

(No Model.)

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

No. 235,744.

Patented Dec. 21, 1880.

Fig. 1.

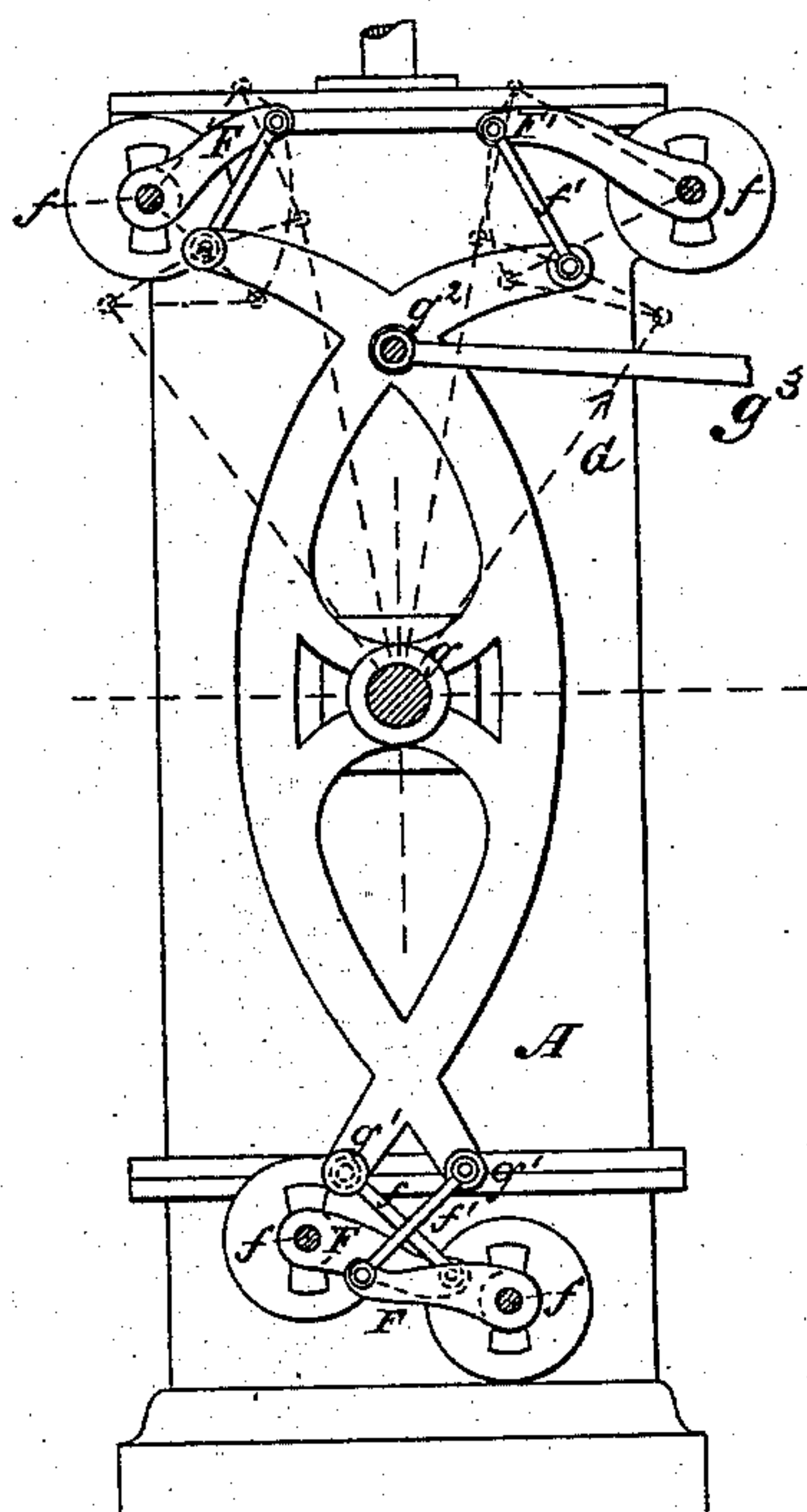
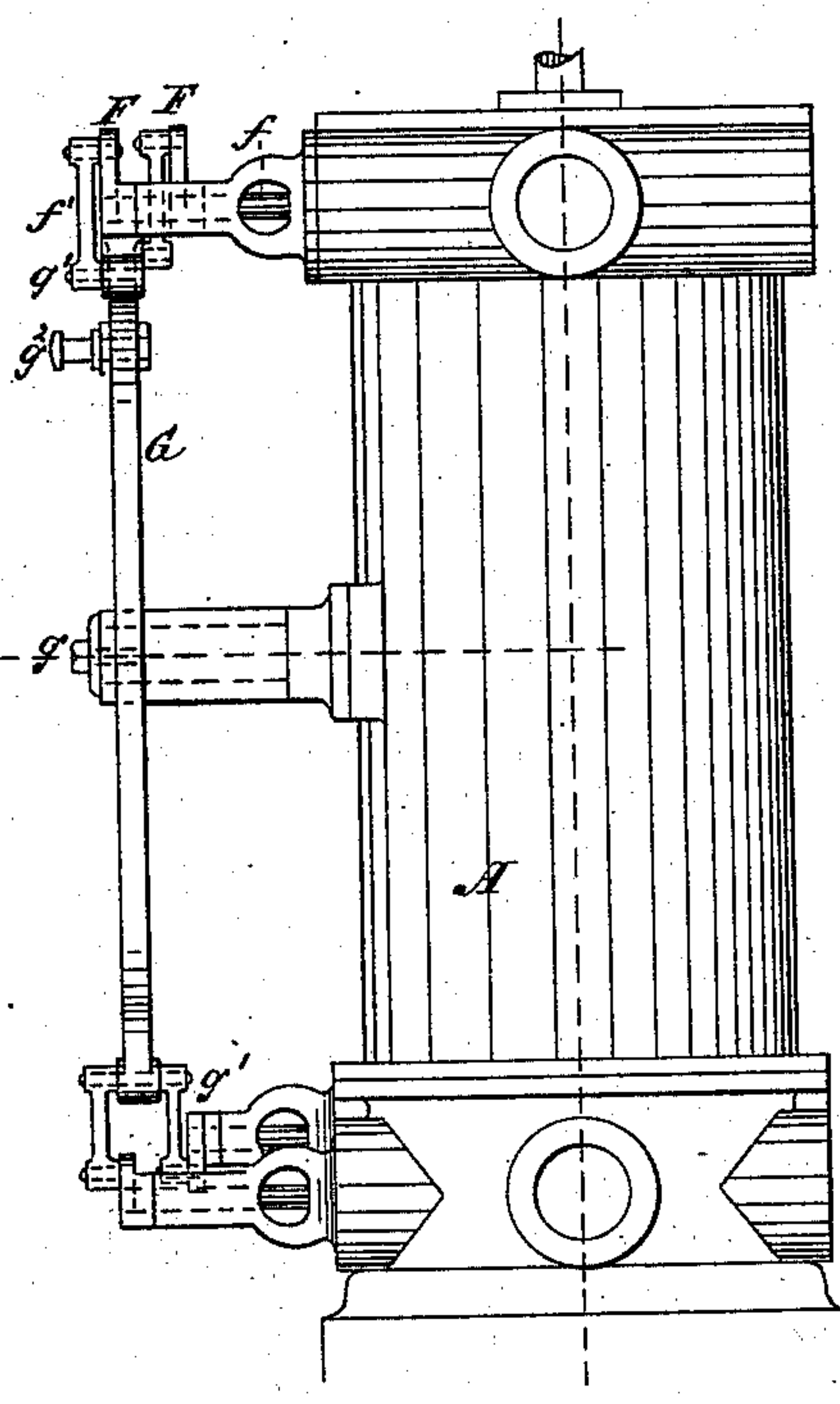


