J. C. GLENN.

ENGINE VALVE.

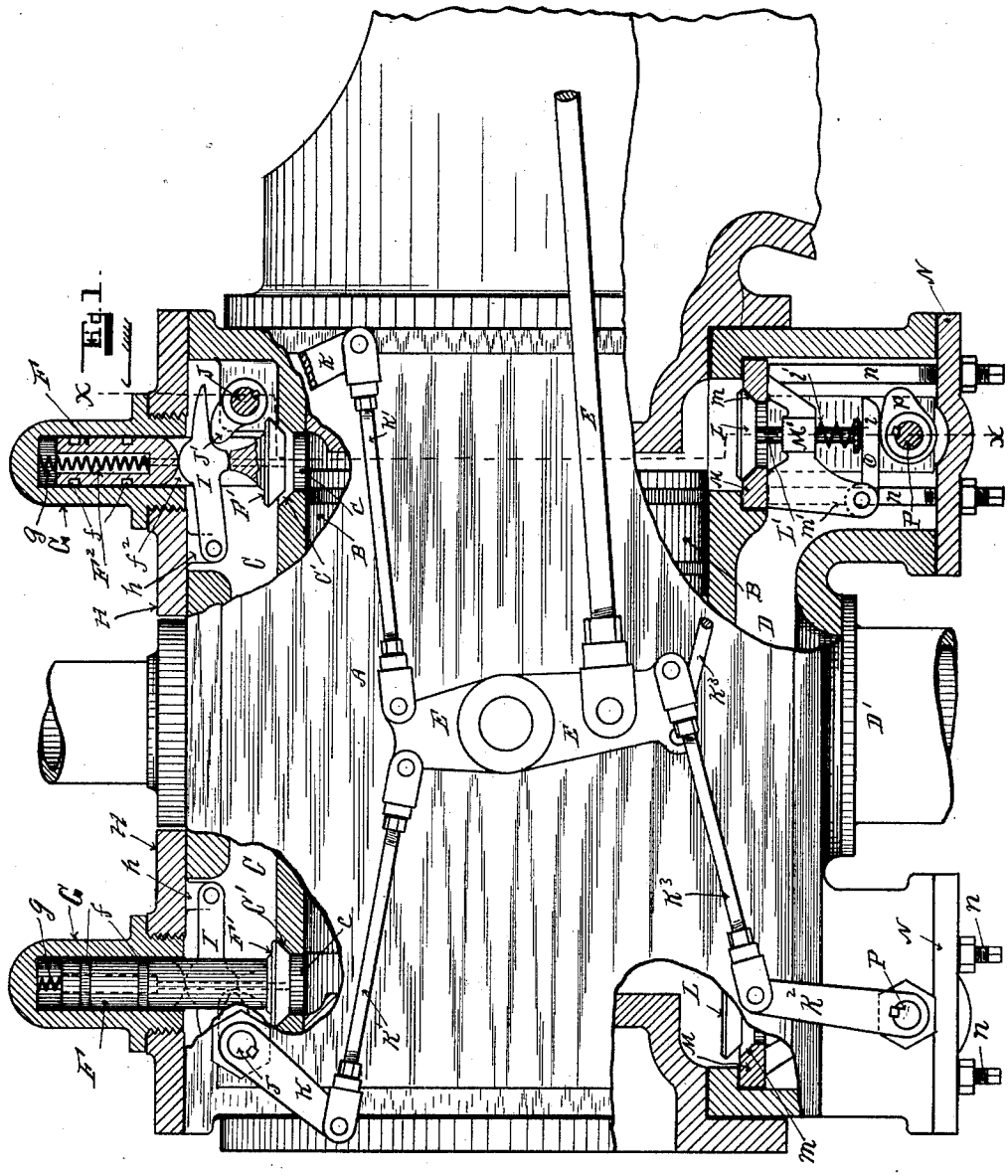
APPLICATION FILED MAR. 22, 1911.

1,097,543.

Patented May 19, 1914.

