

M. V. NOBLES, dec'd.  
J. C. CLARK, Adm'r.

Reciprocating Steam-Engines.

No. 158,510.

Patented Jan. 5, 1875.

Fig. 1

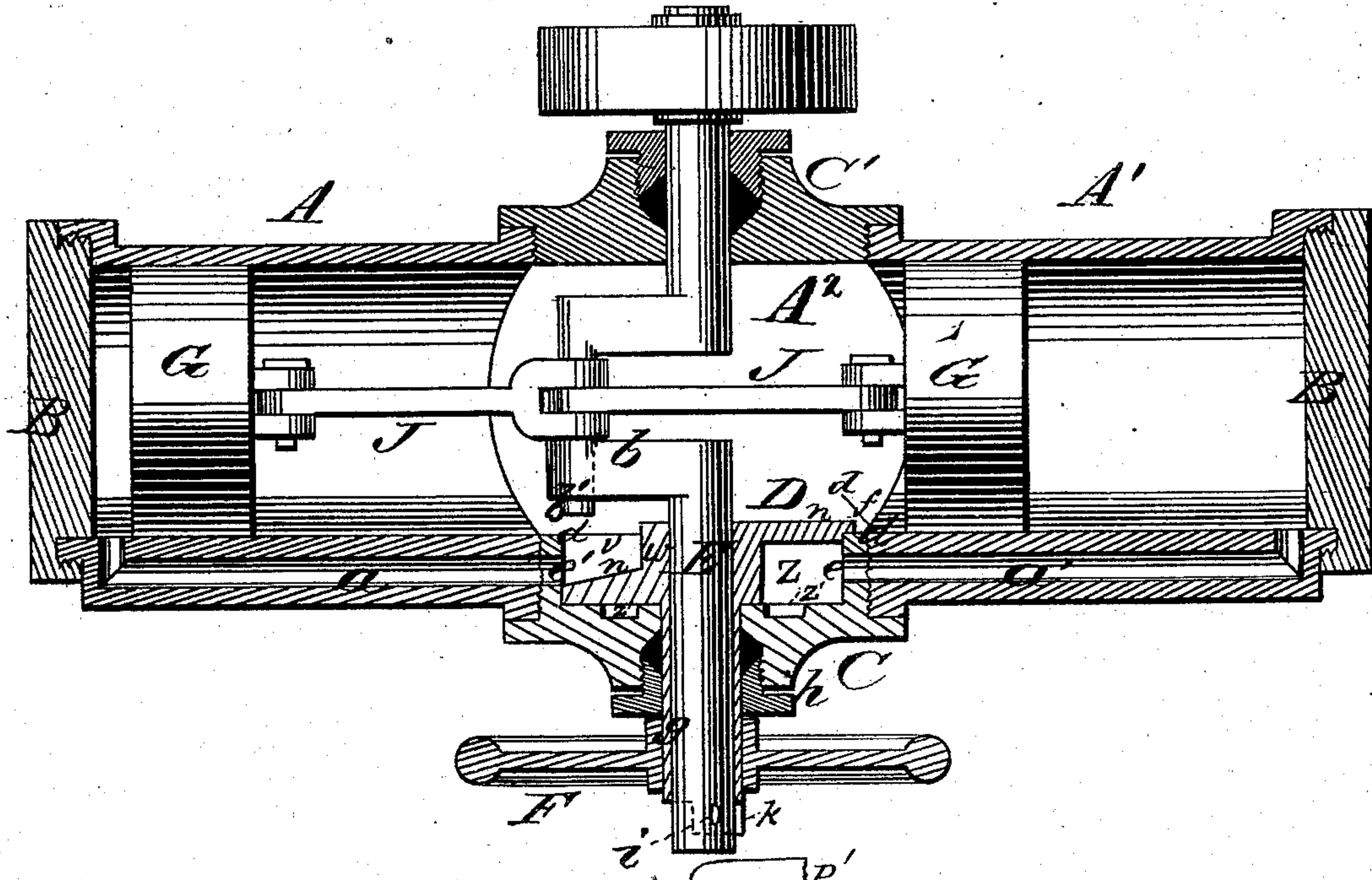
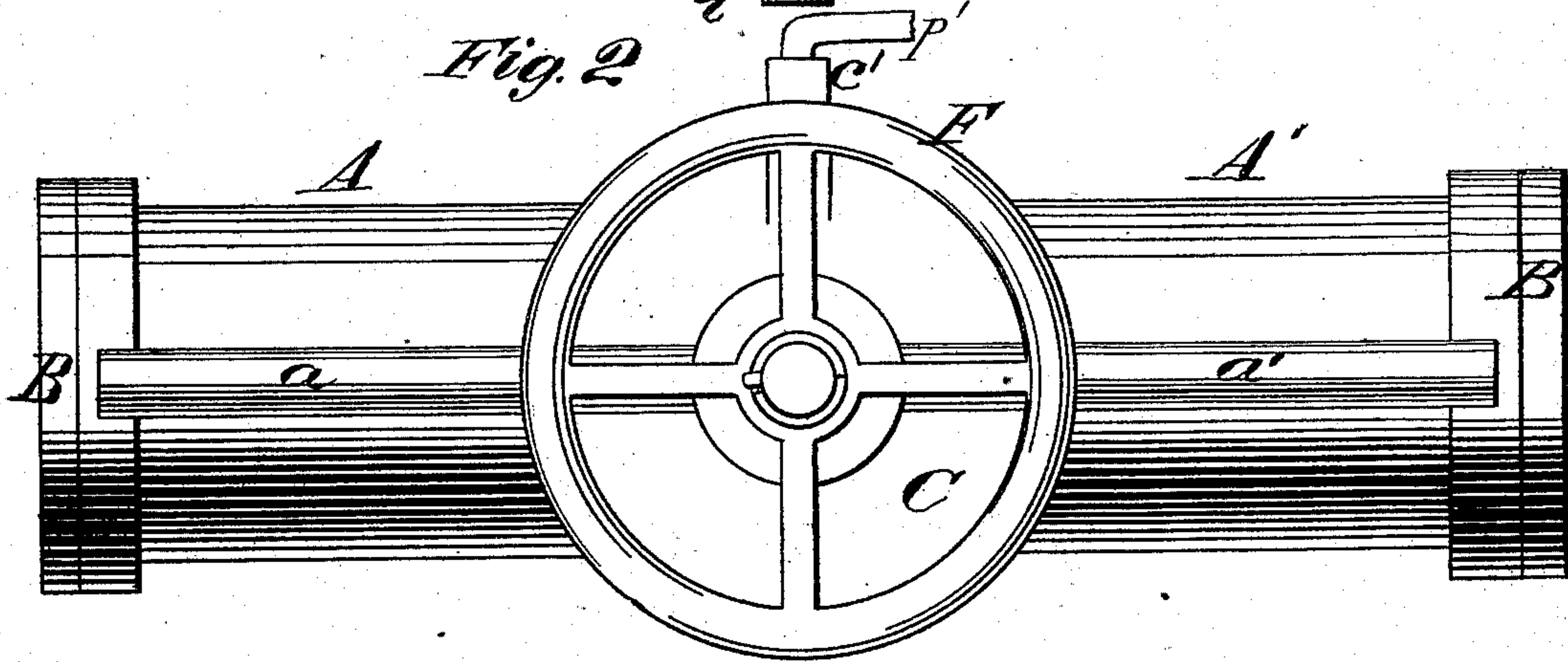


