

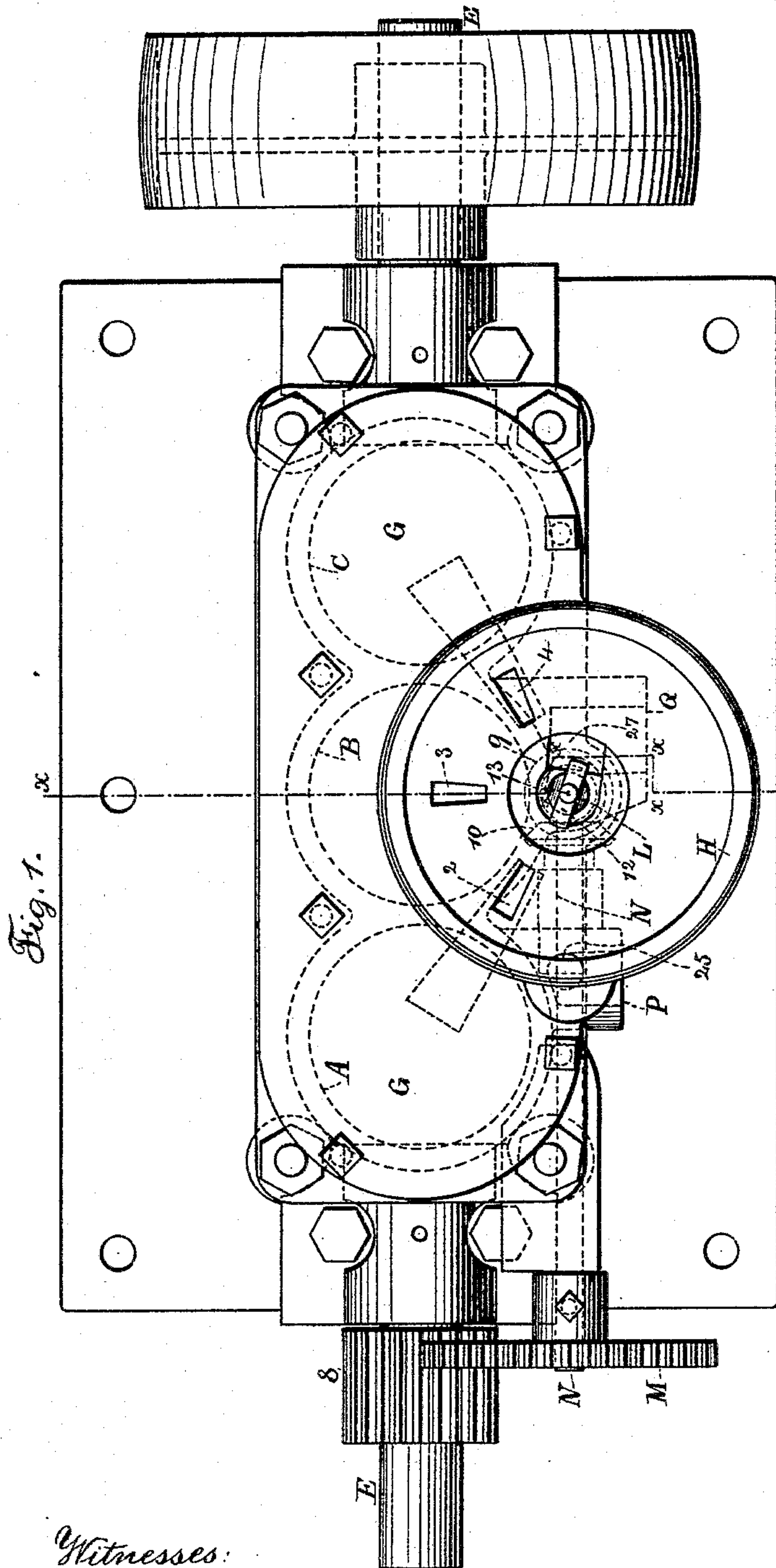
(No Model.)

