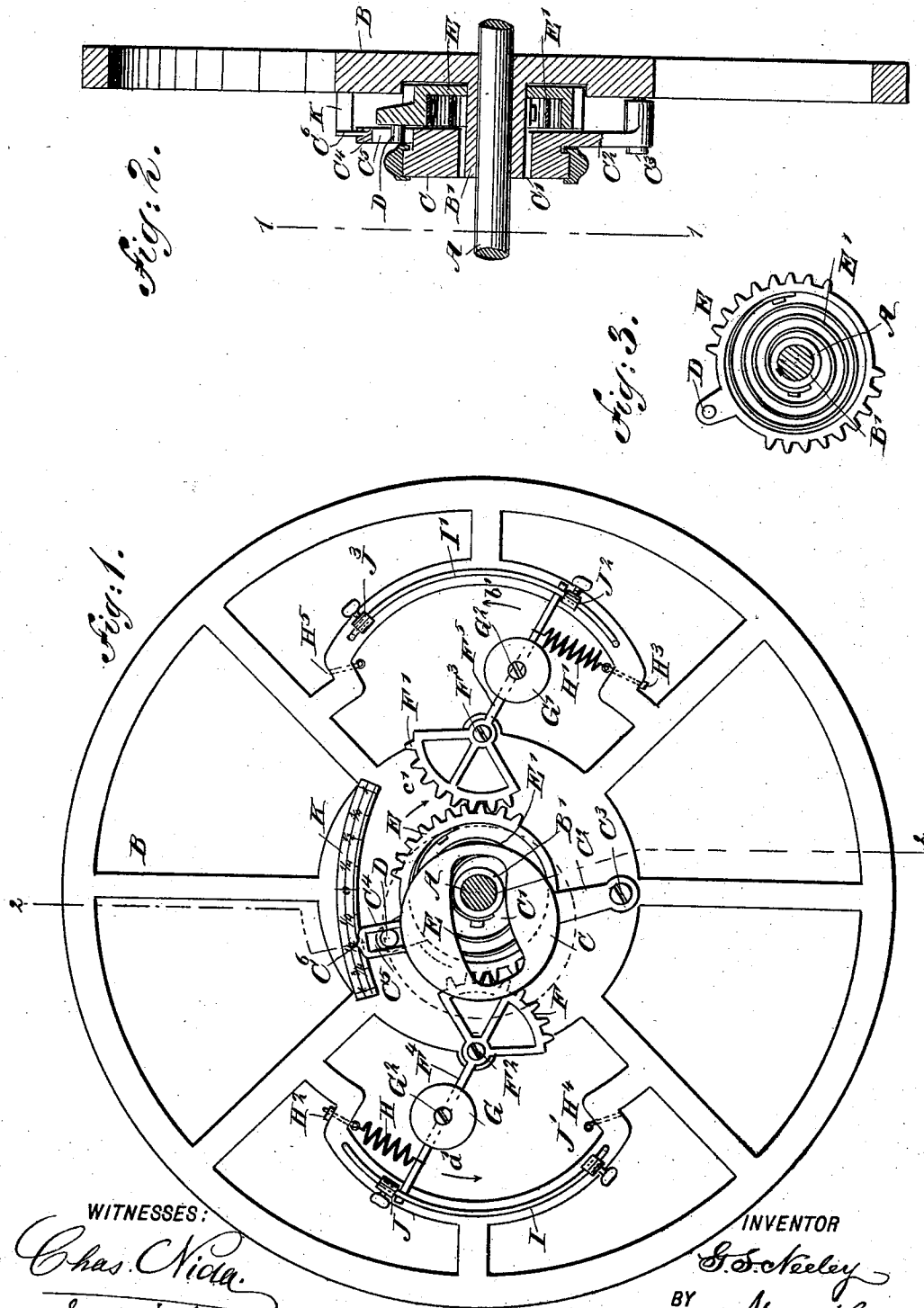


(No Model.)

G. S. NEELEY.  
CENTRIFUGAL SHAFT GOVERNOR.

No. 506,534.

Patented Oct. 10, 1893.



WITNESSES:

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# UNITED STATES PATENT OFFICE.

GEORGE S. NEELEY, OF PACIFIC, MISSOURI.

## CENTRIFUGAL SHAFT-GOVERNOR.

SPECIFICATION forming part of Letters Patent No. 506,534, dated October 10, 1893.

Application filed July 5, 1893. Serial No. 479,604. (No model.)

### *To all whom it may concern:*

Be it known that I, GEORGE S. NEELEY, of Pacific, in the county of Franklin and State of Missouri, have invented a new and Improved Centrifugal Shaft-Governor, of which the following is a full, clear, and exact description.

