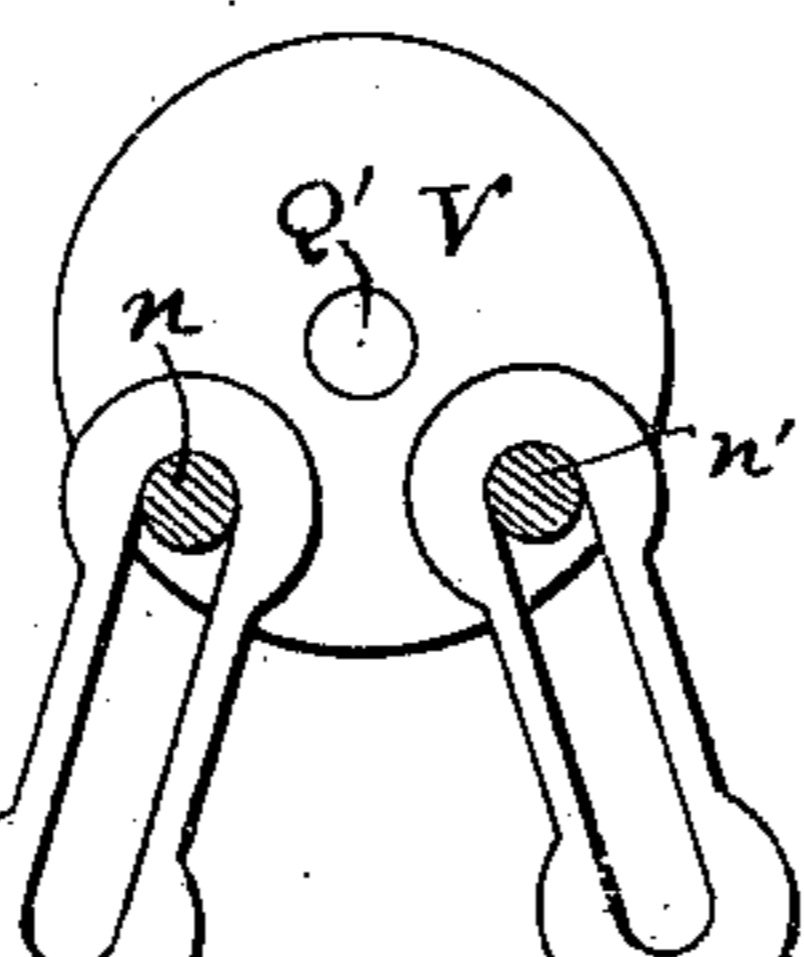


Fig. 8.

