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H. J. HERSHEY
CENTRIFUGAL GOVERNOR

3,080,020

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FIG. 1

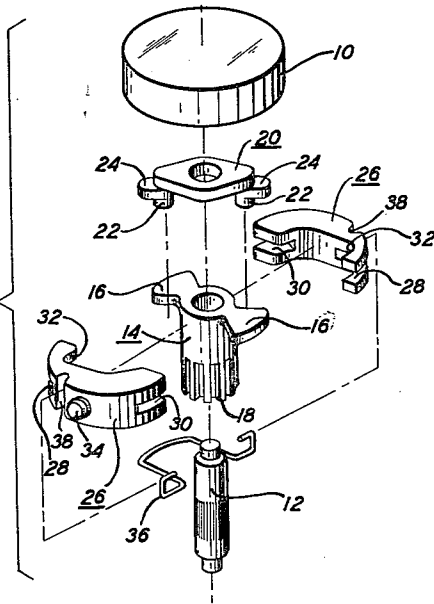


FIG. 2

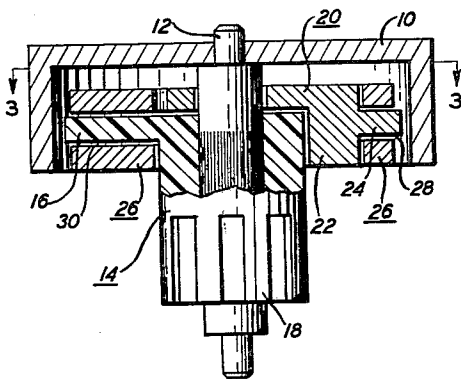
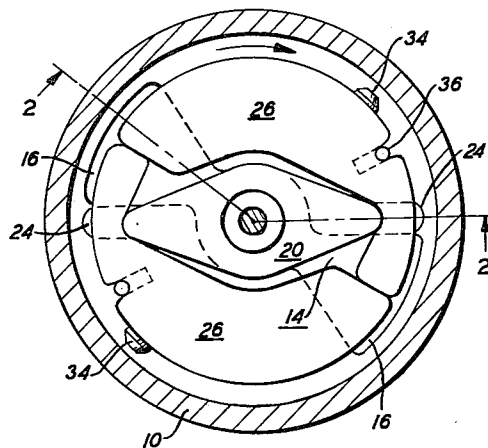


FIG. 3



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CENTRIFUGAL GOVERNOR

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12 Claims. (Cl. 188—184)

This invention relates to speed regulating devices and particularly to frictionally retarded centrifugal governors of the type used in telephone dials.

Recently, interest has been shown in incorporating the telephone dial into the handset of the telephone set rather than including it in the base. The introduction of the dial into the handset raises two requirements with regard to the governor that are not encountered when the dial is situated in the base. First, the dial when adapted for use in a handset must be reduced in size so as to permit its accommodation in the handset without making the handset unduly cumbersome to handle. As one of the components of the dial, it is necessary that the governor also be reduced in size. Secondly, the telephone handset is portable and, therefore, the dial when part of the handset will be subject to operation while oriented in all conceivable positions with respect to the force of gravity and even while changes in position are occurring. It is therefore necessary that the governor be able to provide uniform speed control no matter what its orientation is with respect to gravity and while changes in that orientation are taking place.

An object of this invention is to provide a governor that meets both of the above requirements while providing a high standard of speed control.

Particularly, an object of this invention is to provide a governor that lends itself to miniaturization.

Another object of this invention is to provide a governor that provides the same high standard of speed control no matter which position it is operated from and even while changing position.

These and other objects of this invention are achieved in an illustrative embodiment thereof wherein the governor comprises a stationary cup shaped casing having a shaft journaled therein. Fixedly secured to the shaft is a drive bar having flaring ends, and rotatively mounted on the shaft adjacent to the drive bar is a fly bar having tapering ends and tabs extending from the tapering ends. A pair of arcuate weights pivot about the fly bar, each weight having a notch formed on the inside surface thereof for accommodating one of the tapering ends of the fly bar. Each weight has a slot in each end thereof for accommodating portions of the flaring ends of the drive bar and the weights are in this way supported by the drive bar. Furthermore one slot in each weight also accommodates one of the tabs of the fly bar, and the fly bar is in this way supported by the weights. The outside surfaces of the weights are provided with studs for frictionally engaging the inner wall of the casing in response to torque and centrifugal force, while a spring biases the weights toward each other to restrain the outward movement of the weights.

A feature of this invention resides in using a minimum of components and interlocking the components so as to permit miniaturization of the governor.

Another feature of this invention resides in supporting

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each weight at both of its ends so as to prevent the weights from sagging, the sagging of the weights leading to changes in performance of the governor with changes in the position of the governor with respect to gravity.

