(No Model.)

G. H. HELVEY.

VALVE GEAR.

No. 406,904. Patented July 16, 1889.

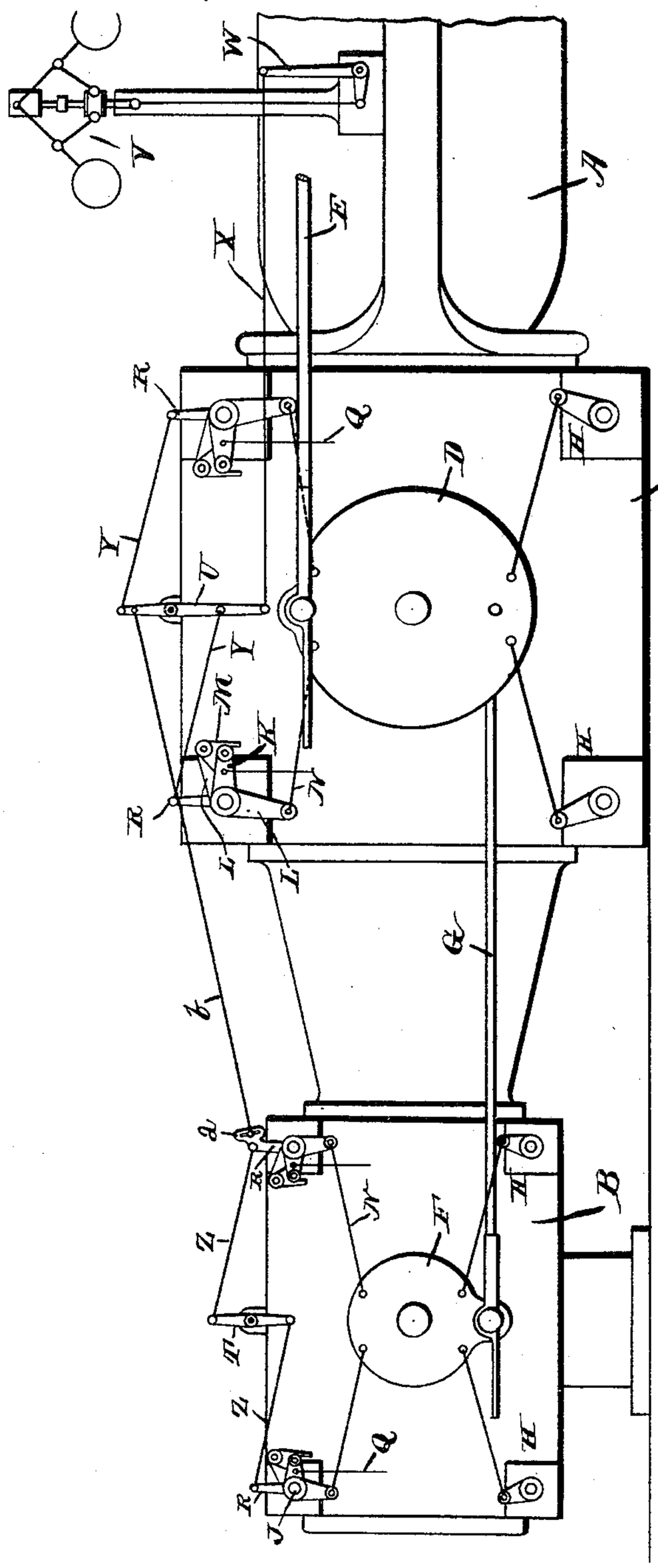

Fig. 1.

