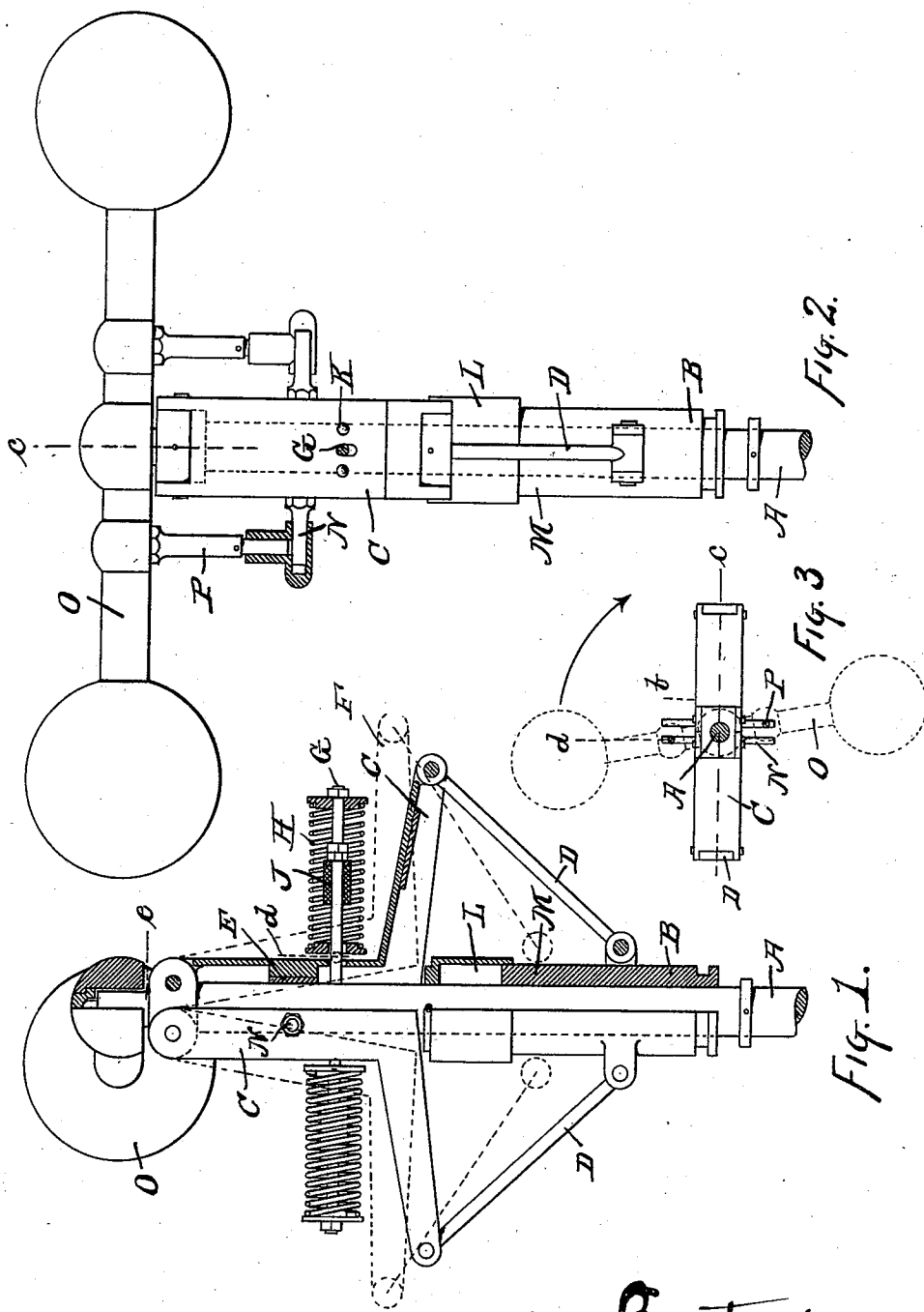


(No Model.)

J. BEGTRUP.
ENGINE GOVERNOR.

No. 510,313.

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Witnesses:
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UNITED STATES PATENT OFFICE.

JULIUS BEGTRUP, OF RIDGWAY, PENNSYLVANIA, ASSIGNOR OF ONE-HALF
TO JAMES H. McEWEN, OF SAME PLACE.

ENGINE-GOVERNOR.

SPECIFICATION forming part of Letters Patent No. 510,313, dated December 5, 1893.

Application filed January 31, 1893, Serial No. 460,243. (No model.)

To all whom it may concern:

Be it known that I, JULIUS BEGTRUP, of Ridgway, Elk county, Pennsylvania, have invented certain new and useful Improvements in Engine-Governors, of which the following is a specification.

