Dec. 25, 1956 W. H. HARSTICK 2,775,665

CENTRIFUGAL SPEED GOVERNOR

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FIG. 2.

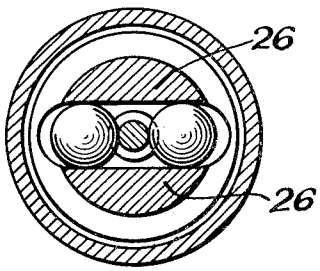


FIG. 1.

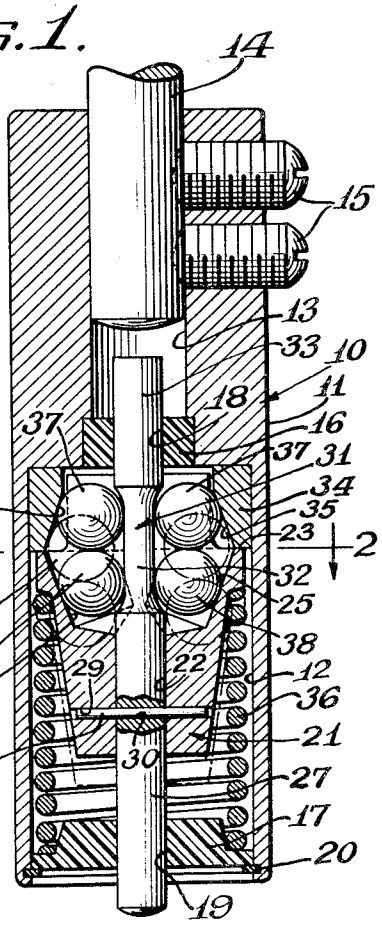
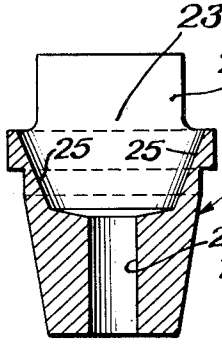


FIG. 3.



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Fig. 5.

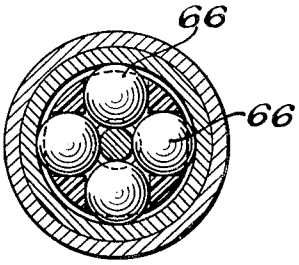


Fig. 4.

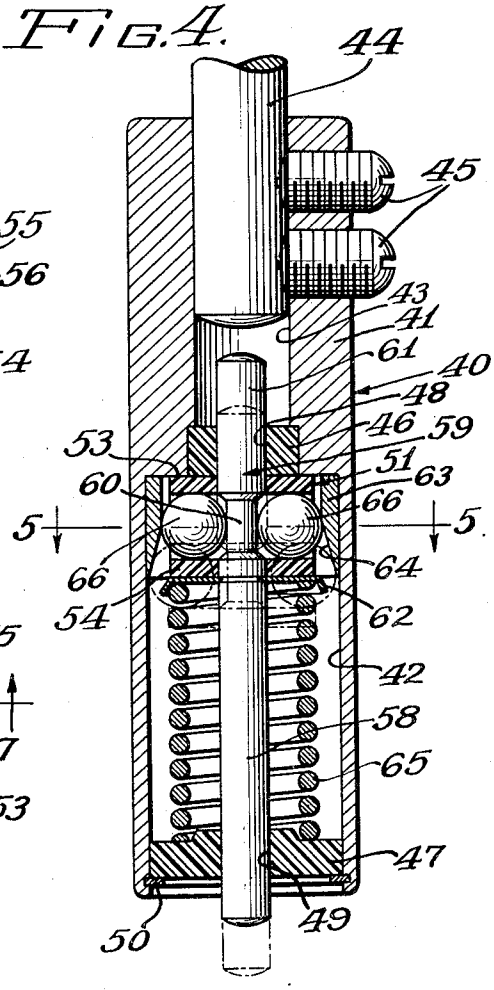


Fig. 7.