Fig. 2



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of the INVENTOR  
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ATTORNEYS

WITNESSES  
E. A. Bates  
D. R. Cowl

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Fig. 3

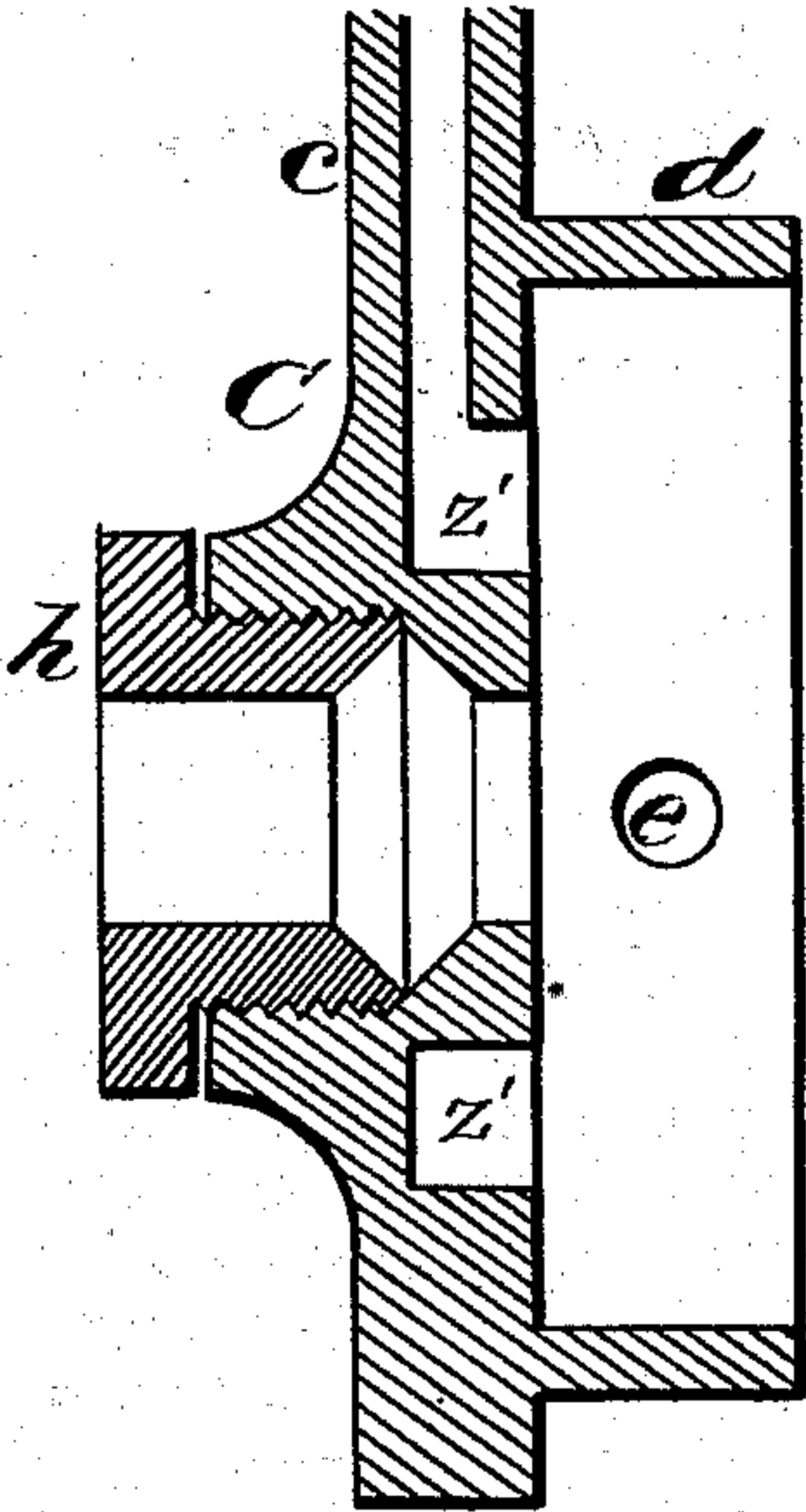


