(No Model.)

E. F. GORDON.

VALVE GEAR FOR ENGINES.

No. 422,343. Patented Feb. 25, 1890.

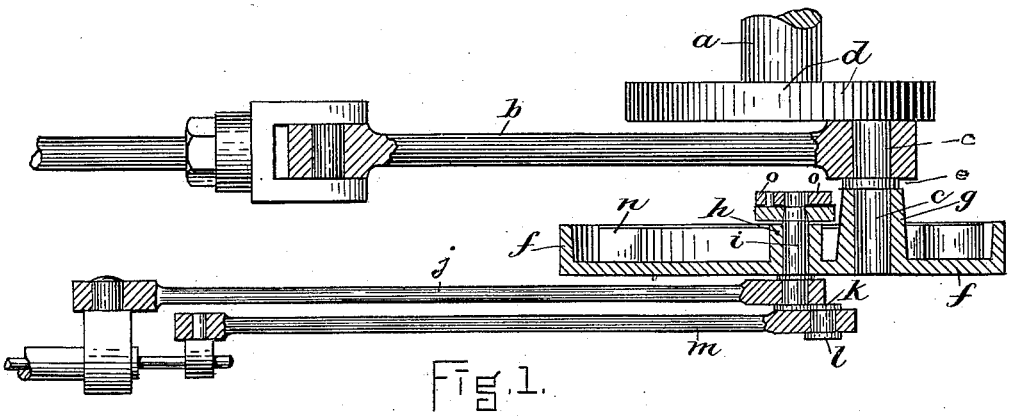


Fig. 1.

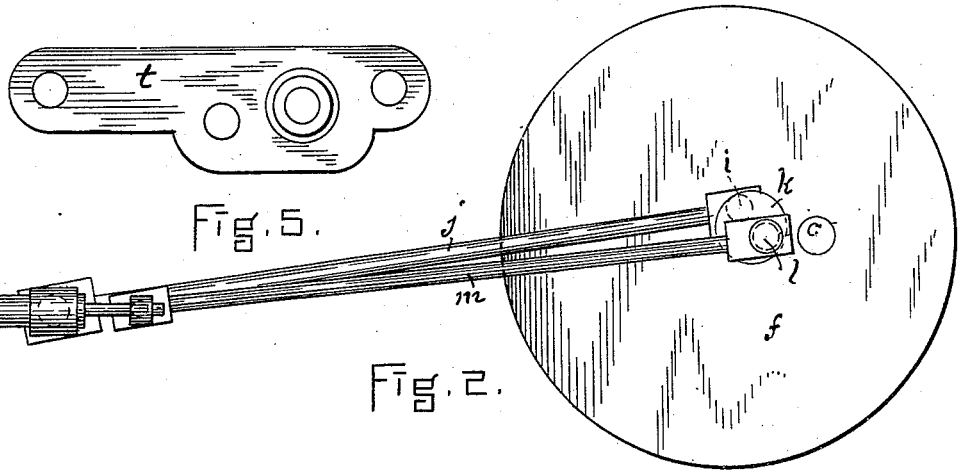


Fig. 5.

Fig. 2.

Fig. 4.

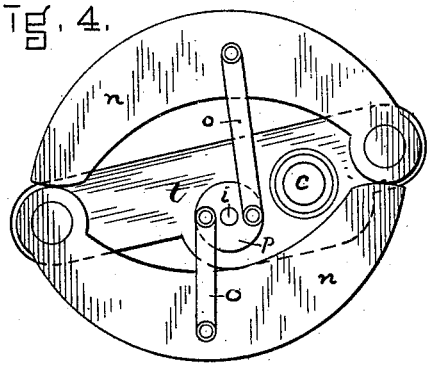
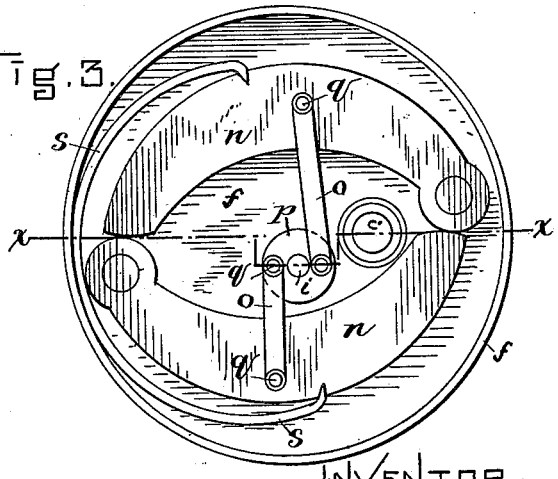


Fig. 3.



WITNESSES.
R. Henry Marsh.
G. F. Butterfield

INVENTOR.
Edward F. Gordon
by A. H. Reuech, atty

UNITED STATES PATENT OFFICE.

EDWARD F. GORDON, OF CONCORD, NEW HAMPSHIRE, ASSIGNOR OF ONE-HALF TO HORATIO HOBBS, OF SAME PLACE; ARMENIA W. HOBBS ADMINISTRATRIX OF HORATIO HOBBS, DECEASED.

VALVE-GEAR FOR ENGINES.

SPECIFICATION forming part of Letters Patent No. 422,343, dated February 25, 1890.

Application filed March 9, 1889. Serial No. 302,625. (No model.)

To all whom it may concern:

Be it known that I, EDWARD F. GORDON, of Concord, in the county of Merrimac and State of New Hampshire, have invented certain new and useful Improvements in Valve-Gear for Engines, of which the following, taken in connection with the accompanying drawings, is a specification.