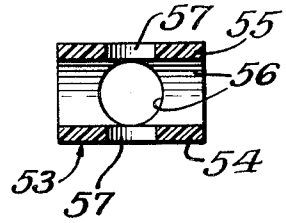
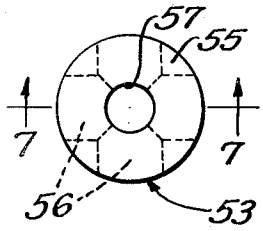


Fig. 6.



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CENTRIFUGAL SPEED GOVERNOR

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Application April 11, 1955, Serial No. 500,625

6 Claims. (Cl. 200—80)

This invention relates to speed governors. More particularly the invention relates particularly to speed governors for governing the speed of electrical power units by interrupting the current flow at a predetermined speed.

It is a prime object of this invention to provide an improved speed governor particularly adapted for use with electrical power units.

A still further object is to provide a centrifugal governor having centrifugally actuated elements adapted to move an actuating member, the said elements being particularly sensitive to speed variations in a high-speed electrical motor.

A still further object is to provide an improved centrifugal governor for electric motors, the said governor including governor actuating elements adapted to move in response to the centrifugal force with a minimum of friction with respect to the surrounding structure.

These and other objects will become further apparent from a reading of the specification when examined in connection with the accompanying sheets of drawings.

In the drawings:

Figure 1 is a cross sectional view through a speed governor,

Figure 2 is a cross sectional view through a speed governor taken particularly along the line 2—2 of Figure 1,

Figure 3 is a cross sectional view through an actuating member or element of a speed governor,

Figure 4 is a cross sectional view through a modified type of speed governor,

Figure 5 is a cross sectional view taken substantially along the line 5—5 of Figure 4,

Figure 6 is a detailed view of an actuating member, and

Figure 7 is a cross sectional view taken along the line 7—7 of Figure 6.

Referring now particularly to Figures 1, 2 and 3, a speed governor is generally designated by the reference character 10. The speed govenor 10 comprises a casing 11 having a governor chamber 12. The casing 11 is also provided with an axially extending bore 13. The bore 13 is adapted to receive a drive element 14 and the casing is rigidly connected to said drive element by means of set screws 15. The drive element 14 generally may be part of an electric motor (not shown) which is to be governed by the speed governor 10.

A plastic guide member 16 is positioned in the lower end of the bore 13. Another plastic guide member 17 is positioned in the lower end of the governor chamber 12 as indicated. The plastic guide member 16 includes a bore 18 and the plastic guide member 17 includes a bore 19. The plastic guide member 17 is suitably held on the casing 11 by means of a retainer ring 20.

An actuating member generally designated by the reference character 21 is positioned for reciprocation within

the governor chamber 12. The actuating member 21 is provided with a bore 22 as best shown in Figure 3. The member 21 also includes a flat upper surface 23 having therein a recess 24 extending laterally across the said actuating member 21 and longitudinally therein. The recess 24 is provided with oppositely disposed tapering walls 25. The walls 25, as best indicated in Figures 1 and 3, taper downwardly and inwardly with respect to the upper surface 23. The actuating member 21 also includes a pair of laterally spaced projecting ears 26.

A plunger or contact element 27 is positioned within the bore 22, the said element 27 being rigidly secured to the actuating member 21 for reciprocation therewith. The contact element 27 is connected by means of a pin 28 which extends transversely in the bore 29 provided in the member 21 and also extends through a bore 30 provided in the contact element 27.

The contact element 27 includes an extension 31 which is provided with a reduced sectional portion 32 and an upper or end portion 33. The lower portion of the plunger 27 is slidably positioned within the bore 19 of the plastic guide member 17. The end portion 33 is slidably positioned within the bore 18 of the plastic guide member 16.