A complete understanding of the invention and of these and other features and advantages thereof may be gained from consideration of the following detailed description taken in conjunction with the accompanying drawing wherein one embodiment of the invention is illustrated. It is to be expressly understood, however, that the drawing is for the purposes of illustration and description and is not to be construed as defining the limits of the invention.

In the drawing:

FIG. 1 is an exploded perspective view of the governor of this invention;

FIG. 2 is a side view partly in section taken along line 2—2 of FIG. 3; and

FIG. 3 is a cross-sectional view taken along line 3—3 of FIG. 2.

Referring now to the drawing, the governor comprises a cup shaped housing or casing 10 having a substantially cylindrical inner wall. A shaft 12 coaxially disposed with respect to the inner wall is rotatively mounted in the base of the housing, and fixedly secured to the shaft is a drive bar member 14. The upper end of the drive bar member is provided with opposed radially extending fan shaped arms or ends 16 while the lower end advantageously includes integral thereto a pinion 18. The pinion in conjunction with a gear train, not shown, serves to operatively connect the drive bar to a rotation imparting source, not shown, such as a gear driven by the finger wheel of a rotary telephone dial.

Rotatively mounted on the shaft 12 is a diamond shaped fly bar member 20 having tapering arms or ends. The tapering arms of the fly bar member have bosses 22 depending therefrom and tabs 24 projecting outwardly from the bosses along the longitudinal axis of the fly bar. The fly bar member is positioned on top of the drive bar member 14 with the bosses 22 and tabs 24 on opposite sides of and contiguous to the fan shaped arms 16. The tabs 24 are approximately the same height as the arms 16 and when so positioned lie in approximately the same plane as the arms.

The fan shaped arms 16 of the drive bar member 14 support and, as hereinafter described in greater detail, impart torque to a pair of arcuate weights 26. Each weight is provided with a slot 28 in one end thereof and a slot 30 in the other end thereof, the plane of the slots extending substantially parallel to the plane of the weights. The slot 28 of each weight accommodates an individual tab 24 of the fly bar member 20 and a portion of one of the fan shaped arms 16 of the drive bar member 14, the tab 24 being intermediate the end of the slot 28 and the arm 16. The slot 30 of each weight accommodates a remaining portion of one of the fan shaped arms. In this manner, the weights 26 are supported at both ends by the arms 16 of the drive bar member 14, and the weights in turn support and secure the fly bar member 20.

A notch 32, which is formed in the inside surface of each weight 26 a short distance from the end of the weight including the slot 28, accommodates an individual tapering arm and an individual boss 22 of the fly bar member

20. The notch, tapering arm, and boss cooperate to provide a fulcrum about which the weight pivots, the end of the weight including the slot 30 moving outward due to torque and centrifugal force as hereinafter explained.

A friction stud 34 is mounted in the outside surface of each weight 26 between the fulcrum and the outwardly moving end. The studs project beyond the outside surfaces of the weights and frictionally engage the inner wall of the housing 10 when the weights pivot outwardly. A spring member 36 having its ends seated in apertured recesses 38 in the outside surfaces of the weights opposes the outward movement of the weights, the spring member biasing the weights toward one another and thereby acting to maintain the friction studs out of engagement with the inner wall of the housing.

In the operation of the governor, the drive bar member 14 is rotated in a clockwise direction by a rotation imparting source, and torque is applied by the fan shaped arm 16 of the drive bar member to the weights 26, the arms impinging against the ends of the weights including the slot 30. The weights, in turn, apply torque to the fly bar member 20, the end of the weights including the slots 28 impinging against the tabs 24 of the fly bar member. The weights and the fly bar member, which are not secured to the shaft 12, are in this manner caused to rotate.

The torque applied by the arms 16 of the drive bar member 14 to the weights 26, not only causes the weights to rotate, but also tends to pivot the weights about the tapering arms and bosses 22 of the fly bar member 20. In addition, centrifugal force, which acts through the center of gravity of the weights radially from the turning center of the shaft 12, also tends to pivot the weights outwardly. Both of these forces are opposed by the spring member 36, which biases the weights toward each other. Thus only when the components of the torque and centrifugal force tending to pivot the weights outwardly exceed the biasing force of the spring member, does pivoting commence. The outward movement of the weights continues until the friction studs 34 mounted in the outside surfaces thereof engage the inner wall of the housing 10. The friction resulting therefrom acts to retard the rotation of the drive bar member, which in turn, acts to retard the rotation imparting source to which it is coupled. The governor gradually decelerates until the input torque to the governor is balanced by the stud to housing frictional loss, and the governor shaft 12 thereafter rotates at a substantially constant speed.