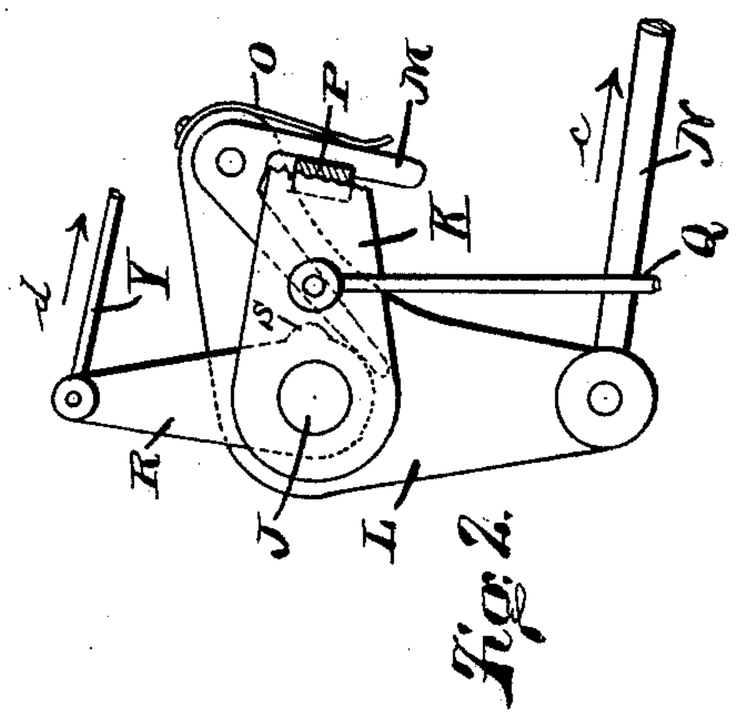

Fig. 2.

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GEORGE H. HELVEY, OF HAMILTON, OHIO, ASSIGNOR TO THE HOOVEN, OWENS & RENTSCHLER COMPANY, OF SAME PLACE.

VALVE-GEAR.

SPECIFICATION forming part of Letters Patent No. 406,904, dated July 16, 1889.

Application filed January 25, 1889. Serial No. 297,591. (No model.)

To all whom it may concern:

Be it known that I, GEORGE H. HELVEY, of Hamilton, Butler county, Ohio, have invented certain new and useful Improvements in Valve-Gear, of which the following is a specification.

This invention has to do with the valve-gear of compound receiver-engines employing valve-gear of the well-known Corliss type, and relates particularly to the mechanism by which the governor controls the cut-off points, the governor acting on the steam-valves of both cylinders, as is usual.

My improvement will be readily understood by those skilled in the art of constructing compound engines with Corliss valve-gear from the following description, taken in connection with the accompanying drawings, in which—

Figure 1 is a side elevation of the rear portion of a compound engine with Corliss valve-gear embodying my improvement; and Fig. 2, an enlarged elevation, same plane as Fig. 1, of one of the valve-stems and its attached levers, showing an ordinary construction of releasing-gear as embodied in Fig. 1.

In the drawings, A indicates a portion of the bed of the engine; B, the high-pressure cylinder, fitted with two steam-valves above and two exhaust-valves below, as is common in engines of the Corliss type; C, the low-pressure cylinder, of similar construction, but of larger size, and placed tandem to the high-pressure cylinder, the exemplification showing the low-pressure cylinder as attached directly to the bed and the high-pressure cylinder to the rear of the same; D, the usual wrist-plate of the low-pressure cylinder; E, the usual rod by which this wrist-plate is oscillated; F, the usual wrist-plate of the high-pressure cylinder; G, the usual rod connecting the two wrist-plates and serving to transmit oscillations from the forward wrist-plate to the rear one; H, the usual exhaust-valves, two below each cylinder; J, the usual stems of the steam-valves, of which there are two above each cylinder; K, the usual valve-levers, fast on the stems of the steam-valves and provided at their ends with blocks by which the valve-opening hooks pull upon the levers in opening the valves; L, the usual hook-rockers, loose upon the valve-stems and oscillated thereon by power transmitted through links from the wrist-plates; M, (see Fig. 2,) the usual hooks pivoted to the hook-rockers and moving with them, and adapted, when the hook-rockers oscillate in one direction, to engage the blocks of the appropriate valve-levers and thus cause the valve-levers to move for the time being in common with the hook-rockers; N, the usual links pivoted to the wrist-plates and to the hook-rockers and serving to transmit oscillations from the wrist-plates to the hook-rockers; O, Fig. 2, the usual springs upon the hook-rockers, urging the hooks into engagement with the blocks of the valve-levers; P, the usual blocks on the valve-levers, to be engaged by the hooks; Q, the usual links attached to the valve-levers and adapted to be connected with springs, generally of the pneumatic or dash-pot type, to serve in pulling the valve-levers quickly down and suddenly closing the steam-valves when the valve-levers shall have become disconnected from the hook-rockers by the disengagement of the hooks at the proper point of closing the steam-valves and cutting off the admission of steam to the cylinders in the ordinary manner; R, the ordinary cam-levers pivoted loosely upon the stems of the steam-valves and projecting upwardly therefrom, and adapted to partially rotate, as required, by the action of the governor; S, Fig. 2, the usual lobe upon the hub of each of the cam-levers R, this lobe serving as a fixed element, changing its position under the action of the governor to be engaged by the hook and cause the release of the hook from the hook-block, the angular position of the lobe determining the point in the opening motion of the rocker-arm at which the hook will release the valve-lever and permit the valve to be pulled shut; T, a double-ended lever mounted upon a fulcrum supported at about the mid-length of the high-pressure cylinder; U, a similar lever, similarly mounted upon the low-pressure cylinder; V, the usual governor or regulator, illustrated as of the fly-ball type; W, the usual governor-rocker oscillated by the rise and fall of the governor; X, a horizontal link connecting the governor-rocker and the lever U, and serving, as the governor-

