

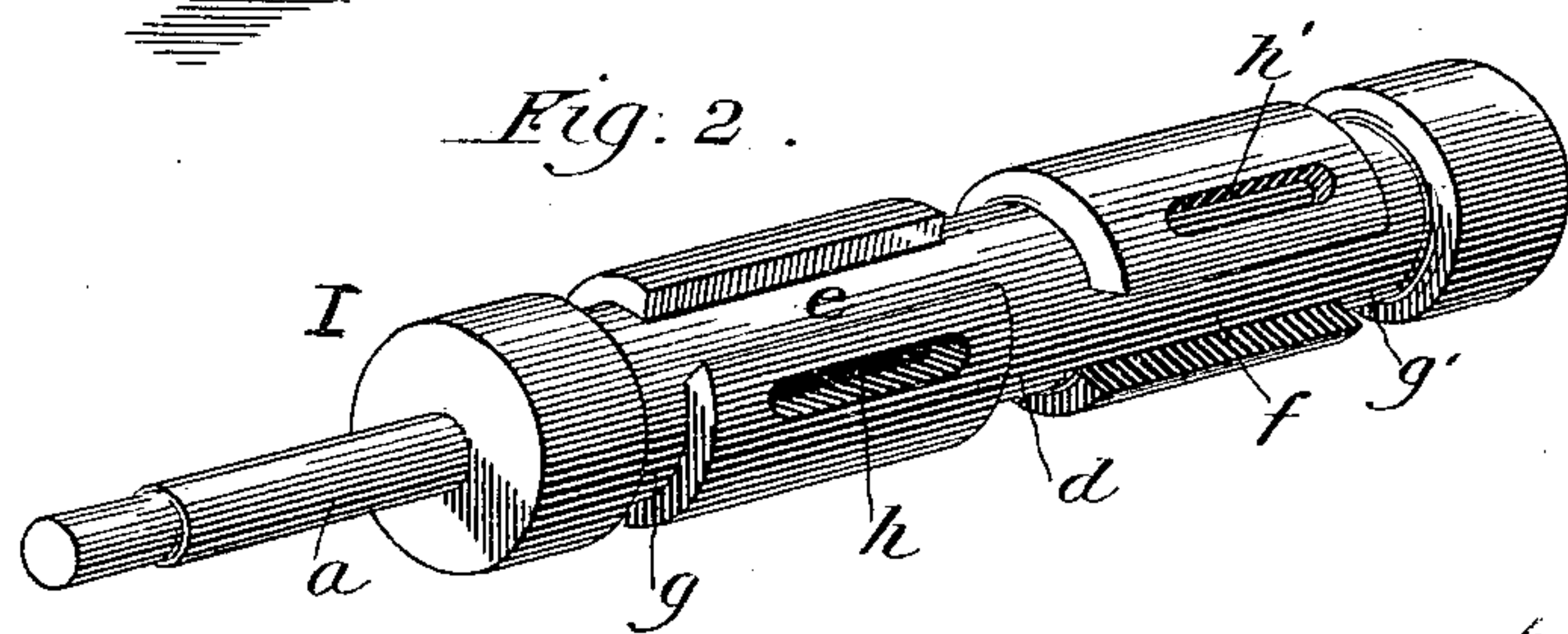