The object of the invention is to provide a new and improved centrifugal shaft governor for engines, which is simple and durable in construction, very effective and sensitive in operation, and arranged to accurately govern the motion of the valve of the engine, to insure uniform running of the latter.

The invention consists principally of a pivoted eccentric disk adapted to move across the driving shaft of the engine, and connected with a central gear wheel yieldingly connected with the hub of the governor wheel secured to the driving shaft, and weighted and spring-pressed segmental gear wheels mounted to turn on the said governor wheel and in mesh at opposite sides with the said central gear wheel.

The invention also consists of certain parts and details, and combinations of the same, as will be hereinafter described and then pointed out in the claims.

Reference is to be had to the accompanying drawings, forming a part of this specification, in which similar letters of reference indicate corresponding parts in all the figures.

Figure 1 is a sectional face view of the improvement on the line 1—1 of Fig. 2. Fig. 2 is a transverse section of the same on the line 2—2 of Fig. 1; and Fig. 3 is a rear face view of the central gear wheel.

On the driving shaft A of the engine is secured the governor wheel B, having its hub B' extending through a segmental slot C' formed in an eccentric disk C, connected in the usual manner with the valve of the engine.

The eccentric disk C is provided with an outwardly-extending arm C<sup>2</sup>, pivotally-connected at C<sup>3</sup> on the governor wheel B, and opposite this arm C<sup>2</sup> extends from the eccentric disk C, a second arm C<sup>4</sup>, formed with an elongated slot C<sup>5</sup> engaged by a wrist pin D, secured on a central gear wheel E, mounted to rotate loosely on the hub B' of the governor wheel B, the central gear wheel E has a yielding connection with the hub B'; and

for this purpose a coil spring E' is provided, fastened with its inner end on the said hub B' and at its outer end to the wheel E, as plainly illustrated in Figs. 2 and 3.

The central gear wheel E is engaged at opposite sides by segmental gear wheels F and F', mounted to turn on studs F<sup>2</sup> and F<sup>3</sup>, respectively, secured on the governor wheel B.

From the segmental wheels F and F' extend outwardly, the arms F<sup>4</sup> and F<sup>5</sup>, respectively, on which are mounted the weights G and G', respectively, adapted to be shifted on the said arms and secured in place thereon by suitable set screws G<sup>2</sup>. The said arms F<sup>4</sup> and F<sup>5</sup> are also connected with springs H and H', respectively, adapted to be fastened on bolts H<sup>2</sup>, H<sup>3</sup>, respectively, secured on the governor wheel B. For reversing the engine, the said springs are disconnected from the bolts H<sup>2</sup> and H<sup>3</sup>, and attached to bolts H<sup>4</sup> and H<sup>5</sup>, respectively, also held on the governor wheel B, but on opposite sides of the arms F<sup>4</sup> and F<sup>5</sup>, as will be readily understood by reference to Fig. 1. The free ends of the arms F<sup>4</sup> and F<sup>5</sup> are guided in guideways I and I', respectively, both secured on the face of the governor wheel B, and on the said guideways are arranged adjustable stops J, J', and J<sup>2</sup>, J<sup>3</sup>, respectively, for adjusting the position of the said arms F<sup>4</sup> and F<sup>5</sup>, according to the desired lead to be given to the engine. When the engine is running in one direction, the stops J and J<sup>2</sup> are in use for the arms F<sup>4</sup> and F<sup>5</sup> and when the engine is running in an opposite direction, the other stops J' and J<sup>3</sup> are employed.

On the arm C<sup>4</sup> of the eccentric disk C is formed a pointer C<sup>6</sup>, indicating on a graduation K, secured or formed on the face of the governor wheel B, the said governor indicating the point of cut-off for the engine valve, whether the engine is running forward or backward.

The operation is as follows: The operator in charge of the engine first adjusts the stops J and J<sup>2</sup> on the guideways I and I' according to the amount of lead to be given to the engine, it being understood that the arms F<sup>4</sup> and F<sup>5</sup> are limited by the said stops in one direction, so as to hold the eccentric disk C in the proper position according to the amount of lead to be given, say, for instance, one-half

of the entire stroke, as shown in Fig. 1. Now, when the engine is started and the main driving shaft A is rotated, then the engine at once has its full lead owing to the position of the stops J and J' preventing the arms F<sup>4</sup> and F<sup>5</sup> from being moved to a closing position by the action of their springs H and H'. It is understood that if these stops J and J' are removed, the springs H and H' acting on the arms F<sup>4</sup> and F<sup>5</sup> will cause the segmental gear wheels F and F' to rotate the central gear wheel E, so that the wrist pin D thereon moves the arm C<sup>4</sup> into an outermost position to full stroke position. Hence, the engine would have no lead.

