(No Model.)

G. H. CORLISS.

GOVERNOR FOR STEAM ENGINES.

No. 324,459. Patented Aug. 18, 1885.

Fig. 1.

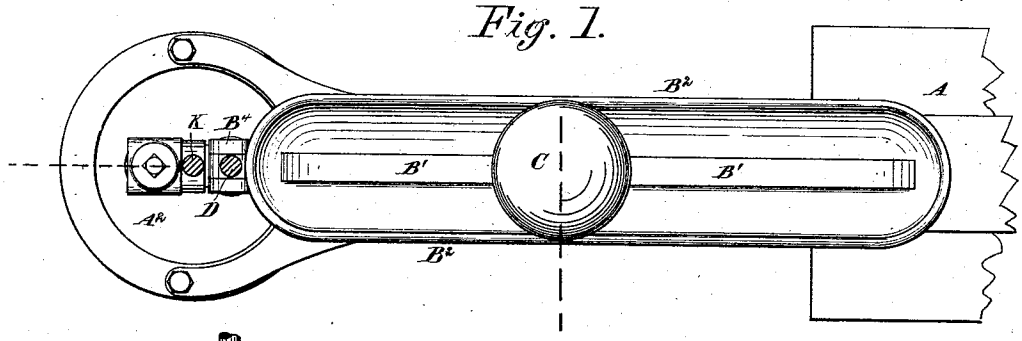


Fig. 2.

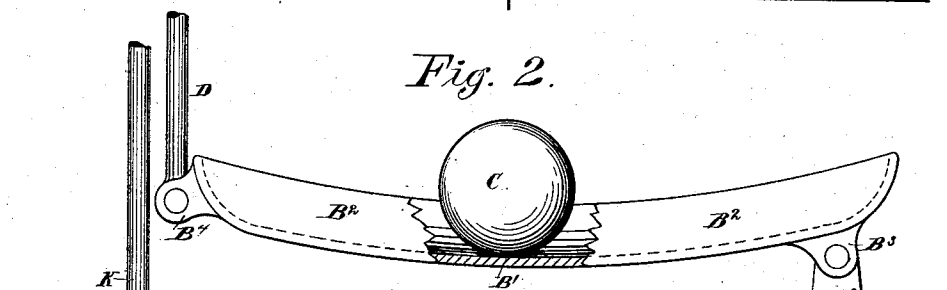


Fig. 3.

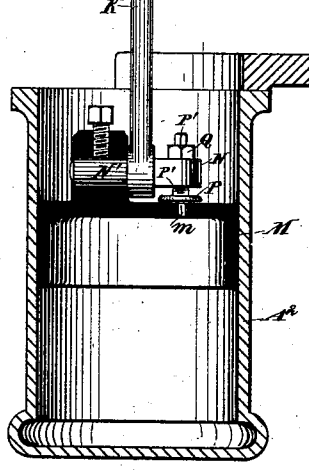
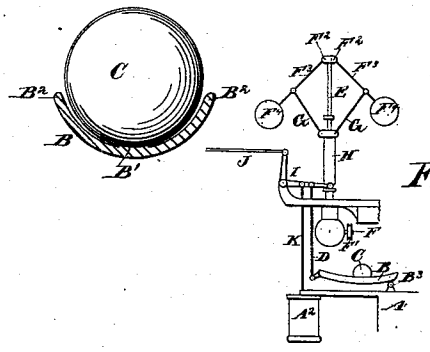


Fig. 4.



Witnesses:
Wm. B. Thurman
John T. Wentham

George H. Corliss Inventor.

N. PETERS. Photo-Lithographer. Washington, D. C.

UNITED STATES PATENT OFFICE.

GEORGE H. CORLISS, OF PROVIDENCE, RHODE ISLAND.

GOVERNOR FOR STEAM-ENGINES.

SPECIFICATION forming part of Letters Patent No. 324,459, dated August 18, 1885.

Application filed June 13, 1885. (No model.)

To all whom it may concern:

Be it known that I, GEORGE H. CORLISS, a citizen of the United States, residing in the city and county of Providence, in the State of Rhode Island, have invented a certain new and useful Improvement in Governors for Steam-Engines and other Motors, of which the following is a specification.

The improvement applies to all the forms of fly-ball governors, and resides in the method of constructing the apparatus for counterbalancing the balls of a centrifugal regulator, so that they may be maintained in different planes of elevation with unchanging velocity.

I employ the gravity of a rolling ball mounted on a properly-curved lever so connected that the inclination changes and the ball rolls inward or outward with each change of the position of the fly-balls. I have combined with the above an adjustable provision for arresting vibrations in the governor. The provision of a piston working loosely in a cylinder, set forth in my patent dated June 10, 1851, No. 8,148, serves for this, adding simply a disk mounted horizontally over a liberal aperture, and adjusted in distance therefrom by a screw-threaded stem and means for turning it. It is held firmly by a jam-nut when properly adjusted. The disk, with the means for adjusting it, gives complete control of the area for the passage of the liquid, and makes it easy to so adjust as to allow the governor to act with promptness without changing so freely as to have vibrations of speed—first too fast and then too slow. The combination of the whole makes the governor prompt, without vibrations, and equable in its effect in all positions.