A sleeve or annular insert 34 is connected within the chamber 12 to the casing 11. The insert 34 includes a pair of inner tapering walls 35 positioned in opposed relation. The walls 35 taper upwardly and inwardly in an opposite direction to the walls 25 as indicated. A spring 36 normally urges the actuating member 21 in a first or upward direction, so that the actuating member 21 is normally in abutment with the insert 34. A pair of upper spherical members 37 are positioned on opposite sides of the reduced sectional portion 32. The upper spherical members 37 are in engagement with the tapering walls 35. A pair of lower laterally spaced spherical members 38 are in rolling or sliding engagement relative to the tapering walls 25. Each of the upper spherical members 37 is also in contact or in engagement with the lower spherical members 38.

In the operation the speed governor 10 is suitably connected to the drive element 14 of an electric motor as indicated. The contact element or plunger 27 has its ends positioned in proximity to a switch (not shown) which may be actuated upon movement of the contact element 27 upwardly from the casing 11 to open said switch and thereby cut off the current flow to the electric motor thus reducing the speed of the same. During high speeds of rotation the spherical members 37 and 38 will move or roll outwardly on the walls 25 and 35. This movement in response to the high speed of rotation of the casing results in the centrifugal outward movement of the said spherical members thus causing the actuating member 21 to be forced downwardly against the action of the spring 36. Thus the plunger 27 is also moved downwardly or outwardly from the casing effecting the desired engagement with a switch for opening the same to reduce the current supply to the motor and effectively decrease the speed of the same. As the spherical members 37 move outwardly on the walls 35 the spherical members 38 also have a tendency to be moved laterally outwardly and in view of the tapering shape of the walls 25 the actuating member 21 is moved downwardly as indicated.

A modified type of speed governor is shown in Figures 4 through 7. The speed governor herein shown is generally designated by the reference character 40. The governor 40 includes a casing 41 having a governor chamber 42. The casing 11 also includes a bore 43 which receives a drive element 44 suitably connected to the casing 11 by set screws 45. A plastic guide mem-

ber 46 is positioned at the lower end of the bore 43. Likewise a plastic guide element 47 is positioned at the lower end of the casing 11. The plastic guide member 46 includes a bore 48 and the plastic guide member 47 includes a bore 49. The guide member 47 is suitably held in position on the casing 11 by means of a retainer ring 50.

An actuating member is generally designated by the reference character 51. This actuating member 51 is particularly well shown in Figures 4, 6 and 7. The actuating member 51 comprises a disc 53, the said disc 53 being bored out to provide a pair of vertically spaced members 54 and 55. The members 54 and 55 define a plurality of passages 56. Aligned openings 57 are provided in the members 54 and 55. The disc 53 is made of a plastic material and a plunger or contact element 58 extends through the openings 57. The plunger or contact element 58 includes an extension 59 having a reduced sectional portion 60 and an end portion 61. The lower end of the plunger or contact element 58 is slidably positioned in the plastic guide member 47 and the end portion 61 is slidably positioned in the plastic guide member 46. A lock disc 62 suitably connects the disc 53 to the plunger 58 so that downward movement of the disc 53 is imparted to said plunger.

An annular insert or sleeve 63 is secured within the chamber 42. The insert 63 is provided with a continuous or annular wall portion 64 of conical or tapering shape. The wall portion 64 tapers outwardly in the direction of the guide member 47 or opening 49. The tapering wall portion 64 is continuous or it may be considered in effect that the sleeve 63 has a plurality of oppositely disposed tapering wall portions formed by said wall portion 64.

A spring 65 is disposed within the chamber 42, the said spring 65 normally urging the actuating member 51 toward the drive element 44. Spherical members or balls 66 are retained within the passages 56, the said balls 66 being adapted to roll or move along the tapering wall portion 64.