2 Sheets—Sheet 1.

C. VOGEL.  
VALVE FOR STEAM ENGINES.

No. 411,944.

Patented Oct. 1, 1889.



Witnesses:  
J. Staib  
Chas. H. Smith

Fig. 5.

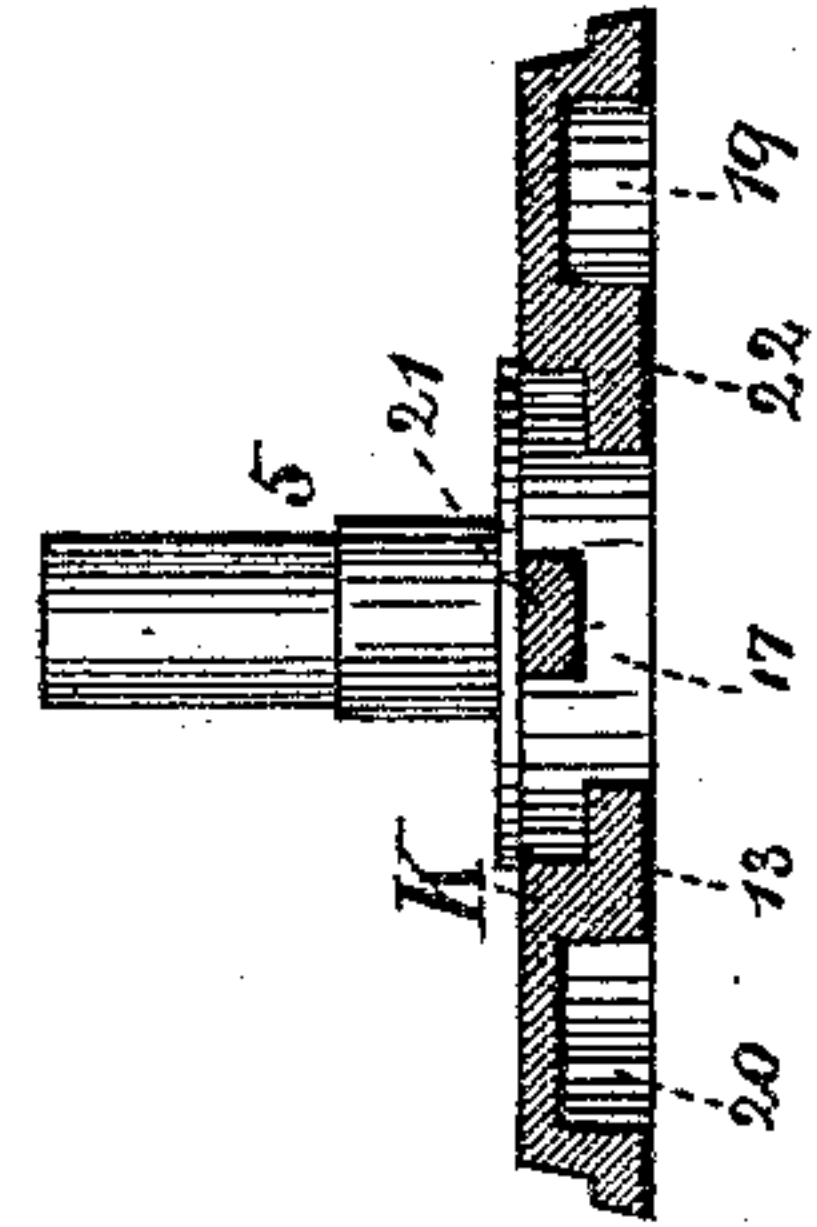


Fig. 2.

