

H. E. MARCHAND.  
Valve-Gear for Steam-Engines.

No. 163,090.

Patented May 11, 1875.

Fig. 1.

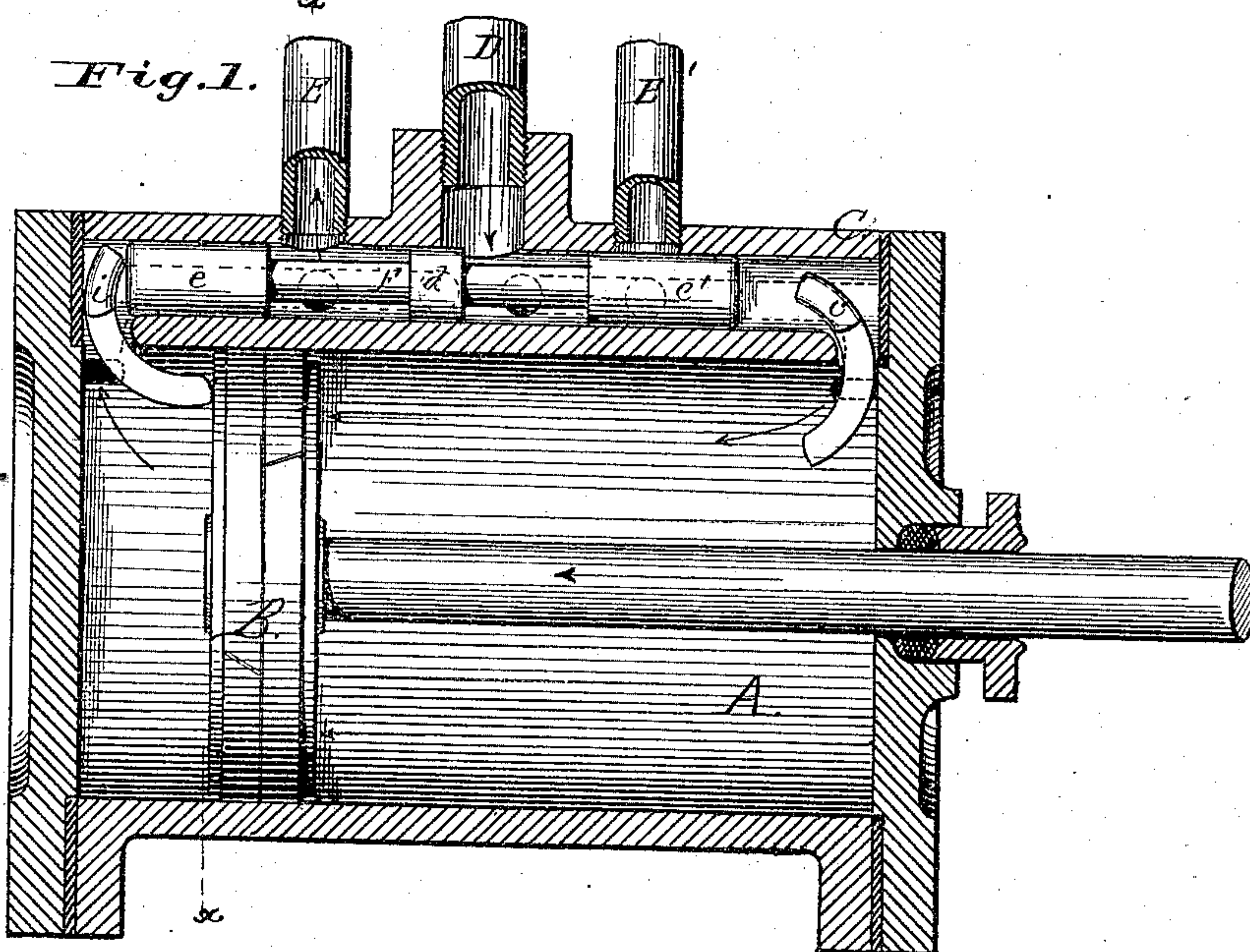


Fig. 2.

