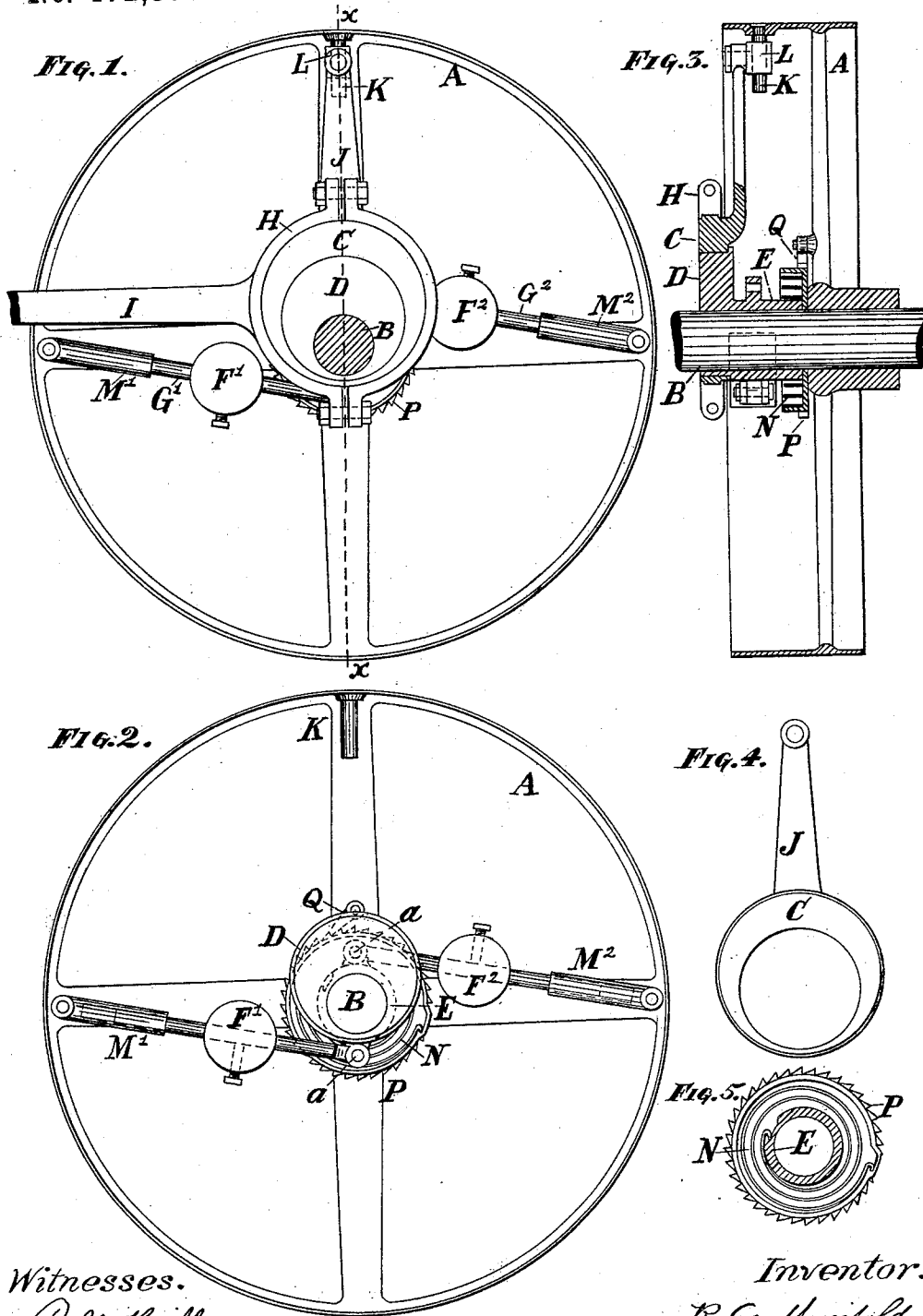


(No Model.)

R. G. MANIFOLD,
GOVERNOR FOR STEAM ENGINES.

No. 472,378.

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Witnesses.

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GOVERNOR FOR STEAM-ENGINES.

