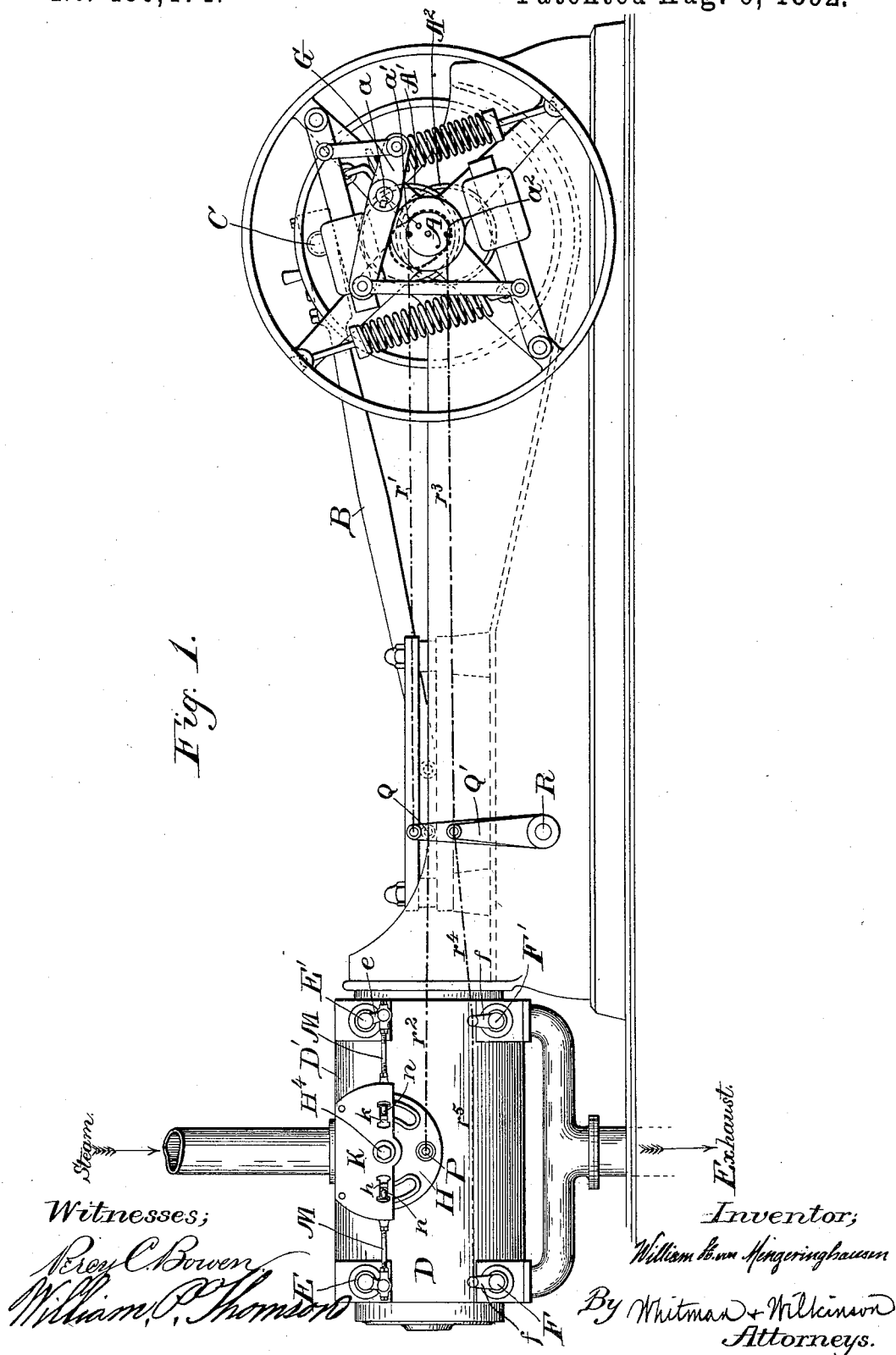


W. H. VON MENERINGHAUSEN.
VALVE GEAR.

No. 480,474.