2 SHEETS—SHEET 1.

Fig. 1.



Witnesses.

Florence Stockert.

G. J. Mead

Inventor.

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2 SHEETS—SHEET 2.

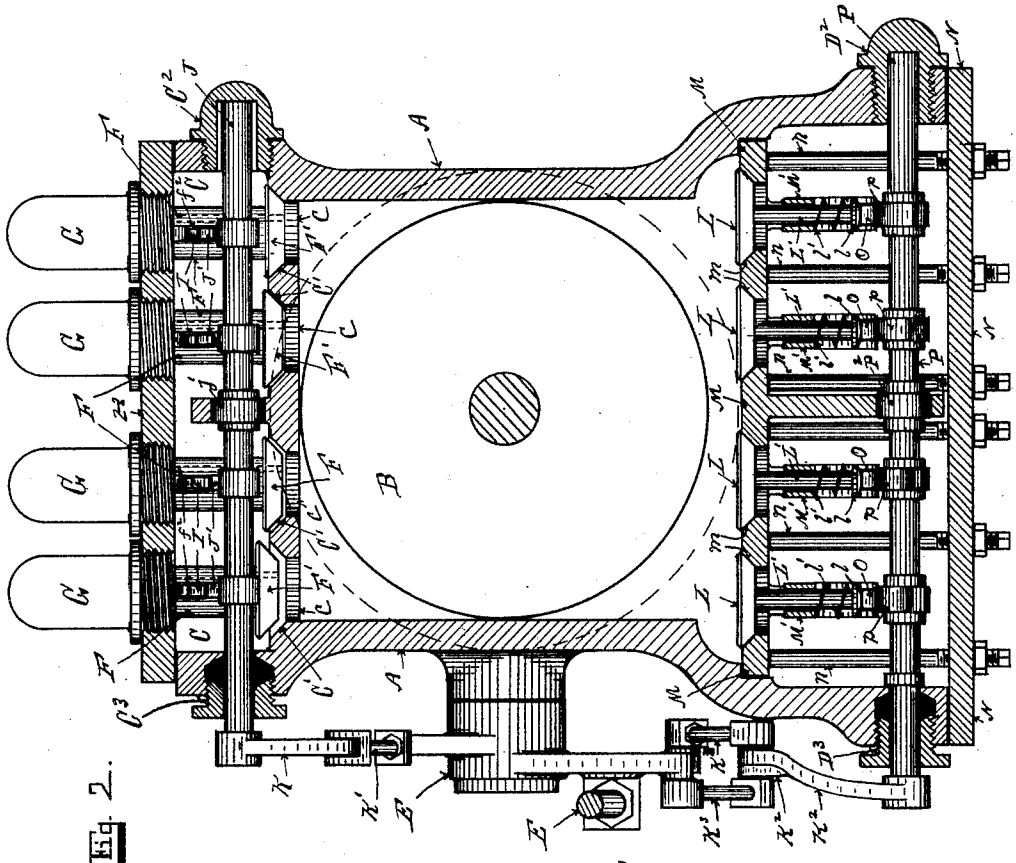


Fig. 2.

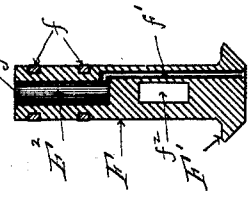


Fig. 3.

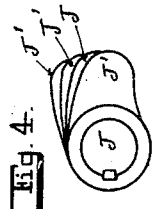


Fig. 4.

Witnesses.

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UNITED STATES PATENT OFFICE.

JOHN C. GLENN, OF ERIE, PENNSYLVANIA, ASSIGNOR TO SKINNER ENGINE COMPANY, OF ERIE, PENNSYLVANIA, A CORPORATION.

ENGINE-VALVE.

1,097,543. Specification of Letters Patent. **Patented May 19, 1914.**

Application filed March 22, 1911. Serial No. 616,227.