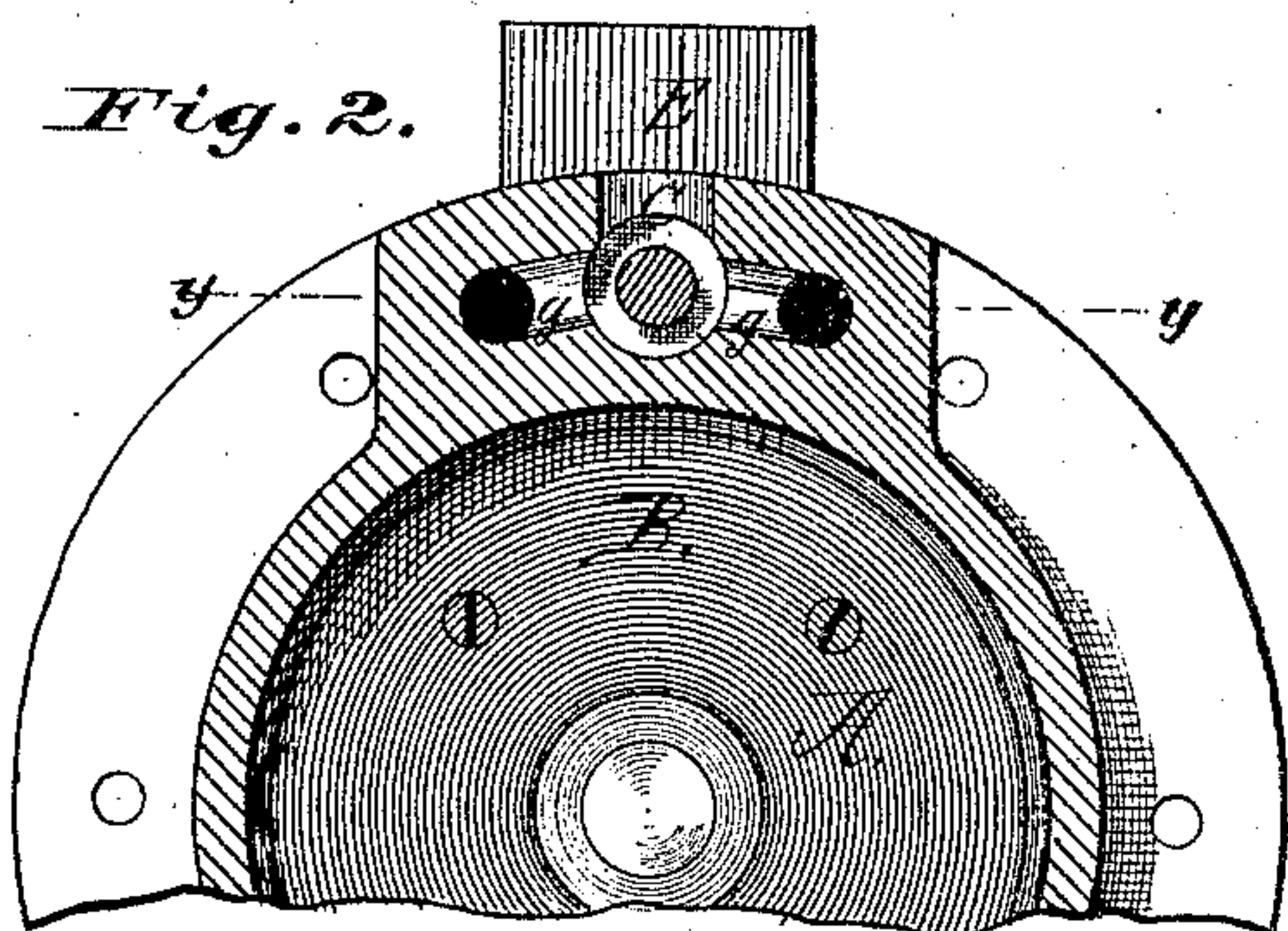


Fig. 3.

