Nov. 29, 1927. 1,650,786

L. W. BURNETT

ELECTRIC GOVERNOR

Filed March 24, 1927 3 Sheets-Sheet 1

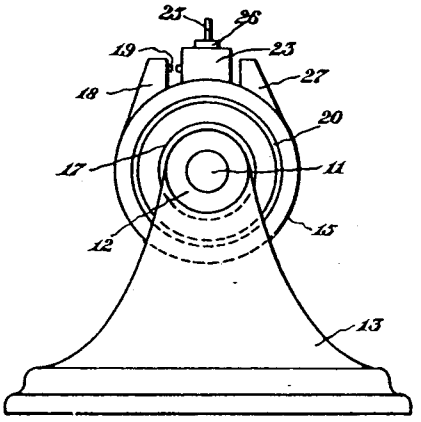



Fig. 1

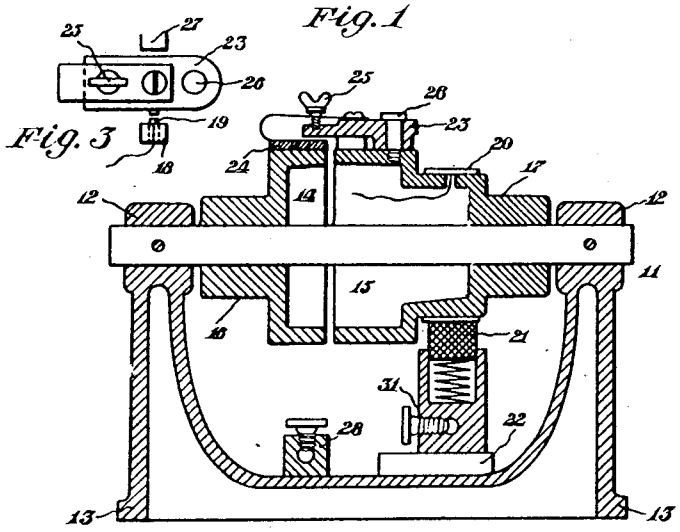



Fig. 3

Fig. 2

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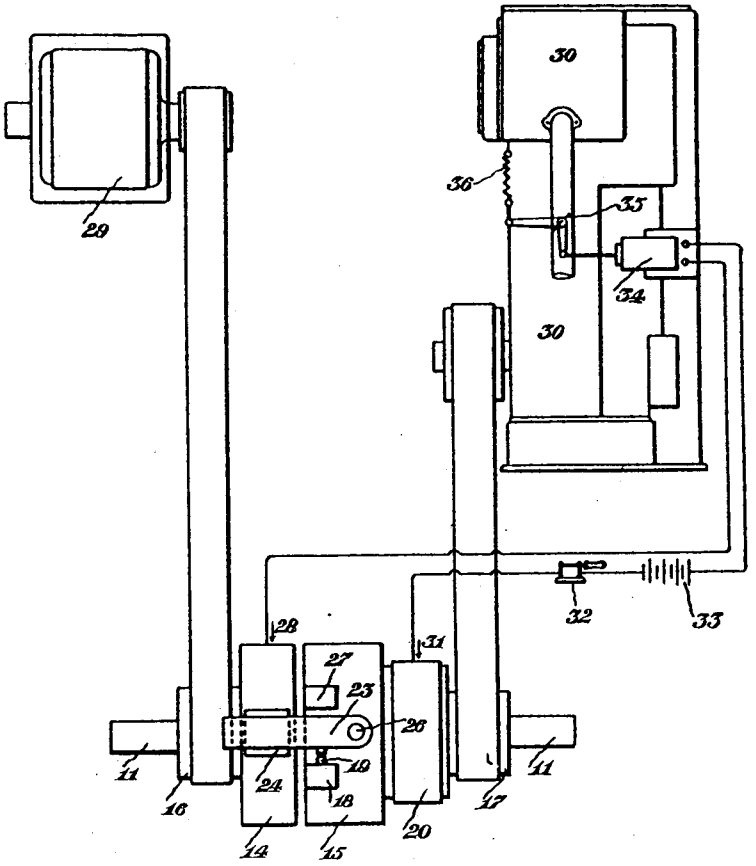