15 When the engine is running with a predetermined lead given, and the stops J and J' are adjusted accordingly, then the position of the eccentric disk C is changed in case of an increase of speed, as the weights G and G' will then impart a swinging motion to the arms F<sup>4</sup> and F<sup>5</sup> in the direction of the arrows a' and b' respectively, and against the tension of their springs H and H' respectively. This movement of the arms F<sup>4</sup> and F<sup>5</sup> causes a turning of the segmental gear wheels F and F', whereby the central gear wheel E is turned in the direction of the arrow c', so that the wrist pin D is moved to the right nearer to the zero point of the graduation K. The movement of the pin D causes a swinging movement of the eccentric disk C, which thus is shifted across the shaft A to bring its center nearer to the center of the main driving shaft A. The stroke of the slide valve is thus decreased and less steam is admitted to the engine until the speed of the latter has decreased to a normal rate. As soon as the speed commences to decrease, the springs H, H' overcome the centrifugal force of the weights G, G', whereby the arms F<sup>4</sup>, F<sup>5</sup> are moved in the inverse direction of the arrows a' and b', thus causing a turning of the segmental gear wheels F and F', which turn the central gear wheel E in the inverse direction of the arrow c', until the said arms F<sup>4</sup> and F<sup>5</sup> again rest on their stops J and J'. The return movement of the central gear wheel E causes a shifting of the eccentric disk C, by the wrist pin D, until the pointer C<sup>6</sup> again stands on the proper mark indicating the desired lead for which the engine is set. It is understood that the governor has the power to affect the speed of the engine soon after starting, on account of the travel of the arms F<sup>4</sup> and F<sup>5</sup> being shortened as well as the stroke of the eccentric disk C, which causes the valve to cut off the steam supply as much less than one-half of the piston stroke, which allows the engine to do the greatest part of its work by the expansion of the steam shut up in the cylinder and at less than one-half of the piston stroke. The engine can thus be run very economically, as far as the steam consumption is concerned.

65 Having thus fully described my invention,

I claim as new and desire to secure by Letters Patent—

1. A centrifugal shaft governor, comprising a governor wheel adapted to be secured on the driving shaft of the engine, a gear wheel having a yielding connection with the said governor wheel and mounted to rotate on the hub of the said governor wheel, a wrist pin held on the said gear wheel, and an eccentric disk having a segmental slot to permit the disk to move across the main driving shaft, the said eccentric disk being engaged by the said wrist pin and also pivoted on said governor wheel, substantially as shown and described.

2. A centrifugal shaft governor, comprising a governor wheel adapted to be secured on the driving shaft of the engine, a gear wheel having a yielding connection with the said governor wheel and mounted to rotate on the hub of the said governor wheel, a wrist pin held on the said gear wheel, an eccentric disk having a segmental slot to permit the disk to move across the main driving shaft, the said eccentric disk being engaged by the said wrist pin and also pivoted on the said governor wheel, and weighted spring pressed segmental gear wheels oscillating on the said governor and in mesh with the said central gear wheel, substantially as shown and described.

3. A centrifugal shaft governor, comprising a central gear wheel for shifting the eccentric disk across the main driving shaft, segmental gear wheels held on the governor wheel, and in mesh with the said central gear wheel, arms projecting from the said segmental gear wheels and carrying weights, and springs and stops for limiting the movement of the said arms, substantially as shown and described.

4. A centrifugal shaft governor, comprising a governor wheel, a central gear wheel on the said governor wheel and adapted to shift the eccentric across the main driving shaft, segmental gear wheels in mesh with the said central gear wheel and mounted to turn on the said governor wheel, arms projecting from the said segmental gear wheels, weights held adjustably on the said arms, springs attached to the said governor wheel and connected with the said arms, and adjustable stops on the said governor wheel and adapted to limit the movement of the said arms in one direction, substantially as shown and described.

5. A centrifugal shaft governor, comprising a governor wheel, a central gear wheel on the said governor wheel and adapted to shift the eccentric across the main driving shaft, segmental gear wheels in mesh with the said central gear wheel and mounted to turn on the said gear wheel, arms projecting from the said segmental gear wheels, weights held adjustably on the said arms, springs attached to the said governor wheel and connected with the said arms, and adjustable stops on the said governor wheel and adapted to limit the movement of the said arms in one direction,

5 a wrist pin held on the said central gear wheel, and an eccentric disk pivoted on the said governor wheel and having a slotted arm engaged by the said wrist pin, substantially as shown and described.

10 6. In a centrifugal governor, the combination, with the engine shaft, the governor wheel, having the graduation, K, the eccentric disk, having a segmental slot and slotted radial arm, C<sup>4</sup>, which serves as a pointer on said gradua-

tion, of the gear wheel, E, segmental gears meshing therewith and having weighted arms F<sup>4</sup>, F<sup>5</sup>, springs for holding the latter in normal position, and stops which are adjustable on concentric guides, as shown and described. 15

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Witnesses:

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