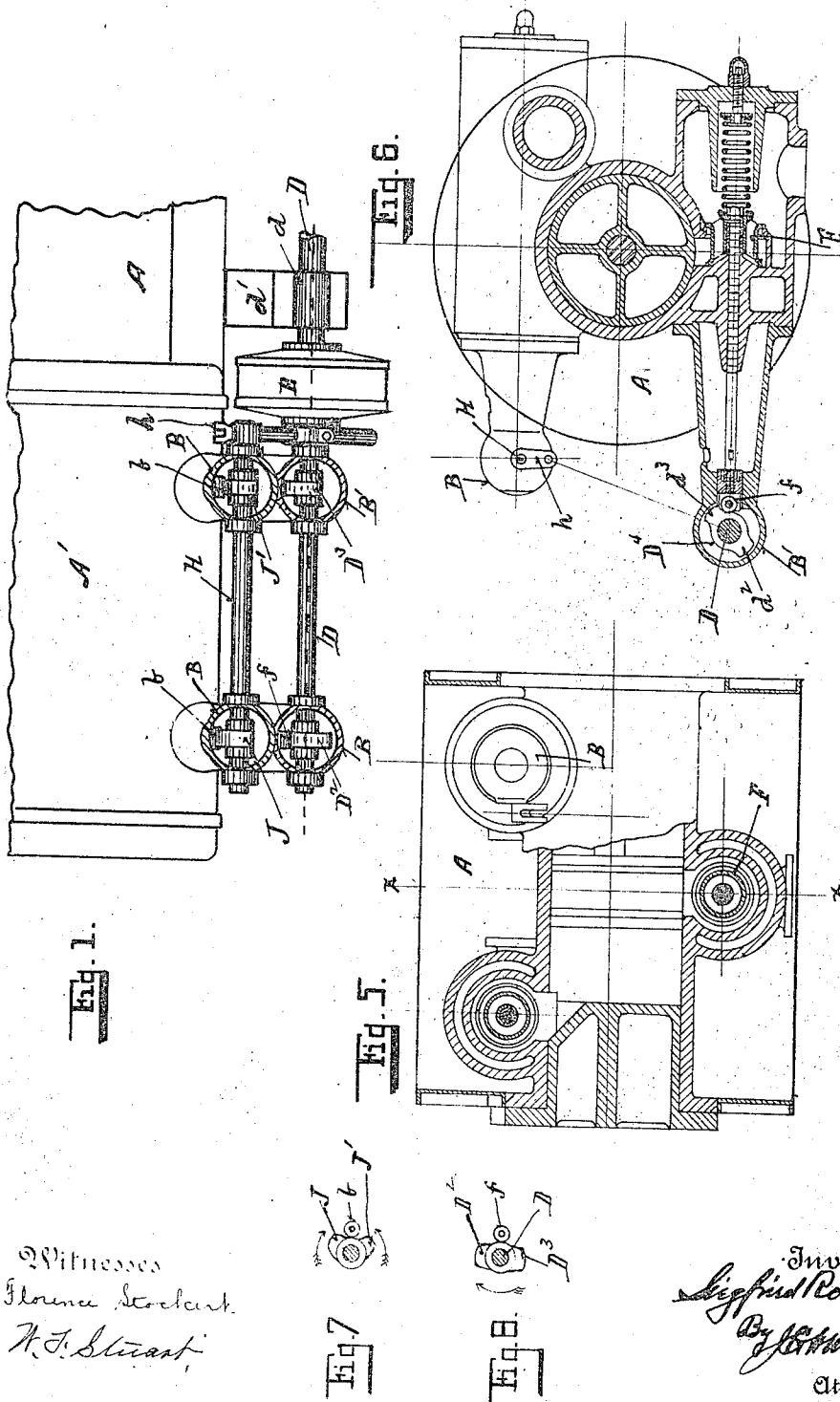


S. ROSENZWEIG.
VALVE GEAR.
APPLICATION FILED DEC. 18, 1911.

1,059,567.

Patented Apr. 22, 1913.

