

(No Model.)

3 Sheets—Sheet 1.

D. A. BARNES.
STEAM ENGINE GOVERNOR.

No. 471,048.

Patented Mar. 15, 1892.

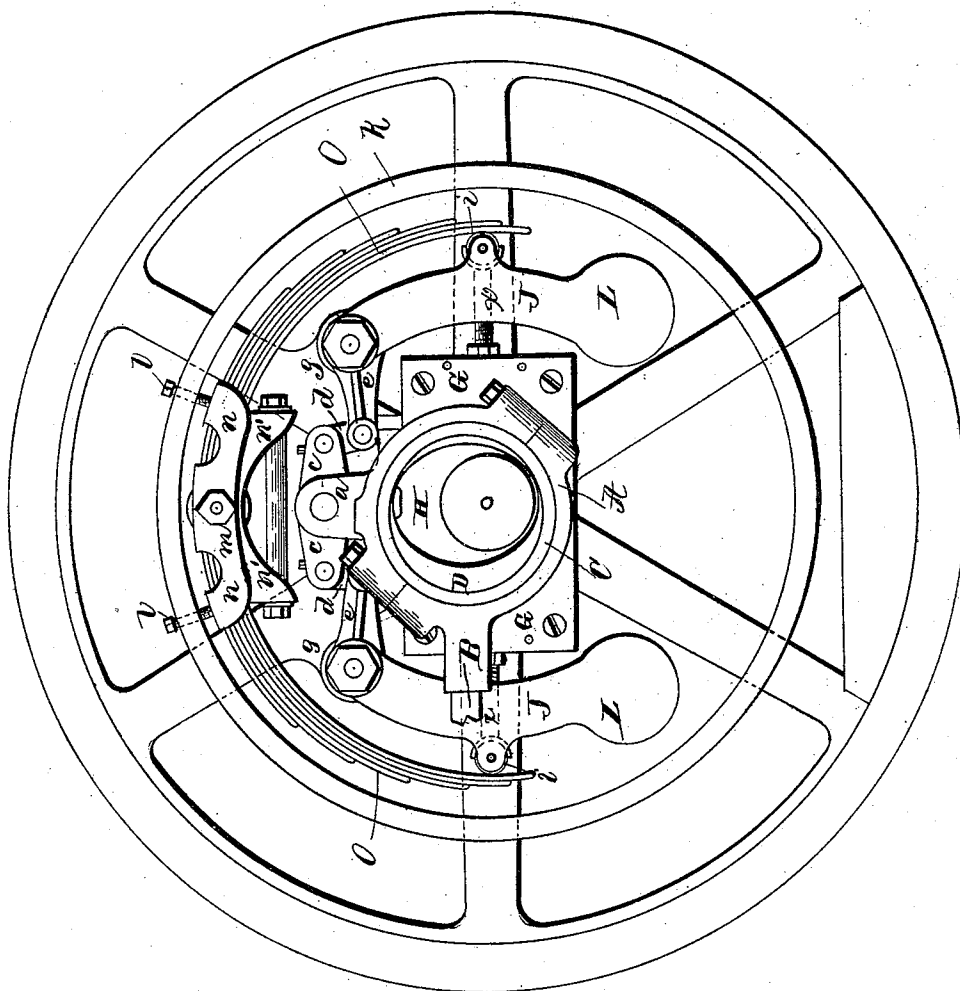


Fig. 1

WITNESSES

Francis Quinlan
W. M. Sterling

INVENTOR

Dana A. Barnes