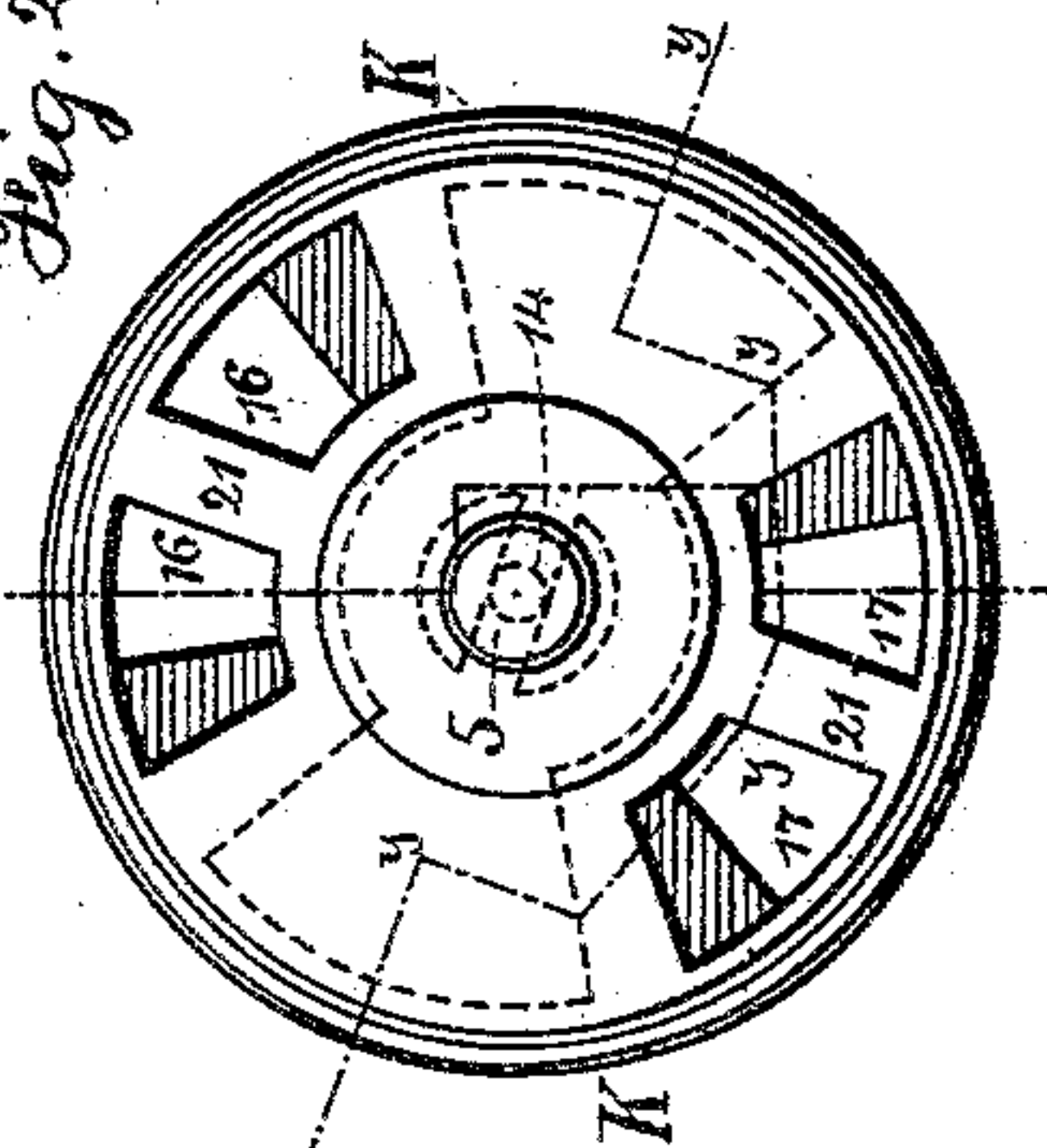
