R. WOLF.

SHAFT GOVERNOR FOR ENGINES.

APPLICATION FILED MAY 16, 1912.

1,038,055. Patented Sept. 10, 1912.

Fig. 1.

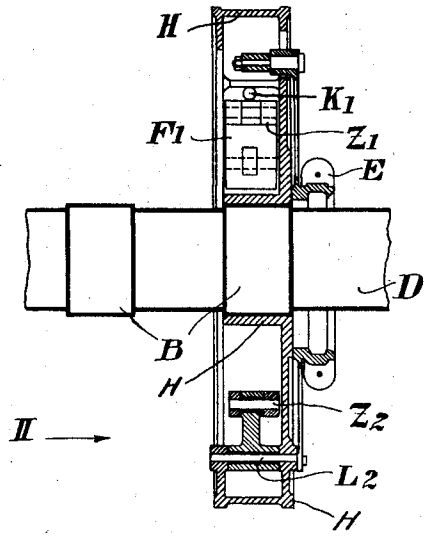
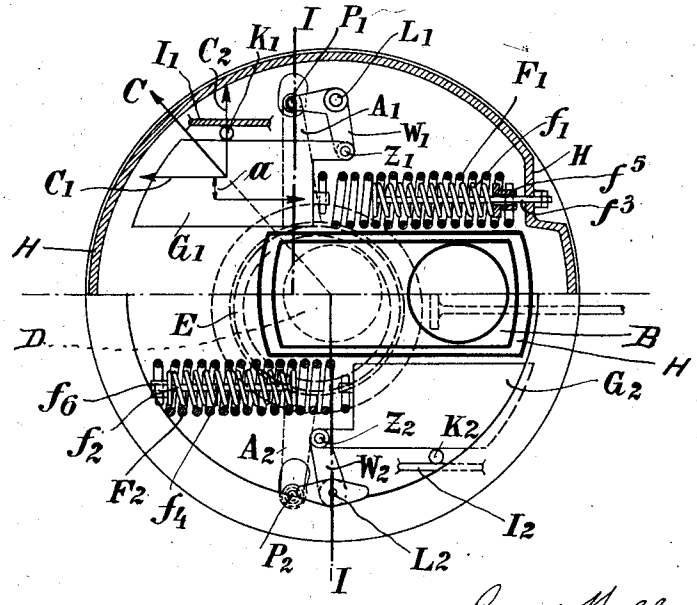


Fig. 2.



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SHAFT-GOVERNOR FOR ENGINES.

1,038,055. Specification of Letters Patent. Patented Sept. 10, 1912.

Application filed May 16, 1912. Serial No. 697,656.

To all whom it may concern:

Be it known that I, RUDOLF WOLF, manufacturer, a citizen of the German Empire, residing at Magdeburg-Buckau, Germany, have invented certain new and useful Improvements in Shaft-Governors for Engines, of which the following is a specification.

My invention relates to improvements in shaft governors for engines, and more particularly to shaft governors which are mounted on one of the crank arms of the crank shaft, and the object of the improvements is to provide a governor of this class which has a large regulating power, and which is compact in construction, it being possible to limit its dimensions so that it shall be not much larger in diameter than the double of the outer radius of the crank arm.

With this and other objects in view my invention consists in arranging the fly balls or bodies and their coöperating springs at opposite sides of the crank arm and with their axes parallel thereto, and in such a way that the fly balls or bodies move under the influence of centrifugal force in a direction parallel to the crank arm.

For the purpose of explaining the invention an example embodying the same has been shown in the accompanying drawing, in which the same letters of reference have been used in all the views to indicate corresponding parts.

In said drawing Figure 1 is a cross-section of the governor taken on line I—I in Fig. 2, and Fig. 2 is a side view thereof seen in direction of the arrow II partly in section.

Referring to the example illustrated in the drawing, the operative parts of the governor are mounted within a frame or casing H in the form of a drum which is secured to one of the crank arms B of the crank shaft D. Within the drum or casing H is a pair of spring-members, one consisting of coil springs F_1, f_1 and the other of coil springs F_2, f_2 each member having one of its ends connected to the casing, and its opposite end to fly balls or bodies G_1, G_2. As shown each of the spring members consists of two sections, viz. an outer section F_1 (and F_2) and an inner section f_1 (and f_2), the inner section being mounted on and secured to a collar f_5 (and f_6) slidable on a stem f_3 (and f_4), and the outer section being connected at one end to the said collar and at the opposite end to the coöperating fly body G_1 (or G_2). The inner ends of the inner springs f_1, f_2 abut against fixed collars on the inner ends of the respective rods f_3 and f_4 and, their rods are affixed to the casing. By thus disposing the spring sections one within the other a compact construction is obtained because the strengthening of the one spring is compensated for by shortening of the other spring. The springs F_1, f_1 and F_2, f_2 are disposed on opposite sides of the crank arm and parallel thereto. The centrifugal forces exerted on the fly bodies G_1 and G_2 act in radial directions, as has been indicated by the letter C, and this force acts by two components C_1 and C_2, the component C_1 being in the direction of the springs F_1, f_1 and F_2, f_2, and the component C_2 being perpendicular thereto. To take up the component C_2 the fly bodies G_1 and G_2 are guided on guide ways I_1 and I_2 respectively, and in order to reduce the friction to a minimum anti-friction rollers or ball bearings K_1 and K_2 are interposed between the fly bodies and their guide ways.