2 SHEETS—SHEET 1.



Witnesses
Hanna Stockart
H. J. Stuart

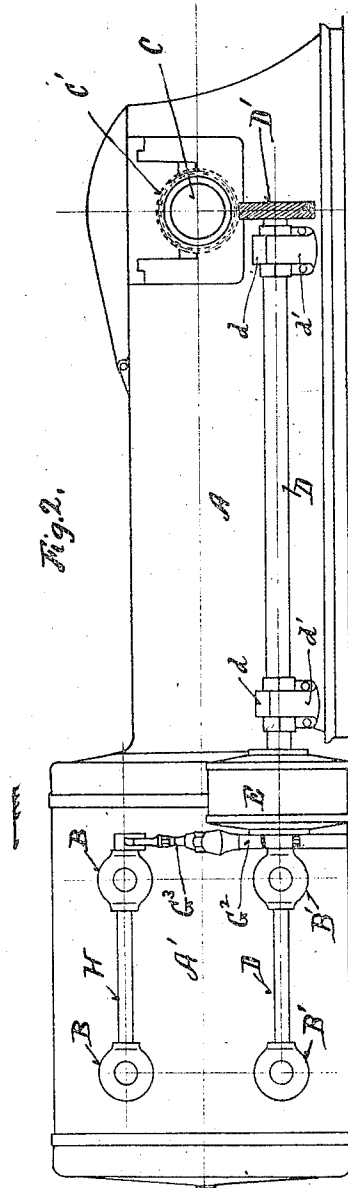
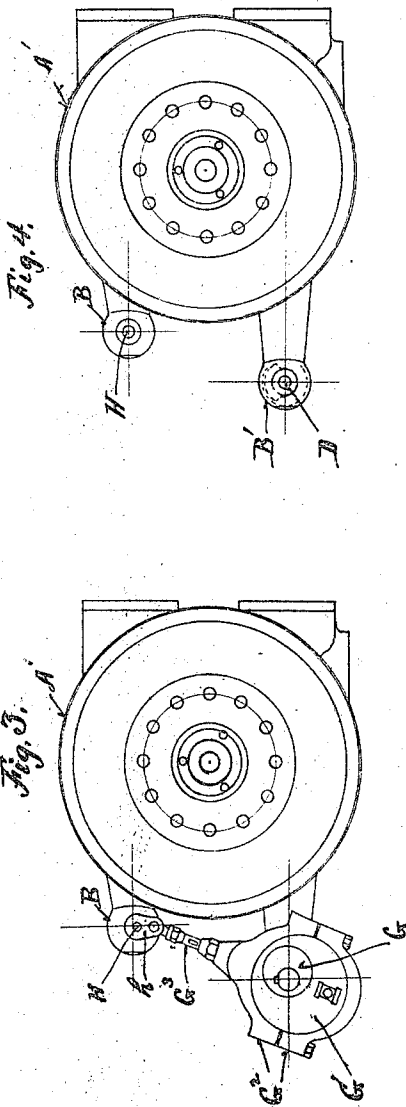
Inventor
Sigfried Rosenzweig
By *[Signature]*
Attorneys

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3 SHEETS—SHEET 2.



Witnesses
Thorne Stockert.
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UNITED STATES PATENT OFFICE.

SIEGFRIED ROSENZWEIG, OF ERIE, PENNSYLVANIA.

VALVE-GEAR.

1,059,567.

Specification of Letters Patent.

Patented Apr. 22, 1913.

Application filed December 18, 1911. Serial No. 666,520.

To all whom it may concern:

Be it known that I, SIEGFRIED ROSENZWEIG, a citizen of the German Empire, residing at Erie, in the county of Erie and State of Pennsylvania, have invented certain new and useful Improvements in Valve-Gear; 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, reference being had to the accompanying drawings, and to the letters of reference marked thereon, forming part of this specification.

My invention relates to reciprocating engines and has for its object the construction and arrangement of the valve-gear of an engine in such a manner that the vibration of reciprocating parts is practically eliminated.

In carrying out the objects of my invention I mount a shaft outside of the bed of the engine, on a plane with the exhaust valves, which shaft extends from a point in vertical line with the axis of the main shaft backward along the side of the engine bed and through the housings of the valve stems of the exhaust valves of the engine, and upon said shaft within said valve-stem housings are placed valve operating cams which are so timed as to open the exhaust valves at proper time with relation to the movement of the piston. Upon this horizontal shaft I mount a centrifugal governor mechanism, which is adapted to control pitch of the inlet valve controlling eccentric, which is also mounted on and rotates with said shaft.

