C. P. HALL.

CENTRIFUGAL GOVERNOR.

APPLICATION FILED MAR. 23, 1908.

942,900. Patented Dec. 14, 1909.

Fig. 1.

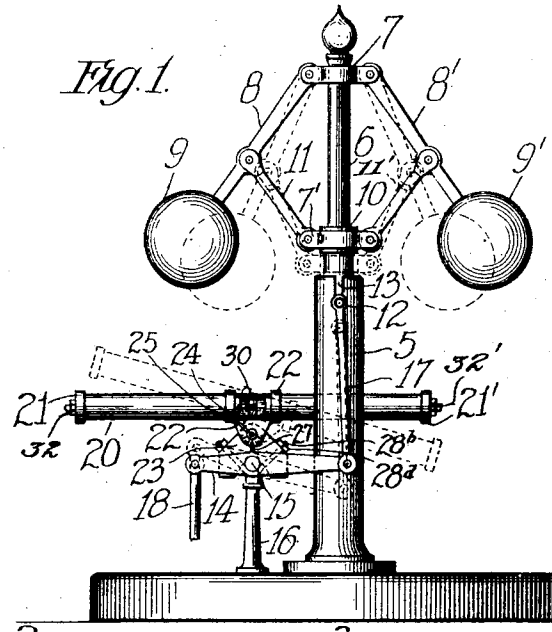


Fig. 2.

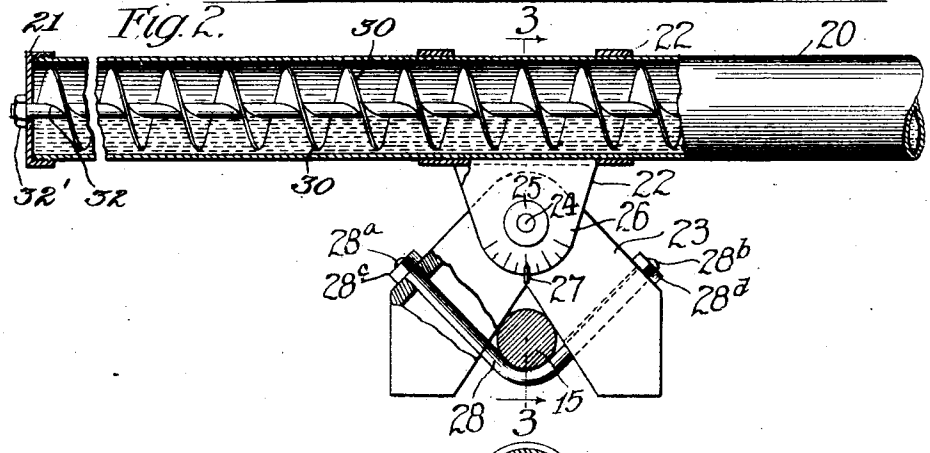
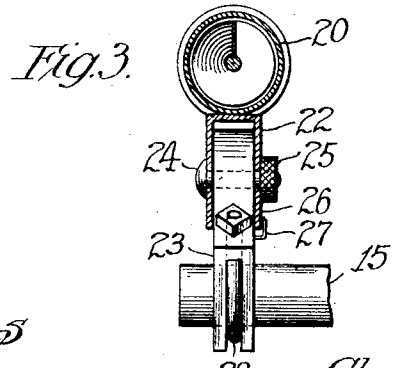


Fig. 3.



Witnesses
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CENTRIFUGAL GOVERNOR.

942,900. Specification of Letters Patent. Patented Dec. 14, 1909.

Application filed March 23, 1908. Serial No. 422,638.

To all whom it may concern:

Be it known that I, CHESTER P. HALL, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Centrifugal Governors, of which the following is a specification.

My invention relates to improvements in centrifugal governors.

One of the objects of my invention is to provide an auxiliary regulating means for centrifugal governors, of the usual fly ball type, whereby said governor is caused to act promptly and positively at any desired critical point within its scope at which there is a change of velocity or tendency to change velocity of the motor associated with said governor, and before said change of velocity shall effect a material difference of speed of said motor.

Other objects of my invention will become apparent to persons skilled in the art from a consideration of the specification taken in conjunction with the drawing, in which;

Figure 1 is an elevation of an ordinary fly ball, centrifugal governor with my attachment applied; Fig. 2 is an enlarged fragmentary detail, part of which is shown in longitudinal section; Fig. 3 is a cross sectional view taken on line 3—3 of Fig. 2.

In all of the views the same reference characters indicate similar parts.

A hollow column, or pillar 5, affords support for the governor mechanism within which the driven spindle 6 is adapted to be rotated by the motor, the speed of which the governor is designed to control by varying the motive fluid supply thereto. A cross bar 7 is fixed to the upper end of the spindle 6, to the extremities of which are freely pivoted the centrifugally responsive weighted arms 8, 8′ respectively. Said arms carry on their free extremities the weights 9 and 9′ respectively. A cross-bar 7′ surrounds the upper end of the sleeve 10, being loosely fitted in a groove therein to permit free rotation of said cross bar thereon. The sleeve 10 has free vertical sliding movement on the spindle 6 and within the pillar 5. Connecting links 11 and 11′ are freely pivoted to the ends of the cross bar 7′ and to the respective arms 8 and 8′. A pin 12 is attached to the sleeve 10 and projects through the slot 13 made in the upper end of the pillar 5. A lever 14 is secured to the shaft 15, which has oscillating movement within bearings upon the pillar 16. A link 17 is freely pivoted to the lever 14 and to the pin 12, the other end of the lever 14 being pivoted to the valve-actuating rod 18.