This invention relates to governors for the regulation of engine speeds.

My present improvements will be readily understood from the following description taken in connection with the accompanying drawings, in which—

Figure 1, is a front elevation, half vertical section, in the plane of line "c" of Figs. 2 and 3, of a governor exemplifying my present invention; Fig. 2, a side elevation of the same, with parts appearing in vertical section in the plane of line "d" of Figs. 1 and 3; and Fig. 3, a sectional plan of the same, the section being taken in the plane of line "e" of Fig. 1.

In the drawings:—A, indicates the governor-spindle, to which rotary motion is to be imparted in any usual manner; B, a sleeve sliding thereon, this sleeve being the part from which connection is to be made to the valve or valve-gear to be controlled by the governor; C, a pair of centrifugal arms pivoted to the spindle so as to be capable of swinging outward and inward, these arms projecting downwardly from their sustaining pivots and then turning outwardly almost at right angles to their upper portions, the arms being hollow so that their upper portions may lie close to and, when down, fairly embrace the upper portion of the governor spindle; D, links connecting the outer ends of the centrifugal arms C with the sleeve B so that as the arms swing outwardly upon their pivots the sleeve will be raised; E, buffers within the arms to strike the governor spindle when the arms reach their farthest inward position and thus relieve the parts from shock; F, dotted lines indicating the position of the centrifugal arms C when they are moved outwardly under the action of centrifugal force; G, a rod extending across the governor through the governor stem and freely through openings in the centrifugal arms; H, compression springs upon this rod, one outside each of the centrifugal arms, these springs acting between the centrifugal arms and col-

lars upon the outer ends of the rod and serving to resist the outward movement of the centrifugal arms; J, buffers upon the rod G within the springs H, in position to arrest the centrifugal arms C at their proper limit of outward motion; K, balls interposed between the outer faces of the centrifugal arms C and the inner faces of collars upon the inner ends of the springs H, each spring being thus provided with two of these balls arranged one at each side of the rod G, these balls furnishing an efficient pivot of oscillation at the points where the springs exert their inward pressure upon the centrifugal arms; L, a cylinder rigidly secured to and concentric with the governor spindle and open at its lower end; M, an upward projection from the sleeve B forming a piston working upwardly within the cylinder L, the piston and cylinder forming a dash-pot for the governor; N, studs projecting outwardly from the faces of the centrifugal arms C, each of the centrifugal arms being provided with a stud projecting from each side of the governor, one stud of each arm being, however, an extra stud for use only in case the governor is designed to turn in a contrary direction, or, otherwise stated, two studs only are needed and two are provided for the other direction of motion; O, an inertia-weight mounted upon the governor spindle and adapted for free rotation thereon with reference to the centrifugal arms; and P, rigid arms reaching downwardly from the inertia-weight O into articulate engagement with the active pair of the studs N upon the centrifugal arms, that is to say, an arm P from the inertia-weight engages one of the centrifugal arms C upon one side of the governor, and the other arm P engages the other centrifugal arm upon the other side of the governor.

Considering the centrifugal structure alone, it will be observed that the centrifugal arms, C, are of such form as to readily lend themselves to the presence of the very conveniently arranged centripetal springs H. The outward and inward movement of the centrifugal arms C, raises and lowers the sleeve B, and the dash-pot L M serves in increasing the stability of the governor.

The inertia-weight O turns with the centrifugal system and, by its inertia, exercises

an aversion to changes in speed, seeking, for the instant, to lag somewhat behind the centrifugal system if the governor increases its speed, and seeking, for the instant, to maintain present speed and therefore stand ahead of the centrifugal structure if the governor decreases its speed. If the centrifugal weight O drops back in its rotation with reference to the centrifugal system, its arms P, acting on the studs N, will tend to move the centrifugal arms outwardly, and if the weight moves ahead of the centrifugal structure, it will move the centrifugal arms inwardly. So, also, any outward or inward movement of the centrifugal arms will enforce a change of position of the inertia-weight with reference to the centrifugal system and the inertia of the inertia-weight tends to resist such change, the inertia system and the centrifugal system therefore acting in unison under the influence of changes in speed, but the inertia of the inertia-weight steadying the action of the centrifugal system. The inertia-weight acts by its inertia to immediately overcome friction in the centrifugal system when a change of load occurs and the governor will therefore be sensitive and quick acting without yielding to small irregular or periodical vibrating movements of the centrifugal weights as imposed by the valve-gear or other causes. The projection of the arms C downwardly from their pivots and then sharply outward gives to a portion of their mass the most effective position for the action of centrifugal force and at the same time produces points having a great degree of vertical motion as the vertical portions move inward and outward, the form of the arms also offering peculiarly favorable conditions for the presence of centripetal springs without interfering with the compactness of the structure.