Within the inlet valve-stem housings I mount a horizontal rock-shaft which is operated by an eccentric-rod, extending from the eccentric heretofore mentioned. Upon this rock-shaft within the inlet valve-housings are secured cams which operate the inlet valves; the cams on the rock shaft being so timed as to operate both inlet valves from one rock shaft.

The features of my invention are hereinafter set forth and described and illustrated in the drawings as follows:—Figure 1 is a plan view of a portion of a steam engine embodying my invention. Fig. 2 is a side view of the same. Fig. 3 is an end view of the engine cylinder removed from the engine bed, and with the governor mechanism

removed from its shaft, looking in the direction of the arrow in Fig. 2. Fig. 4 is a like view of the engine cylinder with the eccentric and its rod removed. Fig. 5 shows a side view of an engine cylinder having but one exhaust port, parts thereof being broken away. Fig. 6 is a vertical central section of the same on the line $x-x$ in Fig. 5. Fig. 7 shows an end view of the inlet valve rock-shaft and valve operating cams thereon, removed from its supporting bearings, showing the relations of the cams to each other, the oscillating thereof being indicated by arrows. Fig. 8 is a like view of the exhaust valve shaft and valve operating cams thereon, showing the relation of the cams' surface to each other.

In these drawing A indicates an engine bed, and A' indicates the cylinder thereon.

B indicates the bonnets or housings of the valve stems of the inlet valves, and B' indicates the housings of the valve stems of the exhaust valves of the engine. The inlet valves and exhaust valve mechanism are not shown in Figs. 1, 2, 3, and 4 but are indicated in Fig. 5 and an exhaust valve is shown in Fig. 6, in longitudinal section; but no claim is made therefor herein, the same being reserved for a separate application.

Upon the crank-shaft C of the engine, I place a screw-gear C' indicated by broken lines, and parallel with one side of the engine bed A I mount a governor shaft D in bearings d upon brackets d' secured to the side of the engine bed, so that it will be seen said shaft D is at right angles to the crank-shaft C. Upon the end of said governor shaft D adjacent to the crank-shaft C, I secure a screw gear wheel D' preferably of the same diameter as the diameter of the screw gear C' on the crank-shaft of the engine. Adjacent to the opposite end of said governor shaft D, I mount a centrifugal governor mechanism E of usual and ordinary construction, said governor mechanism being connected with and adapted to control a valve operating eccentric in the usual manner. The shaft D passes entirely through the governor mechanism and the eccentric mechanism, and extends through the bonnets or housings B' of the exhaust valves of the engine, wherein it is mounted in suitable bearings (not shown). In Fig. 1, the bonnets B' are shown with the upper portions thereof broken away, thereby disclosing

valve operating cams D^2 and D^3 secured upon said shaft D. The cam D^3 being shown as having moved the valve stem backward in the act of opening the exhaust valve (not shown) on said valve stem, and the cam D^2 being in the position thereof when its corresponding exhaust-valve (not shown) is closed, the valve-stem-anti-friction roller f being shown as bearing against the low side of the cam D^2 . The relation of the cams D^2 and D^3 on the shaft D are directly opposite to each other as shown in Fig. 8; and as indicated by the arrow in said figure, said shaft D, and valve operating cams D^2 and D^3 thereon, have continuous rotation. It will be understood that these exhaust-valve operating-cams D^2 and D^3 are not controlled in any manner by the action of the governor mechanism E, but that they revolve in proper relation to the revolutions of the crank-shaft C of the engine, and that each of said cams at each revolution thereof, opens its corresponding exhaust valve to the greatest extent of said valve; that is, the exhaust-valves are always given their maximum of movement.

In the construction shown in Figs. 5 and 6, wherein is shown a single centrally located exhaust-valve F, I place upon the shaft D a single cam D^4 having thereon two oppositely disposed cam-services d^2 and d^3 . It will be seen however, that the two cam-services d^2 and d^3 , on the cam D^4 bear the same relation to each other as do the two cams D^2 and D^3 shown in Figs. 1 and 8, the sole difference in operation being that the single exhaust-valve F will be opened twice with each revolution of the shaft D, while in the case of two exhaust-valves, each one thereof is opened but once with each revolution of the shaft D.