Fig. 2.



Witnesses:

W. Colborne Brooks  
Charles C. Stetson

Inventor.

George H. Corliss.  
By his attorney  
Thomas S. Stetson



# UNITED STATES PATENT OFFICE.

GEORGE H. CORLISS, OF PROVIDENCE, RHODE ISLAND.

## VALVE-GEAR FOR STEAM-ENGINES.

SPECIFICATION forming part of Letters Patent No. 235,744, dated December 21, 1880.

Application filed June 14, 1880. (No model.)

*To all whom it may concern:*

Be it known that I, GEORGE HENRY CORLISS, a citizen of the United States, residing at Providence, in the county of Providence and State of Rhode Island, have invented certain new and useful Improvements in Valve-Gear for Steam-Engines, of which the following is a specification.

The invention relates to the means for communicating motion to the steam and exhaust valves, respectively.

I use the "circular sliding valves" sometimes known as "Corliss," operated by turning alternately in opposite directions, in a manner analogous to a stop-cock. The exhaust-valves are operated with a positive continuous connection to the mechanism. The steam-valves are, under ordinary conditions, opened by the mechanism, liberated therefrom, and closed by the force of a weight, spring, or atmospheric pressure.

It is important to so operate the connections that the valves will open and close rapidly, and to do this by a motion derived from an eccentric. I have, in a patent issued to me dated May 9, 1876, No. 177,099, shown a mode of doing this by virtue of the different angular positions assumed by the valve-lever and by the links which connect each valve-lever to the operating parts; but that mechanism requires multiplication of parts and increased chances of maladjustment. I have discovered and practically worked out means for attaining the end in great perfection with a single eccentric and few parts.

The following is a description of what I consider the best means of carrying out the invention. The accompanying drawings form a part of this specification.

Figure 1 is a side elevation of a cylinder with my improved means of communicating motion to the valve. Fig. 2 is an elevation at right angles thereto.

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

Referring to the figures, A is the body of the cylinder, provided with four valves—two steam-valves and two exhaust-valves. The levers are marked, respectively, F.

G is a skeleton-lever turning on a center,  $g$ , fixed on the side of the cylinder A, or of the

fixed framing adjacent to the cylinder. This skeleton-lever is rocked by means of a rod,  $g^3$ , operated by an eccentric, (not represented,) and connected to a pin,  $g^2$ .

The skeleton-lever G is branched, as represented. Each of the four branches carries a pin,  $g'$ , which, by the arrangement of the parts, is caused to move at each oscillation in the near vicinity of the corresponding valve-shaft  $f$ . Each of the valve-levers F is joined to its respective pin  $g'$  by a link,  $f'$ .

The paths of the centers  $g'$  at the upper end of the cylinder are indicated by dotted lines. So, also, are the paths of the ends of the valve levers or arms F. It will be seen that the rocking of the single lever G turns each of the valves to the proper extent, and also that by reason of the path of the pins  $g'$  each near the shaft  $f$  of its respective valve, the valve is turned much more rapidly when the rocking lever is at the middle of its motion than when it is at either end of its motion. This gives the required rapid turning motion of the valve at the moment the valve is being opened and being closed, with the required slower motion at each end of its sweep; and this is effected by the single lever G with few connections and little chance of maladjustment.

It will be understood that the steam-valves will usually close still more rapidly than is provided by this motion, by virtue of their being detached and closed by self-acting means, (not shown,) but which may be similar to those long approved on what are known as "Corliss" engines. The quick motion in opening and closing and the slower motion at each end of the sweep of the valves is more particularly important with the exhaust-valves; but the quick opening is of considerable value also for the steam-valves. The present invention attains this.

It will be observed that the left pins,  $g'$ , which work the exhaust-valves, move nearer the axes  $f$  of their respective valves than the corresponding right pins,  $g$ , which work the steam-valves. This is important. The exhaust-valves should open and close with a very rapid motion, and dwell with a slow motion in the open and closed positions. The steam-valves should not possess the peculiarity of motion to the same extent. It is important in delicately ad-



justing the point of cut-off by the governor that the steam-valves shall be opened with a more nearly uniform motion.

5 The centers  $g'$  require in this instance to be placed much wider apart at the upper end of the cylinder than at the lower end, to correspond to the wider-apart position of the valves at the upper end.

10 It will be understood that the parts must be so designed that the motion will be correct relatively to the valve-center, wherever the valve may be placed.

15 I can make the skeleton-lever  $G$  in various other forms, so long as the correct positions of the centers  $g'$ , and consequently their correct motions, are attained.

20 Modifications may be made in the details by any good mechanic without departing from the principle or sacrificing the advantages of the invention.

The steam-valves may partake in a higher or lower degree of the quality of moving quickly in opening and closing. I prefer the proportions and conditions represented.

It will be understood that this invention 25 does not interfere with any of the improvements of the valves and other parts of the steam-engine which have been used or may be used with this class of valves.

I claim as my invention—

30 In a steam-engine having circular sliding valves, the skeleton-lever  $G$ , rocked as shown, and having pins  $g'$  moving near the axes  $f$  of their respective valves, in combination with the links  $f$ , connecting such pins with the valve- 35 arms  $F$ , all arranged to operate as and for the purposes herein specified.

In testimony whereof I have hereunto set my hand, at Providence, Rhode Island, this 9th day of June, 1880, in the presence of two 40 subscribing witnesses.

GEO. H. CORLISS.

Witnesses:

EDGAR PENNEY,

ED. W. RAYNSFORD.