

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

No. 215,797.

Patented May 27, 1879.

Fig. 1.

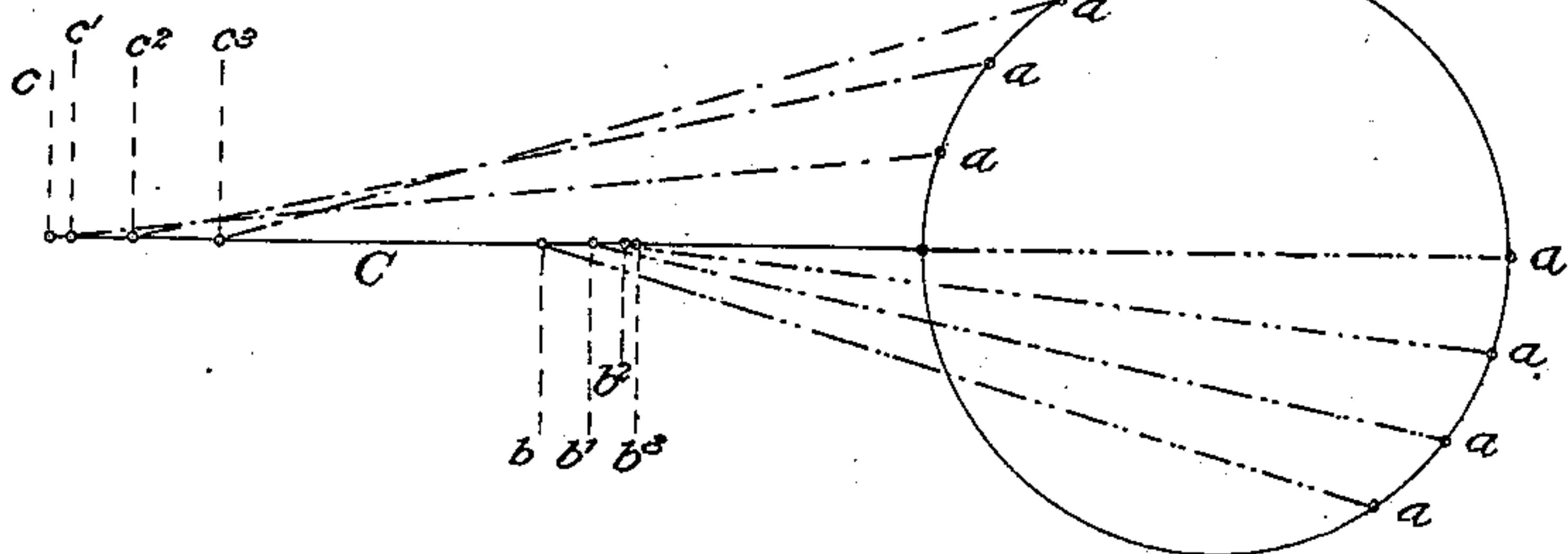


Fig. 2.