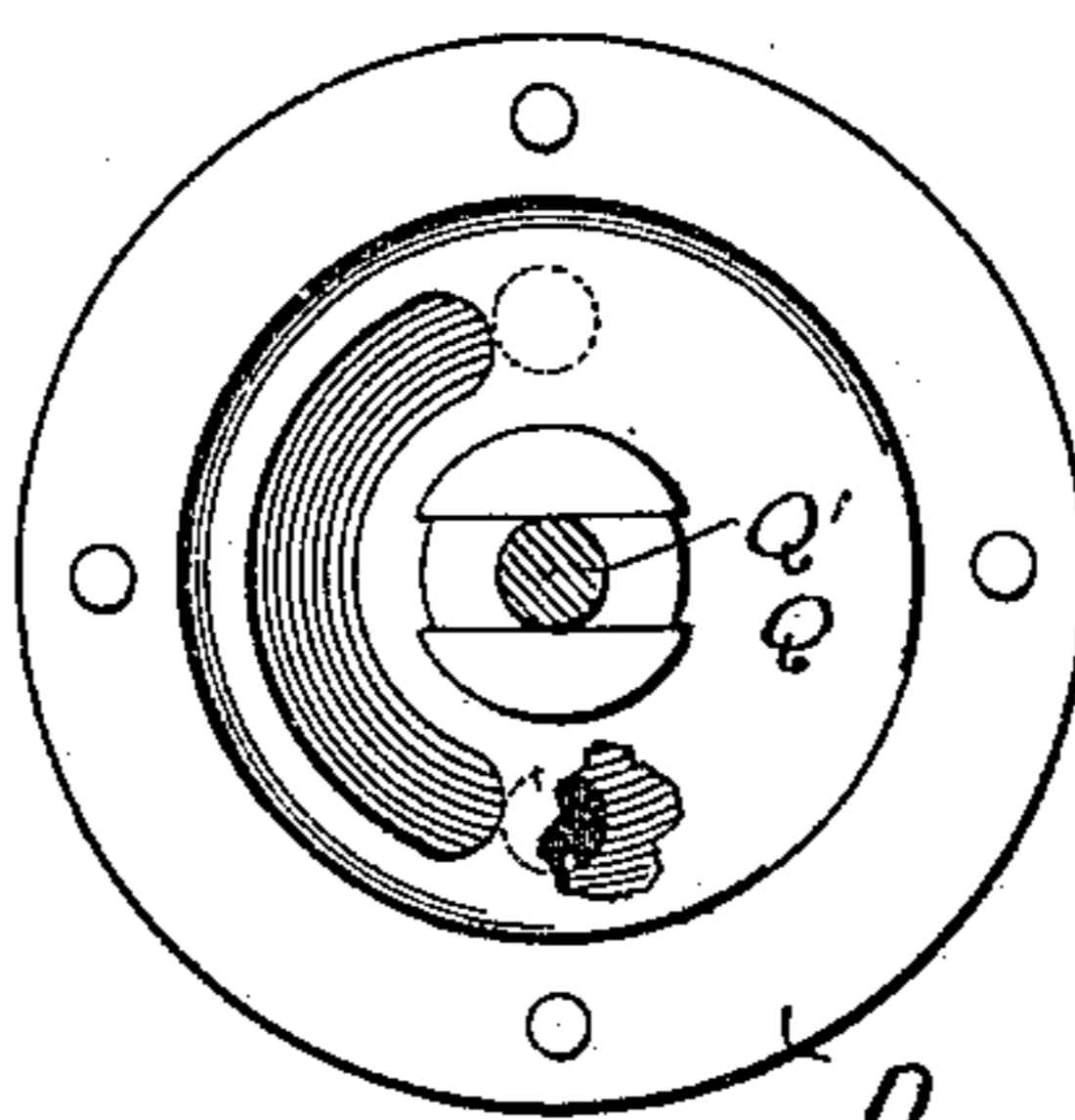


Fig. 5.