To all whom it may concern:

Be it known that I, JOHN C. GLENN, a citizen of the United States, residing at Erie, in the county of Erie and State of Pennsylvania, have invented certain new and useful Improvements in Engine-Valves; 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 valve mechanism for steam engines. In the construction of the four valve or Corliss type two inlet and two exhaust valves, usually of the rotary or oscillatory type are used, and because of the steam pressure upon said valves, particularly upon the inlet valves, considerable power is required to operate them and great difficulty is experienced in keeping said valves in repair and steam-tight. To overcome this difficulty I have provided a series of balanced steam inlet puppet valves at each end of the cylinder, which are provided with cam mechanism operating to consecutively open and close said valves, one after the other, and I also preferably provide a series of puppet exhaust valves, cam actuated so as to consecutively open and close in the same manner as the inlet valves above referred to.

My invention also relates to methods of construction of the inlet valves whereby they may be substantially balanced, and whereby access can readily be had to both the inlet and exhaust valves when necessary for adjustment and repair.

The primary objects of my invention are to provide a steam engine with a valve mechanism which will operate under varying steam-pressures without adjustment, and which under all conditions is easily operated, while at the same time it is subjected to the minimum amount of deterioration from use, and when necessary to repair either the valves or valve-seats it can be speedily and easily done, or new valves quickly substituted for worn valves when necessary.

The features of my invention are hereinafter fully set forth and explained, and illustrated in the accompanying drawings, in which:

Figure 1, is a side view in elevation of a steam engine cylinder, having parts broken away showing the construction and arrangement of my improved valve mechanism thereon. Fig. 2, is a transverse section of the same approximately on the line x—x in Fig. 1, looking in the direction of the arrow. Fig. 3, shows a vertical section of one of my improved inlet valves. Fig. 4, shows an end view of the cam-shaft and cams for operating the valves.

In these drawings, A, represents a steam engine cylinder, B, the piston operating therein, C, the steam chest, D, D′, the exhaust, and E, valve operating gear, all substantially of the usual construction.

The inlet valves, F, of my invention are of the puppet-valve type provided with conical lower ends, F′, which fit conical valve seats C′, in the bottom of the steam-chest, C; the stems of these valves, F, are preferably of about the same size as the openings, c, into the cylinder, A, and the upper ends thereof are inclosed in caps, G, screwed into the steam-chest cover, H, and are provided with steam-rings, f. In the upper part of the stems of the valves, F, there is a recess, F^2, in which a spiral spring, g, operates against the inside of the top of the cap, G, and from the bottom of the valve there is a passage, f', leading up into the recess, F^2, (see Fig. 3) so that pressure against the bottom, F′, of the valve, F, and on the top of the stem thereof are substantially equalized, so that the valves, F, will not lift off of their seats by reason of compression within the cylinder, A. In the stem of each valve, F, there is also a transverse slot, f^2, in which cam-levers, I, pivoted to bearings, h, on the under face of the steam-chest cover operate, and in each end of the steam-chest I mount a series of these valves, F, as illustrated in Fig. 2. For operating these series of valves I preferably mount a transverse cam-shaft, J, in bearings C^2 and C^3 in the ends of the steam-chest, C, one end of which shaft extends out through the bearing, C^3, where it is provided with an arm K, connected by a link, K′, with the valve operating mechanism, E, whereby the shaft, J, can be oscillated back and forth by said valve operating mechanism in the usual manner. On the shaft, J, under the cam-levers I, are secured cams, J′, in such relation to each other that they will operate on the arms, I, to raise the valves, F, off of

their seats, C′, one after the other, as illustrated in Fig. 2, and this arrangement of the cams, J′, on the shaft, J, for producing this result, is clearly illustrated in Fig. 4, and the valves, F, are consecutively closed upon their seats, C′, by the action of the springs, *g*, when the movement of the cam-shaft, J, is reversed. The result of this construction is that as but one of the valves, F, is raised off of its seat at a time comparatively a small amount of power is required to operate the cam-shaft, J, to raise the valves, F. On the center of the cam-shaft J, I provide a bearing, *j*, which when the arm, K, is detached from the end of the shaft, J, and the bearing, C^2, at the opposite end of the steam-chest, C, is removed, the cam-shaft, J, the cams, J′, and the bearing, *j*, can be removed or drawn out of the steam-chest endwise through the opening ordinarily closed by the bearing, C^2, and then by the removal of the steam-chest cover, H, the entire series of valves, F, and their operating levers, I, can be removed, or any one or more of the valve caps, G, can be removed from the valve-chest cover, H, and replaced when necessary for inspection or repair.