Fig. 4

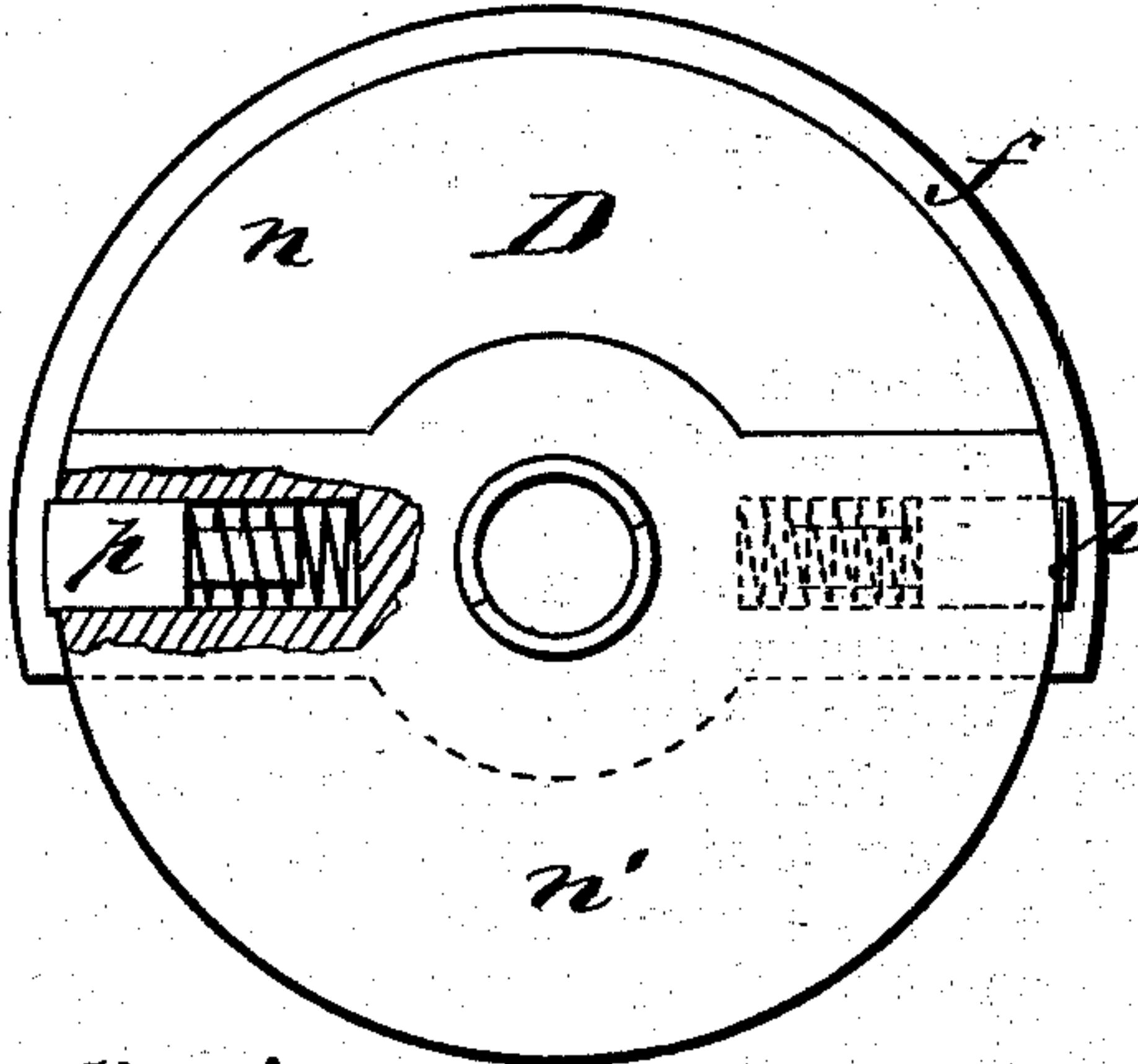


Fig. 5

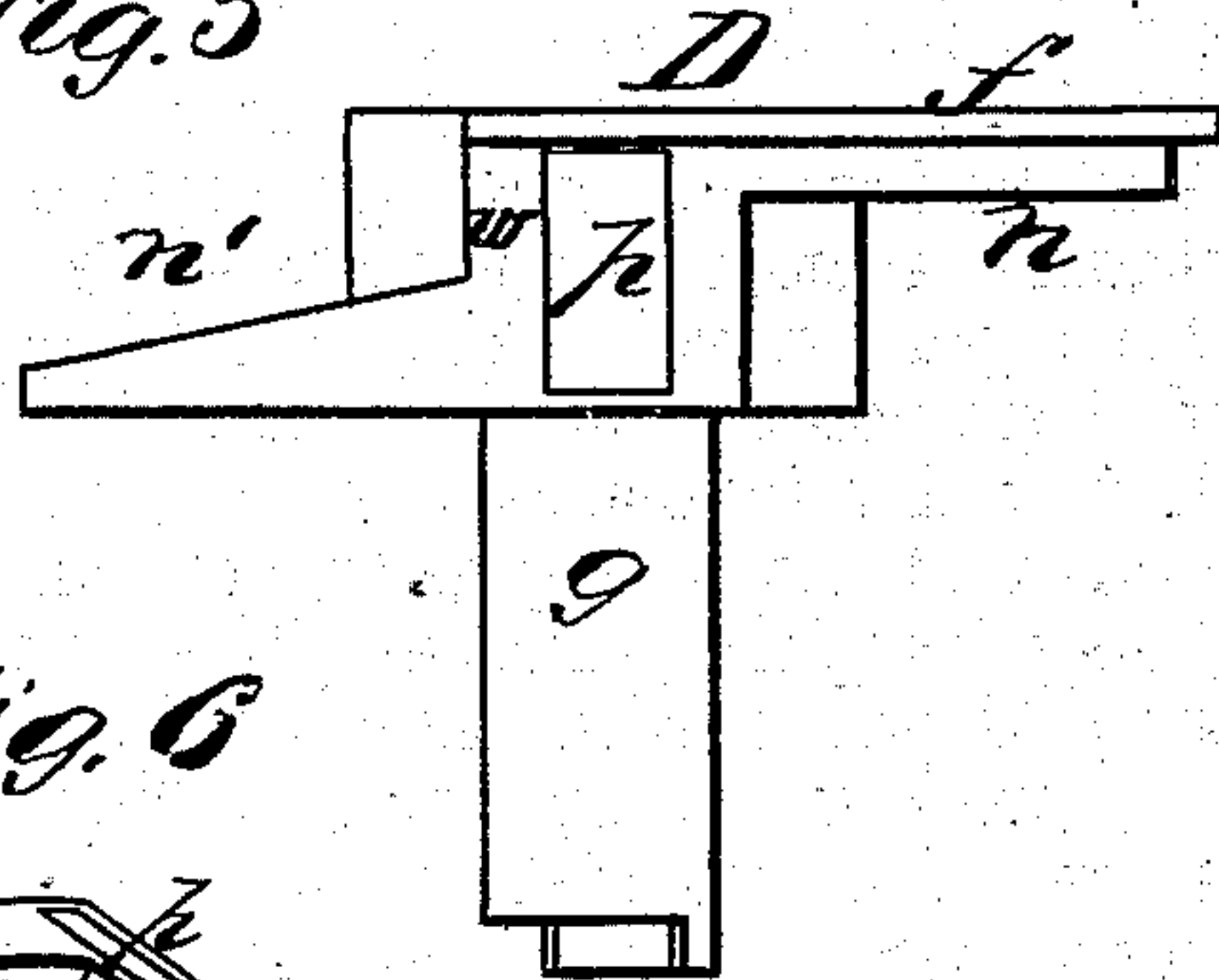
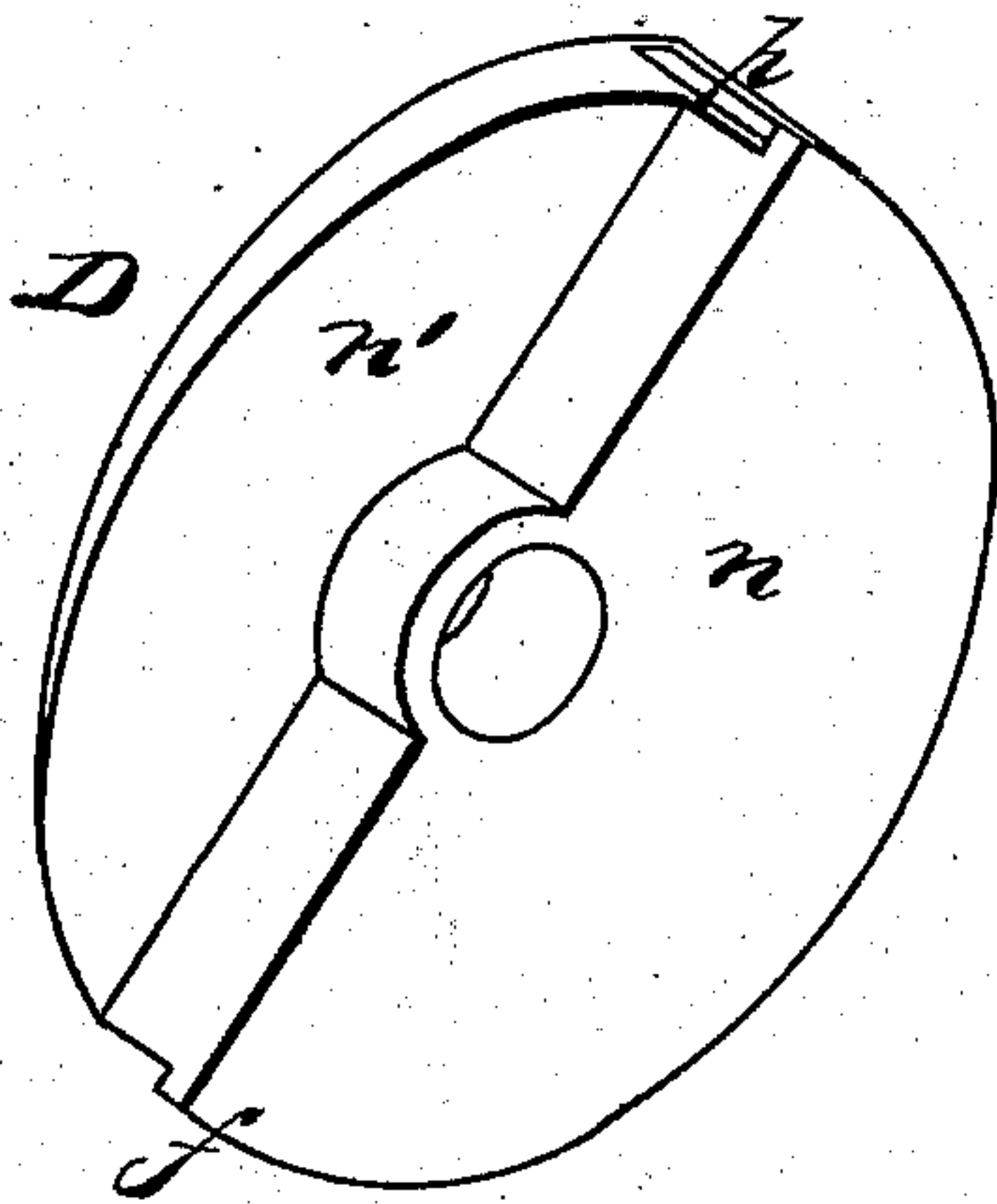