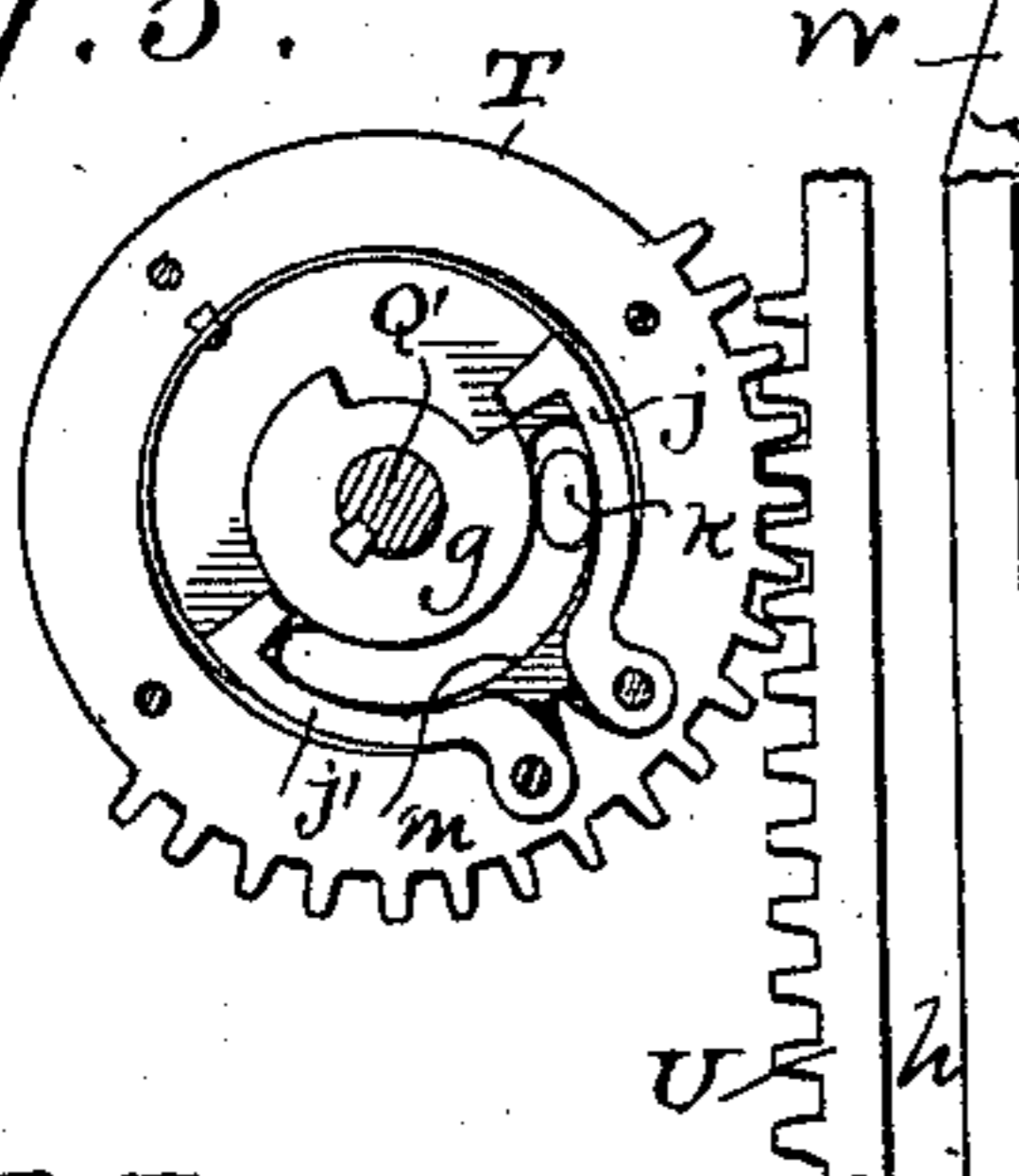


Fig. 7.

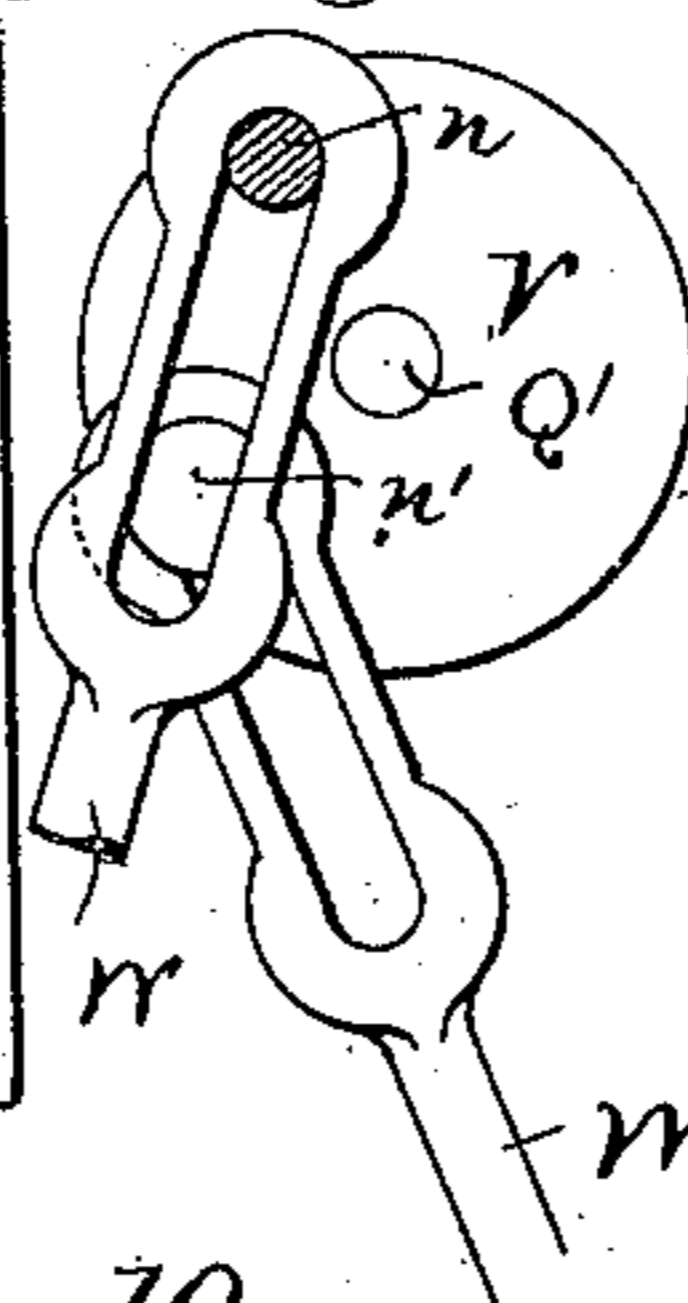


Fig. 9.