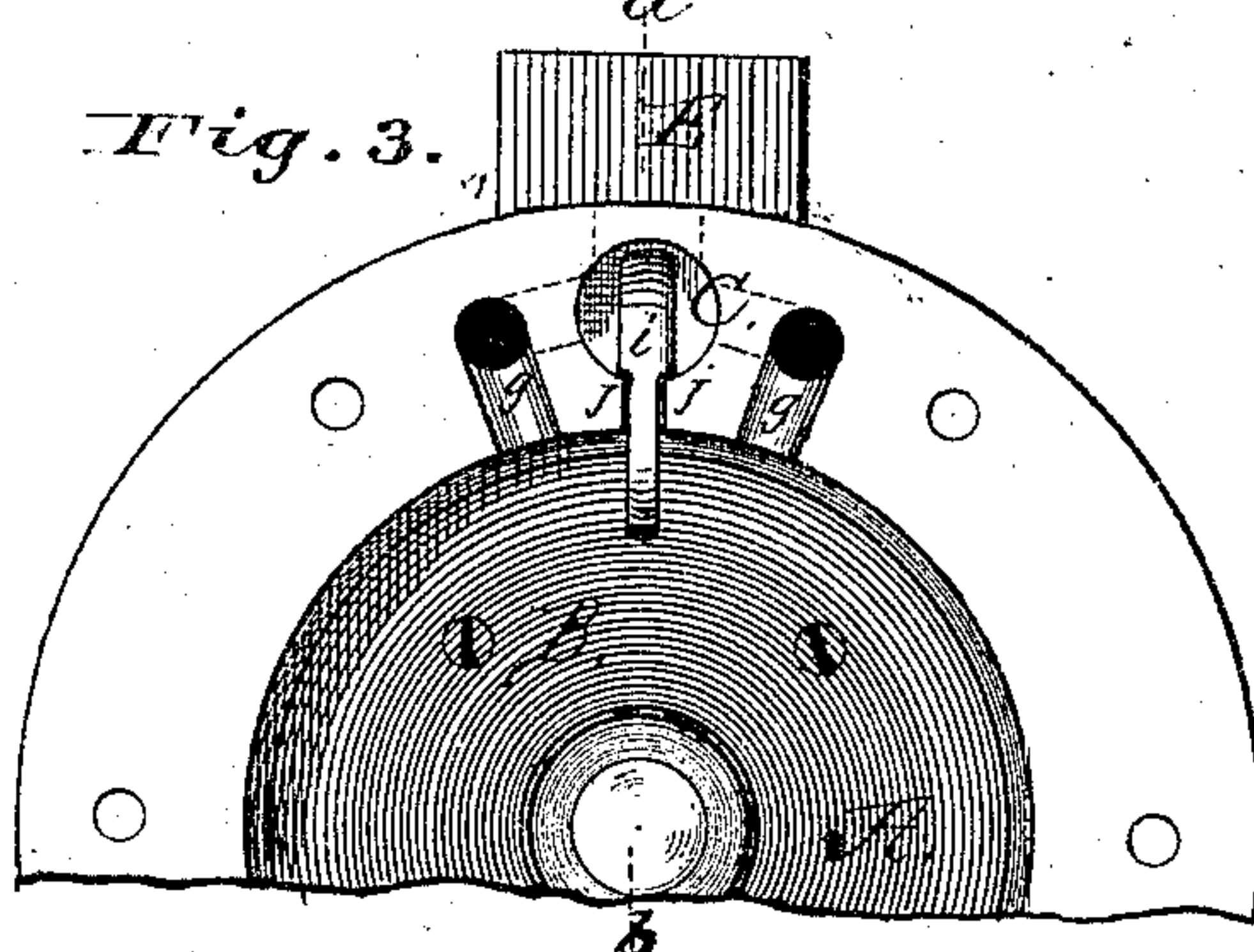