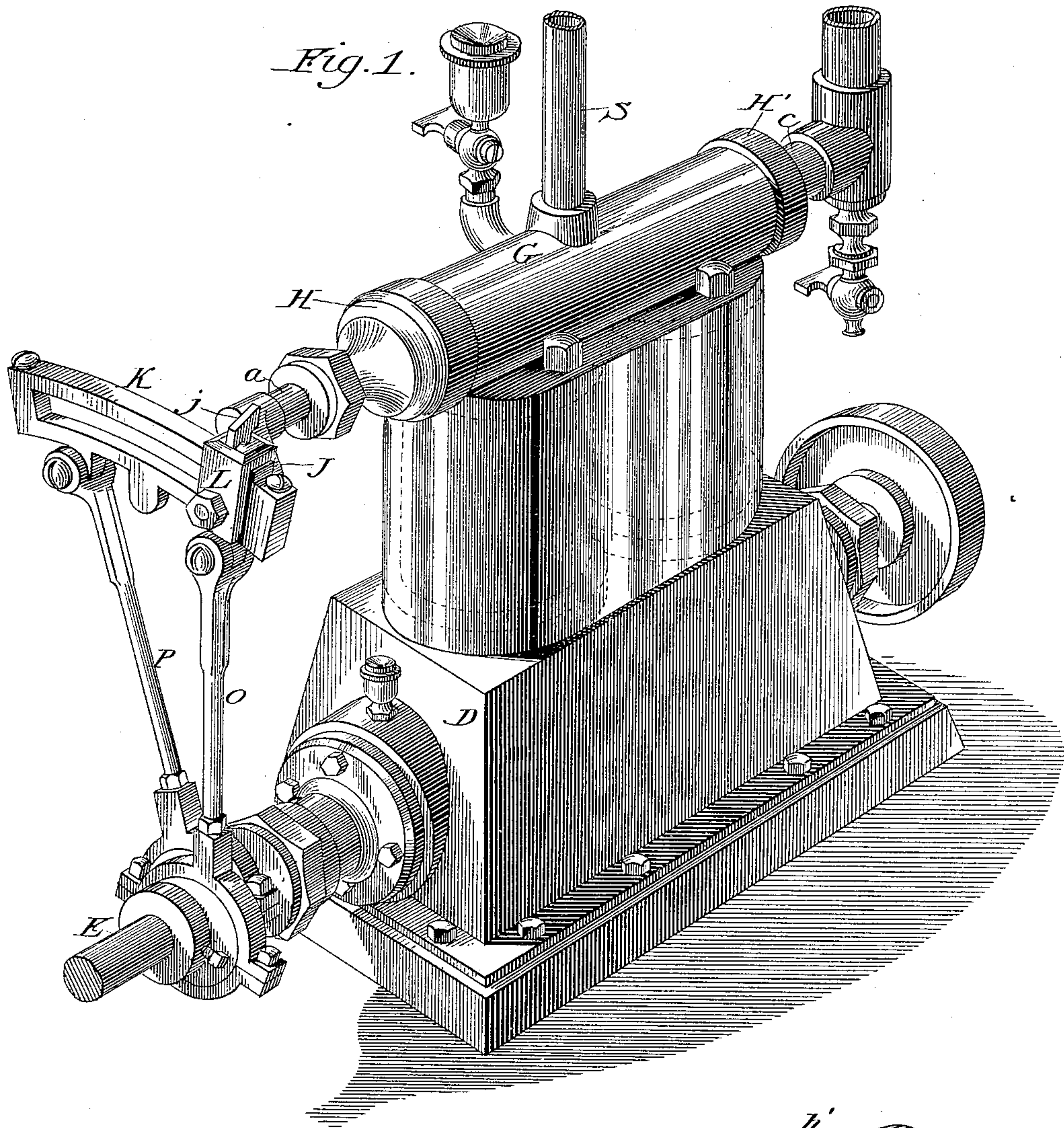
(No Model.)