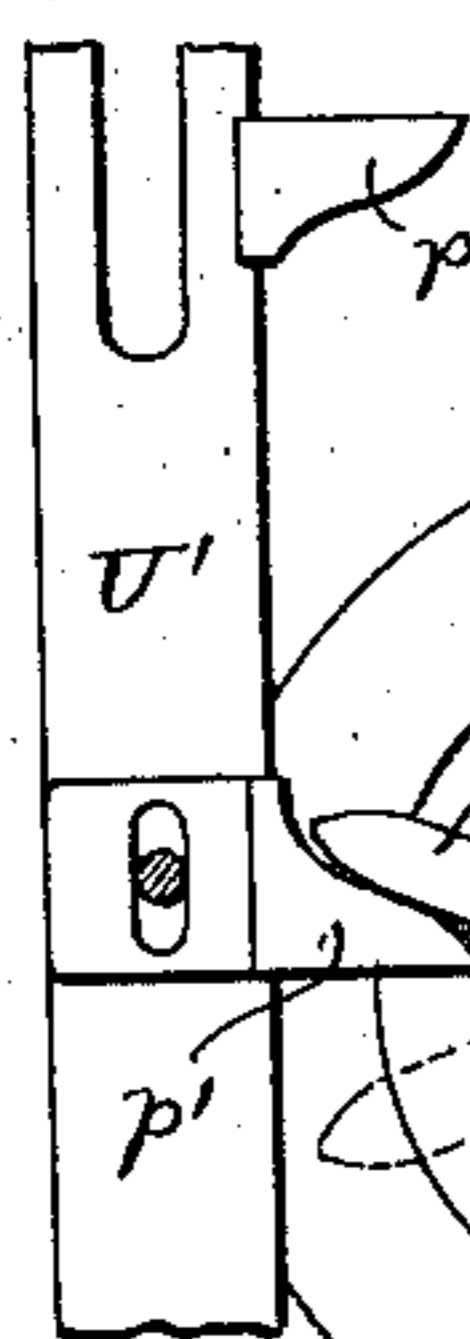
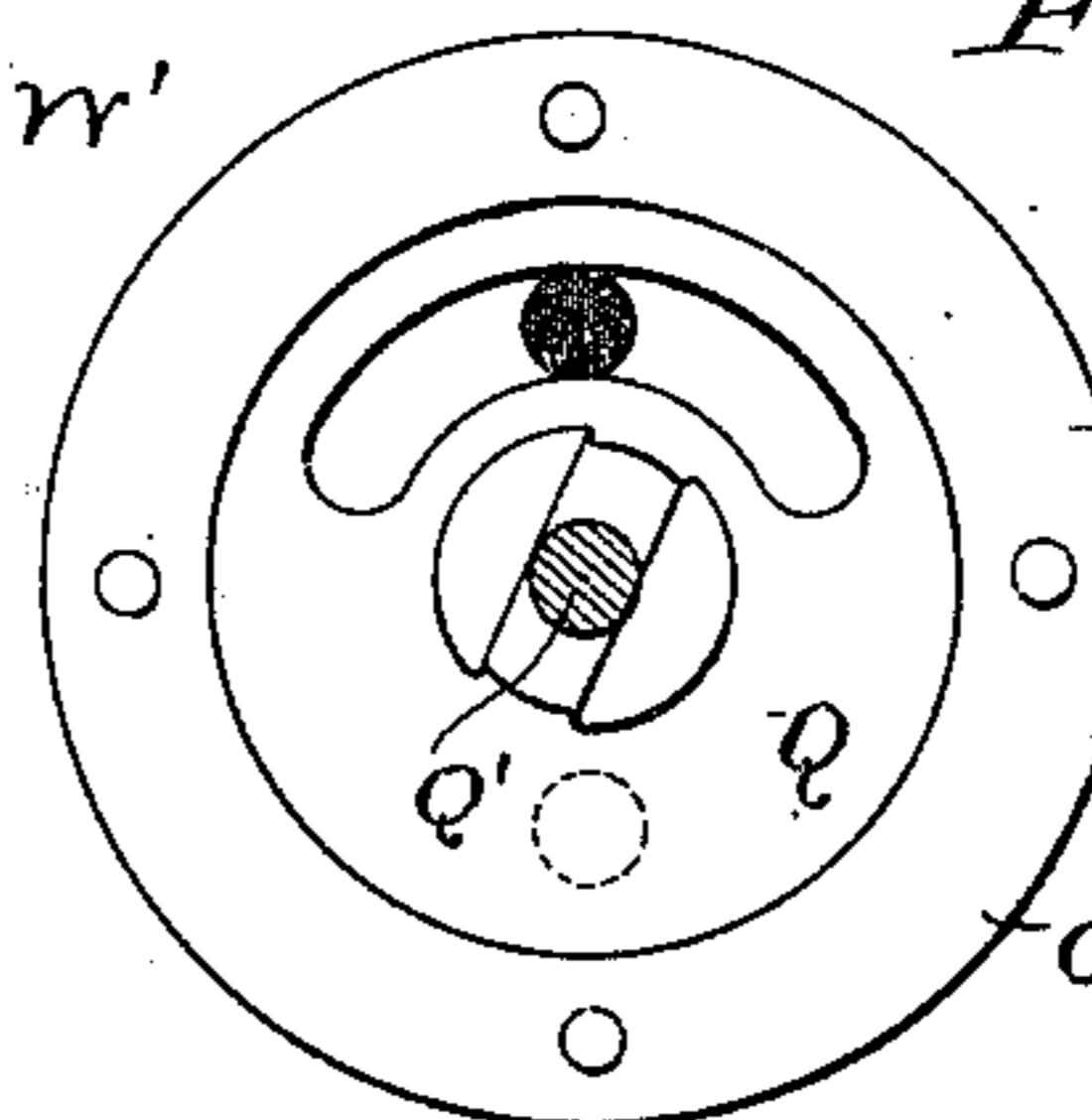