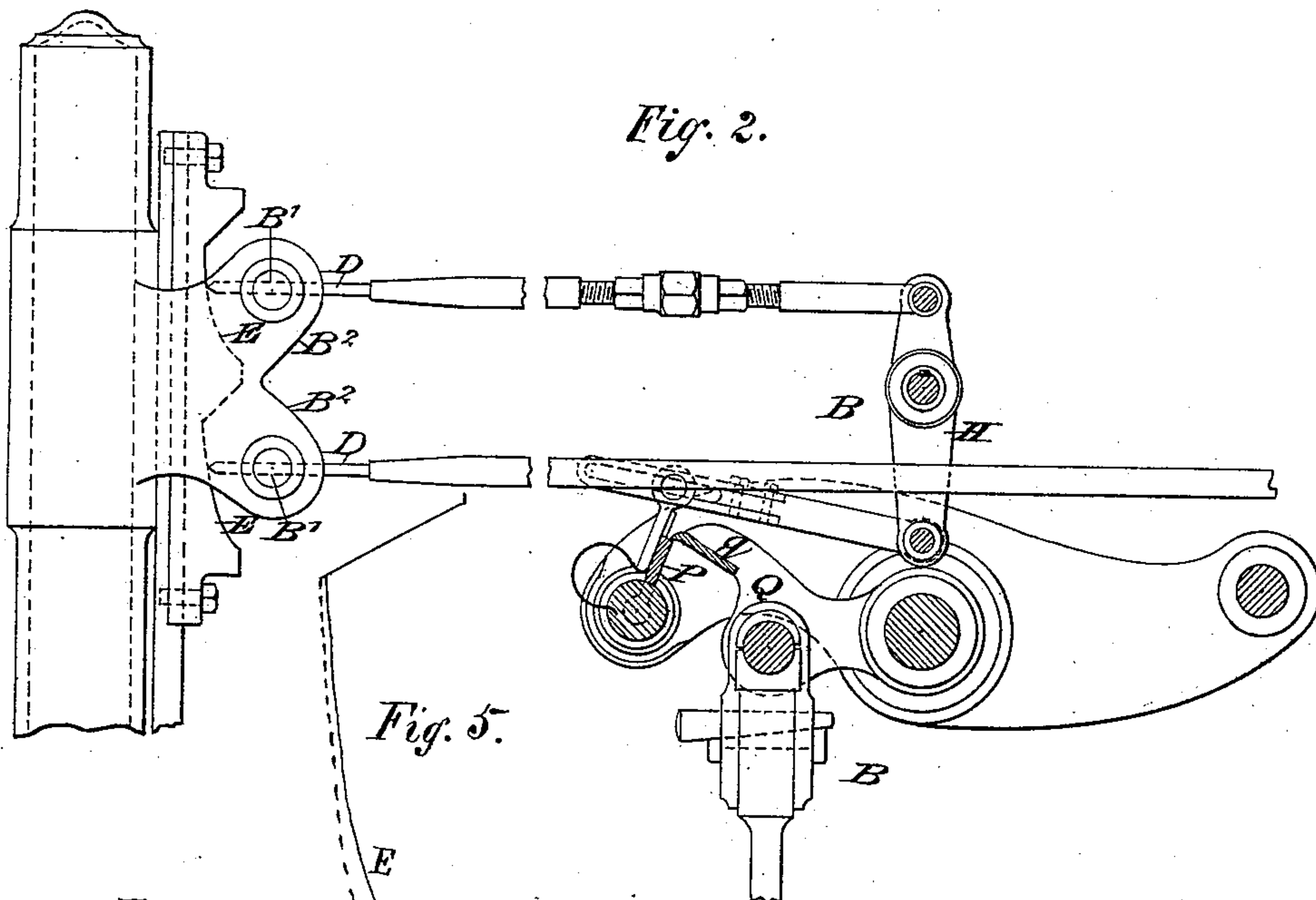


Fig. 5.

Fig. 4.

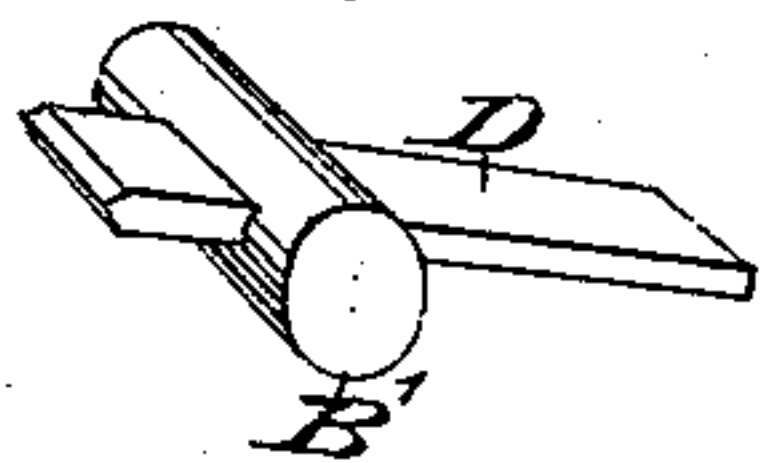
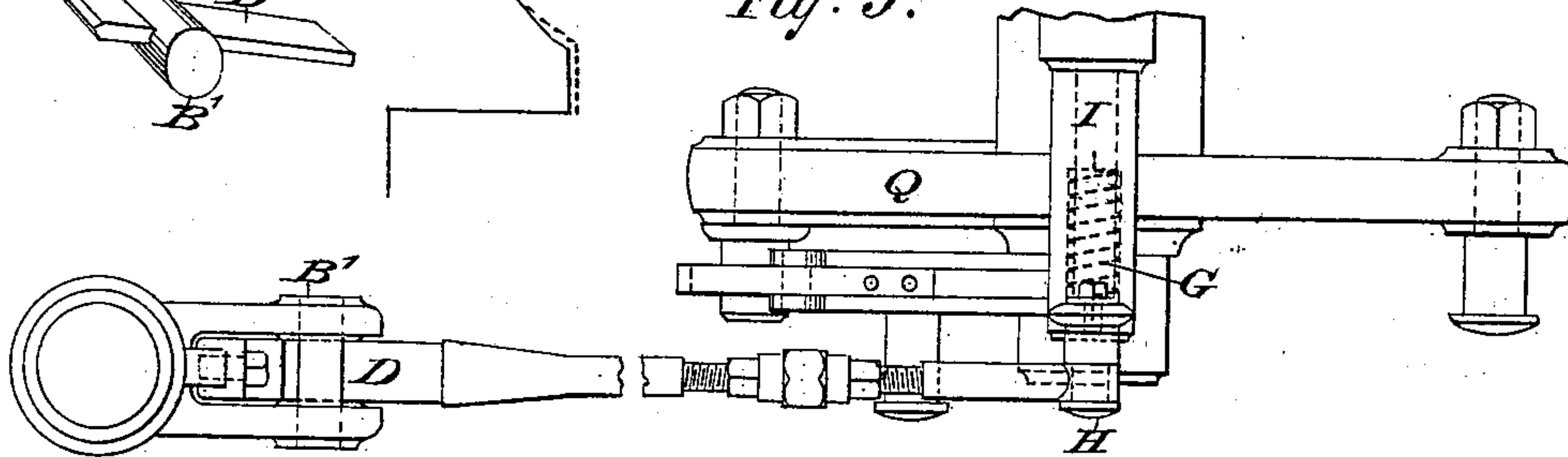


Fig. 5.