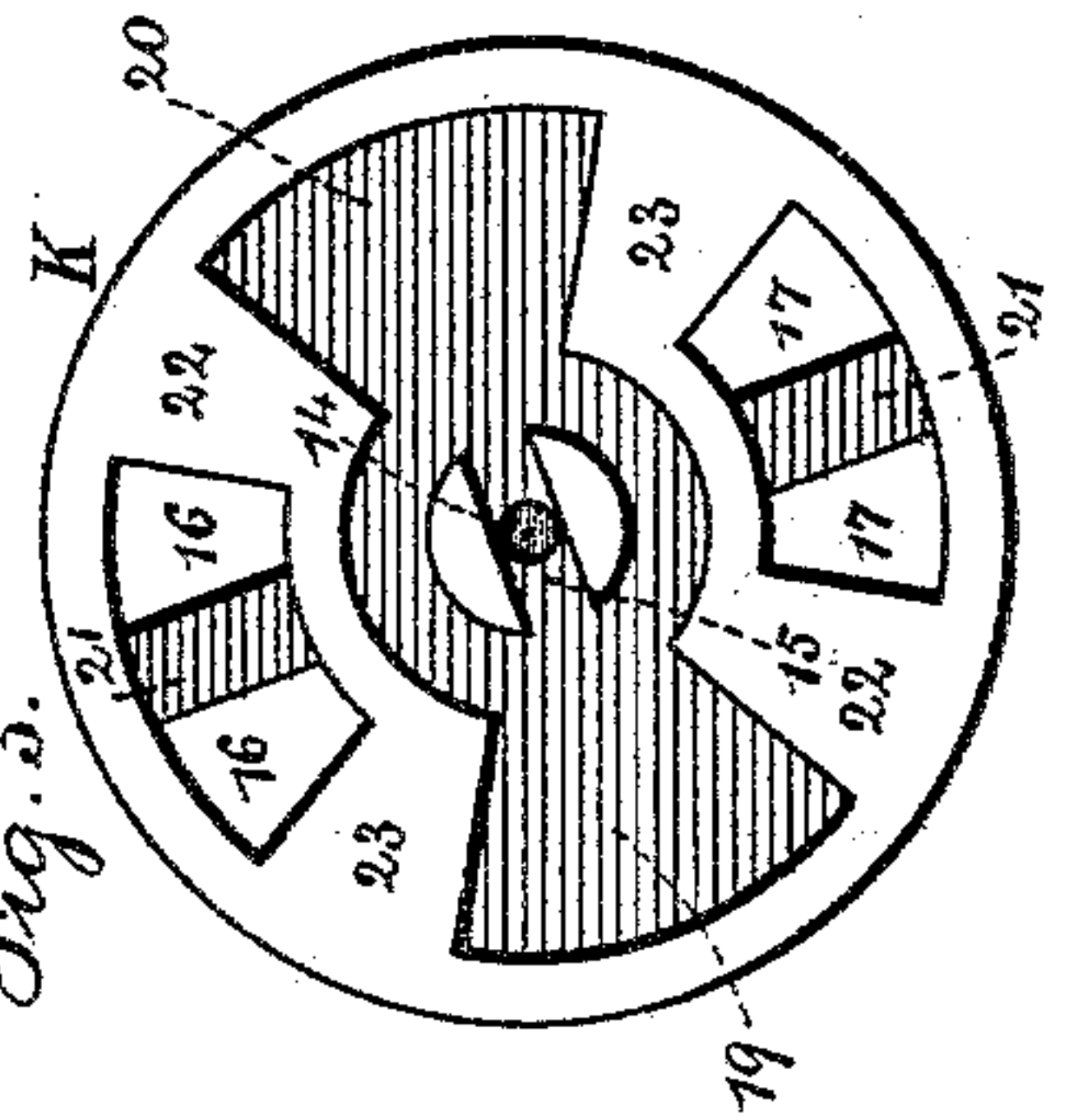


