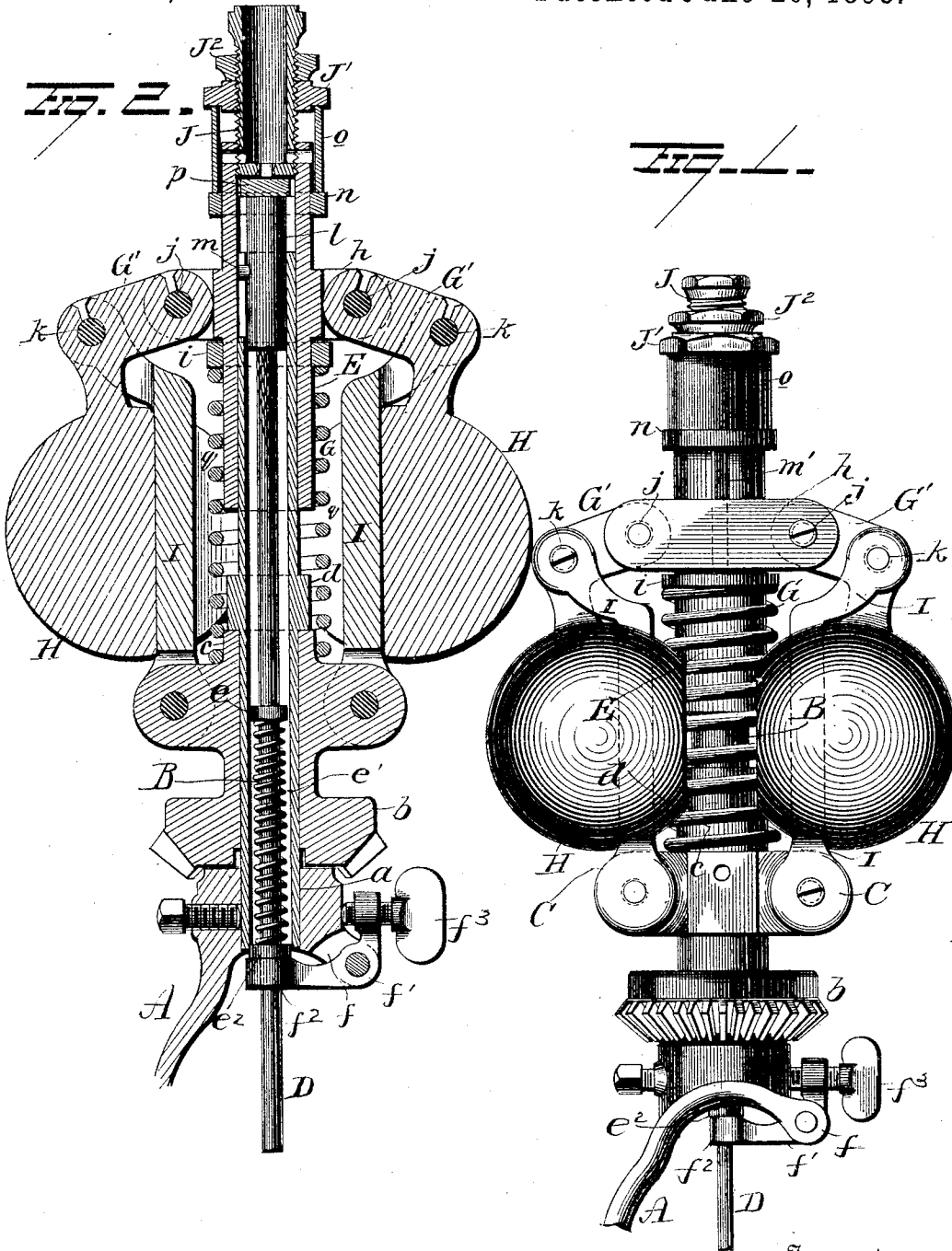


(No Model.)

W. T. DAVIS.
ENGINE GOVERNOR.

No. 499,875.

Patented June 20, 1893.



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WILLIAM T. DAVIS, OF BATTLE CREEK, MICHIGAN.

ENGINE-GOVERNOR.

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To all whom it may concern:

Be it known that I, WILLIAM T. DAVIS, residing at Battle Creek, in the county of Calhoun and State of Michigan, have invented certain new and useful Improvements in Steam-Engine Governors; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to an improvement in throttling steam engine governors,—the object of the invention being to produce simple and efficient means for opposing to some extent the centrifugal action of the governor balls.

A further object is to provide a centrifugal governor having a spring adapted to oppose the centrifugal action of the balls, with devices for regulating the tension of said spring. said devices being constructed and arranged in such manner that the opposition to the centrifugal force may be greatly increased or diminished to change the speed, without increasing its friction or in any way affecting its rotary motion, but allowing it to run as freely at a high rate of speed as when running at a slow speed.

A further object is to provide a governor with a spring adapted to operate in opposition to the valve stem and to produce simple and efficient devices for regulating the tension of said spring.

A further object is to produce a steam engine governor which shall be simple in construction, sure of operation and effectual in the performance of its functions.

