

A. D. SKINNER.

VALVE GEAR.

APPLICATION FILED JAN. 6, 1910.

1,003,664.

Patented Sept. 19, 1911.

2 SHEETS—SHEET 1.

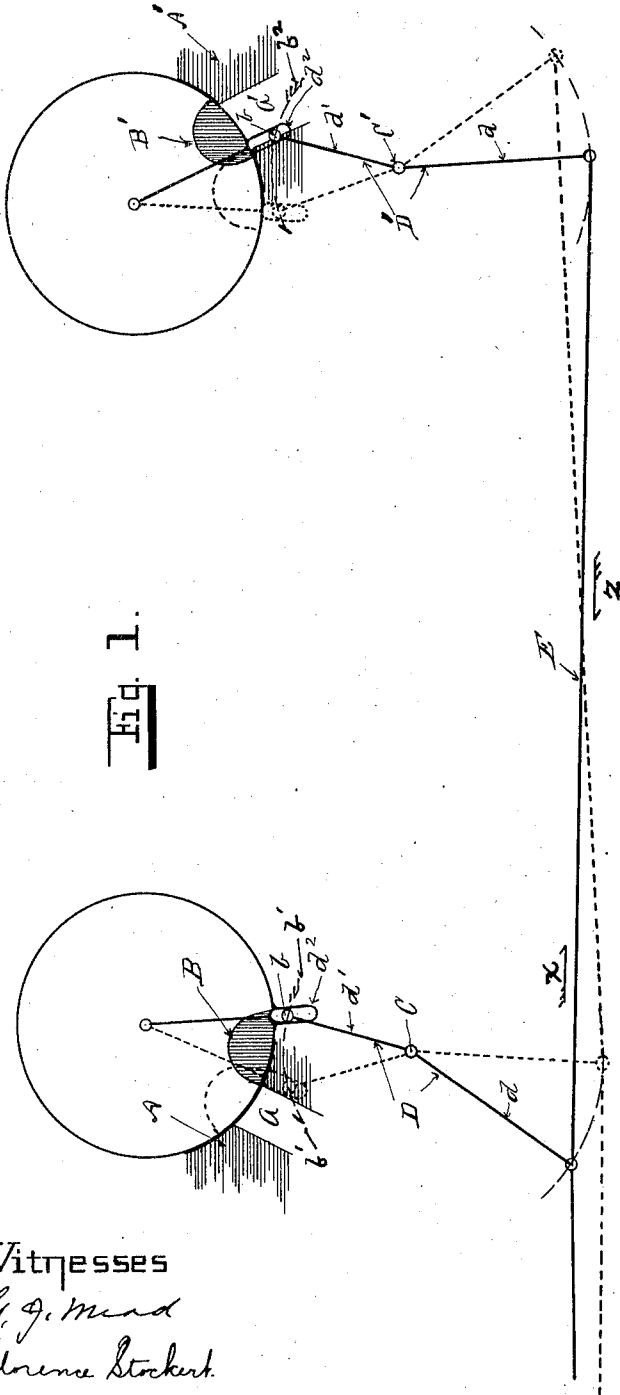


FIG. 1.

Witnesses
G. J. Mend
Florence Stockert.