by *S. W. Furbough*
Attorney

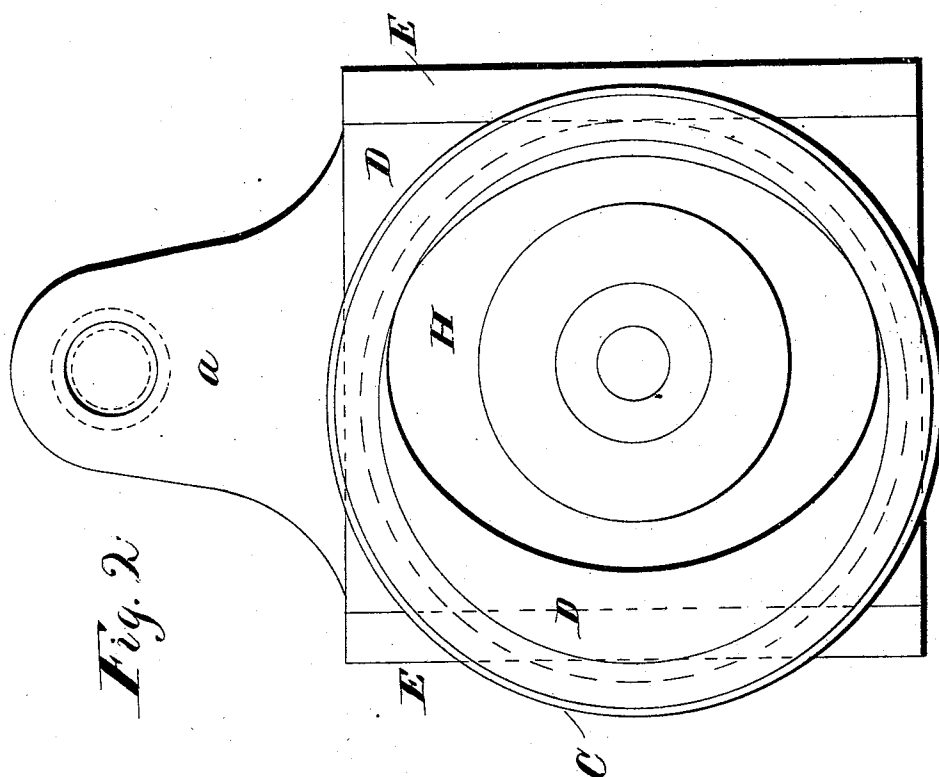
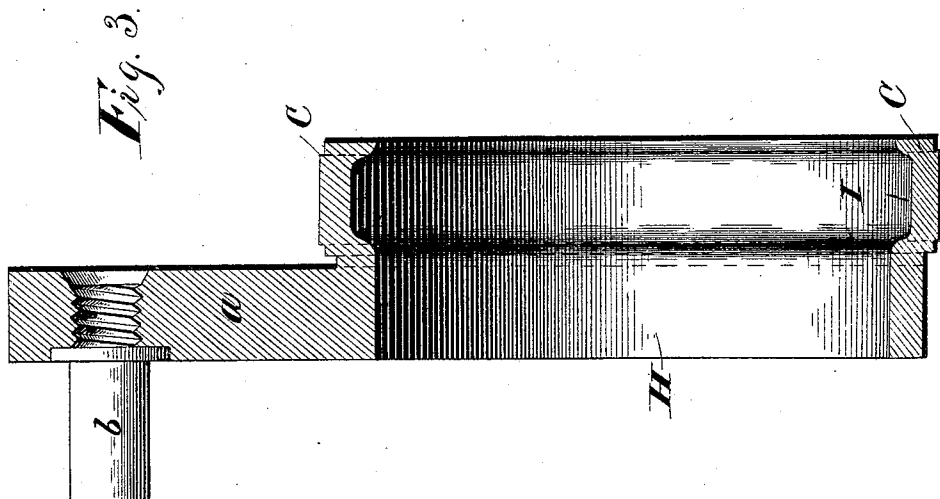
(No Model.)

3 Sheets—Sheet 2.

D. A. BARNES.
STEAM ENGINE GOVERNOR.

No. 471,048.

Patented Mar. 15, 1892.