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To all whom it may concern:

Be it known that I, RICHARD G. MANIFOLD, a citizen of the United States, residing in the city and county of San Francisco, State of California, have invented certain new and useful Improvements in Governors for Steam-Engines; and I hereby declare the following specification, with the drawings accompanying the same, to be a full and exact description of my invention.

My invention relates to that class of steam-engine governors wherein the centrifugal weights and other mechanism are attached to and revolve with the engine-shaft, moving directly the eccentric, which actuates the cut-off valve of the engine.

My invention consists in mounting the main eccentric on a bearing, also eccentric with respect to the engine-shaft, and partially revolving and adjusting this eccentric-bearing by means of weights controlled by centrifugal force and the speed of the engine, the object being to absorb in such bearing the thrust or resistance of moving the valve and thus maintain a positive position of the main eccentric thereby with respect to the speed of the engine.

My invention also includes mounting the centrifugal weights on sliding rods instead of on radial links or arms, for their movement will be nearly rectilinearly uniform and isochronal under changes of heat.

It further consists in opposing the centrifugal force of the weights by means of an adjustable coil-spring housed and protected in a cylindrical casing and in various constructive details, to be hereinafter more fully explained.

Referring to the drawings, Figure 1 is a side view of one of my improved governors mounted in a band-wheel or pulley. Fig. 2 is another side view of one of my improved governors with the main eccentric removed. Fig. 3 is a vertical section through Fig. 1 on the line *x x*. Fig. 4 is a side view of the main eccentric detached; and Fig. 5 is a side view, partially in section, showing the coil-spring for opposing the centrifugal force of the weights.

Similar letters of reference on the different figures are employed, representing corresponding parts.

The various parts of the governor are attached to a wheel or pulley A, mounted on the engine-shaft B. The main eccentric C is mounted on an eccentric-disk D, formed integrally with the sleeve or shell E, to which is attached the weights F' and F² by means of the sliding rods G' and G².

The eccentric-strap H is of the usual construction, provided with an extension I, connecting to the engine-valve in the usual manner. The rods G' G² are connected to the shell E by pin-joints *a a*, (shown in Fig. 2,) one on each side, so that the centrifugal force of the weights F' and F² tends to revolve the sleeve or shell E, and with it the eccentric disk or bearing D, thus moving the main eccentric C across the axis of the engine-shaft, changing its position in respect to the same, and altering accordingly the range of the rod I and the valve to which it is attached.

As the adjustment of the bearing D is in a curve about the axis of the engine-shaft B, that of the main eccentric has to conform thereto and is controlled in the following manner: To one side of the eccentric C is attached an arm J, which extends outward to some point beyond the place in which the governor rotates. In the present case I have shown this arm attached to the rim of the wheel or pulley A by means of a stud K and sliding shell or bearing L thereon, to which the end of the arm J is attached, as shown in Figs. 1 and 3. As the disk-bearing D is partially revolved by the action of the weights F' and F² the bearing or shell L moves out and in upon the stud K, as the sine of the curve made by the eccentric-bearing D may determine. The centrifugal weights F' and F², when revolving with the wheel or pulley A, are drawn away radially from the center, and the rods G' and G², on which these weights are supported, slide into the pivoted sleeves M' and M² until all the various parts assume the required position at which the point of cut-off will determine the power and speed of the engine in respect to its load. In case of abrupt changes of speed or in the case of racing or vibration, such as sometimes occurs in the case of centrifugal governors, the sleeves M' and M² can be arranged as dash-pots; but the method of mounting the eccentric C is such that no vibration or racing is likely to occur.

Hence I make no claim to any function of the sleeves M' and M^2 except that of guiding and supporting the rods G' and G^2 . The centrifugal force of the weights F' and F^2 is resisted by the coil-spring N , which is at one end attached to the sleeve E and at the other end to a barrel or case P , as shown in the side view, Fig. 5. This barrel or case P is mounted loosely on the shaft B and provided on its periphery with a serrated pawl-rack, into which the pawl Q meshes. In this manner the tension of the spring N can be increased or diminished by turning the barrel or case P forward or back, the pawl Q catching and holding in any position, so that the position of the weights F' and F^2 and consequent speed of the engine can be regulated at will.

