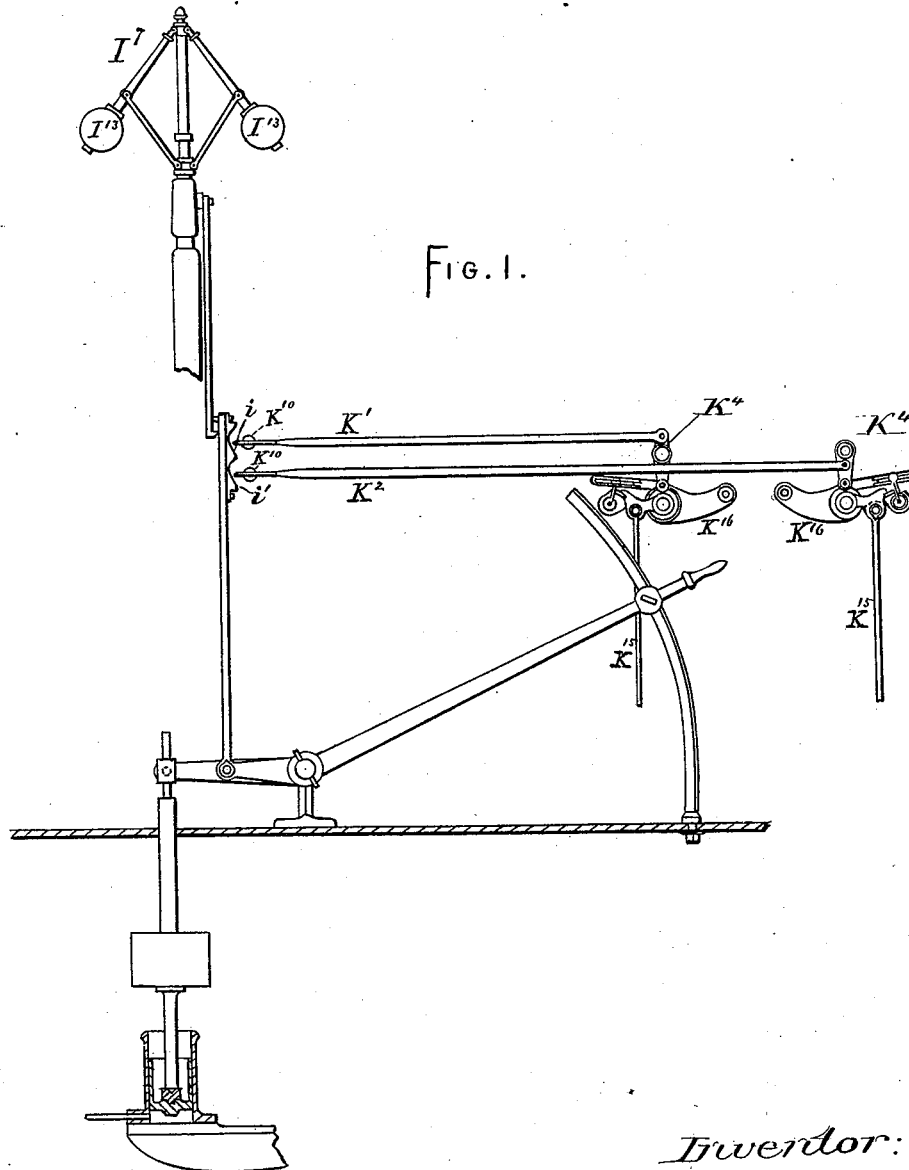


G. H. CORLISS.
Valve-Gear for Steam-Engines.

No. 215,884.

Patented May 27, 1879.



— WITNESSES: —
Charles K. Stetson
E. B. Bolton

Inventor:
Geo. H. Corliss
By his attorney J. L. Stetson

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FIG. 2.