The accompanying drawings form a part of this specification, and represent what I consider the best means of carrying out the invention.

Figure 1 is a plan view; Fig. 2, an elevation partly in vertical section, and Fig. 3 a cross-section on the line *x x* in Figs. 1 and 2.

The above figures show the novel parts, with so much of the ordinary parts as is necessary to show their relations thereto.

Fig. 4 is an elevation on a smaller scale, showing the same with all the general mechanism of a fly-ball governor, to which the invention is applied.

Similar letters of reference indicate corresponding parts in all the figures where they occur.

A is a stationary frame-work, certain portions being designated, when necessary, by additional marks, as A' A^2. The governor may be of the ordinary construction—an upright shaft to which fly-balls are connected by hinged arms—so that they may swing in different planes of elevation as the speed increases or decreases.

B is a lever, curved, as shown, and having an accurately-curved and smoothly-finished track in its hollowed upper face, as indicated by B′, adapted to guide a well-finished ball, C, which rolls thereon. It has also guards B^2, extending entirely around it and a little out of contact with the ball C.

B^3 is the hinge by which the lever B is supported at one end on the bracket A^3, fixed on A′. The opposite end of B is jointed at B^4 to the rod D, which connects it to the governor.

Referring to Fig. 4, the upright shaft E is turned by bevel-gearing (not shown) from the shaft F, receiving motion from the pulley F′ by a belt (not represented) impelled by the engine. (Not shown.) Knuckles F^2 connect arms F^3, supporting fly-balls F^4, and connected by links G to the sleeve H, which is raised or lowered as the centrifugal force or the gravity of the fly-balls F^4 shall alternately prevail with the changes of velocity of the engine.

I is a bell-crank lever, the lower arm of which engages in a groove in the sleeve H, while the upper arm is connected to a rod, J, which, as it is shifted endwise by well-known means, (not shown,) varies the point of cut-off to maintain a uniform speed of the engine.

The rod D connects the free end of the lever B with the lower arm of lever I. It pulls downward on the balls F^4 with a force which varies as the ball C rolls toward or from the fulcrum B^3 of the lever B. It pulls downward with greater force as the balls sink. The weight of the ball C and the length and curvature of the lever B are such as to effect a counterbalance of the governor-balls in different planes of elevation and maintain a uniform velocity of speed in the engine.

The proportions may be varied within considerable limits, each change inducing a change in some respect in the effect. I have shown

what I esteem the best forms and proportions for general practice.

K is a rod, pivoted also to the lower arm of the lever I, and connecting it to the piston M, which plays with moderate tightness in the vertical cylinder A^2, and is provided with a considerable aperture, *m*. The cylinder A^2 is nearly filled with water, oil, or other inelastic fluid, which resists the movement of M up or down, except as the fluid, or rather the liquid, can flow through the aperture *m*. The device offers no appreciable resistance to slow changes of position, but very great resistance to quick changes. It is similar to the means for attaining this end set forth in the patent granted to me dated June 10, 1851, No. 8,148, except as now to be described.

P is a flat valve or disk, having a screw-threaded stem, P′, tapped through an eye, N, formed on the wrist-pin N′, by which the rod K is connected to M. The upper end of P′ is squared, to be turned by a wrench. Q is a jam-nut. This valve is just enough above the orifice *m* to sufficiently restrain the flow of water, oil, or other liquid through. It affords an easy means of adjusting the efficiency of this restraint on the governor to prevent objectionable vibrations. It also performs the function of arresting and deflecting longitudinally in all directions any strong jet of oil or other liquid, which is liable to shoot upward through *m* when the piston M is violently depressed.

Modifications may be made in the forms and proportions without departing from the principle or sacrificing the advantages of the invention. Parts of the invention may be used without the whole. I can dispense with the narrow track B′ on the lever B; but it will then be necessary to finish a greater width of the interior of the concave upper surface of B. I prefer the whole used together, and proportioned about as shown.

I claim as my invention—

1. The combination of a centrifugal governor, as F F′ G H, with a lever, as B, and a rolling ball, as C, and a piston, M, having an adjustable opening, *m*, working easily in a cylinder, A^2, containing liquid, all arranged for joint operation, as herein specified.

2. The adjusting-disk P, and means, as P′ Q, for varying its distance from the piston M, an opening, *m*, in combination therewith and with the cylinder A^2, lever B, shifting weight, as C, and a centrifugal governor, all arranged for joint operation, as herein specified.

3. In combination with a centrifugal governor and steadying-piston, M, having opening *m*, working in a cylinder, A^2, containing an inelastic fluid, the disk P, stem P′, and confining-nut Q, eye N, and pin N′, the latter serving the double function of a wrist for the rod K and a support for the disk, as herein specified.

In testimony whereof I have hereunto set my hand, at Providence, Rhode Island, this 2d day of June, 1885, in the presence of two subscribing witnesses.

GEORGE H. CORLISS.

Witnesses:
HENRY MARSH, Jr.,
WILLIAM B. SHERMAN.