The construction and arrangement of my preferred form of exhaust valve mechanism consists substantially of a series of puppet exhaust valves, L, operating on valve-seats, *m*, in a removable plate, M, supported by rods, *n*, secured in removable plates, N, closing the ends of the lower part of the exhaust chamber, D, the stems, L′, of the valves L, operating in guides, M′, and the lower ends thereof are provided with heads, *l*, which rest upon cam-levers, O, pivoted to the downward projections, *m′* on the plates, M, and a spiral spring, *l′*, surrounds the valve-stem, L′, and operates between the head, *l*, thereon and the under side of the guides, M′, to close the valves, L, upon their seats, *m*. Under the cam-levers, O, I mount a cam-shaft, P, in bearings, D^2 and D^3. One end of this shaft, P, extends out through the bearing, D^3, where it is provided with an arm, K^2 connected by a link, K^3, with the valve operating mechanism, E, whereby the shaft, P, can be oscillated back and forth by said valve operating mechanism in the usual manner. On this cam-shaft, P, under the cam-levers, O, I secure cams, *p*, in substantially the same relation to each other, as are the cams, J′, on the shaft, J, illustrated in Fig. 4, so that they operate on the cam-levers, O, to raise the valves, L, off of their seats, *m*, one after the other, and the said valves, L, are consecutively closed upon their seats, *m*, by the action of the springs, *l′*, when the movement of the shaft, P, is reversed, the result of this construction being that as but one of the valves, L, is raised off of its seat at a time comparatively a small amount of power is required to operate the cam-shaft, P, to open the valves, L.

On the center of the shaft, P, I preferably provide a bearing, P^2, which when the arm, K^2, is detached from the cam-shaft, P, and the bearing, D^2, at the opposite end of the exhaust chamber, D, is removed, can, together with the cam-shaft, P, and the cams, *p*, thereon, be drawn out of the exhaust chamber through the opening ordinarily closed by the bearing, D^2, and then by the removal of the plate, N, the valve plate, M, the series of valves, L, and their cam-levers, O, can be removed from the exhaust chamber, D, if desired for repair, if necessary.

In operation the rotation of the cam-shaft, J, causes the cams, J′, thereon to consecutively raise the cam-levers, I, and thereby raise the valves, F, one after the other to admit steam to the cylinder, A, one of the results therefrom being that as soon as the first valve is raised from its seat the pressure is substantially removed from the remaining valves of the series, so that the aggregate power necessary to operate the whole series of valves is comparatively small, and therefore a comparatively small governing mechanism will effectually control their action. This same feature equally applies to the exhaust valve mechanism hereinbefore described.

Having thus described my invention so as to enable others to utilize my invention, I do not confine myself to the exact construction thereof hereinbefore shown and described, but what I claim as new and desire to secure by Letters-Patent is:

In a steam engine valve gear, the combination of an engine cylinder having steam inlet ports adjacent to each end thereof, valve-seat openings communicating with said ports, a steam-chest surrounding said valve-seat openings, rock-shafts mounted in said steam-chest, steam chest covers, valve-stem housings secured in said covers, valve-stems mounted in said housings having transverse slots therethrough, valves thereon adapted to seat upon said valve-seat openings, levers pivoted to said covers and extending through said slots, and cams secured on said rock-shafts within said steam-chest adapted to engage and raise said levers, substantially as set forth.

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

JOHN C. GLENN.

Witnesses:
FLORENCE STOCKERT,
H. M. STURGEON.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."