Fig. 10.

Fig. 11.

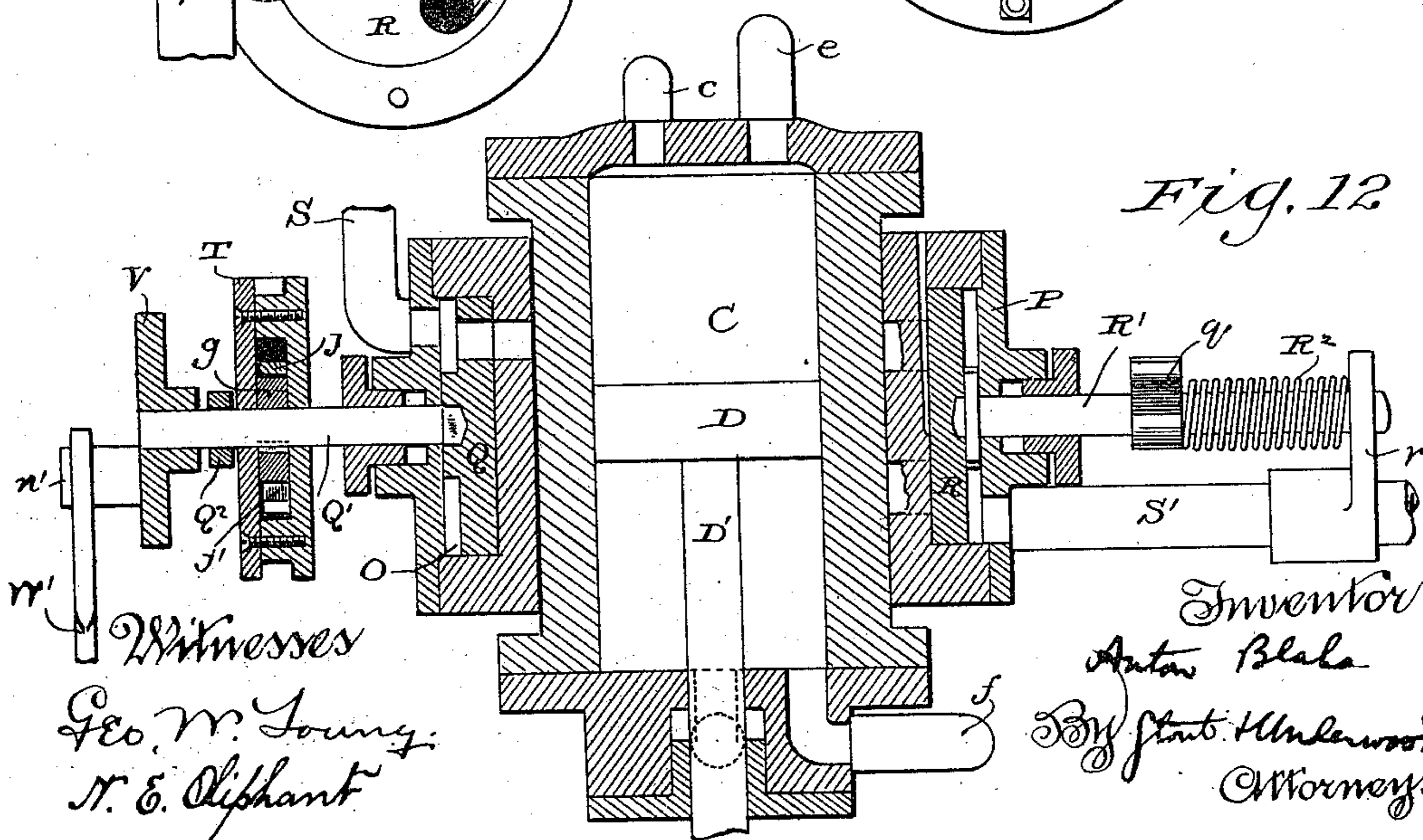
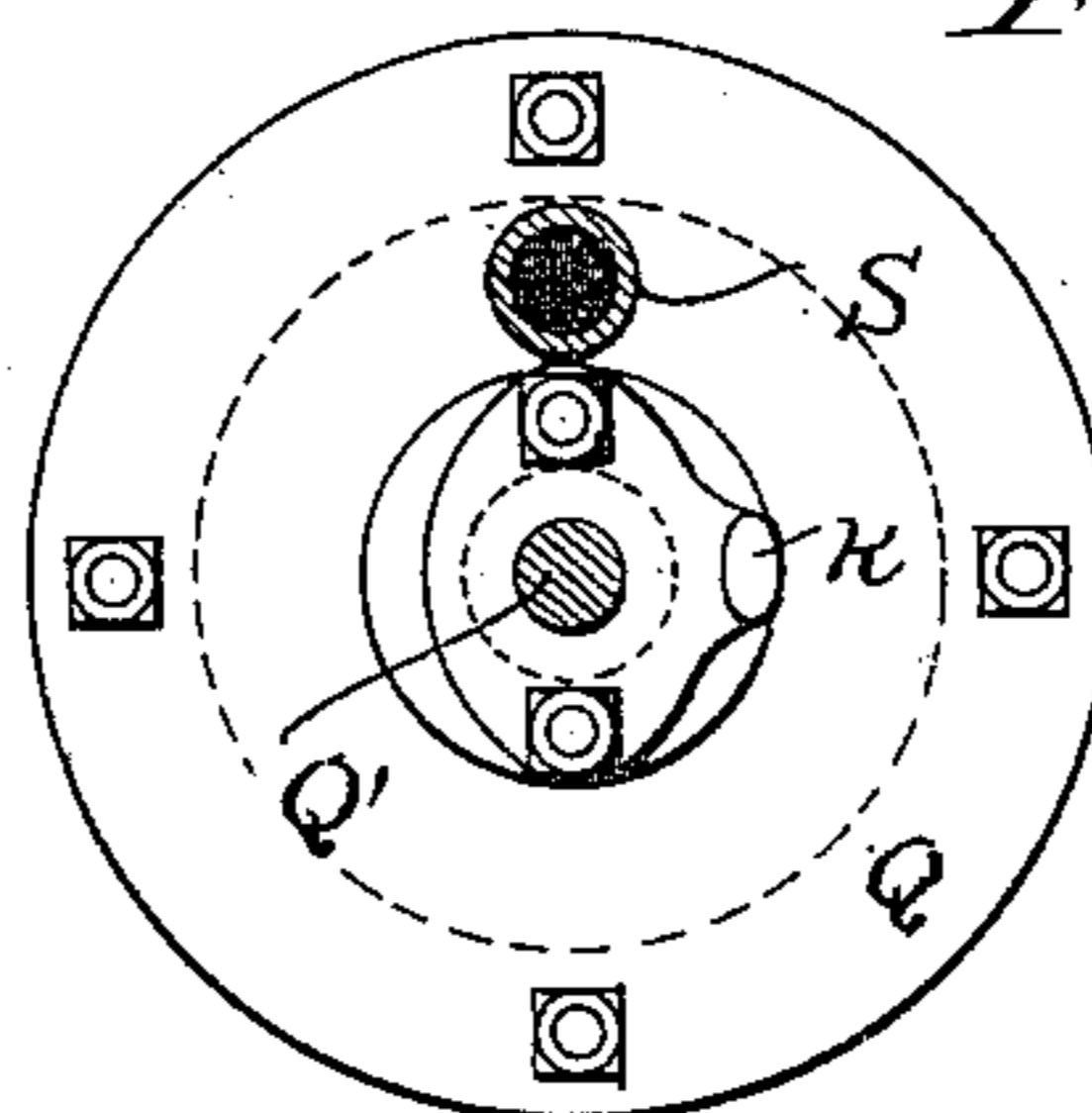


Fig. 12

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# UNITED STATES PATENT OFFICE.