WITNESSES
Francis Quinlan
H. M. Sterling

INVENTOR
Dana A. Barnes
by *E. W. Gunsbaugh*
Attorney

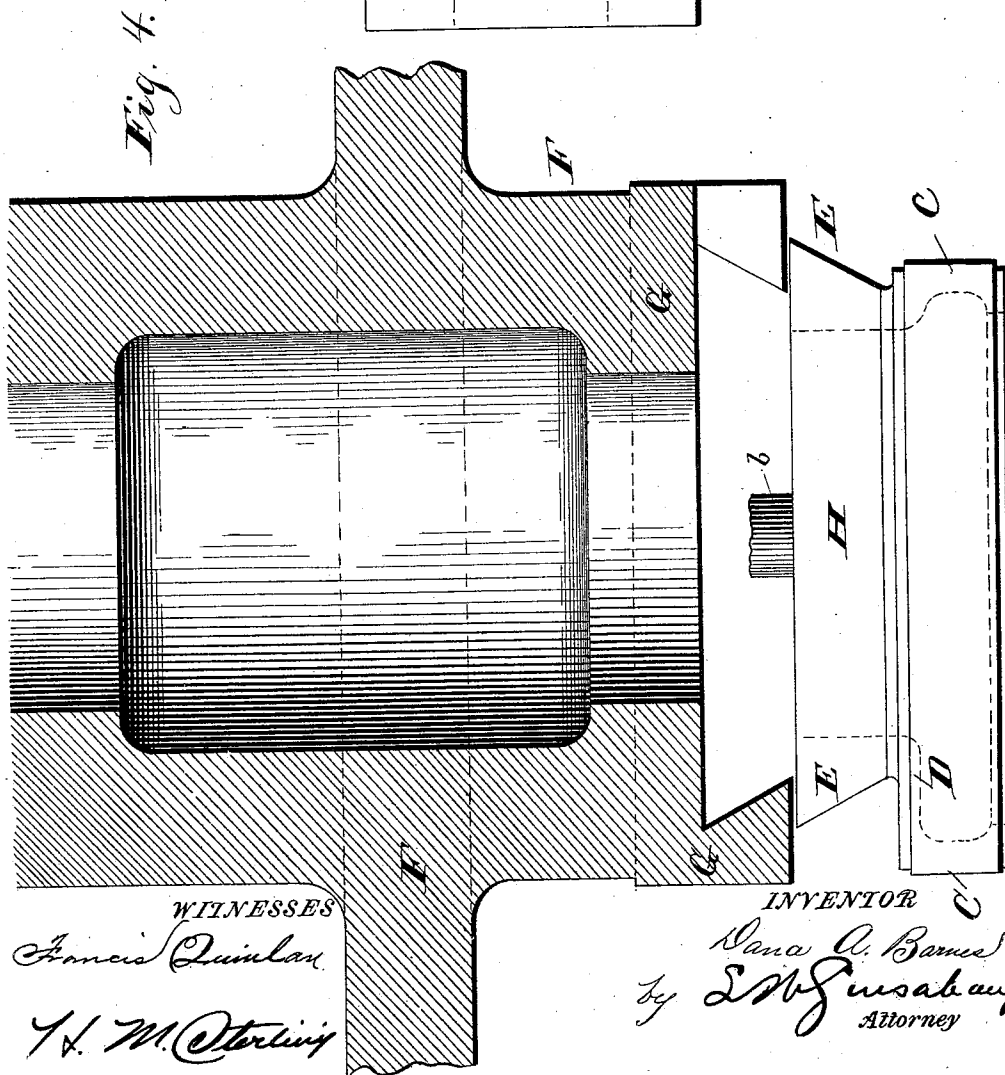
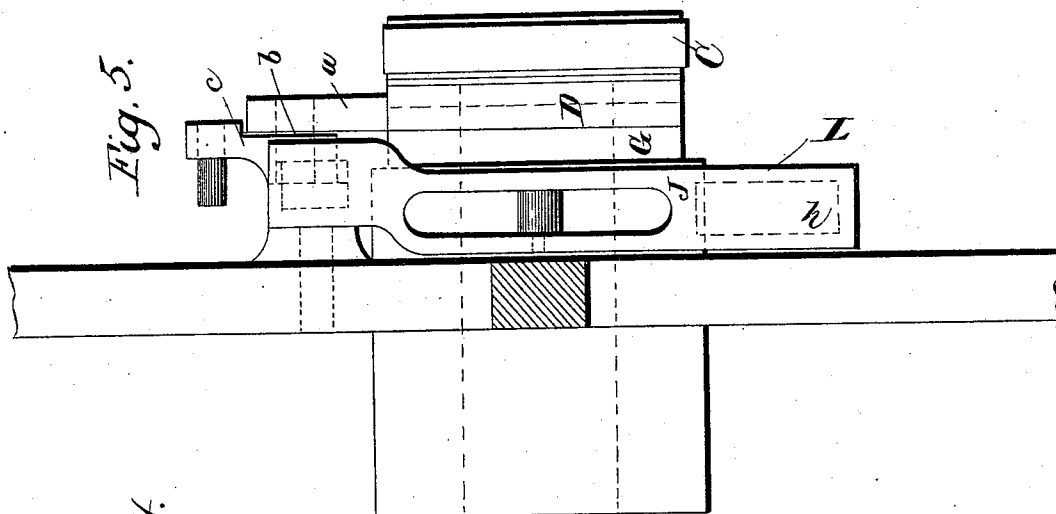
(No Model.)

3 Sheets—Sheet 3.

D. A. BARNES.
STEAM ENGINE GOVERNOR.

No. 471,048.