Patented Aug. 9, 1892.

Fig. 1.



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Fig. 2.

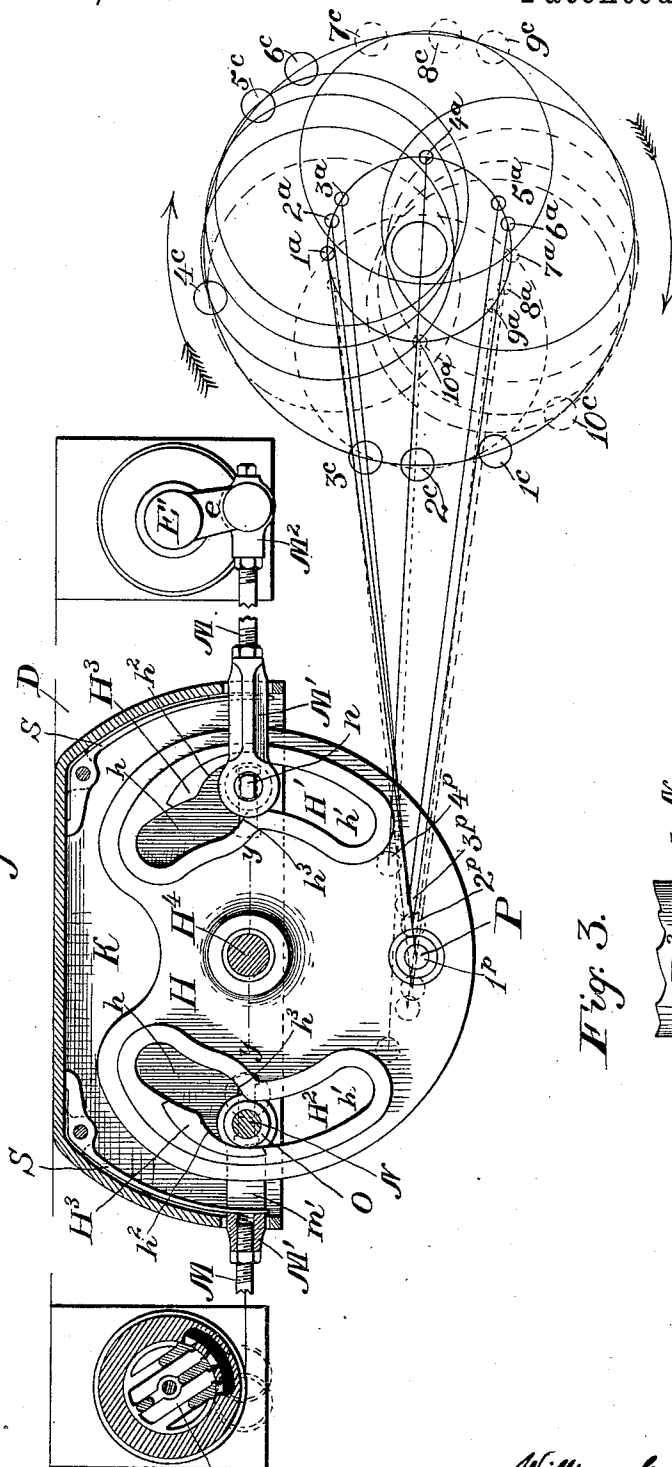
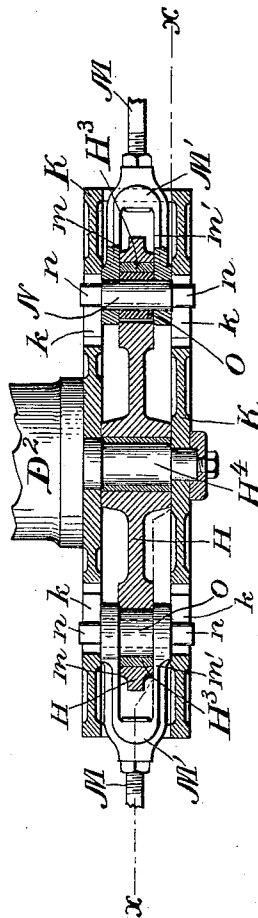


Fig. 3.