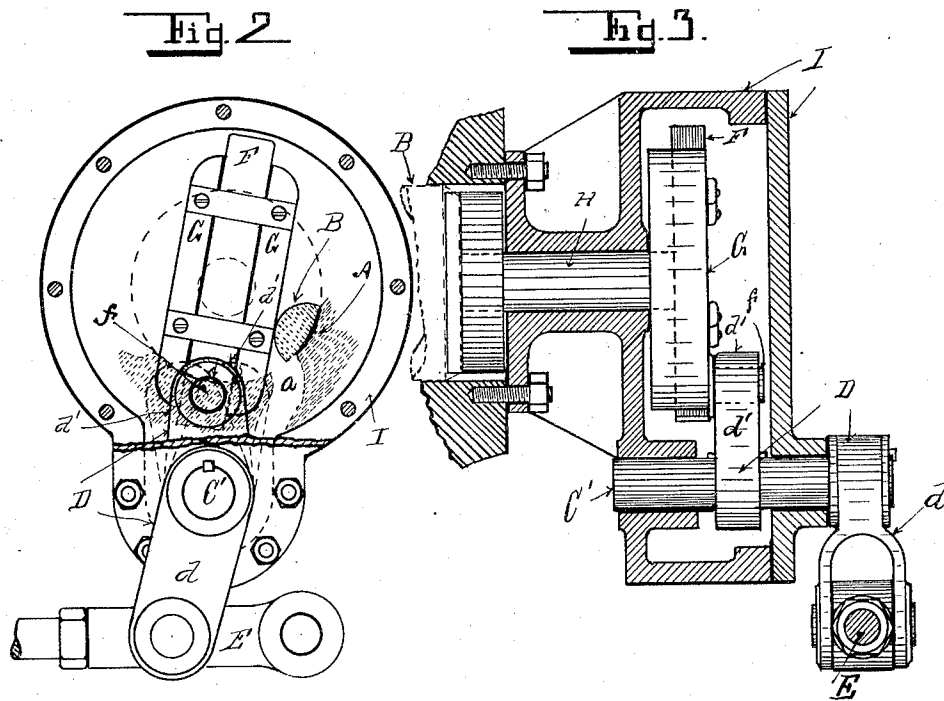
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UNITED STATES PATENT OFFICE.

ALLAN D. SKINNER, OF ERIE, PENNSYLVANIA.

VALVE-GEAR.

1,003,664.

Specification of Letters Patent. Patented Sept. 19, 1911.

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To all whom it may concern:

Be it known that I, ALLAN D. SKINNER, 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 Valve-Gears; 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-gear for steam engines, and has for its objects the construction of a valve-gear which will open the valve to the predetermined point allow it to stop and dwell at such predetermined point while the eccentric-rod continues to travel to the end of its reciprocation. Heretofore this object has been accomplished, with valves of the Corliss type, by the use of snap-gear and dash-pots, but by means of the mechanism hereinafter described, I am enabled substantially coincident with the initial movement of the eccentric rod in either direction, to cause the valve to quickly and completely open the cylinder ports a predetermined distance, and to maintain such opening until a predetermined point of cut-off has been reached when the movement of the eccentric rod is reversed and the valve is quickly moved in the opposite direction so as to completely close said ports and permit the valve to remain in such a closed position for a predetermined period of time and until the movement of the eccentric rod is again reversed.

My invention and a convenient mechanism by means of which I accomplish the above mentioned results, is hereinafter fully set forth and described, and illustrated in the accompanying drawings, in which:

Figure 1, is a diagrammatic illustration of mechanism embodying my invention. Fig. 2, is a front elevation of a preferred form of construction of my improved valve operating mechanism. Fig. 3, is a transverse section of the same.

In these drawings illustrating my invention I have shown my improved valve operating mechanism as applied to a rotary valve, but to those skilled in the art it will be obvious that the same may be applied to

other forms of valves, without departing from the spirit of my invention.

In the drawings A, A' indicate valve-seats; *a, a'* indicate ports therein, and B, B' indicate valves operating on the valve seats A, A'. Upon fulcrum studs C, C', I pivot, intermediate of their length, levers D, D', preferably of the bell-crank type, one arm of each of said levers connecting with an eccentric-rod E, and the other arm *d'* of said levers being each provided with a pivot *b*, operating in a slot *d*² located on a line transversely across the ends of the valves B, B', as illustrated in Fig. 1, or on a pivot *f*, mounted on a slide F, secured between guides G G, on the valve-stem H, as shown in Figs. 2 and 3. In this preferred construction, illustrated in Figs. 2 and 3, there is a valve-stem H, which extends outward from the end of the valve B, (shown in broken lines in Fig. 3) into an inclosed case I, and on the end of the stem H, I secure transverse guides G G, between which a slide F is secured, and on the slide F, I place a stud-pin *f*. The lever D in this instance is provided with a fulcrum bearing C' (see Figs. 2 and 3) mounted in the case I, and which projects outward therefrom, and the arm *d'* of said lever D is secured thereto inside of said case, while the arm *d* thereof is secured to said fulcrum bearing outside of said case, with its lower end connected with the eccentric-rod E.