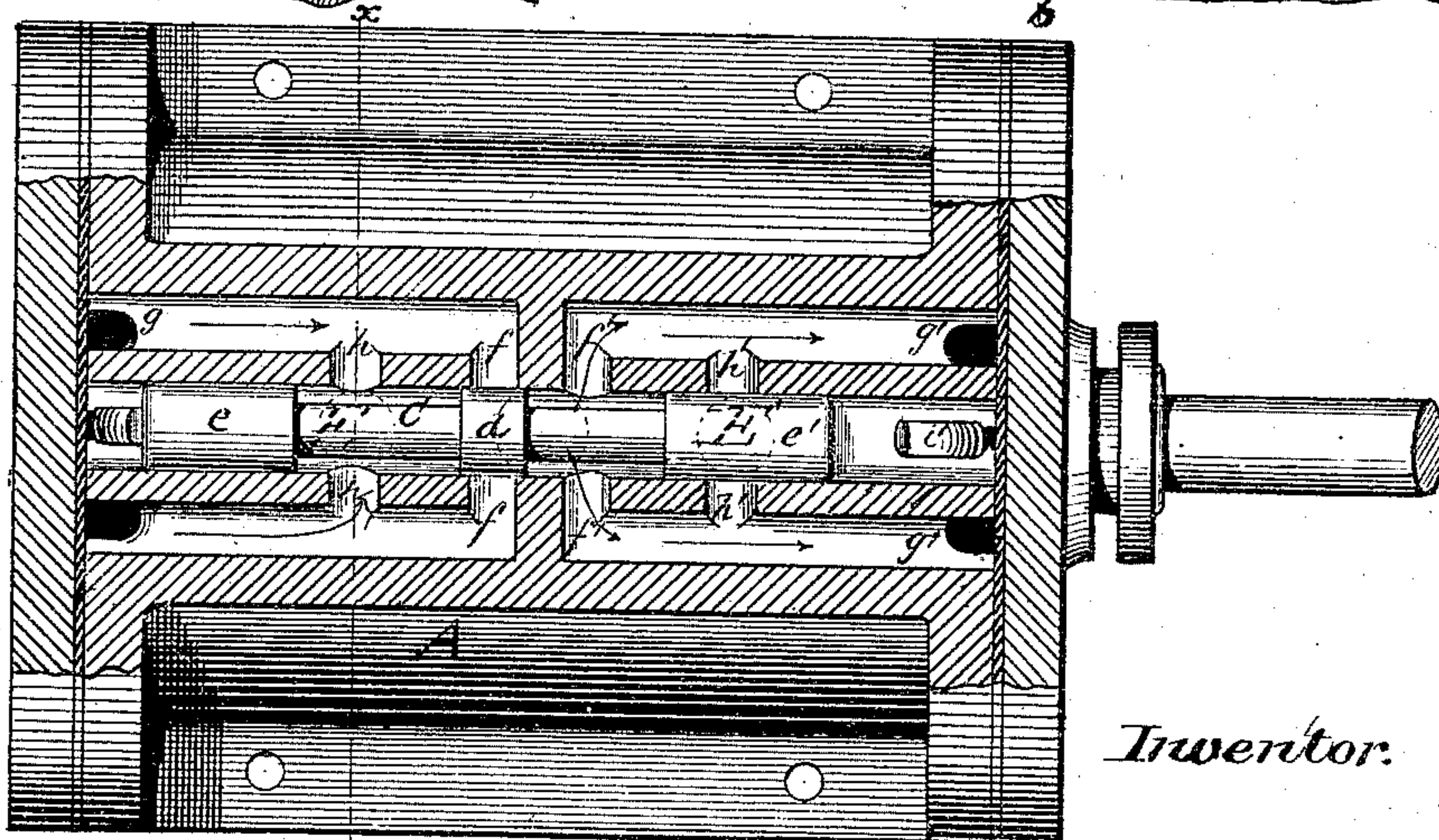