This invention is designed to provide means for actuating both a steam-valve and its cut-off valve automatically from a single disk or crank, and the apparatus herein set forth may be employed in connection with the improved engine-valves described and shown in my application for patent thereon filed simultaneously herewith or with any equivalent valves.

The primary feature of novelty in my present invention is a valve-actuating disk or crank so mounted upon the crank-pin of the engine as to be revolved about the same axis, that of the main shaft, said disk or crank carrying a crank-pin which engages the valve-stem to reciprocate it, in combination with a pair of spring-pressed governor-weights carried on said disk and serving to give a partial rotation to this crank-pin within its aperture in said disk, the outer end of said crank-pin having a short crank formed upon it engaging with the end of the stem of the cut-off valve to vary its action relatively to the main valve.

My invention is embodied in the combinations of devices herein set forth, and especially referred to in the appended claims.

In the drawings, Figure 1 is a section of the governor-disk and connected parts in the plane of the several crank-pins on the line x x, Fig. 3, showing the shaft, pitman, and valve-stems in plan. Figs. 2 and 3 are front and rear elevations of the governor-disk. Fig. 4 represents the governor-weights as applied to a bar in lieu of the disk. Fig. 5 is a detail of said bar.

The main shaft a has rotation imparted to it by the pitman b, connected in the usual way to the main crank-pin c, fixed in the arm or disk d on the end of the shaft a. A small collar e on the pin c keeps the pitman in proper position. On the outer end of the main crank-pin c, I secure firmly the flanged governor-disk f in such position that its peripheral rim is concentric with the shaft a and so that the crank-pin c as it revolves describes a circle about the center of said disk. A laterally-projecting rigid hub or sleeve g, formed integral with the disk f, receives such pin and keeps such disk always in its proper plane perpendicular to the shaft a and pin c. The disk f has another similar hub h, not at its center of motion, but nearer thereto than is the hub g. The hub h forms a seat for the crank-pin i, which engages the end of the valve-stem j to operate the main steam-valve, the extent of the reciprocating stroke of said valve being determined by the distance of the pin i from the axis of the disk f. This pin i has at its outer end a crank or small eccentric disk k, with a crank-pin l, which engages the end of the stem m of a cut-off valve, working, in conjunction with the main steam-valve, to control the influx of steam, as set forth in my other application hereinbefore referred to.

The crank-pin i is not fixed firmly in the disk, but is sufficiently loose therein to permit a partially-rotary movement to said pin, in order to vary the throw of the cut-off valve and to regulate the supply of steam according to the relative positions of the two parts of the compound valve controlled by the valve-stems extending from these two crank-pins.

In order to automatically vary the position of the cut-off valve, I connect the inner end of the crank-pin i to the pivoted governor-weights n by means of two links o, each extending from one of the weights inwardly to a disk or bar p, secured to the inner end of said crank-pin i. The weights n are shown in Fig. 3 as curved arms attached to the governor-disk f by end pivots g, and their centrifugal tendency during rapid rotation is resisted by the curved spring s, engaging at its ends in notches in said arms and lying just within the peripheral flange of the disk f, recessed to receive the weights and spring. Fig. 1 represents the recessed disk with the weights, links, and spring in section.

The disk f is not essential, since the parts may be supported upon a bar t, as in Figs. 4 and 5, such bar representing the disk cut away to leave only what is necessary to the action

heretofore described. Said bar is eccentrically mounted upon the main crank-pin *c*, to which it is secured, as has already been described as to the disk. The governor-weights also are pivoted upon the bar and act with the same effect as before.

Under the construction thus set forth the disk *f* (or its equivalent, the bar *t*) not only forms a part of the mechanism for operating the main valve, but also supports and is a part of the governing device controlling the cut-off valve. The crank-pin *i* not only serves to move the stem of the main valve, but also by its terminal crank serves to actuate the cut-off-valve stem. I consider the disk with its marginal flange preferable to the bar, since it gives a better finish, largely conceals the working parts of the governor, and may be used as a belt-pulley.

I claim as my invention—

1. In a valve mechanism, a disk or bar fixed upon the main crank-pin of the engine, in combination with a crank-pin carried by said disk or bar and with a valve-stem and cut-off-valve stem actuated by engagement with said pin, substantially as set forth.

2. In a valve mechanism, the main crank-pin driven by the connecting-rod direct from the piston-rod, in combination with a compound valve-actuating crank mounted upon said crank-pin, for the purpose set forth.

3. In a valve mechanism, the governor disk or bar fixed on the main crank-pin and the governor-weights carried thereon, in combination with the double valve crank-pin *i*, extending movably through said disk or bar and having the valve-stems and the governor-weights suitably connected thereto, substantially as set forth.

4. In a valve mechanism, the recessed and peripherally-flanged disk *f*, mounted on the main crank-pin *c*, concentric with the main shaft and formed with the hubs *g* and *h* to receive the crank-pins *c* and *i*, in combination with the governor-weights *n*, links *o*, disk or bar *p*, and spring *s*, whereby the terminal crank of the crank-pin *i* is automatically varied in position, for the purpose set forth.

In testimony whereof I have signed my name to this specification, in the presence of two subscribing witnesses, on this 2d day of March, A. D. 1889.

EDWARD F. GORDON.

Witnesses:
L. S. MORRILL,
H. C. BROWN.