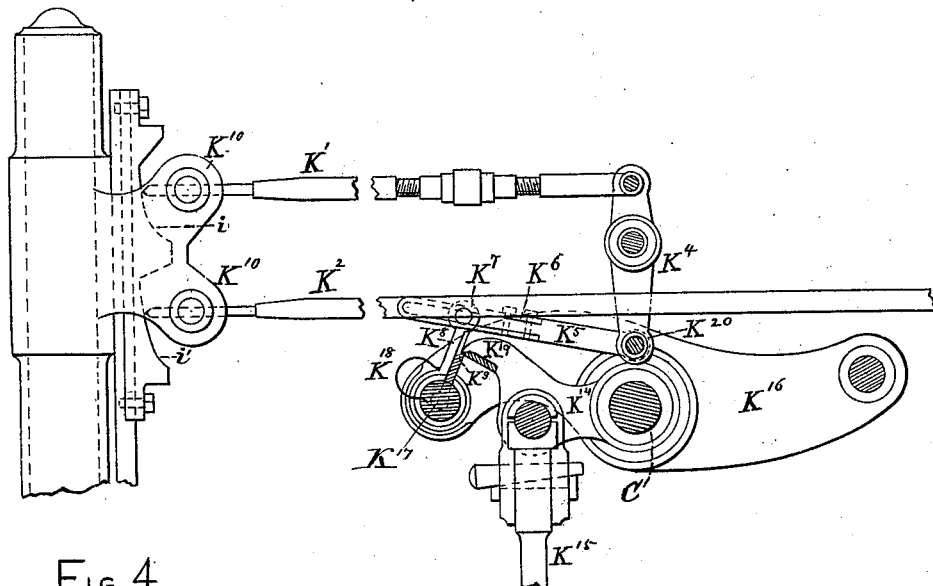


FIG. 4.

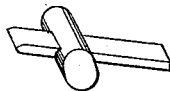
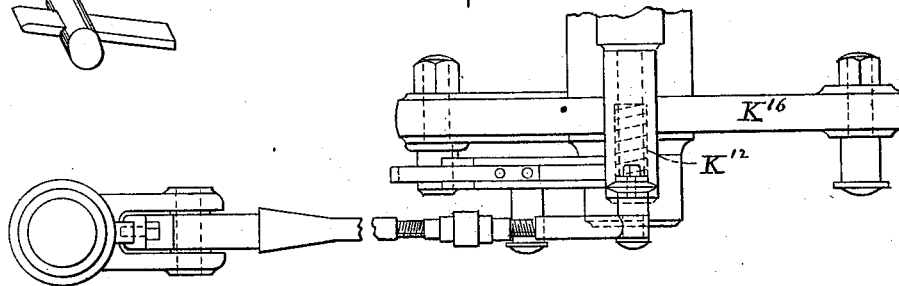


FIG. 3.



— WITNESSES —

W. Colborne Brooks
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— INVENTOR —

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UNITED STATES PATENT OFFICE.

GEORGE H. CORLISS, OF PROVIDENCE, RHODE ISLAND.

IMPROVEMENT IN VALVE-GEARS FOR STEAM-ENGINES.

Specification forming part of Letters Patent No. **215,884**, dated May 27, 1879; application filed February 6, 1879.

To all whom it may concern:

Be it known that I, GEORGE H. CORLISS, of Providence, in the State of Rhode Island, have made certain new and useful Improvements relating to Steam-Engines; and I do hereby declare the following to be a full and exact description thereof.

The invention applies to steam-engines with a liberating valve-gear, and involves a modification of the mechanism for opening and closing the steam-valves.

What I term "liberating valve-gear" is any form, with or without a variable cut-off, in which the valves are opened by a proper mechanism, and are closed automatically on being detached from the mechanism which opens them. A sufficient force—gravity, a spring, or the action of air or steam on a piston—urges the valves toward a shut position. The mechanism engages and disengages at each stroke.

I have devised an apparatus for this purpose in which the opening mechanism is connected with the valve by means of a steel shoulder on a light lever, which is operated by means of a light detaching-rod turning on an adjustable center, a stop (which may be adjustable) carried by said rod causing said lever to turn to release the valve and allow it to be closed. The steel shoulder engages with a steel catch-piece on the valve-arm, holding it securely, but offering great facility for liberation by a small movement of the light lever which carries the shoulder. The lever carrying the shoulder turns on the same center as the valve, so that there is no rolling motion of one part upon the other. The detaching movement is effected with certainty at the proper moment, and without exerting any appreciable disturbing influence on the governor.

The following is a description of what I consider the best means of carrying out the invention.

Figure 1 is an elevation of the general arrangement. Fig. 2 is an elevation, partly in section, illustrating the invention. Fig. 3 is a plan. Fig. 4 is a detail perspective view of one of the swivel-guides and part of one of the steel-pointed followers.

Similar letters of reference indicate like parts in all the figures.

A description of the mechanism for operating one valve will suffice for both.

C is the stem or shaft of a steam-inlet valve of the circular sliding description invented and used by me. (Not represented.) K¹⁴ is an arm rigidly fixed thereon.

K¹⁵ is a rod connected to the arm K¹⁴, and having at its lower end any suitable device for pulling the arm K¹⁴ in the direction to close the valve on the shaft C.

K¹⁶ is a rocking lever, centered on the same valve-shaft C, and receiving a positive rocking motion through suitable connections. (Not represented.)