Fig. 4

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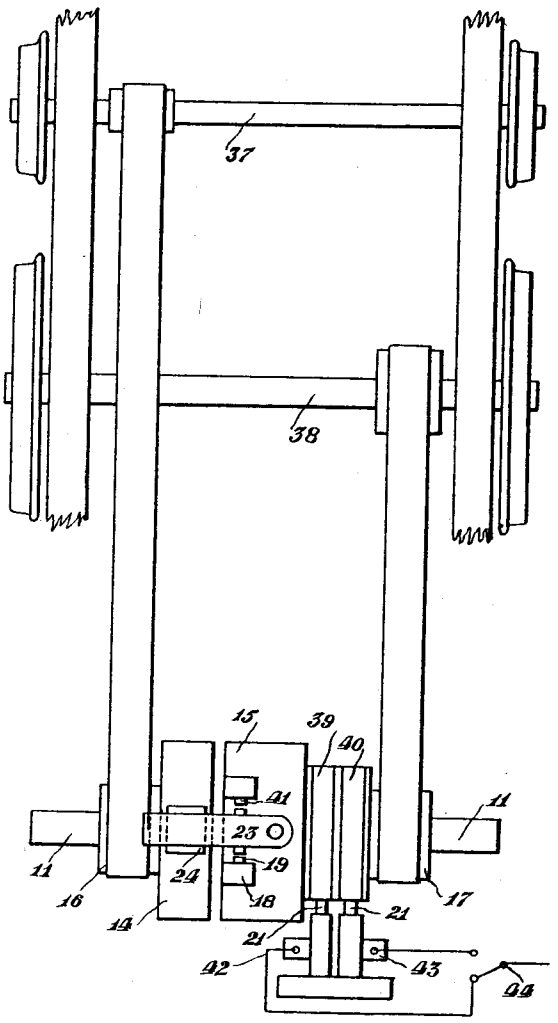



Fig. 5

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# UNITED STATES PATENT OFFICE.

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## ELECTRIC GOVERNOR.

Application filed March 24, 1927. Serial No. 178,077.

This invention relates to electric governors for regulating and controlling within narrow limits the range of speed variation permissible or desired in engines or other mechanical combinations.

Its main object is to effect this control by a simple and inexpensive device which will be in addition much more sensitive to variations of speed than centrifugal or other speed regulating devices now usually adopted for this purpose.

The main factors which I employ to secure these results consist elementally of a pair of revolving members, say of the nature of drums or pulleys mounted to revolve in the same direction on two separate shafts in axial alignment, the said drums being in close juxtaposition so that there may be an overhanging arm from one drum to the other with a resilient friction pad secured to the arm but bearing upon the second drum.

The arm is pivotal on one drum and carries an electric contact which engages a similar contact thus closing an electric circuit when the motion of one drum lags behind that of the other drum, the pivotal arm being moved on its pivot by the surface friction of the pad upon the drum whenever a speed variation takes place. By arranging the adjustments of the friction pad and electric contacts a high degree of refinement in control of speed variation may be effected.

The details and action of the device are clearly shown in the drawings herewith forming part of this application and in which—

Figure 1 is an elevational section of one general form of my device.

Figure 2 being an end view of same.

Figure 3 shows details of the contacts.

Figure 4 is an illustration of an application of the device to the governing of an engine of the internal combustion type.

Figure 5 exhibits another application of the device to a locomotive.

Taking the drawings in detail as the best means of exemplifying the invention and noting that similar numerals in any of the views indicate identical parts or parts having identical functions, 11 indicates a spindle rigid with the supports 12 carried by the base plate 13. Two members 14 and 15 revolving side by side each driven in the same direction and normally at the same speed by the attached pulleys 16 and 17 form the principal parts of the mechanism.

The member 15 carries on its periphery an insulating block 18 bearing an electrical contact 19. This contact is in electrical connection with a slip ring 20 which revolves with the member and is in electrical contact with the brush 21 which is similarly insulated at its base at 22. The member 15 also carries a pivotal arm 23 which overhangs the adjacent revolving member 14. The arm carries a resilient and adjustable friction pad 24 which may be allowed to bear upon the revolving surface of 14 by adjustment of the thumb screw 25 sufficiently to overcome the friction of the arm 23 on its pivot 26 so that in the event of any variation in the peripheral velocity of the two members 14 and 15 the friction of the pad 24 will be sufficient to cause the arm 23 to move on the pivot 26 and thus make or break the electrical contact 19.

Thus should the device be set so that the member 14 revolves at constant speed and the member 15 commences to race even by a small fractional increase, the friction pad 24 will retard the arm 23 causing an electrical circuit to be completed when the contact 19 is engaged, thus operating a solenoid or other means for motivating the necessary rectifying mechanism to control the speed of the racing member. A stop for the pivotal arm is shown at 27 and the grounded terminal at 28.