rocker is moved by the governor, to transmit these movements to the lever U; Y, links connecting the cam-levers R of the low-pressure cylinder with the lever U, and serving to transmit motion from the lever U to both levers R simultaneously; Z, links connecting the lever T with the cam-levers R of the high-pressure cylinder, and serving to endow both these cam-levers with simultaneous motion; *a*, a slot, substantially radial, in the cam-lever R at the forward end of the high-pressure cylinder; *b*, a link connecting the lever U with the cam-lever R at the forward end of the high-pressure cylinder at the slot *a*, this link serving to transmit motion from the lever U to the cam-lever R, the slot *a* serving as a means for adjusting the pivotal engagement of the link with this cam-lever, whereby the degree of angular motion of the cam-lever may be altered in its relation to the degree of angular motion of the lever U; *c*, Fig. 2, an arrow indicating the direction of motion of the link N when the steam-valve is being pulled open, and *d*, Fig. 2, an arrow indicating the direction of motion of the link Y when the cam-lever R is being moved into a position to effect the earlier disengagement of the hook.

Fig. 2 is to be taken as illustrating the parts pertaining to the steam-valve at the rear end of the low-pressure cylinder.

The operation of the valve-gear, aside from peculiarities of connections between the governor and the cam-levers, is as usual in this class of engines. Fig. 2 illustrates the ordinary arrangement pertaining to one of the steam-valves, and it will be sufficient to briefly describe it. The valve-lever K is fast on the valve-stem J, and the spring-rod Q tends to hold the valve-lever down into a position corresponding with the closed position of the steam-valve. The rod N rocks the hook-rocker, and, the hook being spring-pressed into engagement with the block, the valve-lever accompanies the hook-rocker, and the valve opens and continues its opening motion. The cam-lever R and the lobe S are stationary, and as the hook rises its tail comes in contact with the lobe and the hook is forced to disengage from the block, whereupon the spring-rod Q pulls the lever down and suddenly closes the valve. The time of valve-closure and the consequent degree of cutting off and of expansion will be determined by the position of the lobe S. If the lobe is in such position that the tail of the hook strikes it early in the opening motion, the valve will close early, while if the lobe be further advanced the hook-release and valve-closure will be later. If the engine runs above the normal speed, the governor-balls rise and cause the cam-lever R to move to the right and advance the lobe angularly, so as to meet the hook-tail at an earlier point in its travel. All this is as usual.

The governor, through the medium of the single link X, effects an angular adjustment of the lever U, and this lever, through the medium of the links Y, effects the angular adjustment of the cam-levers of the low-pressure cylinder. The link *b* at the same time serves to effect the adjustment of the cam-lever R upon the forward end of the high-pressure cylinder, and this cam-lever, through the medium of the links Z and lever T, serves to effect the adjustment in the proper direction of the cam-lever upon the rear end of the high-pressure cylinder. The slot *a* at the point where the link *b* connects with the forward cam-lever of the high-pressure cylinder is not essential if the parts be properly proportioned in the construction; but the slot is of utility in properly proportioning the angular movements of the cam-levers pertaining to the high and low pressure cylinders, respectively. In case the valve-moving parts of the high and low pressure cylinders were the same size the cam-levers R of all the steam-valves would require the same angular movement as the point of cut-off advances; but in practice the valves and the valve-moving parts of the low-pressure cylinder are generally larger than those of the high-pressure cylinder, and corresponding degrees of motion are required at the cam-levers of the two cylinders; hence the utility of the adjustment provided by the slot *a*.

I claim as my invention—

In a compound engine having valve-gear of the Corliss type and having the two cylinders arranged tandem and having at each steam-valve of each cylinder a cam-lever to be adjusted angularly to change the point of valve-closure, the combination, substantially as set forth, with such cam-levers and the governor which is to actuate them, of a double-ended lever pivoted on one cylinder between the two steam-valves of that cylinder, a link connecting said lever with the governor, links connecting said lever with each of the cam-levers of the cylinder on which the lever is pivoted, a link connecting said lever with one of the cam-levers of the second cylinder, a double-ended lever pivoted on the second cylinder between its steam-valves, and links connecting said last-mentioned double-ended lever with the two cam-levers of said second cylinder.

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