Fig. 3.



Inventor:  
Charles Vogel  
per Lemuel W. Ferrell atty

(No Model.)

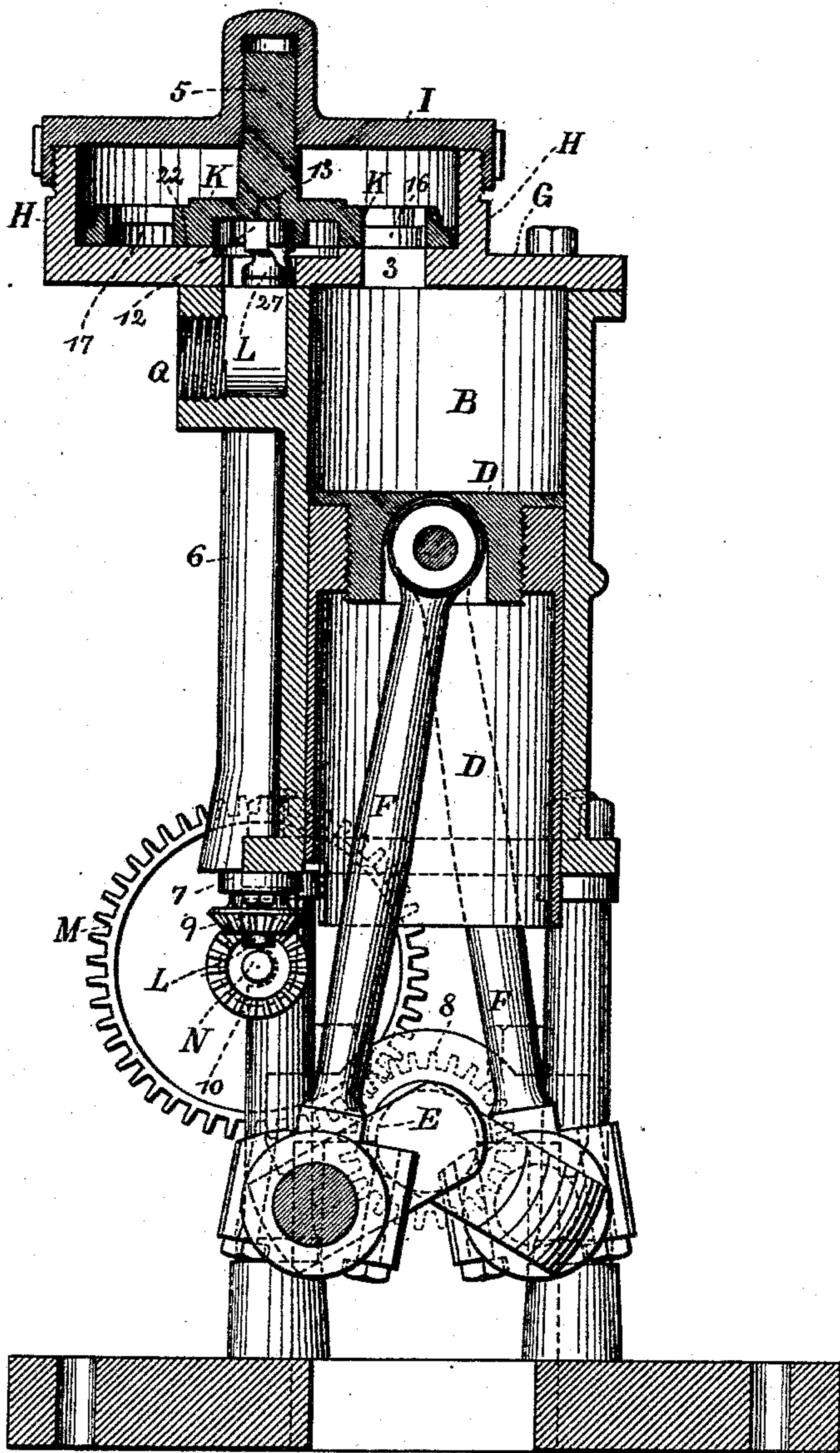
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*Fig. 4.*



Witnesses:  
*J. Staib*  
*Chas. H. Smith*

Inventor  
*Charles Vogel.*  
per *Samuel W. Terrell* atty.



# UNITED STATES PATENT OFFICE.

CHARLES VOGEL, OF FORT LEE, ASSIGNOR TO HIMSELF AND GEORGE O'ROURKE, OF ENGLEWOOD, NEW JERSEY.

