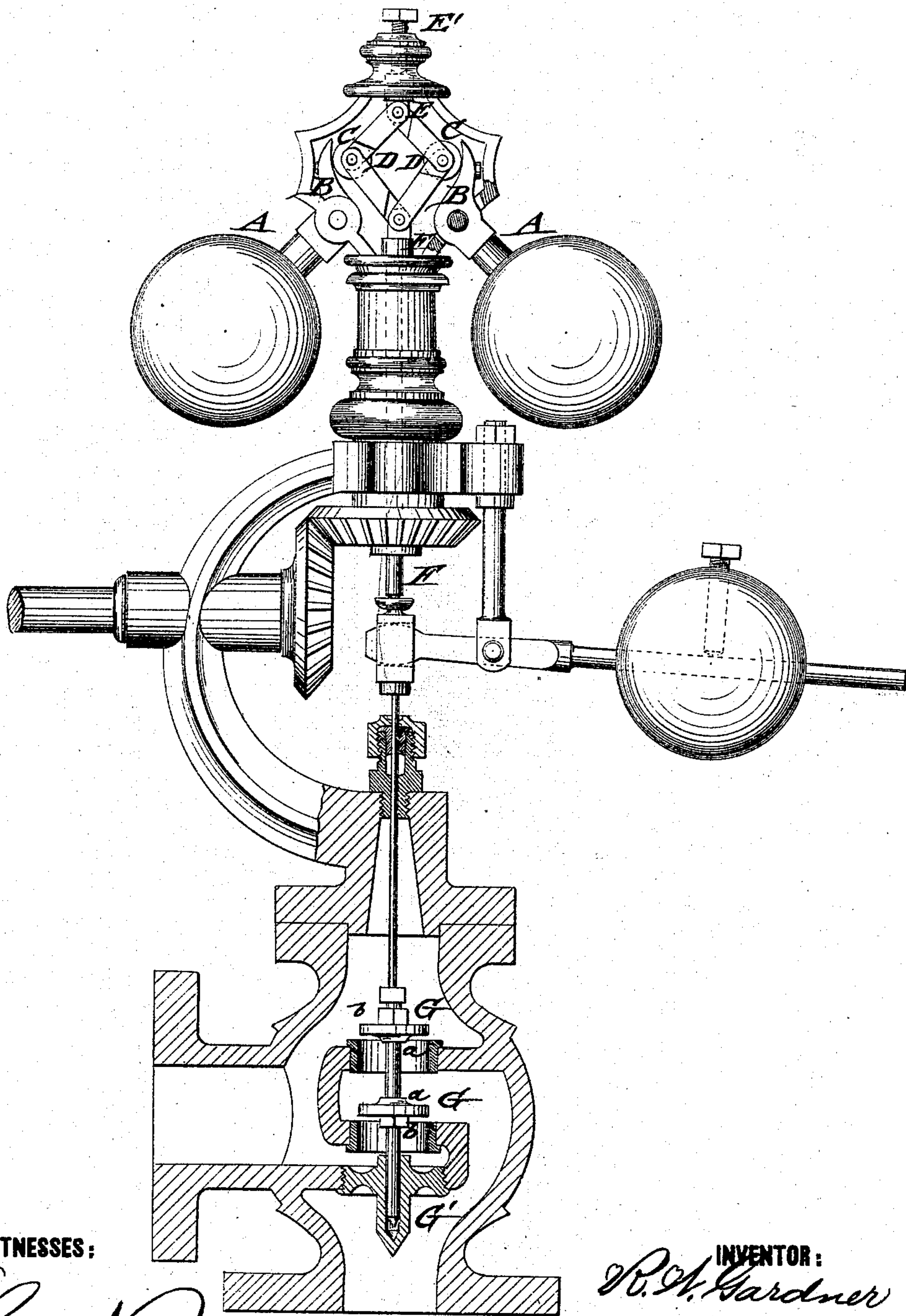


R. W. GARDNER.  
GOVERNORS FOR STEAM-ENGINES.

No. 182,816.