With these objects in view the invention consists in certain novel features of construction and combinations and arrangements of parts as hereinafter set forth and pointed out in the claims.

In the accompanying drawings: Figure 1 is a face view of my improved governor. Fig. 2 is a vertical sectional view of the same.

A represents a fixed arm on which the governor is mounted and projecting upwardly from this arm is a hollow rod or tube B which communicates or aligns with an opening *a* in the arm A. On the hollow rod or tube B a yoke C is loosely mounted and carries a pinion *b* which meshes with another pinion (not

shown) whereby to transmit motion to the governor. From the top of the yoke C an annular flange or collar *c* projects and in proximity to the end of said annular flange or collar, a collar *d* is secured to the rod or tube B, whereby to limit the upward movement of the governor.

Passing through the hollow rod or tube B and through the opening *a* in the fixed arm or support A is a valve stem D, to which a collar *e* is secured at a point between its ends. A coiled spring *e'* encircles the valve stem D, bearing at one end against the collar *e* and at the other end against a loose collar *e''* on said valve stem. Lugs or ears *f* project from the fixed arm or support A and between them an L-shaped lever *f'* is pivoted. The inwardly projecting end of the lever L is bifurcated, as at *f''* and adapted to permit the passage through it of the valve stem D, said bifurcated end of the lever also bearing against the loose collar *e''*. The other end of the lever *f'* is made with a screw-threaded perforation for the accommodation of an adjusting screw *f'''* which bears at its inner end against the fixed arm or support A. By manipulating the thumb or adjusting screw *f'''* the tension of the spring *e'* can be readily adjusted while the governor is in motion, as will be readily understood, and thus the resistance of the valve stem to the action of the governor balls can be easily and quickly regulated.

Revolubly mounted on the upper portion of the hollow rod or tube B is a sleeve E, at points between the ends of which, arms *h* are located, said arms comprising a yoke disposed at right angles to the sleeve E.

A comparatively heavy spring G encircles the hollow rod or tube B, being received at its lower end by the annular flange *c*, and at its upper end adapted to encircle the lower portion of the sleeve E and bear on a collar *i* under the arms *h*. The end of each arm *h* is perforated for the accommodation of bolts *j*, one perforation in each arm being screw-threaded for the reception of the screw-threaded ends of said bolts. Between the ends of the arms *h*, the ends of L-shaped arms G' projecting from governor balls H are inserted and loosely connected thereto by means of the bolts *j*. At the angle of the L-

shaped arms G', perforations are made, and at this point the upper bifurcated ends of links I embrace said arms and are provided with perforations to align with the perforations in the arms G', for the reception of bolts or pins *h*, whereby to pivotally connect said arms and links. The lower ends of the links I are also bifurcated to embrace the yoke C, to which they are pivotally connected.

Inserted in the upper end of the tube or hollow rod B is a short rod or bar *l*, said rod bearing at its lower end upon the upper end of the valve stem D and having a projection *m* at a point between its ends to enter a slot in the upper end of the rod or tube B, whereby to prevent the rotation of said rod *l*.

Passing loosely through perforations in the arms *h* at diametrically opposite sides of the sleeve E are pins *m'*, said pins bearing at the lower ends on the loose collar *i* which rests upon the spring G. A collar *n* loosely encircles the sleeve E in proximity to its upper end and rests on the tops of the pins *m'*. A sleeve or cylinder *o* loosely encircles the upper end of the sleeve E and projects somewhat above the same, said sleeve or cylinder *o* resting on the loose collar *n*.

The upper end of the sleeve E is screw-threaded internally for the reception of a screw J, and between the lower end of this screw and the upper end of the short rod *l* a packing disk or washer *p* is located. The screw J is preferably made hollow, with a closed perforated end, whereby the lubrication of the parts at the upper end of the governor will be facilitated, and the upper end of said screw is made with flat faces for the accommodation of a suitable wrench by means of which to turn or adjust it. A nut J' is placed on the screw J and adapted to bear upon the upper end of the sleeve or cylinder *o*. Another nut J² is placed on the screw J and bears upon the nut J', whereby to retain it in the position to which it is adjusted.

In order to permit the governor balls to lie close to the body of the governor and permit a sufficient scope of movement to the valve stem, said balls are made with recesses *q* for the reception of the links I.

From the construction and arrangement of parts as above described it will be seen that by turning the nut J' on the screw J the tension of the spring G can be easily and quickly adjusted, and the resistance to the centrifugal force of the governor balls can be thus effectually regulated without in the least increasing the friction of the governor. It will also be seen that the resistance of the valve rod to the centrifugal force of the balls can be easily adjusted while the governor is in motion by manipulating the thumb screw *f*³, and thus regulate the governor. It will also be seen that the arms G' of the governor balls H are pivotally connected with the arms *h* carried by the upper sleeve E, and connected with the lower yoke or sleeve C by the links