WITNESSES

Chas. C. Stetson  
E. B. Bolton

INVENTOR

George H. Corliss  
By James D. Stetson

Attorney

# 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. **215,797**, dated May 27, 1879; application filed December 30, 1878.

### *To all whom it may concern:*

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

My improvement is applicable to engines whose inlet-valves are opened by the ordinary eccentric, and, being liberated, are closed by an independent force; and in which the time of closing of the valves is made to depend upon the time of their liberation from the control of the eccentric; and in which, also, the liberation of the valves is effected by and dependent upon the opening movement derived from the said eccentric.

The defect existing in all forms of liberating valve-gear, which it is the object of my invention to remedy, is one arising from the fact that the pistons of all reciprocating engines, connected to a crank in the usual proportions, move at velocities which, at one extreme of the stroke, differ materially from those at the other extreme—that is to say, assuming that the crank-pin in its throw passes over equal spaces of its circuit in equal times, the corresponding rectilinear spaces passed over by the piston will not only be very unequal, but will be found to differ at one end of the throw very materially from the corresponding spaces at the other end; and consequently, that any form of valve-gear whose movements at one end of the stroke are precisely duplicated at the other end, cannot, in the nature of the case, liberate the valves at precisely such distances from the commencement of the stroke as would accurately correspond to the irregular movement of the piston, and therefore must always fail to meet the demands of a perfect adjustment.

By reference to Figure 1, it will be seen that while the crank moves over equal spaces *a a*, the spaces traversed by the piston, while at or near one end of the cylinder *b b<sup>1</sup> b<sup>2</sup> b<sup>3</sup>*, differ materially from the corresponding spaces at the other end, *c c<sup>1</sup> c<sup>2</sup> c<sup>3</sup>*. This irregularity is exaggerated in the figure by taking the connecting-rod C one-half the usual length.

In Fig. 2, D is a steel-pointed follower, which reaches to the valve-stand B, and there holds a movable abutment, P, against which the catch

q of the valve-lever Q impinges to effect the liberation of the valve.

Swivel-guides B<sup>1</sup>, supported by the brackets B<sup>2</sup> B<sup>2</sup>, and working in sockets formed in the brackets, have each a rectangular opening, to which the steel point is fitted, and through which it slides in following the profile of the inclined planes or cams.

The swivel-guides B<sup>1</sup> are accurately fitted to their sockets, so as to turn easily. This is done to prevent the friction between the steel-pointed follower D and the swivel-guides B<sup>1</sup>, which would arise from the slight changes in the angular position of the rod, caused either by its own flexibility or by the circular movement of the lever H, to which it is connected at its outer end.

The importance of this provision will be understood when it is considered that the most accurate adjustment is essential to the proper working of the mechanism, while any considerable amount of friction would destroy the sensitiveness of the governor and prevent it from working promptly and efficiently.

The steel point of the follower is retained in easy contact with the profile of its cam E by the action of a spiral spring, G, let into the stud I, upon which the lever H oscillates.

It will be understood that Fig. 1 is an outline diagram, showing the motions, while Figs. 2 and 3 are full drawings, giving what I regard as the preferable form and arrangement of the parts. Fig. 2 is a side elevation, Fig. 3 a plan view, and Fig. 4 a perspective view, of one of the details detached. Fig. 5 is a diagram, showing the two cams superposed one upon the other, in order better to show their difference of form. One is shown in full line and the other in dotted line. The full line is the upper cam, and controls the dropping of the steam-valve attachment for the end of the cylinder nearest to the crank. No attempt is made to give the exact outline of curve required for any given engine, but to show the difference which my invention is adapted to allow. This figure shows the difference somewhat exaggerated.

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

There being two of the cams E, moved simultaneously by the action of the governor, (not represented,) and two of the steel points D, one



of which controls the liberation of the steam-valve at one end of the stroke, and the other of which controls the liberation of the steam-valve at the other end of the stroke, by giving a different form to the two cams E, I can operate the two steel points D so as to exactly allow for the different motion of the piston at the two ends of the stroke, and cause the valve to be dropped and the steam cut off equally at the two ends of the stroke under all conditions.

The tripping mechanism here shown is made the subject of a separate application for patent.

I claim as my invention—

1. The combination of a liberating valve-gear with two differently-formed cams, so ar-

ranged that a difference of profile shall compensate for the peculiar irregularities in the movements of the piston herein described, and thereby secure the liberation of the steam-valves at points equally distant from the commencement of the in and out strokes of the piston.

2. The combination of swivel-socket, steel-pointed follower, cam, and spring for keeping the follower and cam in contact, as described.

In testimony whereof I have hereunto set my hand this 19th day of December, 1878, in the presence of two subscribing witnesses.

GEO. H. CORLISS.

Witnesses:

JESSE WALRATH,  
GEO. W. KENNEDY.