Upon the shaft D preferably between the governor mechanism E and the valve-stem housing B' next adjacent thereto, I place the usual valve operating eccentric G, upon which is mounted the governor eccentric G' which revolves in the eccentric-strap and yoke G^2 and through the eccentric-rod G^3 , controls the movement of the crank h of the rock-shaft H. This rock-shaft H extends through and is mounted in bearings (not shown) in the bonnets B of the housings of the valve-stems of the inlet-valves (not shown) of the engine. Upon the rock-shaft H within the bonnets B I secure valve operating cams J, and J', the cam J opening its corresponding valve at one oscillation of the rock-shaft H, and the cam J' operating to open its corresponding valve on the reverse oscillation of said shaft H.

In Fig. 1 are shown portions of each anti-friction roller b (see Fig. 7) mounted on the valve-stems (not shown) of the steam-inlet valves of the engine, and in Fig. 6 is

likewise shown the anti-friction roller f (see Fig. 8) on the valve stem of an exhaust valve.

It will be observed from the foregoing and from the drawings accompanying this application, that I have eliminated from my improved valve gear all the usual reciprocating mechanism for controlling the exhaust-valves, and have reduced the weight of the reciprocating parts of the valve gear for controlling the inlet valves of the engine to the short eccentric rod, yoke and strap, extending between the shaft D and the rock-shaft H, so that there is practically little or no inertia to be overcome by the governor mechanism in controlling the opening and closing of the inlet valves of the engine. Another advantage of the construction and arrangement of mechanism herein shown and described, is that it enables me to so locate the valve mechanism for controlling the inlet and exhaust of steam to and from the cylinder A as to reduce the amount of clearance ordinarily incident to such valve mechanisms. This feature however is not claimed in this application, but is reserved for another application.

Having thus fully shown and described my invention so as to enable others to construct and utilize the same, what I claim as new and desire to secure by Letters Patent is:—

1. The combination in an engine valve-gear of a valve-stem housing secured to the engine cylinder, a valve-stem supported by said housing, an engine crank-shaft, a gear-wheel secured thereon, a valve operating shaft extending from said engine shaft to and supported adjacent to the end of the valve-stem, a cam thereon adapted to engage and operate said valve-stem, and a gear-wheel on said shaft inter-meshing with the gear-wheel on the engine crank-shaft whereby said valve operating shaft is continuously rotated so as to operate said valve-stem at each revolution thereof, substantially as set forth.

2. The combination in an engine valve-gear, of valve-stem housings for the exhaust and inlet valves secured to the engine-cylinder, valve-stems supported in said housings, a crank-shaft, a shaft geared thereto and extending through the exhaust valve-stem housing, eccentric mechanism on said shaft, cam-mechanism thereon adapted to actuate the stem of the exhaust valve, a shaft mounted in the housings of the inlet valves, cam-mechanism thereon adapted to actuate the stems of the inlet valves, and crank and eccentric-rod mechanism extending between said eccentric mechanism and the last mentioned shaft, substantially as set forth.

3. The combination in an engine valve-

gear, of valve-stem housings for the exhaust and inlet valves secured to the engine cylinder, valve-stems supported in said housings, a crank-shaft, a shaft geared thereto and extending through the exhaust valve-stem housing, cam-mechanism on said shaft adapted to actuate the exhaust valve-stem, eccentric mechanism on said shaft, governor mechanism on said shaft for controlling the throw of said eccentric, a shaft mounted in the housings of the inlet valve-stems, cam-mechanism thereon adapted to actuate the inlet valve-stems, and crank and eccentric-rod mechanism extending between said eccentric and said last mentioned shaft, substantially as set forth.

4. The combination with a reciprocating engine, composed of the usual engine bed, crank-shaft, piston cylinder and piston, and piston rod, pitman and necessary connections, inlet and exhaust valves and valve-stem housings, secured on the piston-cylinder, of a shaft mounted parallel with the

piston-rod of said engine, in bearings on the engine bed and in the housing of the valve-stem of an exhaust valve of the engine, a valve-stem actuating-cam secured on said shaft within the housing of the valve-stem of the engine exhaust valve, an eccentric mounted on said shaft, a governor mechanism on said shaft adapted to control the throw of said eccentric, a rock-shaft mounted in the housings of the valve-stems of the inlet-valves of an engine, valve-stem actuating cams secured on said rock-shaft within said valve-stem housings, and crank and eccentric-rod mechanism extending between said rock-shaft and said eccentric, substantially as set forth.

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

SIEGFRIED ROSENZWEIG.

Witnesses:

P. V. GIFFORD,
H. M. STURGEON.