The fly bodies are provided with pivot bolts Z_1, Z_2 by means of which they are connected to bell crank levers W_1, W_2 which are pivotally mounted on the casing H at L_1 and L_2 respectively. The said bell crank levers are connected with the eccentric E by levers A_1, A_2 which are jointed to the bell crank levers at P_1 and P_2. The circular paths of the pivots P_1 and P_2 are congruent with the curve described by the eccentric when being set. The rod E_1 of the eccentric E acts upon the inlet valve of the engine in a manner not shown in the drawings as these parts of the engine can be made in any known way.

In the preferred form of the governor the fly bodies G_1 and G_2 are so mounted relatively to the springs F_1, f_1 and F_2 f_2, that their centers of gravitation are at a slight distance away from the axes of the springs, which distance has been indicated in the drawing by the letter *a*. Thereby the fly bodies exert a pressure on the arms W_1 and

W_2 of the bell crank levers, which pressure is in the direction of the said arms and causes friction in the fulcrums of the bell crank levers sufficient to dampen the reacting forces.

In governors as now constructed the eccentric-rod and the valve stem operating the valve must ordinarily be connected by means of a rocker or the like. In my improved construction such members for transmitting the movements of the eccentric laterally are entirely dispensed with, because the slide or other valve (not shown) may be located within the central plane of the eccentric.

Having now particularly described and ascertained the nature of my said invention and in what manner the same is to be performed, I declare that what I claim is:—

1. In a governor for steam engines, the combination with a shaft having a crank arm, of a casing mounted on said crank arm, a pair of coil spring members each attached at one end to a relatively fixed part of the casing and disposed upon opposite sides of and parallel with the crank arm, a fly body coöperating with each of said spring members, means adapted to guide said fly body in a direction substantially parallel to the crank arm, and means adapted to operatively connect said fly body with the mechanism for controlling the engine.

2. In a governor for steam engines, the combination with a shaft having a crank arm, of a casing mounted on said crank arm, a pair of coil spring members each attached at one end to a relatively fixed part of the casing and disposed upon opposite sides of and parallel with the crank arm, a fly body coöperating with each of said spring members, means adapted to guide said fly body in a direction substantially parallel to the crank arm, and means adapted to operatively connect said fly body with the mechanism for controlling the engine, said guiding means embodying an anti-friction bearing.

3. In a governor for steam engines, the combination with a shaft having a crank arm, of a casing mounted on said crank arm, a pair of coil spring members each attached at one end to a relatively fixed part of the casing and disposed upon opposite sides of and parallel with the crank arm, a fly body coöperating with each of said spring members, means adapted to guide said fly body in a direction substantially parallel to the crank arm, and means adapted to operatively connect said fly body with the mechanism for controlling the engine each of said fly bodies having its center of gravitation at a distance away from the axis of its coil spring member, and said means for connecting the fly bodies with the engine controlling mechanism each embodying a lever having one of its arms pivoted to said fly body and disposed substantially in the direction of force caused by the location of the fly body away from the axis of the spring.

4. In a speed governor, the combination with a casing and a fly body, of a coiled spring member coöperating with said fly body and constructed in two sections disposed one within the other and connected at one of their ends with each other and with the opposite ends respectively to the fly body and to a relatively fixed part of said casing.

5. In a speed governor, the combination with a casing and a fly body, of a coiled spring member coöperating with said fly body and constructed in two sections disposed one within the other, a stem passing through said spring sections and secured to a relatively fixed part of said casing, and a sleeve slidably mounted on said stem, said spring sections having one of their ends connected to said sleeve and their opposite ends respectively to said stem and to the fly body.

6. In a speed governor for engines and other purposes, the combination with a frame or casing adapted to be mounted on a crank arm, of two spring members secured at one of their ends to relatively fixed parts and respectively disposed when the governor is mounted on the crank arm at the opposite sides of and parallel to the crank arm, fly bodies coöperating with said spring members, means to guide said fly bodies in a direction parallel to the crank arms, and means adapted to operatively connect said fly bodies with the mechanism for controlling the engine.

7. In a speed governor for engines and other purposes, the combination with a frame or casing adapted to be mounted on a crank arm, of two spring members secured at one of their ends to relatively fixed parts of the casing and respectively disposed when the governor is mounted on the crank arm at the opposite sides of and parallel to the crank arm, fly bodies coöperating with said springs, means including antifriction bearings to guide said fly bodies in a direction parallel to the crank arms, and means adapted to operatively connect said fly bodies with the mechanism for controlling the engine.

8. In a speed governor for engines and other purposes, the combination with a frame or casing adapted to be mounted on a crank arm, of two spring members secured at one of their ends to relatively fixed parts of the casing and respectively disposed when the governor is mounted on the crank arm at the opposite sides of and parallel to the crank arm, fly bodies coöperating with said springs and located with their centers of gravitation respectively at a distance away from the axis of said spring members, means to guide said fly bodies in a direction parallel to the crank arms, and means adapted to

operatively connect said fly bodies with the mechanism for controlling the engine, said means comprising levers respectively jointed to said fly bodies and disposed substantially in the direction of the forces caused by the location of the fly bodies away from the axes of the springs.

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

RUDOLF WOLF.

Witnesses:
GUSTAV KRASPER,
OTTOVON SZCYCPAURKS.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."