In operation the casing 11 is connected to the drive element 44 as indicated. The drive element 44 may be suitably connected to an electrical power unit which is sought to be governed during a predetermined speed of operation. The plunger 58 during movement in a direction away from the drive element 44 may engage a suitable switch (not shown) for breaking the electrical supply to the power unit thus governing the speed or slowing down the rotation of of the drive member 44. During high speeds of operation the balls 66 move in a longitudinal direction and outwardly on the tapering wall portion 64 thus exerting pressure against the member 54 causing movement of the plunger 58 outwardly from the casing 41. Thus a switch may be suitably opened and when the electric motor returns to normal speed the spring 65 will be effective to again return the plunger 58 to its normal position.

Thus it can be seen that an improved speed governor and a modification of the same has been disclosed. The governors so disclosed are particularly adapted for use with electrical power units operating at high speeds. The governors are extremely sensitive to changes in high speed in view of the relatively frictionless conditions effected by the spherical members or balls which operate centrifugally outwardly against the tapering or conical walls to cause movement of the actuating members and the contact elements. With this type of arrangement minimum maintenance is required and accurate governing action is afforded. Thus the objects have been fully achieved and it is apparent that changes and modifications may be made which do not depart from the spirit of the invention as disclosed or the scope thereof as defined in the appended claims.

What is claimed:

1. A speed governor having a casing, said casing being adapted to be connected to the drive shaft of a power unit for rotation therewith, a governor chamber within said casing, said casing having an open end bore at one end communicating with said chamber, an actuating member positioned for reciprocation within said chamber, spring means disposed in said chamber for urging said actuating member in a first direction, a contact element connected to said actuating member for movement therewith, said contact element projecting outwardly from said bore and being adapted to engage a speed control element, a relative flat surface at one end of said actuating element, said surface having a recess extending transversely and longitudinally within said member, said recess having oppositely disposed first walls tapering from the flat surface inwardly toward the axis of said actuating element, said governor chamber having oppositely disposed second walls adjacent said first walls, said second walls tapering inwardly toward the axis of said casing and in a direction opposed to the tapering direction of said first walls, an extension on said contact element, said extension having a portion of reduced cross sectional dimension disposed in said chamber and an end portion projecting outwardly of said chamber, a guide element on said casing, said end portion engaging said guide element in relative sliding relation, a plurality of first spherical members disposed adjacent said first walls, a plurality of second spherical members disposed adjacent said second walls, said first and second spherical members being in contacting relation with each other and being disposed between the ends of said reduced portion whereby during rotation of said casing said spherical members move outwardly on said walls in response to centrifugal force, for moving said actuating member and said contact element longitudinally in a second direction relative to said casing.

2. A speed governor having a casing, said casing being adapted to be connected to the drive shaft of a power unit for rotation therewith, a governor chamber within said casing, an actuating member positioned for reciprocation within said chamber, means disposed in said chamber for urging said actuating member in a first direction, a contact element connected to said actuating member for movement therewith, said contact element projecting outwardly from said casing and being adapted to engage a speed control element, a relative flat surface at one end of said actuating element, said surface having a recess extending transversely and longitudinally within said member, said recess having oppositely disposed first walls tapering from the flat surface inwardly toward the axis of said actuating element, said governor chamber having oppositely disposed second walls adjacent said first walls, said second walls tapering inwardly toward the axis of said casing and in a direction opposed to the tapering direction of said first walls, an extension on said contact element, said extension having a portion of reduced cross sectional dimension disposed in said chamber and an end portion projecting outwardly of said chamber, a guide element on said casing, said end portion engaging said guide element in relative sliding relation, a plurality of first spherical members disposed adjacent said first walls, a plurality of second spherical members disposed adjacent said second walls, said first and second spherical members being in contacting relation with each other and being disposed between the ends of said reduced portion whereby during rotation of said casing said spherical members move outwardly on said walls in response to centrifugal force for moving said actuating member and said contact element longitudinally in a second direction relative to said casing.