Witnesses:
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UNITED STATES PATENT OFFICE.

WILLIAM H. VON MENGERINGHAUSEN, OF CHESTER, PENNSYLVANIA.

VALVE-GEAR.

SPECIFICATION forming part of Letters Patent No. 480,474, dated August 9, 1892.

Application filed April 11, 1892. Serial No. 428,735. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM H. VON MENGERINGHAUSEN, a citizen of the United States, residing at Chester, in the county of Delaware and State of Pennsylvania, have invented certain new and useful Improvements in Valve-Gears for Corliss Engines; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to certain improvements in the valve-gear for steam-engines, which will be hereinafter described and claimed.

Reference is had to the accompanying drawings, wherein the same parts are indicated by the same letters.

Figure 1 represents a side elevation of an engine provided with valve-gear arranged according to my invention, the connecting-rods from the valve-eccentrics to the induction and the exhaust valves being indicated by broken lines for the sake of clearness in the drawings. Fig. 2 represents an enlarged sectional view on the line $x x$ of Fig. 3 of the oscillating wrist-plate for controlling the induction-valves with a diagrammatic view of the relative positions of the crank, eccentrics, cam, and induction-valves; and Fig. 3 represents a section of the oscillating wrist-plate and its connections along the line $y y$ of Fig. 2.

A represents the crank-shaft, having shifting eccentric A' , with center at a' , for the induction-valves and fixed eccentric A^2 , with center at a^2 , for the exhaust-valves. This shifting eccentric A' is connected by the pin a to the centrifugal governor G of well-known construction.

B represents the connecting-rod; C, the crank-pin; D, the cylinder; D', the steam-chest, and D² a projection on said cylinder, carrying the pivoted wrist-plate H and the frame or cover K therefor.

E and E' represent the induction-valves, preferably of the gridiron form of Corliss valves, and F and F' represent the exhaust-valves. The oscillating wrist-plate H is pivoted in the frame K at H⁴ and has two symmetrical irregular grooves H' and H² in either side thereof. These irregular grooves each have two circular portions h and h' of differ-

ent radius, yet concentric with the axis of oscillation, and two curved surfaces h^2 and h^3 eccentric thereto connecting said concentric portions. Detachable backing or reinforce pieces H³ of hardened metal may be inserted to prevent the wear on said eccentric portions.

The frame K is attached to the boss D² or the side of the cylinder and covers the wrist-plate H, at the same time forming a bearing for the pivot H⁴ and having slots k , serving as guides to the flat ends n of the pins N, carrying the rollers O, which revolve in the grooves H' and H² as the wrist-plate H oscillates. These rollers O are held between the sides m and m' of the forked ends M', connected to the valve-rods M, and the springs S, secured inside the frame K, keep said rollers always pressed against one side of the groove H' and H², and thus the wear is thrown on the reinforce-pieces H³. The other ends M² of these valve-rods are connected to the cranks e , attached to the oscillating induction-valves E and E'.

P represents a wrist-pin on the wrist-plate H, which is connected by the rod r^2 to the arm Q, pivoted at R, and this arm is connected by the rod r' to the shifting eccentric A'. The exhaust-valves are connected by rods r^5 r^4 , the arm Q', and rod r^3 to the fixed eccentric A².