I claim as my invention—

1. In a revolving pendulum governor, the combination, substantially as set forth, of a governor spindle, two centrifugal arms carried thereby, an inertia-weight carried by the governor spindle and connected with the centrifugal arms, and a dash-pot connected with the centrifugal arms.

2. In a revolving pendulum governor, the combination, substantially as set forth, of a governor spindle, a pair of centrifugal arms carried thereby on pivots at right angles to the spindle, an inertia-weight carried by the governor spindle, and capable of rotation thereon and rigid arms extending from the inertia-weight into connection with the centrifugal arms.

3. In a revolving pendulum governor, the combination, substantially as set forth, of a governor spindle, a pair of centrifugal arms carried thereby on pivots at right angles to the spindle, an inertia-weight carried by the governor spindle and capable of rotation thereon and connected with the centrifugal arms, and springs arranged to resist the tendency

of the centrifugal arms to move under the influence of centrifugal force.

4. In a revolving pendulum governor, the combination, substantially as set forth, of a governor spindle, a pair of centrifugal arms carried thereby, an inertia-weight carried by the governor spindle and connected with the centrifugal arms, springs arranged to resist the tendency of the centrifugal arms and centrifugal weight to move under the influence of centrifugal force, and a dash-pot connected with the centrifugal arms and resisting their outward motion.

5. In a revolving pendulum governor, the combination, substantially as set forth, of a governor spindle, a pair of centrifugal arms carried thereby, and a pair of compression springs acting inwardly upon said centrifugal arms and having their common axes intersecting the axis of the governor spindle.

6. In a revolving pendulum governor, the combination, substantially as set forth, of a governor spindle, a pair of centrifugal arms pivoted to said spindle and having the form of angular bars extending from their pivots along the governor spindle and then turning outwardly therefrom, and springs arranged to resist the outward motion of the centrifugal arms upon their pivots.

7. In a revolving pendulum governor, the combination, substantially as set forth, of a governor spindle, a pair of centrifugal arms pivoted thereto and extending from their pivots downwardly alongside the governor spindle and having their lower portions extending outwardly at an angle from the spindle, an inertia-weight carried by the spindle and connected with the centrifugal arms, and springs arranged to resist the outward movement of the arms upon their pivots.

8. In a revolving pendulum governor, the combination, substantially as set forth, of a governor spindle, a pair of centrifugal arms carried thereby, an inertia-weight mounted for rotation upon the governor spindle above the pivots of the centrifugal arms, and arms extending from inertia-weight downwardly into connection with the centrifugal arms.

9. In a revolving pendulum governor, the combination, substantially as set forth, of a governor spindle, a pair of centrifugal arms pivoted thereto, a rod extending through the centrifugal arms and the governor spindle, and springs arranged upon the rod to act inwardly upon the centrifugal arms.

10. In a revolving pendulum governor, the combination, substantially as set forth, of a governor spindle, a pair of centrifugal arms carried thereby, a rod extending through the centrifugal arms and the governor spindle, springs arranged upon said rod to resist the outward motion of the centrifugal arms, and buffers upon said rod within said springs to check the outward motion of the centrifugal arms.

11. In a revolving pendulum governor, the

combination, substantially as set forth, of a governor spindle, a pair of centrifugal arms pivoted thereto and having their upper portions extending downwardly alongside the governor spindle and having their lower portions projecting outwardly therefrom, and centripetal acting springs arranged over the outwardly projecting portions of said centrifugal arms and acting upon the upper portions of said arms.

12. In a revolving pendulum governor, the combination, substantially as set forth, of a governor spindle, a pair of centrifugal arms pivoted thereto, an annular piston and cylinder carried concentrically by said governor spindle and forming a dash-pot rotating entire with the spindle, and connections from an appropriate part of said dash-pot to said centrifugal arms.

13. In a revolving pendulum governor, the combination, substantially as set forth, of a governor spindle, a pair of centrifugal arms carried thereby, an annular cylinder fixed to the governor spindle, a sleeve pivoted for sliding motion upon said spindle and forming a piston for said cylinder, and connections from said sleeve to said centrifugal arms.

14. In a revolving pendulum governor the combination substantially as set forth of a governor spindle, an inertia-weight, a pair of centrifugal arms, and studs extending outwardly from said centrifugal arms into articulate engagement with said inertia-weight.

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Witnesses:

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