The speed at which the governor stabilizes is dependent upon the friction between the studs and the housing, the magnitude of the driving torque, and the tension to which the spring 36 is adjusted. This speed consequently may be varied by varying any one of these parameters. The first two parameters, however, are usually not variable once the governor is assembled, and therefore adjustment of the speed after assembly is generally achieved by varying the last parameter, the tension of the spring.

What is claimed is:

1. A centrifugal governor comprising:

- a shaft;
- a drive bar member secured to the shaft, the drive bar member having arms;
- a fly bar member rotatable about the shaft, the fly bar member having arms;
- a pair of weights, each of which pivots about an arm of the fly bar member and each of which has a slot for accommodating each arm of the drive bar member, the weights being supported by the arms of the drive bar member;
- a wall disposed about the weights;
- means extending beyond the outer surface of the weights for engaging the wall in response to torque and centrifugal force;

and spring means for restraining outward pivoting of the weights.

2. A centrifugal governor comprising:

- a shaft;
- a drive bar member secured to the shaft, the drive bar member having arms;
- a fly bar member rotatable about the shaft, the fly bar member having arms;
- a pair of weights, each of which has a notched inner surface for accommodating one of the arms of the fly bar member and each of which has a slot for accommodating each arm of the drive bar member, each weight pivoting about the fly bar member and being supported by the drive bar member;
- a wall disposed about the weights;
- means extending beyond the outer surface of the weights for engaging the wall in response to torque and centrifugal force;
- and spring means for restraining outward pivoting of the weights.

3. A centrifugal governor comprising:

- a shaft;
- a drive bar member secured to the shaft, the drive bar member having a pair of radially extending arms;
- a fly bar member rotatable about the shaft, the fly bar member having a pair of radially extending arms;
- a pair of weights, each of which has a notched inner surface and a slot formed in each end thereof, the notched inner surface of each weight accommodating one of the radially extending arms of the fly bar member, the weight pivoting thereabout, and the slots of each weight accommodating both of the radially extending arms of the drive bar member, the weight being supported thereby;
- a wall disposed about the weights;
- means extending beyond the outer surface of the weights for engaging the wall in response to torque and centrifugal force;
- and spring means for restraining outward pivoting of the weights.

4. A centrifugal governor comprising:

- a shaft;
- a drive bar member secured to the shaft, the drive bar member having a pair of radially extending arms;
- a fly bar member rotatable about the shaft, the fly bar member having a pair of radially extending arms;
- a pair of weights, each of which has a notched inner surface and a slot formed in each end thereof, the plane of the slots extending generally parallel to the plane of the weights, the notched inner surface of each weight accommodating one of the radially extending arms of the fly bar member, the weight pivoting thereabout, and the slots of each weight accommodating both of the radially extending arms of the drive bar member, the weight being supported thereby;
- a wall disposed about the weights;
- means extending beyond the outer surface of the weights for engaging the wall in response to torque and centrifugal force;
- and spring means for restraining outward pivoting of the weights.

5. A centrifugal governor comprising:

- a shaft;
- a drive bar member secured to the shaft, the drive bar member having flaring ends;
- a fly bar member rotatable about the shaft, the fly bar member having tapering ends;
- a pair of weights, each of which has a notched inner surface and a slot formed in each end thereof, the plane of the slots extending generally parallel to the plane of the weights, the notched inner surface of each weight accommodating one of the tapering ends of the fly bar member, the weight pivoting thereabout, and the slots of each weight accommodating

the flaring ends of the drive bar member, the weight being supported thereby;
 a wall disposed about the weights;
 means extending beyond the outer surface of the weights for engaging the wall in response to torque and centrifugal force;
 and spring means for restraining outward pivoting of the weights.

6. A centrifugal governor comprising:
 a shaft;
 a drive bar member secured to the shaft, the drive bar member having flaring ends;
 a fly bar member rotatable about the shaft, the fly bar member having tapering ends;
 a pair of arcuately shaped weights, each of which has a notched inner surface and a slot formed in each end thereof, the plane of the slots extending generally parallel to the plane of the weights, the notched inner surface of each weight accommodating one of the tapering ends of the fly bar member, the weight pivoting thereabout, and the slots of each weight accommodating the flaring ends of the drive bar member, the weight being supported thereby;
 a wall disposed about the weights;
 means extending beyond the outer surface of the weights for engaging the wall in response to torque and centrifugal force;
 and spring means for restraining outward pivoting of the weights.