The operation of the device is as follows: As the shaft A revolves, the eccentric A' imparts a vibratory motion to the wrist-plate H, causing the grooves H' and H² to swing through arcs of circles. Whenever the rollers O are in the portions h and h' of said grooves, the radius of curvature having the same center with the axis of vibration, there is no lengthwise motion of the pins N in the guides k , and therefore the valves will not be moved while the rollers are traversing these concentric portions of the grooves; but when the rollers are passing between the curved surfaces h^2 and h^3 the valve-rods M and the valves E and E' will be given a rapid motion, and the rapid motion causes the valves to open or close very quickly and cut off at the desired point. Thus, suppose the crank-pin is at 1° just before the end of the stroke and the center of the shifting eccentric to be at 1°, the wrist-pin P being at 1° and the valve E covering the steam-ports. Now as the crank-pin moves around in the direction of the arrow when it reaches the

position 2° the eccentric will have moved to 2^a, the pin P to 2^p, and the surface h^2 of the irregular groove will move the pin N to a position midway between that indicated by the full lines and that indicated by the dotted circle. At the same time the valve E is brought into a position just about to open the ports. When the crank-pin gets to 3° and the eccentric to 3^a, the pin P will be in the position 3^p and the roller O will be in the position shown in dotted circle, while the valve E will be opened wide. Beyond this position of the pin P, as 4^p, the rollers O will simply roll in the concentric grooves h and h' , respectively, of the cam-grooves H^2 and H' , and there will be no motion to either valve. When the crank-pin gets to the position 4° at about center stroke, the pin P will have reached the position 4^p and the wrist-plate will now begin to vibrate in the opposite direction; but no motion will be given to the valves until the pin P returns to the position 3^p, which it will do when the crank is at 5° and the eccentric at 5^a, and when the crank reaches 6°, the eccentric reaches 6^a, and the pin P reaches 2^p the valve E will be closed, thus cutting off at very nearly the end of the stroke the position shown by 7°. In the same way the valve E' will begin to open when the crank-pin gets to 8° and will be fully open when it gets to 9°, the roller O, connected to the valve E, meanwhile rolling in the concentric portion h' of the groove H^2 without moving the valve E from its closed position.

It will be obvious that a projecting flange, corresponding in curvature with the outer line of the irregular groove and adapted to move between two rollers on the valve-rods, would constitute the mechanical equivalent of and may be substituted for the irregular groove.

It will be seen that if the springs S be made sufficiently strong to keep the roller constantly pressed against the outer side of the irregular groove the inner side of said irregular groove may be omitted or cut away well clear of the roller O.

While I have described the oscillating wrist-plate as provided with grooves, portions of which are concentric, it is not essential that absolute concentricity should be observed in such portions, as the same might be made slightly eccentric, so as to give the valves a slight continuous motion without materially enlarging the valve area.

The herein-described oscillating wrist-plate is of special value when applied in connection with induction-valves, which require but little movement, as the valve movement may be limited to the exact requirements irrespective of the further traverse of the wrist-plate after the required movement has been made. The advantage in thus limiting the valve movement is that with valves having two or more ports the width of the spaces or bridges between the ports in the cylinder and valve need not exceed the width of the ports, except

to a sufficient degree to give the lap required for tight closure, whereas if the opening or closing movement of the valve continues throughout the entire period of movement of the eccentric connections the surplus movement at late points of cut-off will be such as to necessitate the widening of the spaces between the ports (to prevent reopening after closure or reclosure after opening) to an extent which will materially reduce the degree of port capacity relatively to a given valve area.

Having thus described my invention, what I claim, and desire to secure by Letters Patent of the United States, is—

1. In a steam-engine, the combination, with the cylinder and induction-valves, with crank-arms on said valves, of rods connected to said crank-arms and having a roller on the inner end thereof, an oscillating wrist-plate having two symmetrical irregular grooves adapted to engage said rollers, the exterior portions of each of said grooves being of longer and shorter radius and concentric with the axis of oscillation, the said concentric portions being connected by an intermediate eccentric portion, and means for moving said wrist-plate synchronously with the motion of the piston, substantially as described.