I at a point which is as near as possible directly over the weights or balls H when the governor is in motion and the weights or balls are partially thrown outwardly by their centrifugal force. And in order to locate the weights or balls in the above described position and still have it all as compact as possible it is necessary to have the recesses *q* in the balls to receive the links. Thus it will be seen that the weights or balls H are located directly under the point where their arms are pivotally connected to the links. It will also be seen that the links I are connected at their lower ends to the yoke C and their other ends attached to the arms G' of the weights or balls H at points farther from the center of the spindle or rod B around which they revolve, than the distance from the center of the spindle to the center of the weights or balls,—so that when the weights or balls are thrown outward by their centrifugal force, their average position will be in line with the points at which the arms of the balls are pivoted to the arms *h*, the line being parallel with the spindle,—or in other words, the average position of the weights being directly below the point at which the weight arm is pivoted to the link that connects it with the lower sleeve or yoke C,—the inner ends of the arms G' being pivoted to the arms *h* of the upper sleeve.

The device is simple in construction and effectual in the performance of its functions.

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

1. In a steam engine governor, the combination with the balls, and valve stem, of a spring adapted to resist the centrifugal force of said balls, a collar at one end of said spring, a collar above the first mentioned collar, pins interposed between said collars, and means for moving the upper collar to regulate the tension of said spring, substantially as set forth.

2. In a steam engine governor, the combination with a supporting arm and a hollow rod or tube carried thereby, of a sleeve mounted on said rod or tube, arms carried by said sleeve, governor balls connected with said arms, a spring adapted to resist the centrifugal force of said balls, a collar at the upper end of said spring, another collar loosely encircling said sleeve, pins interposed between said collars, a thimble or cylinder located on the upper sleeve, a screw passing through said thimble or cylinder and adapted to screw into the upper end of the sleeve, a nut on said screw adapted to bear on the top of said thimble or cylinder and another nut adapted to bear on the first-mentioned nut, substantially as set forth.

3. In a steam engine governor, the combination with a supporting arm and a hollow rod or tube carried thereby, of a sleeve adapted to encircle said rod or tube, arms carried by said sleeve, governor balls connected with said arms, a spring, a collar at the upper end

of the spring, another or upper collar encircling the sleeve, pins interposed between said collars and passing loosely through perforations in said arms, a thimble or cylinder located on the upper collar, a tubular screw having a perforated bottom, passing through said thimble or cylinder and entering the screw-threaded upper end of the sleeve, a nut on said screw adapted to bear on the upper end of the thimble or cylinder, and a nut adapted to bear on the first-mentioned nut, substantially as set forth.

4. In a steam engine governor, the combination with a supporting arm and a hollow rod or tube carried thereby, of a yoke loosely mounted on said hollow rod or tube, a sleeve loosely mounted on said rod or tube, arms carried by said sleeve, governor balls having L-shaped arms connected at their ends to the arms on said sleeve whereby the balls rest normally inward approximately beneath the pivotal supports of the arms, links connecting the arms of the governor balls with said yoke, said governor balls having recesses to receive said links, a spring interposed between the arms on the sleeve and the yoke, means for adjusting said spring, and a valve rod, substantially as set forth.

5. In a steam engine governor, the combination with a supporting arm and a tubular rod, a sleeve mounted on said rod, governor balls connected with said sleeve, a screw in the upper end of said sleeve, a valve stem passing through said tubular rod, a short rod adapted to bear on the top of said valve stem, and a pin or projection on said short rod adapted to enter a slot in the tubular rod, substantially as set forth.

6. In a steam engine governor, the combination with a rod or spindle and two yokes or sleeves revolubly mounted thereon, of governor balls, arms projecting from said governor balls and pivotally connected to the upper revoluble yoke and links connecting said arms with the lower yoke, the connection of said links with the arms of the balls being such

that when the governor is in motion, said connection will be directly over the balls, substantially as set forth.

7. In a steam engine governor, the combination with a rod or spindle and two yokes or sleeves revolubly mounted thereon, of governor balls, arms projecting from said governor balls and pivotally connected to the upper revoluble yoke and links connecting said arms with the lower yoke, the connection of said links with the arms of the balls being such that when the governor is in motion, the vertical axis of the balls will be parallel with the rod or spindle about which they revolve, substantially as set forth.

8. In a steam engine governor, the combination with a rod or spindle and two yokes or sleeves revolubly mounted thereon, of governor balls, L-shaped arms projecting from said governor balls whereby the balls are located approximately beneath the pivotal support of the arms, said arms pivotally connected to the upper revoluble yoke and links connecting said arms with the lower yoke, said balls being recessed to receive said links, substantially as and for the purpose set forth.

9. In a steam engine governor, the combination with a rod or spindle and two yokes or sleeves revolubly mounted thereon, of governor balls, arms projecting from said governor balls and pivotally connected to the upper revoluble yoke and links connecting said arms with the lower yoke, the connection of the links to the arms of the governor balls being at points farther from the center of the rod or spindle around which they revolve than the distance from the center of the spindle to the center of the weights or balls, substantially as set forth.

In testimony whereof I have signed this specification in the presence of two subscribing witnesses.

WILLIAM T. DAVIS.

Witnesses:

STEVEN S. HULBERT,
GEO. W. MECHEM.