3 Sheets—Sheet 1.

J. S. ROBBINS & J. T. FOSTER.  
STEAM ENGINE.

No. 329,954.

Patented Nov. 10, 1885.



Witnesses:

Frank J. Blanchard  
Albert N. Adams.

Inventors:

John S. Robbins  
Julius T. Foster  
By West & Bond  
Attorneys.



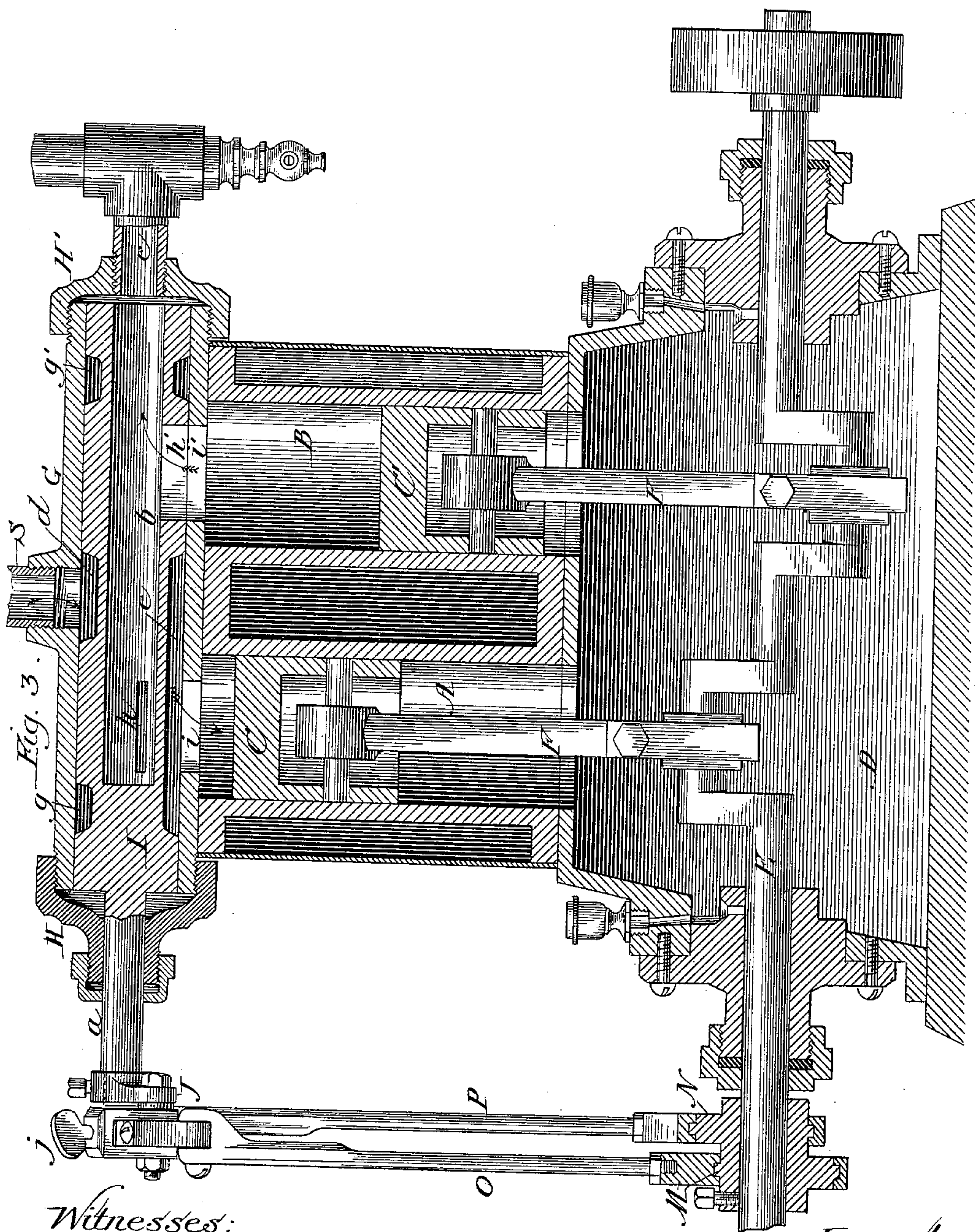
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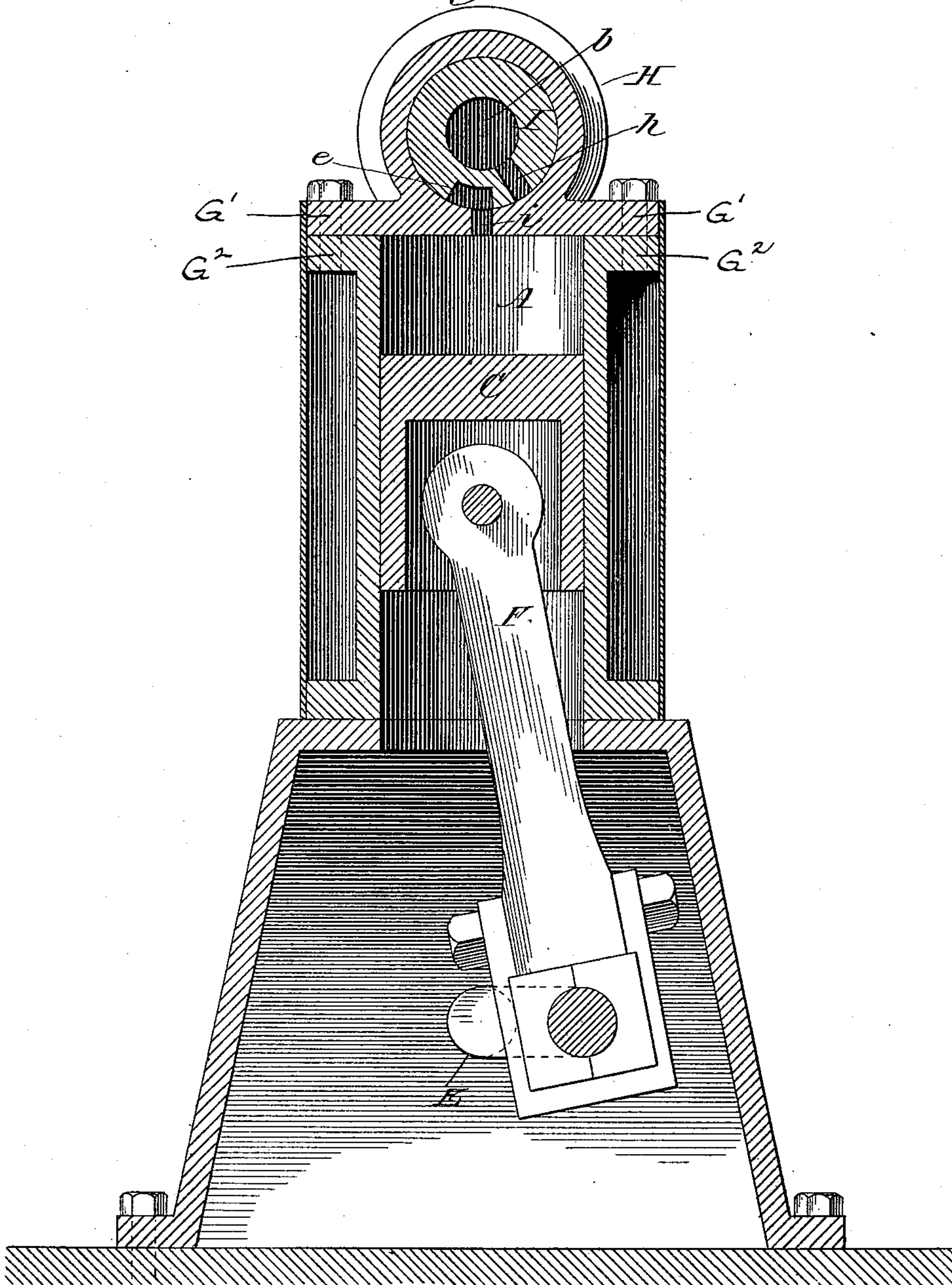
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*Fig. 4.*