Patented Mar. 15, 1892.



WITNESSES

Francis Quinlan

J. H. M. Sterling

INVENTOR

by *Nana A. Barnes*
L. H. Ginsburgh
Attorney

UNITED STATES PATENT OFFICE.

DANA A. BARNES, OF DUNKIRK, NEW YORK.

STEAM-ENGINE GOVERNOR.

SPECIFICATION forming part of Letters Patent No. 471,048, dated March 15, 1892.

Application filed April 27, 1891. Serial No. 390,622. (No model.)

To all whom it may concern:

Be it known that I, DANA A. BARNES, a citizen of the United States, and a resident of Dunkirk, in the county of Chautauqua and State of New York, have invented new and useful Improvements in Steam-Engine Governors; and I do hereby declare the following to be a full, clear, and exact description of said invention, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form a part of this specification.

This invention relates to a new and useful improvement in automatic governors for steam-engines, and especially to that class of governors operating on the fly-wheel of an engine.

The object of the invention is to provide a governor operating by centrifugal force to be located on the fly-wheel of the engine and to operate to shift the eccentric working the valve-rod to shorten or lengthen the stroke of the same and govern the admission of steam thereby.

The invention consists in certain novel features in the arrangement and construction of parts, all as hereinafter fully set forth.

Referring to the accompanying drawings, Figure 1 represents a view in elevation of the fly-wheel fitted with the improved governor or sliding eccentric. Fig. 2 represents a front elevation of the sliding eccentric. Fig. 3 represents a section of the sliding eccentric in side elevation, taken on the line *xx* of Fig. 2. Fig. 4 represents a horizontal sectional view through the hub of the fly-wheel and grooved plate secured thereto and a top or plan view of the sliding eccentric. Fig. 5 represents a side elevation of a central portion of the fly-wheel and governor attached thereto.

The general principle on which this invention operates is by controlling the admission of steam to the steam-chest by shifting the eccentric and operating the valve-rod to or from the center of the shaft to shorten or lengthen the reciprocating movement imparted to the said valve-rod.

In the present instance the yoke A, to which is connected the valve-rod B, works on the

eccentric-ring C. This eccentric-ring projects from and is made integral with a plate D, so formed as to slide back and forth on the hub of the wheel within certain limits. For this purpose the slide D is provided with a dovetail portion E, which is fitted within a corresponding shaped groove on the hub F, or, as shown in the drawings, to a hub-plate G, and in such manner is adjustably secured to the wheel, and for the purpose of admitting the shaft through the sliding plate G, carrying the eccentric-ring C, an elliptical slot H is formed therein, and is of a regulated size, to establish the limits within which the sliding of the eccentric may work.

As before intimated, the operation of the eccentric C is not directly upon the shaft, but upon the hub F of the fly-wheel, which wheel is so constructed as to be readily adapted to receive the sliding eccentric and the other operating parts of the governor for automatically shifting the said eccentric.

The hub F of the fly-wheel is either provided with a plate of metal rigidly secured thereto or with an enlarged face, and in this plate or enlarged hub portion G is formed a wide dovetail groove, which extends across the entire width of the hub portion and is designed to receive the dovetail portion E of the sliding eccentric. This eccentric C, while preferably consisting of several parts, is formed integral with the slide D, from the surface of which this eccentric projects, and the slide is of such a construction as to be secured on the hub portion G within the dovetail sliding groove.

Within the central portion of the slide D is formed the elliptical slot H, for the purpose heretofore mentioned, the eccentric-ring C not being concentric with the center of the slot, which is centrally located in the slide, but formed thereon with its center to one side of that of the slide or the shaft on which the fly-wheel revolves, and being eccentric with the fly-wheel, must also be eccentric with the shaft. The valve-rod B is yoked to this ring-eccentric and has a reciprocating movement imparted thereto in consequence, and such reciprocating movements are diminished or

increased as regards the length of stroke or valve travel by any variation in the position of the eccentric on the hub, and the government of this variation in position of eccentric is controlled automatically by the centrifugal force of the fly-wheel operating on the slide D through a connection of levers. On the inner face of the eccentric-ring is provided a groove I to catch and retain the oil which may run from the bearings of the several parts of the device.