In operation, when the eccentric-rod E commences to move in the direction of the arrow X, in Fig. 1, the pivot *b* will prescribe a segment of a circle, as shown by broken line *b'*, and while doing so it will move along the line of the guides G G in Figs. 2 and 3, or the slot *d*² in Fig. 1, toward the axis of the valve B, thereby moving the valve B into the position thereof indicated by broken lines, so as to close the port *a*. It will be noted that because the pivot *b* starts its segmental travel at a greater distance from the axis of the valve B, than it occupies when midway of said travel, it necessarily starts said valve gradually, imparting to it a progressively increasing speed which increase continues until about the moment the port *a* is closed, when the velocity of movement of said valve commences to decrease until there is no movement of said valve. While the above described operation of the valve B is in progress, the ec-

centric-rod E has forced the lever D' into the position thereof shown by broken lines, which causes the pivot *b* thereon to describe a segment of a circle, as indicated by broken lines *b*². At the commencement of said movement said pivot *b* is at its greatest distance from the axis of the valve B', and while said valve is covering the port *a'* the movement thereof is very slow; but at substantially the moment said valve breaks open the port, the sliding pivot *b* is approaching the highest point of the segment *b*², and is therefore at its nearest point to the axis of the valve B', and therefore is imparting to said valve the maximum of speed, so that the port *a'* is almost instantly opened to the predetermined point, from which point the further travel of the pivot *b* begins to lead it away from the axis of the valve B'; and at about the instant each of said valves have passed the midway point of their respective movements, the speed of each progressively decreases as the pivot *b* recedes farther away from the axis of said valves, while the speed and movement of the eccentric rod remains unchanged. It will be seen therefore that by means of the arrangement of elements hereinbefore shown and described I am enabled to so operate an engine valve that when it opens it will open instantly to the predetermined point, at which point the slidable pivot will be in such a position that it will continue its motion, but said motion will be along the line of the slot *d*² or of the slides G G and will not impart any perceptible movement to said valve while the eccentric-rod travels on to the point of cut-off; that is, until the reverse movement of the eccentric-rod quickly closes said valve; that the movement of said valve in either direction will gradually commence and gradually cease, attaining its greatest speed when in an unloaded condition, that is, when the port is opened.

In adjusting my improved valve-gear so as to obtain the most desirable results, the fulcrum C and C' may be placed at such points with relations to the axes of the valves B and B' as may be found to produce the best results. Likewise the positions of the pivots *b* and C with relation to the piv-

otal connection of said lever with the eccentric-rod may be altered as may be found desirable, without departing from the spirit of my invention. The valve-gear which I have hereinbefore shown and described can as readily be adapted to operate the exhaust valves of an engine as the inlet valves.

Therefore, having fully described the construction and operation of my improved valve-gear so as to enable others to construct and operate the same, what I desire to secure by Letters-Patent is:

1. The combination in a valve-gear, of a rotatable valve having a transverse slot across the end thereof, an eccentric-rod, an intermediately pivoted lever one arm of which continuously engages the slot in the valve, and the other arm thereof engaging said eccentric-rod, substantially as set forth.

2. The combination in a valve-gear, of a rotatable valve having a transverse slot in the end thereof, an eccentric-rod, a bell-crank lever one arm of which continuously engages the slot in the end of the valve and the other arm thereof engaging the valve-rod, substantially as set forth.

3. The combination in a valve-gear, of a rotatable valve, an eccentric-rod, transverse guides secured to the end of said valve, a slide operating in said guides, a stud on said slide, and a lever pivoted intermediate of its length one arm of which engages said stud and the other arm of which engages said eccentric-rod, substantially as set forth.

4. The combination in a valve-gear, of a rotatable valve, an eccentric-rod, transverse guides secured to said valve, a slide operating in said guides, a stud on said slide, a bell-crank lever one arm of which connects with the stud on said slide, a case inclosing said mechanism, and the other arm of said bell-crank lever extending outside of said case and connecting with the eccentric-rod of the engine, substantially as set forth.

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

ALLAN D. SKINNER.

Witnesses:

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