A concrete application of the device as detailed above is shown in Figure 4. In this case an electric motor 29 designed to run at constant speed controls the speed of an engine 30 subjected say to wide variations of load but in which the speed variation is important. The governing apparatus is identical with that shown in Figures 1, 2 and 3, but electrical connections are added in which the brush terminal 31 connects with the main switch 32, the energizing battery 33 (or other source of electrical energy) and to a solenoid 34. The solenoid operates the throttle valve 35 against the action of the helical spring 36 thus controlling the fuel admission to the engine instantaneously as the speed varies and within any value of desired range.

A further illustration of the application of the invention is shown in Figure 5 where the axle 37 of the leading wheels of a locomotive provides the driving power to the revolving member 14 and the axle 38 of the driving wheels that to the member 15 thus

enabling the device to be used as a control for the throttle against the slipping of the driving wheels.

In this particular application it is to be noted that the member 14 normally runs slightly faster than 15 and in the same direction. If the driving wheels are slipping 15 runs faster than 14 and contact points close, and will open again when slipping has ceased.

Two sets of contact points, rings and brushes and a double point switch interlocked with the link valve motion gear are used so that the governor may operate with locomotive running either backward and forward.

In this case the design of the device is also almost identical with that shown in Figures 1, 2, and 3, but to allow for the reversing action the slip ring is duplicated as indicated at 39 and 40, an additional contact 41 being carried by the member 15 instead of merely a stop to engage the arm 23 on the reverse motion.

This arrangement entails a double set of electrical connections as indicated at 42 and 43, these being the terminal blocks. A double contact switch 44 interlocked with the link motion gear completes the salient features of the device.

The operation of the invention can be readily followed from the drawings and foregoing description and may be briefly stated as follows:

The two revolving cylindrical members 14 and 15 are separately driven at a common speed, one being at an independent steady and constant rate, the fellow member being subject to necessary variation. The only connection between the two members is the friction pad extending from the everhanging pivotal arm. This is so adjusted that on the slightest increase of speed between the peripheries of the two members 14 and 15 the small amount of friction provided by the pad retards the pivotal arm and causes it to engage the electrical contact closing a circuit of electrical energy and with this setting in motion any desired controlling mechanism.

It is obvious that the device has a scope of application which is exceedingly wide, including such diverse utilities as the control of speed of a marine propeller, the regulation of the throttle of a skidding locomotive, the exactitude of regulation demanded of the engine of a spinning mill and other equally diverse industrial requirements, where a strictly limited range of speed variation is urgently called for.

Having now particularly described my invention, what I claim as new and desire to be protected in by Letters Patent, is:

1. In an electric governor the combination comprising, two cylindrical members of similar diameters revolving in the same direction and adjacent each other on the same axis, one of said members carrying on its periphery a pivotal arm extending over the other said member in a direction at right angles to its direction of motion, a resiliently supported adjustable friction pad engaging the periphery of the second said member and between the said arm and the last said member, an electrically insulated contact on the periphery of the first said member and adapted to complete an electric circuit when engaged by the said arm.

2. In an electric governor the combination comprising, two cylindrical members of similar diameters revolving in the same direction, each said member being driven from an independent source of power, the two said members revolving on the same axis, one of said members carrying on its periphery a pivotal arm, the said arm extending transversely of the two members and over the second said member, a resiliently supported adjustable friction pad secured to the extended portion of the said arm and adapted to engage the exterior surface of the second said member, an electrically insulated contact on the periphery of the first said member and adapted to engage the said pivotal arm when the latter is pivotally moved by the retardation of one of the said members owing to the frictional connection between them set up by the said pad, the engagement of the said arm and the said contact being adapted to complete an electric circuit.

3. In an electric governor the combination comprising, two cylindrical members of similar diameters revolving in the same direction, each said member being driven from an independent source of power, the two said members revolving on the same axis, one of said members carrying on its periphery a pivotal arm, the said arm extending transversely of the two members and over the second said member, a resiliently supported adjustable friction pad secured to the extended portion of the said arm and adapted to engage the exterior surface of the second said member, an electrically insulated contact on the periphery of the first said member and adapted to engage the said pivotal arm when the latter is pivotally moved by the retardation of one of the said members, a slip ring attached to the first said member, said ring being insulated from the said member and in electrical connection with said contact, a brush insulated from said member and from the base plate and framework of said member, said brush making contact with said slip ring, a terminal connected with said brush, a second terminal connected with said base plate.

In testimony whereof I affix my signature.

LEWIS W. BURNETT.