Fig. 6



WITNESSES  
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# UNITED STATES PATENT OFFICE.

JOHN C. CLARK, OF ELMIRA, NEW YORK, ADMINISTRATOR OF MILTON V. NOBLES, DECEASED, ASSIGNOR TO ELMIRA STEAM-ENGINE COMPANY, OF SAME PLACE.

## IMPROVEMENT IN RECIPROCATING STEAM-ENGINES.

Specification forming part of Letters Patent No. 158,510, dated January 5, 1875; application filed October 10, 1874.

*To all whom it may concern:*

Be it known that MILTON V. NOBLES, deceased, did invent a new and valuable Improvement in Steam-Engines, and that I, JOHN C. CLARK, of Elmira, in the county of Chemung and State of New York, administrator to the estate of MILTON V. NOBLES, deceased, do hereby declare that the following is a full, clear, and exact description of the construction and operation of the same, reference being had to the annexed drawings, making a part of this specification, and to the letters and figures of reference marked thereon.

Figure 1 of the drawings is a representation of a longitudinal section of the steam-engine, and Fig. 2 is a plan view of the same. Figs. 3, 4, 5, and 6 are detail views of the same.

The object of this invention is to construct a cheap compound steam-engine, which shall consist of very few parts, that are simple and easily made and put together, and readily accessible for repair and lubrication. The nature of the invention consists in a rotary valve of novel construction, applied on one side of and between the two connected cylinders, in combination with a steam-chest between the pistons, and with steam ports and ways, arranged as will be hereinafter explained. The invention further consists in a provision for reversing the engine, whether the same be in motion or at rest.

In the annexed drawings, A A<sup>1</sup> designate two steam-cylinders, which may be made for any length of stroke or diameter of pistons, and which are provided with removable heads B B. A<sup>2</sup> designates the steam-chest, which is provided with two circular heads, C C', and which is designed to be cast with the two cylinders, so that these cylinders and the chest may be of a single piece. The two cylinders A A<sup>1</sup> are in the same line with each other, and their longitudinal axes coincide. This facilitates boring the cylinders and making them perfectly true. Inside of the cylinders work two pistons, G G, which are connected by pitman-rods J J to a crank, b, on a shaft, E. The rods J J are pivoted to the pistons, so as to allow the ends which are connected to the crank b to vibrate freely in the steam-