When the governor, thus far described, and which by the way forms no part of my invention, is at rest the position of the parts is shown in dotted lines. When the motor with which this governor is associated is running at the speed which it is desirable to maintain constant, the parts of the governor will occupy practically the positions shown in full lines. The control of speed of the motor is ultimately attained, through the instrumentality of the governor, by the change of position of the fly ball weights 9 and 9′.

After the balls have assumed a position, such as indicated in full lines, and the motor is operating at a speed which it is desirable to maintain constant, under all conditions of load, it is well known that, before the governor can overcome its own inertia or momentum and act to vary the supply of motive fluid, considerable variation of speed has been effected by the motor. It is to hasten the action or prevent delay in the operation of the governor parts that my device is designed to accomplish. This is done by producing a positive action of the parts that effect the regulating functions of the governor at a critical period, so that the governor is caused to act powerfully and positively within small limits of its range before any material variation of the velocity, or of the speed of the controlled motor has taken place.

The ordinary fly-ball governor is subject to variations of centrifugal effect due to change of velocity, the balls flying out, as shown in full lines in Fig. 1, upon the occasion of an increase of velocity, and returning to normal positions upon a decrease of velocity. If an additional weight could be applied temporarily, as required, to assist the balls through the effect of gravity to move them in either direction, only when they have been moved to abnormal positions, and to return them to normal position the governor would thus be caused to operate more positively and with greater celerity at the desired critical time. On the shaft 15 I place, in the illustration shown, my device for accomplishing the results to which I have heretofore referred.

A tube 20, preferably composed of iron or glass, closed at both ends, as by caps 21

and 21′, is secured at or near its center to a bracket 22. This bracket is pivotally connected and frictionally secured to a bifurcated, triangular supporting part 23, as by the bolt 24 and the thumb nut 25. The lower part of the bracket is provided with a scale, adjacent a fixed mark or pointer 27 secured to the part 23. An angular-shaped bolt 28 is provided with threaded ends 28^a and 28^b which, with the nuts 28^c and 28^d, in conjunction with the angle pieces 23 provides a convenient means of securing the stationary angle piece 23 firmly in contact with the shaft 15. The tube 20 and bracket 22 may be freely moved about the axis afforded by the bolt 24 and securely fixed in any desired position by the clamping thumb nut 25.

A series of continuous baffles comprising in the specific illustration shown, spirally arranged walls 30, around an axially arranged rod 32 secured to the ends 21, 21′ by nuts 32′ is located within the tube 20. The baffle plates are a trifle smaller in diameter than the interior of the tube. The tube 20 contains mercury 31, being preferably about half full. The series of continuous baffles prevent the mercury from suddenly rushing from one end to the other of the tube or of any compartment thereof, when the tube is slightly and suddenly inclined, but permit the mercury to slowly shift from end to end, thus avoiding "chugging" or any spasmodic action causing "hunting" or "racing" of the motor or engine with which the governor is associated.

After the motor or engine is started the fly-balls of the governor assume substantially the positions indicated in full lines at the time when the desired speed is reached, at which time, it will be noted that the tube 20 occupies substantially a horizontal or balanced position. A slight variation from this position will shift the weight of the tube 20 in a direction to assist the balls in whichever direction they have been moved as a result of changed velocity. When the balls are about to change position, due to a change in velocity of the engine, they move slowly, but a slight movement thereof will produce an inclination of the tube sufficient to cause the mercury to flow therein toward the end of the tube which will hasten the movement of the balls by the added weight of the mercury. The series of continuous baffles permits the mercury to slowly move through the obstacles and to attain a level top surface distributing the weight substantially in proportion to the angle of inclination and to admit all of the mercury to either end of the tube when the tube has been inclined to a greater or less degree. The scale and pointer 26 and 27 provide means for preserving the desired position of the tube when it has been removed and replaced, and the joint at this point, the axis afforded by the screw and nut 24 and 25, provides a means for adjusting the inclination of the tube to coincide with the adjustment of the governor. The attachment for securing the device to the shaft 15 affords an adjustable means that may be varied to compensate for governor shafts of varying diameters.

Having thus described my invention, what I claim and desire to secure by Letters Patent, is:

1. An attachment for centrifugal governors, comprising a tube closed at both ends, a spiral baffle-means, and a mobile mass within the tube.

2. In a device of the character described, the tube 20, provided with interior baffles and a mobile mass, the bracket 22 provided with a scale 26, to which said tube is secured, a bifurcated angle-piece 23, adjustably secured to said bracket, and a bolt 28 for securing the device to a shaft.

In testimony whereof I hereunto set my hand in the presence of two witnesses.

CHESTER P. HALL.

In the presence of—
FOREÉ BAIN,
MARY F. ALLEN.