ANTON BLAHA, OF MILWAUKEE, WISCONSIN.

## VALVE-GEAR FOR STEAM-ENGINES.

SPECIFICATION forming part of Letters Patent No. 408,452, dated August 6, 1889.

Application filed May 4, 1889. Serial No. 309,564. (No model.)

*To all whom it may concern:*

Be it known that I, ANTON BLAHA, of Milwaukee, in the county of Milwaukee, and in the State of Wisconsin, have invented certain new and useful Improvements in Valve-Gears for Steam-Engines; and I do hereby declare that the following is a full, clear, and exact description thereof.

My invention relates to steam-engines; and it consists in certain peculiarities of construction and combination of parts, to be hereinafter described with reference to the accompanying drawings, and subsequently claimed.

In the drawings, Figure 1 represents an elevation of one side of an engine constructed according to my invention, certain of the parts being broken away for the purpose of better illustration; Fig. 2, a similar view of a portion of the engine, looking at the side opposite that shown in the preceding figure; Fig. 3, a front elevation of a portion of said engine; Figs. 4 to 11, inclusive, detail views illustrating the operation of the valve-gear; and Fig. 12, a vertical transverse section of the cylinder and valves.

Referring by letter to the drawings, A represents the standards of my engine provided with base-flanges B, and bolted to these standards at their upper ends is a cylinder C for a piston D, that has its rod D' fast in a cross-head E on a plate E', that plays up and down between guides F on the standards A, as is best illustrated in Fig. 3. A rod G runs through the cross-head E, and depending from this rod are links H, pivotally connected to links I, that are in turn pivoted to the standards A, and the pivot b, uniting the links H and I, also serves to connect them with another link J, pivoted to suspension-links K, that have their bearing on a rod K', rigidly secured in brackets L on said standards. The pivot that unites the links J and K also serves to connect them with another link M, that is in turn connected to a crank-shaft N, supported in suitable bearings and designed for rigid connection with a fly-wheel, the latter being illustrated by dotted lines in Fig. 1.

Arranged on opposite sides of the cylinder C are chambers O P for valves Q R, the chamber O being connected to a steam-supply pipe S and the chamber P with a steam-exhaust

pipe S', as is best illustrated in Fig. 12, and the latter valve-chamber is provided with a petcock P'.

Connecting the cylinder C with the valve-chamber O are ports or pipes c d, and ports or pipes e f connect said cylinder and valve-chamber P, as is best illustrated in Fig. 3, said ports or pipes being alternately opened or closed by the movement of valves Q R, as will be hereinafter more particularly described.

Rigidly secured to the stem Q' of the valve Q is a notched disk g, inclosed by a circular casing T, loose on said stem and toothed upon its periphery to engage a rack-bar U, the latter being coupled at its lower end to the rod G and provided at its upper end with a slot h, to permit of vertical play on a bracket i, projecting from the cylinder C, this bracket also serving as a support for an arm Q<sup>2</sup>, that forms a bearing for the said valve-stem.

Pivotally secured within the casing T are spring-controlled dogs j j' for alternate engagement with the notched disk g on the valve-stem Q', these dogs being lifted by an arm k, that projects from the valve-chamber O and enters a slot m in said casing. Another disk V is fast on the valve-stem Q' and provided with studs n n' for engagement with slotted upper ends of spring-controlled plungers W W', that work in dash-pots X X', pivotally connected to stationary brackets o o', as is best illustrated in Fig. 1.

Connected at its lower end to the rod G is a slotted bar U', that moves vertically on a bracket i', projecting from cylinder C, and said bar carries fingers p p', that come in and out of contact with a finger q on the stem R' of valve R, this stem being supported at its outer end in a bearing r on the exhaust-pipe S', and said valve is held against its seat by means of a spring R<sup>2</sup> coiled around its stem between the bearing r and finger q, as is best illustrated in Fig. 3. The finger p' is preferably vertically adjustable on the bar U', as is best illustrated in Fig. 10, and therefore the finger q on the valve-stem R' can be tripped at longer or shorter intervals, as may be found desirable.