Patented Oct. 3, 1876.



WITNESSES:

*Chas. N. ...*  
*John ...*

INVENTOR:

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BY

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# UNITED STATES PATENT OFFICE.

ROBERT W. GARDNER, OF QUINCY, ILLINOIS.

## IMPROVEMENT IN GOVERNORS FOR STEAM-ENGINES.

Specification forming part of Letters Patent No. 182,816, dated October 3, 1876; application filed July 31, 1876.

*To all whom it may concern:*

Be it known that I, ROBERT W. GARDNER, of Quincy, in the county of Adams, and State of Illinois, have invented a new and Improved Steam-Engine Governor and Valve, of which the following is a specification:

The accompanying drawing represents a sectional side elevation of my improved steam-engine governor and valve.

The invention relates to improvements on such steam-engine governors in which resistance is opposed to the centrifugal power, either by weights, springs, or other appliances, that the working of the governor is made more approximately isochronous and the valve more reliable and durable.

The invention consists of pendulous arms, with inner extension-toes, acting on double-link parallelograms connected to the valve-rod and regulated by a top set-screw bearing on a top stud of the links. The valve-chamber has two steam-passages and two disks that are detachably applied to the valve-rod, to obtain a uniform flow of steam, the valve-rod being guided below the steam-passages.

In the drawing, A A are the pendulous arms, that are fulcrumed to the revolving governor-head, and provided at the inside with extension-toes B, the inner surface of which is curved, so as to press in a horizontal line against steel rollers C, that are inserted between the double parallelogram links D, which are pivoted at their upper ends to a stud, E, and at their lower ends to the governor-spindle F. The top stud E slides in a guide socket or tube at the top part of the revolving governor-head, and is adjusted perpendicularly by a set-screw, E', so as to produce the variation of the working angle of the links thereby. This admits the adjustment of the governor to give the closest regulation of the engine as required by the different parts, as piston, speed, weight of fly-wheel, point of cut-off, &c., that determine the correctness with which the motion of the engine is converted into rotary motion. The centrifugal force imparted to the weighted pendulous arms A by the revolving head causes the arms to move outwardly, and as the speed increases the steel rollers are carried by the extension-toes nearer to the center of suspension of the arms, thus lessening the resistance to the centrifugal force; at the same time the double links form parallelograms with more

obtuse angles at the points of contact, and reduce the resistance still further.

By proportioning the weight of the centrifugal balls, the amount of resistance and the angle of inclination of the links in proper manner, the governor can be made practically isochronous.

The second part of the invention relates to the governor-valve, which is made of two disks, G, that are balanced by the steam passing through two passages of the valve-chamber. The steam is introduced at the outside of the disks and discharged between the same, by which the flow of steam is always the same through each passage, so that the current of the steam does not affect the valve, as is the case when steam is introduced between the disks and discharged to the outside, from the fact that the lower disk, being the most direct passage to the engine-cylinder, admits more steam to pass than the upper disk, and produces thereby an unequal current that affects the balance of the valve.

The valve-guide G' is arranged below the lower passage, away from the current of the steam, and is thereby perfectly protected against the cutting action of the steam.

The disks G are attached to the valve-rod or stem by being seated against collars a, and fastened by screw-nuts or pins b at the other side. This allows the disks to be readily detached and reversed to present a new face to the steam, in case one face is destroyed by the cutting action of the steam.

Having thus described my invention, I claim as new and desire to secure by Letters Patent—

1. In centrifugal governors, the pendulous arms A A, having curved extension-toes B, in combination with the pivoted double-link parallelograms D D, substantially in the manner, and for the purpose set forth.

2. The combination of the pendulous arms A A, having inner toes B, with the steel rollers C, and pivoted double-link parallelograms D D, substantially as specified.

3. The combination of the double-pivoted-link parallelograms, having sliding top stud, with the guide-tube and set-screw of the governor-head, substantially as set forth.

ROBERT W. GARDNER.

Witnesses:

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URIAH H. KEATH,