Fig. 4.



Attest:  
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# UNITED STATES PATENT OFFICE.

HENRY E. MARCHAND, OF PITTSBURG, PENNSYLVANIA.

## IMPROVEMENT IN VALVE-GEARS FOR STEAM-ENGINES.

Specification forming part of Letters Patent No. 163,090, dated May 11, 1875; application filed October 23, 1874.

*To all whom it may concern:*

Be it known that I, HENRY E. MARCHAND, of Pittsburg, in the county of Allegheny and State of Pennsylvania, have invented certain new and useful Improvements in Valve-Gear for Steam-Engines, of which the following is a specification:

This invention consists in combining, with the steam-piston, two curved gravitating tappets, which extend into the valve-chamber, and act on the valve contained in said valve-chamber, in such a manner that, whenever the piston approaches the end of its stroke in either direction, the valve is thrown, and steam is admitted to cushion the piston, and to force it back on its return stroke, and thereby the motion of the valve is effected by means which are simple, compact, durable, and not liable to get out of order. The valve is constructed with three heads, and it works between steam and exhaust channels issuing or emanating from opposite sides of the valve-chamber, so as to keep said valve perfectly balanced.

In the accompanying drawing, Figure 1 represents a longitudinal section in the plane *a b*, Fig. 3. Fig. 2 is a transverse section in the plane *a a*, Figs. 1 and 4. Fig. 3 is an end view of the steam-cylinder, the head being removed. Fig. 4 is a horizontal section in the plane *y y*, Fig. 2.

In the said drawing, the letter A designates a steam-cylinder, in which is fitted the piston B. On the top of this cylinder is the valve-chamber C, to which steam is admitted through the pipe D, and from which steam exhausts through the pipes E E'. Said valve-chamber is bored out to receive the piston-valve F, which is composed of three heads, *e d e'*. The steam, which is admitted through the pipe D, passes from the valve-chamber through channels *f f'*, Fig. 4, to the ports *g g'*, and the exhaust steam passes from the ports *g g'* through channels *h h'* to the exhaust-pipes E E'. In the ends of the valve-chamber are situated two tappets, *i i'*, which ride on shoulders *j*, (see Fig. 3,) and the shanks of which extend down into the cylinder. These tappets are so balanced that the same, when left to follow their inherent grav-

ity, assume the position occupied by the tappet *i'* in Fig. 1.

When the piston moves in the direction of the arrows marked on it in Fig. 1, the piston-valve is so situated that the head *d* closes the channels *f f*, and steam passes through the channels *f' f'*, Fig. 4, and the ports *g'*, into the cylinder, and the steam exhausts from the cylinder through ports *g g*, channels *h h*, and pipe E.

When the piston strikes the tappet *i*, the valve F is thrown back, so that the head *e* will close the channels *h h*, the head *d* will open the channels *f f*, and closes the channels *f' f'*, and the head *e'* will open the channels *h' h'*, and force back the head of the tappet *i'*. All these changes take place before the piston comes close up to the cylinder-head, and as soon as the channels *f f* are thrown open, steam is admitted, through the ports *g g*, behind the piston, so as to cushion the same and prevent it from slamming against the cylinder-head.

It will be seen, from the above description, that this valve-motion is exceedingly simple.

The tappets *i i'* are suspended loosely in the ends of the valve-chest, and when the cylinder-heads are removed said tappets can be readily taken out, and free access is obtained to the valve.

During the operation of the engine the valve F is balanced, and it requires but little power to move the same.

It will be noticed that the front and rear faces of the piston solely act upon the tappets, and thus a quick direct movement is secured, the tappets being made to rise in their seats and move in a curved direction, to act upon the valve.

I am aware that a tappet-rod having lateral arms has been seated in the rear of a valve, one of said arms being constructed to operate upon the valve, while the other arm is acted upon by the piston, in such a manner that the tappet is caused to turn in its seat by the piston coming in contact with the arm, to bring the other arm in position for operating the valve; and such is not claimed by me.

I claim as my invention—

1. The loosely-suspended tappets *i i'*, in combination with the valve F, steam-cylinder A, and piston B, substantially as and for the purpose described.

2. The valve F, composed of three heads, *e d e'*, in combination with channels *f f' h h'*, ports *g g'*, steam-pipe D, and exhaust-pipes E, substantially as set forth.

In testimony that I claim the foregoing I have hereunto set my hand.

HENRY E. MARCHAND.

Witnesses:

JAMES L. NORRIS,  
JOS. L. COOMBS.