In the operation of my engine steam is

admitted through pipe S into the chamber O, and the port or pipe c being open the piston D in the cylinder C will be actuated in a downward direction, while at the same time the valve Q will be partially rotated by the engagement of the disk g on the valve-stem Q' with the spring-controlled dog j, that is pivoted to the casing T, thereby actuating the disk V against the resistance of the spring-controlled plunger W. The partial rotation of the casing T causes the dog j to be lifted out of engagement with the notched disk g by means of the arm k, and the plunger W recoils, and thus the travel of the valve Q is reversed to cut off the admission of steam to the chamber O, while at the same time the dog j' comes into engagement with said disk. By the momentum of the fly-wheel the casing T and valve Q continue the reverse movement, the port or pipe d is opened and steam admitted to the cylinder C to cause the upstroke of the piston D, the disk V being rotated against the resistance of the spring-controlled plunger W' until such time as the arm k lifts dog j' out of engagement with disk g to allow of the latter being brought to its normal position by the recoil of said plunger to thereby cut off the steam as said piston finishes its upstroke. The bar U' moves with the one U, and thus the valve R is alternately rotated in opposite directions by the action of the fingers p p' on the finger q, secured to the stem R' of said valve, whereby the ports or pipes e f are likewise alternately opened and closed to permit the escape of steam from the cylinder.

The reciprocating movement of the piston-rod D' is communicated to the crank-shaft N through the medium of the link-gear above described, and by this construction I increase the leverage, save the wear that ordinarily occurs where a piston-rod has a direct crank-connection with a drive-shaft, and at the same time I lessen the jar occasioned by the latter construction when said piston-rod passes the dead-centers.

Having thus fully described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In a steam-engine, the combination of a valve having a stem provided with a notched disk rigid thereon, a slotted casing surrounding the disk and provided with spring-controlled dogs for alternate engagement with the same, an arm projected into the casing to come in the path of the dogs, and suitable means for actuating said casing alternately in opposite directions and for returning the valve to its normal position after the disengagement of either dog from the notched disk, substantially as set forth.

2. In a steam-engine, the combination of a valve having a stem provided with a notched

disk rigid thereon, a slotted and toothed casing surrounding the disk and provided with spring-controlled dogs for alternate engagement with the same, an arm projected into the casing to come in the path of the dogs, a rack-bar connected to the piston-rod of the engine to mesh with the teeth on said casing, and suitable means for returning the valve to its normal position after disengagement of either dog from the notched disk, substantially as set forth.

3. In a steam-engine, the combination of a cylinder, its valve-chambers and ports, an inlet-valve having a stem provided with a notched disk rigid thereon, a slotted casing surrounding the disk and provided with spring-controlled dogs for alternate engagement with the same, an arm projected into the casing to come in the path of the dogs, suitable means for partially rotating said casing alternately in opposite directions, opposing dash-pot plungers connected to said valve-stem, an exhaust-valve and suitable means for actuating the latter valve, substantially as set forth.

4. In a steam-engine, the combination of a cylinder, its valve-chambers and ports, an inlet-valve having a stem provided with a notched disk rigid thereon, a slotted and toothed casing surrounding the disk and provided with spring-controlled dogs for alternate engagement with the same, an arm projected into the casing to come in the path of the dogs, a rack-bar connected to the piston-rod of the engine to mesh with the teeth on said casing, suitable means for returning said inlet-valve to its normal position after disengagement of either dog with the notched disk, an exhaust-valve also provided with a stem, a finger projecting from the latter stem, and a bar also actuated by said piston-rod and provided with fingers to operate alternately upon the valve-stem finger, substantially as set forth.

5. In a steam-engine, the combination of a piston-rod, a crank-shaft, links depending from the piston-rod, links pivoted to the engine-standards and said depending links, another link pivotally united to those aforesaid and likewise connected to other links pivotally suspended from said standards, and another link connecting said suspension-links and the one immediately adjacent thereto with said crank-shaft, substantially as set forth.

In testimony that I claim the foregoing I have hereunto set my hand, at Milwaukee, in the county of Milwaukee and State of Wisconsin, in the presence of two witnesses.

ANTON BLAHA.

Witnesses:

N. E. OLIPHANT,  
WILLIAM KLUG.