## VALVE FOR STEAM-ENGINES.

SPECIFICATION forming part of Letters Patent No. 411,944, dated October 1, 1889.

Application filed June 13, 1889. Serial No. 314,148. (No model.)

*To all whom it may concern:*

Be it known that I, CHARLES VOGEL, of Fort Lee, in the county of Bergen and State of New Jersey, have invented an Improvement in Valves for Steam-Engines, of which the following is a specification.

This invention has for its object the supply of steam to two or three cylinders by one circular and rotary valve, and the exhausting of the steam directly through such valve.

Rotary valves have before been used in steam-engines. By my present improvements the construction of the valve is simplified, and the spindle that is employed for driving the valve passes up from below such valve and is in or adjacent to the exhaust-port, so that risk of leakage around such spindle is avoided and the valve can be lifted out of the chest for cleaning or repairs without disturbing the other parts, except to remove the cover of the steam-chest.

In the drawings, Figure 1 is a plan of the engine with the cover of the steam-chest removed and the valve taken out. Fig. 2 is a plan view of the valve. Fig. 3 is an inverted plan showing the face of the valve. Fig. 4 is a section of the engine at the line *x x*, Fig. 1; and Fig. 5 is a section of the valve at the line *y y*.

I have represented three steam-cylinders A B C, and within each cylinder is a plunger or piston D, and the main driving-shaft E has upon it three cranks at one hundred and twenty degrees apart, and there are connecting-rods F from the respective cranks to the pistons or plungers D.

My present improvements are especially adapted to single-acting engines, such as represented, but not necessarily limited thereto, and when three cylinders are made use of a more uniform revolution of the main driving-shaft is secured. The head G is common to all three cylinders, and in it are the ports 2 3 4 to the respective cylinders, and upon this head G is the steam-chest formed by the short cylinder or rim H; and I is the cover of the steam-chest, which is secured in any suitable manner. I prefer to screw the same into place, there being a flange to the cover and a screw-thread around the upper portion of the

steam-chest. The valve-seat is on the same plane, or nearly so, as the top of the head G, and it is preferably turned off level; but it might be more or less conical, and the face of the valve K corresponds to the valve-seat. This valve K is circular, and it is preferably provided with a stem 5, passing up into circular recesses in the center of the cover I, which stem aids in retaining the valve in its position as such valve is revolved. I make use of a valve-moving spindle L within the case 6, which case is preferably cast with the steam-cylinders A B C, and it is tubular for the reception of said spindle, and there may be a gland or stuffing-box at the lower end of this spindle, as at 7, to make this spindle steam-tight, and this spindle is made use of for giving the proper rotary movement to the valve K, and for this purpose suitable gearing is employed for connecting the spindle L with the main driving-shaft E. I have represented a pinion 8 on the driving-shaft E, gearing to a wheel M upon the shaft N, and bevel gear-wheels 9 10 on the spindle L and shaft N respectively, and when the valve K revolves once to two revolutions of the shaft E the gear-wheel M will be twice the size of the pinion 8. At the upper end of the spindle L is a T head or clutch 12 and pin 13, the latter passing into a central hole 14 in the under side of the valve, and there is a cross-slot 15 for the T head 12, (see Fig. 3,) so that the spindle L can give to the valve the proper rotary movement, but the valve can be easily lifted off the end of the spindle when the cover I of the steam-chest is removed. This gives access to the face of the valve and to the valve-seat for cleaning, grinding, facing, or repairing by the simple removal of the cover of the steam-chest.

The valve K is provided with the necessary ports for the passage of the steam and for the exhaust, and these ports are located in such relation to the ports 2 3 4 that steam will be admitted to the cylinders in succession and the exhaust will be opened at the end of the stroke of each piston. With this object in view the ports 2 3 4 are placed at sixty degrees apart, and the valve K is provided with steam-ports 16 and 17 through it, and



exhaust-passages 19 and 20, formed as recesses or cavities in the face of the valve, and I remark that to strengthen the rim of the valve I have shown bridges at 21 across the steam-  
5 ports 16 and 17, but these bridges may be omitted.