2. In a steam-engine, the combination, with the cylinder and induction-valves, with crank-arms on said valves, of rods connected to said crank-arms and having a roller on the inner end thereof, an oscillating wrist-plate having two symmetrical irregular grooves adapted to engage said rollers, the exterior portions of each of said grooves being of longer and shorter radius and concentric with the axis of oscillation, the said concentric portions being connected by an intermediate eccentric portion, a shifting eccentric mounted on the engine-shaft, with a suitable governor regulating said eccentric, and rods connecting said shifting eccentric to said wrist-plate, substantially as and for the purposes described.

3. In a steam-engine, the combination, with the cylinder D and induction-valves E and E', having the crank-arms e , of the rods M, having the stub end M^2 connected to said crank-arms, and the fork ends M' , carrying a pin N and roller O, of an oscillating wrist-plate attached to said cylinder and having two symmetrical irregular grooves adapted to engage said rollers, the two exterior portions of each of said grooves being of longer and shorter radius and concentric with the axis of oscillation, the said concentric portions being connected by an intermediate eccentric portion, and means for moving said wrist-plate synchronously with the motion of the piston, substantially as described.

4. In a steam-engine, the combination, with the cylinder D and induction-valves E and E', having the crank-arms e , of the rods M, having the stub end M^2 connected to said crank-arms, and the fork ends M' , carrying a pin N and roller O, of an oscillating wrist-plate at-

tached to said cylinder and having two symmetrical irregular grooves adapted to engage said rollers, the two exterior portions of each of said grooves being of longer and shorter radius and concentric with the axis of oscillation, the said concentric portions being connected by an intermediate eccentric portion, a shifting eccentric mounted on the engine-shaft, with a suitable governor regulating said eccentric, and rods connecting said shifting eccentric to said wrist-plate, substantially as described.

5. In a steam-engine, the combination, with the cylinder and the induction-valves, with crank-arms attached to the said valves, of rods connected at one end to said crank-arms and having a roller at the other end, an oscillating wrist-plate having grooves adapted to engage each of said rollers, a spring bearing against a portion of said rod and adapted to keep said rollers normally pressed against one side of said groove, and means for vibrating said wrist-plate synchronously with the piston, substantially as and for the purposes described.

6. In a steam-engine, the combination, with the cylinder and the induction-valves, with crank-arms attached to the said valves, of rods connected at one end to said crank-arms and having a roller at the other end, an oscillating wrist-plate having grooves adapted to engage each of said rollers, a spring bearing against a portion of said rod and adapted to keep said rollers normally pressed against one side of said groove, and a shifting eccentric mounted on the engine-shaft, with a suitable governor regulating said eccentric, and rods connecting said shifting eccentric to said wrist-plate, substantially as and for the purposes described.

7. In a steam-engine, the combination, with the cylinder and the induction-valves, with

crank-arms attached to the said valves, of rods connected at one end to said crank-arms and having a roller at the other end, an oscillating wrist-plate having grooves adapted to engage each of said rollers, said grooves being of three portions, the upper and lower portions being arcs of circles of longer and shorter radius concentric with the axis of vibration, and the central portion being a curve connecting the said circular portions, a spring bearing against a portion of said rod and adapted to keep said rollers normally pressed against one side of said groove, and means for vibrating said wrist-plate synchronously with the piston, substantially as and for the purposes described.

8. In a steam-engine, the combination, with the cylinder and the induction-valves, with crank-arms attached to the said valves, of rods connected at one end to said crank-arms and having a roller at the other end, an oscillating wrist-plate having grooves adapted to engage each of said rollers, said grooves being of three portions, the upper and lower portions being arcs of circles of longer and shorter radius concentric with the axis of vibration, and the central portion being a curve connecting said circular portions, a spring bearing against a portion of said rod and adapted to keep said rollers normally pressed against one side of said groove, and a shifting eccentric mounted on the engine-shaft, with a suitable governor regulating said eccentric, and rods connecting said shifting eccentric to said wrist-plate, substantially as and for the purposes described.

In testimony whereof I affix my signature in presence of two witnesses.

WILLIAM H. VON MENERINGHAUSEN.

Witnesses:

B. H. ADAMS,
MARGARETTA THOMSON.