On the upper portion of the slide D is provided an upward extension or arm *a*, having a pivot-pin *b* projecting inwardly therefrom and serves to connect the shiftable eccentric with a system of connected levers acted on by centrifugal force through the weighted arms J in such manner as to shift the eccentric to or from the shaft, according as the speed of the fly-wheel is increased or diminished from any of the causes incident to the practical use of the engine or to the variation of steam-pressure and to regulate thereby the admission of steam to the cylinder to keep the engine at a uniform rate of speed. To this extension *a* is connected by means of a pivot-pin *b* a rock-arm or equalizing-bar *c* for connecting the two weighted bell-crank levers J with the slide D and in such a manner as to get a uniform pressure, notwithstanding any variation in the difference in pull between the respective weighted bell-crank levers, and to the ends of the rock-arm or equalizing-bar *c* are pivotally connected the link-arm *d d*, the said link-arms connecting in the same manner at their lower ends, respectively, with the short arm *e* of the bell-crank lever. These bell-crank levers are located on opposite sides of the hub or center of the wheel, and preferably in close proximity therewith, and are pivotally secured at the points *f f* to the extension *g*, cast on two of the spokes of the wheel for that purpose, or the weighted arms may be secured directly to the spokes when such spokes are so located as to allow the arms to depend therefrom in their proper position.

With the wheel in such position as to bring the hub portion G into a vertical position the normal position of the weighted arms J will be that shown in the drawings and will be parallel to each other.

While the weights or balls L on the ends of the arms J are more properly designed for the purpose of getting greater power from the centrifugal force and not to keep the arms normally situated, a spring O is provided on the wheel, so as to bear against the said arms and to counteract to a greater extent the centrifugal force. The regulation of the governor is accomplished by adjusting the tension of the spring O, as in other devices of a similar character, and the construction and arrangement of the spring and tension-regulator will be hereinafter fully described.

On the outer sides of the arms J are provided

friction-wheels *i*, which are set within a recess or mounted on an extension formed on the arms for that purpose, and said friction-wheels forming a bearing or contact portion of the weighted arms with the spring O. The function of the friction-wheels *i* is, as will be readily understood, to relieve the contact of the spring with the weighted arms of any great friction, making thereby the device more sensitive, and consequently more accurate in its operation. At this point there extends through a slot in the arms J on either side a bolt *x*, which, being provided with a yoke on its end, bears against the friction-wheel *i* and serves as an adjustable stop for the weighted arms J. The weighted end of the arm J is enlarged and made in circular form, and extending through this circular portion L from side to side is a slot *h*, making such portion hollow and adapted to receive a weight or different-sized weights, as may be required.

The spring O is preferably of the type known as "leaf-spring," and is in the form of an arch. This spring partly surrounds the governor and is secured either to the spokes or any suitable part of the inner portion of the wheel or to the portion especially provided for such purpose, as shown in the drawings, and which is a preferred form of construction. This consists of an inner rim or ring *k*, formed integral therewith or otherwise secured thereto, and to which is attached by means of screws or bolts *l* a clip *m* for hollowing the spring O. As before stated, the clip is so formed as to regulate the spring to different degrees of tension and is composed of two primary sections *n* and *n'*, section *n* being rigidly secured to the wheel, while the section *n'* consists of two parts hinged together and held by the screw-bolt, which is operated to hinge the clip on the spring in such manner as to give it any desired tension.

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

1. In a steam-engine governor, the eccentric having a slot formed therein for the admission of the shaft adjustably secured to the hub of the fly-wheel, the weighted bell-crank levers connecting with the eccentric by means of link-arms connected to the ends of a rock-arm or equalizing-bar secured to the sliding eccentric, and a spring impinging against the weighted levers, substantially as described.

2. In a steam-engine governor of the character described, the eccentric adapted to be shifted to and from the center of the shaft, comprising the eccentric-ring secured to a slide operating in ways on the hub of the fly-wheel, an extension on said slide having pivotally secured thereto a rock-arm or equalizing-bar, links pivotally secured to the ends of said rock-arm and depending therefrom, and weighted bell-crank levers, the short arms

of which are respectively connected with the lower ends of the links, substantially as described.

3. In a centrifugal governor, the shiftable
5 eccentric, in combination with the bell-crank weighted levers connecting with the slide of said eccentric by means of links secured to the short arms of the levers and to a rock-arm or equalizing-bar on said slide, and an
10 arched spring secured at its central point to

the wheel, its free ends impinging on friction-wheels mounted on the weighted levers, substantially as described.

In testimony whereof I affix my signature in presence of two subscribing witnesses.

DANA A. BARNES.

Witnesses:

JOHN F. BAILEY,
R. S. GOTT.