The ends of the steam-ports and of the exhaust-passages are radial, or nearly so, and the plane surfaces of the valve-face at 22 and  
10 23, being wider than the ports 2 3 4, cover such ports successively and allow the steam to act expansively, and according to the width of these faces 22 and 23 in comparison with the width of the ports 2, 3, and 4 the steam  
15 will be allowed to act expansively to a greater or less degree.

It will now be apparent that as the steam-port 16 opens to admit steam through the port 2 the port 4 will be covered by the surface 22, and then such port 4 will be opened to the exhaust simultaneously with the covering of the port 3 by the surface 23, and in the further movement of the valve the port 3 will be opened for the admission of steam  
25 during the time that the steam is acting expansively in the cylinder A, and the steam will by this time have been exhausted from the cylinder C and its piston have completed its upstroke as the port 16 opens to admit steam to the port 4, and the part 22 covers the port 3, and at this time steam will be exhausted from the cylinder A by the port 2 and passage 20, and so on the operations will be performed successively, and as the valve K  
35 makes one revolution to two revolutions of the shaft E the steam-port 17 and the exhaust-passage 19 will act the same as has before been described in connection with the ports 16 and the exhaust-passage 20. It is to  
40 be understood that the steam can be admitted to the valve-chest in any suitable manner. I have shown a connection at P for the steam-pipe and a passage-way leading up into the side of the circular steam-chest at 25, and a  
45 connection or pipe at Q for the exhaust, there being an opening at 27 down through the valve-seat into such exhaust, the opening 27 being adjacent to the valve-moving spindle L, and the exhaust-passages 19 and 20 being  
50 united by a central circular passage in the face of the valve. Such exhaust-passages 19 and 20 are always open to the exhaust 27 and Q.

A rotary valve has been made with a central hollow spindle forming an exhaust-tube.  
55 This construction renders the valve difficult of access for cleaning or repairs. In other cases the rotary valve has had two cylindrical walls and rested upon an annular rib in which

are the ports leading to the cylinders, the steam being within the inner cylindrical wall 60 and the exhaust-port around the outer wall.

In my improvement the valve resting on a flat seat and having ports through it and exhaust-ports in its under surface and being rotated from below the seat is easily made, and 65 is accessible for repairs or for grinding or finishing the face of the valve or the seat.

I claim as my invention—

1. The combination, with the cylinder and piston in an engine, of a circular steam-chest 70 having a lateral opening through which steam is supplied, and a circular valve-seat having ports therein leading to the cylinder and a central exhaust-port, a circular valve covering the exhaust-port and having ports and recessed exhaust-passages, a spindle for rotating the valve, having a T head or connection and passing up from beneath the valve, so that the valve may be removed from the spindle, and a removable cover to the steam- 80 chest, substantially as set forth.

2. The combination, with the cylinder and piston in an engine, of a circular steam-chest 85 having a lateral opening through which steam is supplied, and a circular valve-seat having ports therein leading to the cylinder and a central exhaust-port, a circular valve covering the exhaust-port and having ports and recessed exhaust-passages and a central stem, a spindle for rotating the valve, having a T 90 head or connection and passing up from beneath the valve, so that the valve may be removed from the spindle, and a removable cover to the steam-chest, having a central socket for the valve-stem, substantially as 95 set forth.

3. The combination, with the cylinders A B C, their pistons, connecting-rods, main shaft and cranks, of a head to the three cylinders, having steam-ports in it, a steam-chest 100 upon such head, having a central exhaust and lateral steam-supply, a removable cover to the steam-chest, a valve having two steam-ports and recessed exhaust-passages and covering the central exhaust-port, a spindle passing up 105 from below for rotating such valve, and gearing for connecting the spindle and the main shaft, so that the valve may revolve once for every two revolutions of the main shaft, substantially as set forth. 110

Signed by me this 10th day of June, 1889.

CHARLES VOGEL.

Witnesses:

GEO. T. PINCKNEY,  
WILLIAM G. MOTT.