3. A speed governor having a casing, said casing being adapted to be connected to the drive shaft of a power unit for rotation therewith, a governor chamber within said casing, an actuating member positioned for reciprocation within said chamber, means disposed in said

chamber for urging said actuating member in a first direction, a contact element connected to said actuating member for movement therewith, said contact element projecting outwardly from said casing and being adapted to engage a speed control element, said actuating element having a recess extending transversely and longitudinally within said member, said recess having oppositely disposed first walls tapering inwardly toward the axis of said actuating element, said governor chamber having oppositely disposed second walls adjacent said first walls, said second walls tapering inwardly toward the axis of said casing and in a direction opposed to the tapering direction of said first walls, an extension on said contact element, said extension having an end portion projecting outwardly of said chamber, a guide element on said casing, said end portion engaging said guide element in relative sliding relation, a plurality of first spherical members disposed adjacent said first walls, a plurality of second spherical members disposed adjacent said second walls, said first and second spherical members being in contacting relation with each other, whereby during rotation of said casing said spherical members move outwardly on said walls in response to centrifugal force, for moving said actuating member and said contact element longitudinally in a second direction relative to said casing.

4. A speed governor having a casing, said casing being adapted to be connected to the drive shaft of a power unit for rotation therewith, a governor chamber within said casing, an actuating member positioned for reciprocation within said chamber, means disposed in said chamber for urging said actuating member in a first direction, a contact element connected to said actuating member for movement therewith, said contact element projecting outwardly from said casing and being adapted to engage a speed control element, said actuating element having a recess extending transversely and longitudinally within said member, said recess having oppositely disposed first walls tapering inwardly toward the axis of said actuating element, said governor chamber having oppositely disposed second walls adjacent said first walls, said second walls tapering inwardly toward the axis of said casing and in a direction opposed to the tapering direction of said first walls, an extension on said contact element, a plurality of first spherical members disposed adjacent said first walls, a plurality of second spherical members disposed adjacent said second walls, said first and second spherical members being in contacting relation with each other, whereby during rotation of said casing said spherical members move outwardly on said walls in response to centrifugal force, for moving said actuating member and said contact element longitudinally in a second direction relative to said casing.

5. A speed governor having a casing, said casing being adapted to be connected to the drive shaft of a power unit for rotation therewith, a governor chamber within said casing, an actuating member positioned for reciprocation within said chamber, means disposed in said chamber for urging said actuating member in a first direction, a contact element connected to said actuating member for movement therewith, said contact element projecting outwardly from said casing and being adapted to engage a speed control element, said actuating element having a recess extending transversely and longitudinally within said member, said recess having oppositely disposed first walls tapering inwardly toward the axis of said actuating element, said governor chamber having oppositely disposed second walls adjacent said first walls, said second walls tapering inwardly toward the axis of said casing and in a direction opposed to the tapering direction of said first walls, a plurality of first spherical members disposed adjacent said first walls, a plurality of second spherical members disposed adjacent said second walls, said first and second spherical members being in contacting relation with each other, whereby during rotation of said casing said spherical members move outwardly on said walls in response to centrifugal force, for moving said actuating member and said contact element longitudinally in a second direction relative to said casing.

6. A speed governor having a casing, said casing being adapted to be connected to the drive shaft of a power unit for rotation therewith, a governor chamber within said casing, an actuating member disposed for reciprocation within said chamber, means engaging said actuating member for urging the same in a first direction, said actuating means having a contact element adapted to engage a speed control means during movement of said member in a second direction, oppositely disposed first walls on said actuating member, said walls diverging outwardly in the first direction, oppositely disposed second walls on said casing, said second walls diverging outwardly in the second direction, a plurality of first spherical members adjacent said first walls, a plurality of second spherical members adjacent said second walls, said first spherical members being in engagement with said second spherical members, said spherical members being movable laterally outwardly on said walls in response to centrifugal force thereby urging said actuating member to move in the second direction.

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