Having thus described the nature and objects of my invention and the manner of constructing and operating the same, what I claim as new, and desire to secure by Letters Patent, is—

1. In a steam-engine governor, the combination of the eccentric-disk D , connected to or formed integral with the shell E , and the weighted rods G' and G^2 , pivoted to the shell E and supported at their outer ends near the governor-casing, the whole being arranged so as to adjust the main eccentric C across the axis of the engine-shaft B and thus operate a cut-off engine-valve for the purpose of regulation, in the manner substantially as and for the purpose specified.

2. In a steam-engine governor, the shell E , having formed thereon the eccentric-bearing D , the eccentric C , mounted on the bearing D , the rods or links G' and G^2 , pivoted to the shell E and supported movably at their outer ends by connection with the main governor-casing, and the weights F' and F^2 , adjustable upon the rods G' and G^2 , the whole being arranged so that the movement of the weights will cause a partial rotation of the bearing D and thus adjust the main eccentric C so as to produce the required cut-off motion for the engine-valve, substantially in the manner and for the purposes herein set forth and described.

3. In a steam-engine governor, the links or rods G' and G^2 , connected to a partially-rotating sleeve E , provided with weights F' and F^2 and supported in the sleeves or bearings M' and M^2 so as to move forward or backward, as the centrifugal force of the weights may determine, and thus determine the position of the sleeve E and main eccentric C , substantially in the manner and for the purposes set forth.

4. In a steam-engine governor, the combination of the eccentric-bearing D , the sleeve E , the rods G' and G^2 , pivoted to said sleeve and carrying the weights F' and F^2 , the coiled spring N , and its inclosing barrel or case P , to which the spring is connected, it being also connected to the sleeve E , substantially as described.

5. In a steam-engine governor, the coil-spring N , and the barrel or casing P , inclosing the same and provided with a serrated pawl-rack on the periphery, so that the tension of the spring can be regulated by the pawl Q and the position of the weights F' and F^2 and the speed of the engine be controlled accordingly.

6. In a steam-engine governor, the eccentric-bearing D , sleeve E , rods or links G' and G^2 , and weights F' and F^2 , in combination with the coil-spring N and the adjustable barrel or case P , the whole arranged and operating substantially as specified.

7. In a steam-engine governor, the combination of the eccentric-bearing D , connected to or formed integral with shell E , the weighted rods G' and G^2 , pivoted to shell E and supported at their outer ends near the governor-casing, and the pivoted hollow arms M' and M^2 , which receive loosely the outer ends of the rods G' and G^2 , substantially as described.

8. In a steam-engine governor, the combination of the casing A , engine-shaft B , eccentric-disk D , formed integral with sleeve E , the main eccentric C , mounted on the disk D and provided with an arm J , connected at its outer end to the shell or bearing L , which slides on the stud K , secured to the rim of the casing A , and the rods G' and G^2 , arranged to adjust the main eccentric C across the axis of the engine-shaft, together with the eccentric-strap H and rod I , substantially as described.

9. In a steam-engine governor, the combination of the sleeve E , the encircling casing P , the coiled spring N , connected at one end to the shell E and at the other end to the casing P , the weight-carrying arms pivoted at their inner ends to the shell E and supported movably at their outer ends near the governor-casing, together with the eccentric-disk, main eccentric, eccentric-strap, and eccentric-rod, substantially as described.

10. In a governor, the combination, with the engine-shaft and governor-wheel, of an eccentric having an outwardly-extending arm provided at its end with a sleeve which is engaged by a pin on the governor-wheel, substantially as described.

11. In a governor, the combination of the engine-shaft, the eccentric-disk, main eccentric thereon having an outwardly-extending arm provided with a sleeve engaging a pin on the rim of the governor-wheel, and the eccentric strap and rod, all arranged so that the main eccentric may be adjusted across the axis of the engine-shaft, substantially as specified.

In testimony whereof I have hereunto affixed my signature in the presence of two witnesses.

RICHARD G. MANIFOLD.

Witnesses:

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