chest. The crank-shaft E has its bearings in the two heads C C, and carries on one end a belt-wheel, and on the other end is a hand-wheel, F, which is keyed on a sleeve, g, for reversing the engine, as will be hereinafter explained. D designates a circular rotating valve, consisting of two semicircular portions, n n', which are in different planes, connected with a transverse body, w, as shown in Figs. 1, 5, and 6, forming the face recess v, communicating with the steam-chamber, and the back recess z for the exhaust steam, said recesses being segment-shaped, and traveling with the valve. This valve is provided with packing p p, and it is keyed on the sleeve g, and applied in the flanged portion d of the head C, as shown in Fig. 1. The wing n of this valve is flanged at f, which flange fits closely against the edge of the circular flange d of the head C and makes a close joint. At e e', diametrically opposite each other, are two steam-ports, which communicate with steamways a a', leading into the outer ends of the two cylinders A A<sup>1</sup>. The sleeve g, on which valve D is secured, passes through a stuffing-box, h, applied to the head C, and has the wheel F keyed on it. One-half of the outer end of the sleeve g is cut away, as shown in Fig. 5, to form two stops or shoulders, k, diametrically opposite each other, one or the other of which shoulders abuts against a pin, i, on crank-shaft E, thus causing this shaft to rotate the valve. By giving the valve one-half of a revolution when the engine is running the latter can be reversed. An annular groove, z', is made in the inner face of the head C, which groove communicates with the traveling exhaust-recess z under the valve and an exhaust-outlet, c'. When steam is admitted into the chest A<sup>2</sup> through a pipe, p', it will press equally against both pistons, thus balancing them. If the pistons are in the positions shown in Fig. 1, the live steam will pass through port e', traveling exhaust-recess z, and steamway a, and force the pistons to the opposite ends of their cylinders. At the same time the exhaust steam will freely escape through the way a', port e, and passages z' c'. When the engine has made one stroke the



valve D will be turned one half-revolution, and the flanged portion *n* of the valve D will change the course of the steam and cause the engine to make another stroke. In this way, and by these means, valve D is rotated so as to alternately admit steam into and exhaust it from the outer ends of the cylinders. It will be observed that the wing *n* of the valve D alternately cuts off communication between the chest  $A^2$  and the outer ends of the cylinders  $A A^1$ , and the wing *n'* alternately establishes such communication. The wing *n* also establishes communication with the exhaust. For the purpose of facilitating the taking of the engine apart the wrist-pin *b'* of the crank *b* is loosely applied into one arm of this crank, thus allowing one part of the crank-shaft to be detached from the other when the head C is removed from the steam-chest.

I claim—

1. In a steam-engine, the rotary valve D, consisting of a transverse body, *w*, and two segment-shaped wings, *n n'*, extending from the opposite sides thereof in different but parallel planes, thereby forming in the face and back of the valve segment-shaped steam and exhaust recesses, substantially as specified.

2. The combination, with the rotary valve D, having the semicircular wings *n n'*, and the rear rotating exhaust-recess *z*, of the steam-chest  $A^2$ , the cylindrical head C, forming the valve-seat, its rim-ports *e e'*, and annular exhaust-channel *z'*, communicating with the exhaust-pipe, substantially as specified.

3. The rotary valve D, having the semicircular wings *n n'* and transverse body *w*, in combination with the rim-ports *e e'* of a steam-chest, substantially as described.

4. The combination, with the steam-chest  $A^2$ , steam-cylinders  $A A^1$ , and steam-passages *a a'*, of the rotary valve D, having the semicircular wings *n n'*, forming steam and exhaust recesses, and the head C, having the annular groove *z'*, communicating with the exhaust-outlet *c'*, substantially as specified.

5. The sleeve *g*, having the shoulders *k* opposite each other, and the pin *i* on crank-shaft E, in combination with the double-plane rotary valve D, steam-passages *a a'*, and the rotating exhaust-recess *z*, for the purpose of reversing the engine, in the manner set forth.

6. The combination, with the transverse body *w*, of the rotary valve D, its semicircular wings *n n'*, and the rim-ports of the steam-chest, of the elastic packing *p p*, recessed into the ends of said transverse body, substantially as specified.

In testimony that I claim the above I have hereunto subscribed my name in the presence of two witnesses.

JOHN C. CLARK,  
*Administrator to the estate of*  
*Milton V. Nobles, deceased.*

Witnesses:

F. F. FARGO,  
H. H. WARREN.