*Witnesses:*  
*Frank Blanchard*  
*Albert H. Adams.*

*Inventors:*  
*John S. Robbins.*  
*Julius T. Foster*  
*by West & Bond,*  
*Attorneys*



# UNITED STATES PATENT OFFICE.

JOHN S. ROBBINS AND JULIUS T. FOSTER, OF RACINE, WISCONSIN.

## STEAM-ENGINE.

SPECIFICATION forming part of Letters Patent No. 329,954, dated November 10, 1885.

Application filed September 1, 1884. Serial No. 141,962. (No model.)

*To all whom it may concern:*

Be it known that we, JOHN S. ROBBINS and JULIUS T. FOSTER, residing at Racine, in the county of Racine and State of Wisconsin, and citizens of the United States, have invented a new and useful Improvement in Steam-Engines, of which the following is a full description, reference being had to the accompanying drawings, in which—

Figure 1 is a perspective; Fig. 2, a detail in perspective, showing the valve removed. Fig. 3 is a central vertical longitudinal section. Fig. 4 is a vertical cross-section through the center of the cylinder A.

Our invention relates, primarily, to steam-engines provided with two cylinders; and the leading object of our improvement is to provide an oscillating valve so constructed and arranged that the steam and exhaust ports will be very short, and so that the valve will be operated with very little friction, which we accomplish as illustrated in the drawings, in which—

A B represent two vertical cylinders, in which are the pistons C C'.

D is a base and chamber beneath the cylinders.

E is the crank-shaft; F, connecting-rods.

G is the valve-chamber and steam-chest, provided with heads H H', and located directly over the cylinders. The valve-chamber and steam-chest G is provided at each side with a lateral flange, G', Fig. 4, which flanges are bolted to the lateral flanges G<sup>2</sup> at the upper ends of the two cylinders A and B, whereby the valve-chamber and steam-chest constitute heads to the cylinders and enable us to dispense with independent cylinder-heads.

I is an oscillating valve fitting within the valve-chamber G, and provided with a stem, a, which extends out through the head H. The valve is provided with a central chamber, b, as shown in Fig. 3, which communicates at one end with an outlet, c, for the exhaust-steam. The exterior of the valve is cut away at the center, as shown at d, forming a channel around it.

e is a passage in the exterior of the valve, communicating at one end with the central channel, d, and f is another channel in the exterior of the valve, said passages e f being formed, respectively, in the opposite end por-

tions of the valve and arranged out of line with each other, so as to alternately communicate with the two ports i i' in the cylinder-heads, as hereinafter explained.

As shown, there are two exterior channels, g g', one near each end of the valve. These channels g g' are not necessary, but with them the channels e f can more conveniently be made.

h h' are two passages through the wall of the valve, communicating with the interior chamber, b.

i i' are ports through the heads of the cylinders.

S is the steam-inlet.

J is a short crank on the stem a of the valve.

K is the link, and L is a link-block connected with the crank J.

M N are two eccentrics on the crank-shaft E.

O P are eccentric-rods, the upper ends of which are connected with the link K.

j is a set-screw.

The operation is as follows: As shown in Fig. 1, an oscillating motion will be given to the valve through the eccentric M, rod O, block L, and crank J. Steam is admitted to the steam-chest and exterior of the valve through S, and fills the passages d e f. When the parts are brought into the position shown in Fig. 3, the passage e will be directly over the port i, and the port h' will be directly over i', and steam will be admitted to the top of the cylinder A. At the same time the piston C' will rise and the exhaust-steam will pass from the cylinder B through i' h' to the center of the valve, and out through the passage c. When the pistons have reached the limits of their stroke, the position of the valve I will be changed, bringing the passage f over the port i' and bringing h over the port i, and then steam will be taken to the cylinder B through f i', and will be exhausted from A through i h. A reverse motion can be given to the engine by moving the link K to the proper position, as usual.

A valve constructed and arranged as described will be well balanced, and will be operated with but very little friction. The steam inlet and exhaust ports are exceedingly short, and there will be but very little waste steam at the end of each stroke.

An oscillating valve constructed substan-

tially as above described can be used with a single cylinder instead of with two cylinders, omitting the inlet and exhaust passage upon one side of the center, or, which would have the same effect in practice, shortening the valve and retaining only the steam-passages *d e* and the exhaust-port *h*. When used with a single cylinder, steam will be admitted through the passages *d e* at the top of the cylinder, forcing the piston down, and when it reaches the end of its stroke the exhaust-port will open and the momentum of the fly-wheel will carry the piston to the top of the cylinder, thus completing one revolution, the movement of the valve being the same as before described.

What we claim as new, and desire to secure by Letters Patent, is—

The hollow oscillating valve I, closed at one end, formed with the annular channel *d*, and with the longitudinal passages *e f* out of line with each other, and having the ports *h h'*, the said parts being relatively arranged as shown, in combination with two or more vertical cylinders having ports *i i'*, and the valve-chamber and steam-chest G, secured longitudinally above and to the cylinders and constituting the cylinder-heads, substantially as and for the purposes described.

JOHN S. ROBBINS.  
JULIUS T. FOSTER.

Witnesses:

BYRON B. NORTHROP,  
E. C. DEANE.