7. A centrifugal governor comprising:
 a shaft;
 a drive bar member secured to the shaft, the drive bar member having a pair of opposed, radially extending, flaring arms;
 a fly bar member rotatable about the shaft, the fly bar member having a pair of opposed, radially extending, tapering arms;
 a pair of arcuately shaped weights, each of which has a notched inner surface and a slot formed in each end thereof, the plane of the slots extending generally parallel to the plane of the weights, the notched inner surface of each weight accommodating one of the tapering arms of the fly bar member, the weight pivoting thereabout, and the slots of each weight accommodating both the flaring arms of the drive bar member, the weight being supported thereby;
 a wall disposed about the weights;
 means extending beyond the outer surface of the weights for engaging the wall in response to torque and centrifugal force;
 and spring means for restraining outward pivoting of the weights.

8. A centrifugal governor comprising:
 a shaft;
 a drive bar member secured to the shaft, the drive bar member having a pair of opposed, radially extending, flaring arms;
 a fly bar member rotatable about the shaft, the fly bar member having a pair of opposed, radially extending, tapering arms and a tab extending from each arm;
 a pair of arcuately shaped weights, each of which has a notched inner surface and a slot formed in each end thereof, the plane of the slots extending generally parallel to the plane of the weights, both the slots of each weight accommodating the flaring arms of the drive bar member, the weight being supported thereby, one of the slots of each weight accommodating one of the tabs of the fly bar member, the weights in this manner supporting the fly bar member, and the notched inner surface of each weight accommodating one of the tapering arms of the fly bar member, the weight pivoting thereabout;
 a wall disposed about the weights;
 means extending beyond the outer surface of the weights

for engaging the wall in response to torque and centrifugal force;
 and spring means for restraining outward pivoting of the weights.

9. A centrifugal governor comprising:
 a shaft;
 a drive bar member secured to the shaft, the drive bar member having a pair of opposed, radially extending, fan shaped arms;
 a fly bar member rotatable about the shaft, the fly bar member having a pair of opposed, radially extending, tapering arms and a tab extending from each arm;
 a pair of arcuately shaped weights, each of which has a notched inner surface and a slot formed in each end thereof, the plane of the slots extending generally parallel to the plane of the weights, both the slots of each weight accommodating the fan shaped arms of the drive bar member, the weight being supported thereby, one of the slots of each weight accommodating one of the tabs of the fly bar member, the weights in this manner supporting the fly bar member, and the notched inner surface of each weight accommodating one of the tapering arms of the fly bar member, the weight pivoting thereabout;
 a stationary wall disposed about the weights;
 means extending beyond the outer surface of the weights for frictionally engaging the wall in response to torque and centrifugal force;
 and spring means for restraining outward pivoting of the weights.

10. A centrifugal governor comprising:
 a stationary cup shaped housing having substantially cylindrical inner wall;
 a shaft coaxially disposed with respect to the inner wall, the shaft being rotatively mounted in the housing;
 a drive bar member secured to the shaft, the drive bar member having a pair of opposed, radially extending, fan shaped arms;
 a fly bar member rotatable about the shaft, the fly bar member having a pair of opposed, radially extending, tapering arms, a boss depending from each arm, and a tab extending from each boss;
 a pair of arcuately shaped weights, each of which has a notched inner surface and a slot formed in each end thereof, the plane of the slots extending generally parallel to the plane of the weights, both the slots of each weight accommodating the fan shaped arms of the drive bar member, the weight being supported thereby, one of the slots of each weight accommodating one of the tabs of the fly bar member, the weights in this manner supporting the fly bar member, and the notched inner surface of each weight accommodating one of the tapering arms and the boss depending therefrom of the fly bar member, the weight pivoting thereabout;
 a stud mounted on the outer surface of each weight, the stud extending beyond the outer surface for frictionally engaging the inner wall of the housing in response to torque and centrifugal force;
 and spring means for restraining outward pivoting of the weights.

11. A centrifugal governor comprising:
 a shaft;
 a drive bar member secured to the shaft, the drive bar member having arms;
 a fly bar member rotatable about the shaft, the fly bar member having arms;
 a pair of weights, each of which pivots about an arm of the fly bar member and each of which has a slot for accommodating each arm of the drive bar member, the weights being supported by the arms of the drive bar member;
 a wall disposed about the weights in such position that at least a portion of the outer surface of each of the

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weights is capable of engaging the wall in response to torque and centrifugal force acting on the weights; and spring means for restraining outward pivoting of the weights.

12. A centrifugal governor comprising:
a shaft;

a drive bar member secured to the shaft, the drive bar member having arms;

a fly bar member rotatable about the shaft, the fly bar member having arms;

a pair of weights, each of which pivots about an arm

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of the fly bar member and each of which has a slot for accommodating each arm of the drive bar member, the weights being supported by the arms of the drive bar member;

a wall disposed about the weights, the weights having means for engaging the wall in response to torque and centrifugal force;

and spring means for restraining outward pivoting of the weights.

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No references cited.