K⁸ is a light lever with steel shoulder K⁹, turning on a pivot, K¹⁷, carried on the lever K¹⁶, having a spring, K¹⁸, which urges it toward the shaft C. The shoulder K⁹ on the lever K⁸, at each upward movement of lever K¹⁶, engages with the steel catch-piece K¹⁹ on the arm K¹⁴, and lifting the latter opens the valve.

By releasing the catch K¹⁹ from the shoulder K⁹ at the desired point in the stroke, the point of closing the valve, called the "point of cut-off," is determined.

K⁵ is a light slotted rod loosely embracing a pin, K⁷, fixed in the upper end of the lever K⁸, and pivoted at K²⁰ to another lever, K⁴, the position of which latter is controlled by a governor or other means, as shown in Figs. 1, 2, and 3.

The position of the stop K⁶ in the slotted rod K⁵ determines the point in the stroke at which its shoulder K⁹ becomes disengaged from the catch K¹⁹ on the valve-arm K¹⁴ to allow the latter to drop and close the valve.

The slot in the slotted rod K⁵ is of sufficient length to accommodate the extreme throw of the parts in every possible adjustment.

At each oscillation of the rocking lever K¹⁶ the shoulder K⁹ engages the catch K¹⁹ on the valve-arm K¹⁴, and lifting it opens the valve; but as soon as the pin K⁷, above mentioned, meets the stop in the slotted rod K⁵, formed by the end of the slot in the rod, the further motion of the rocking lever K¹⁶ disengages the valve-arm K¹⁴ and allows it to drop. Shifting the stop K⁶ to the right or left by the action of a governor or other means will delay

or hasten the period of such dropping. There is no rolling movement of the shoulder K⁹ upon the catch K¹⁹ at any time, and no sliding movement except at the instant of disengagement. A very slight force of resistance applied at the stop K⁶ is sufficient to cause the disengagement of the shoulder K⁹ from the catch K¹⁹; but until such force is applied the parts remain engaged without any tendency to separate.

In Fig. 1, I have represented connections adapted for effecting the regulation by the aid of a governor. The levers K⁴ turn on fixed centers, their arms being connected to the steel-pointed followers K¹ K², the other ends of which play through the swivel-guides K¹⁰, and rest easily against the cam-shaped surfaces *i i'*, which are moved up and down, as required, by a governor, I⁷, as represented.

It will be understood that the descent of the governor-balls I¹³ lowers the cam-surfaces *i i'*, and by allowing the steel-pointed followers K¹ K² to move to the left under the influence of the coiled spring K¹², (shown in Fig. 3,) or other force, moves the center K²⁰ to the right, and delays the cut-off by delaying the impact of the pin K⁷ with the stop K⁶ in rod K⁵, and liberates the valve-arm K¹⁴.

By means of the rod K⁵ resting on the pin K⁷ of the light lever K⁸, as shown, I obtain a delicate means of effecting the detaching movement, and can move the other center, K²⁰, forward and backward, either by the means shown or by other means, to effect the changes in the point of cut-off. I esteem it particularly important, however, in connection with my cams *i i'*, which serve as a medium for communicating the changes from the governor, which cams are made the subject of a separate application for patent.

Modifications may be made. The mechanism for both ends of the stroke may be operated by any suitable mechanism controlled by the governor; or I can vary the positions of the stops K⁶ by hand adjustment, or any other means.

The rod K⁵, with stop, need not be slotted. The lower half of the slotted part may be removed, and it will still maintain the contact of the upper part with the pin K⁷ by gravity.

It will be seen that in Fig. 1 the cam-shaped surfaces are shown as operated by a speed-governor, while in Figs. 2 and 3 provision is made for a hand adjustment.

The mechanism herein shown and described for regulating the speed is made the subject of a separate application.

I do not claim, broadly, a valve mechanism in which the valve is opened by a dog or shouldered lever pivoted on a rocking lever turning on the same center as a valve; but

I claim as my invention—

The rocking lever K¹⁶, carrying the light lever K⁸, with the shoulder K⁹, engaging with the catch-piece K¹⁹ on the valve-arm K¹⁴, the whole moving on a common axis with the valve to be operated, in combination with the stop K⁶, carried by the light detaching-rod K⁵, turning on the adjustable center K²⁰, and controlled substantially as herein specified, the whole being arranged, constructed, and operated substantially as herein set forth.

In testimony whereof I have hereunto set my hand this 1st day of February, 1879, in the presence of two subscribing witnesses.

GEO. H. CORLISS.

Witnesses:

JESSE WALRATH,
GEORGE A. DODGE.