A. KIMBLE.

ADJUSTABLE CONSTANT SPEED POWER TRANSMITTING DEVICE.

APPLICATION FILED MAY 12, 1919.

1,370,749. Patented Mar. 8, 1921.

Fig. 1.

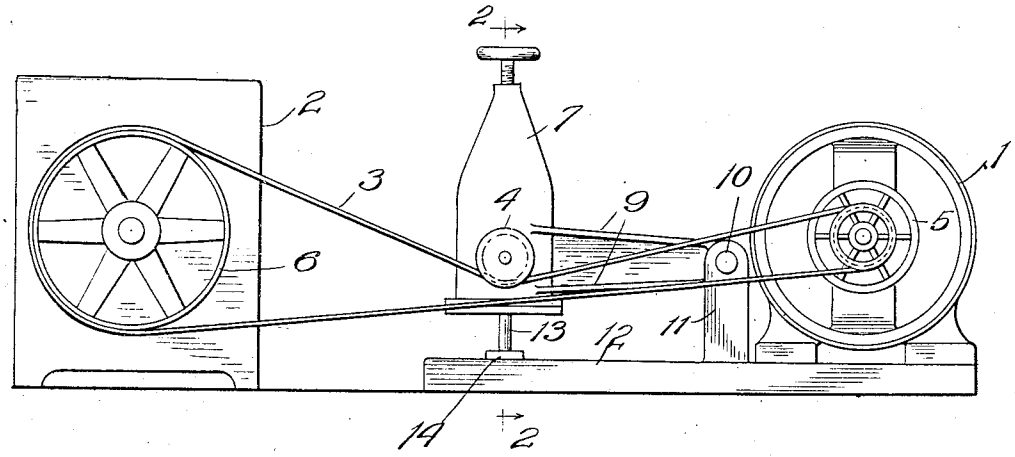
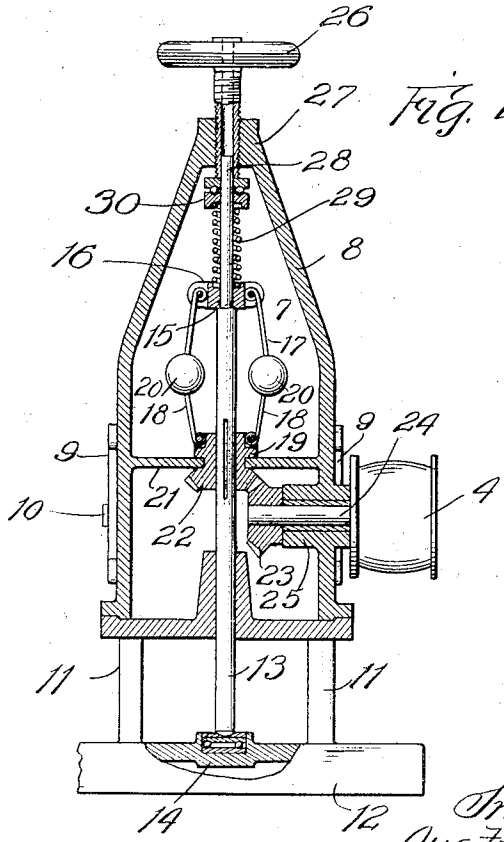


Fig. 2



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UNITED STATES PATENT OFFICE.

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ADJUSTABLE CONSTANT-SPEED POWER-TRANSMITTING DEVICE.

1,370,749. Specification of Letters Patent. Patented Mar. 8, 1921.

Application filed May 12, 1919. Serial No. 296,650.

To all whom it may concern:

Be it known that I, AUSTIN KIMBLE, a citizen of the United States of America, and a resident of Wausau, county of Marathon, and State of Wisconsin, have invented certain new and useful Improvements in Adjustable Constant-Speed Power-Transmitting Devices, of which the following is a specification.

This invention relates to means for controlling the speed of a belt-driven device and more particularly to automatic means for governing the slippage of the belt to accomplish such control. The main objects of the invention are to provide in a belted power transmission system having slippage at the primary pulley, automatic means for maintaining the belt speed constant; to provide an improved form of means for regulating the tension and consequent degree of slippage of a power transmission belt; to provide manual means for adjusting such a device for a greater or less degree of belt speed; to provide a governing device of the character stated adapted to automatically maintain the belt speed substantially constant for a given setting of the governor; and to provide in a governor of the character described, having part of the governor load resting on the belt, adjustable resilient means arranged to carry a part of the governor load not resting on the belt and centrifugal means arranged to carry the balance of the governor load not resting on the belt, depending for proportion on the speed of the belt.

An illustrative embodiment of this invention is shown in the accompanying drawings, in which—

Figure 1 is a side elevation of a pair of belt-connected devices equipped with a constant speed governor connected operatively to the belt.

Fig. 2 is an enlarged section on the line 2—2 of Fig. 1.

The embodiment of this invention shown in the drawings comprises a constant-speed motor 1 belted to the driving pulley of any device 2 which is to receive power, the tension of the belt 3 being adjustable for variable slippage by means of an idler 4 mounted adjustably to bear more or less on the belt, and the pulleys being designed for slippage at the motor pulley 5 rather than at the driven pulley 6. The motor may be, for instance, either a synchronous or induction motor. Moreover, it may be a single, two or three-phase, or direct-current machine.

The pressure of the idle pulley 4 is controlled by a centrifugal governor 7 which is operatively connected to the belt, as for instance through said idler. The governor is so adjusted and connected that excess belt speed and corresponding governor speed decreases the idler pressure and permits more slippage, thus bringing down the secondary speed to the predetermined normal.

On the other hand, if there is too much slippage and corresponding insufficiency of speed, the governor will operate to force the idler more tightly against the belt and thereby diminish the slippage and so bring the driven pulley up to normal speed for which the governor is set.

It is to be understood that the motor pulley and driven pulley are so designed relative to each other, either respecting size or material, that all slippage occurs on the motor pulley. If the motor pulley is the smaller, the slippage naturally tends to occur there, but if the driven pulley in any case is the smaller, it may be made with a friction face adapted to prevent slippage and so assure such action at the motor, as will be understood.

In order to minimize heating of the motor pulley where the constant belt slippage generates more or less heat, the motor pulley is provided with fan means adapted to increase the ventilating effect and so keep the temperature down to a proper degree. The structural details of such a pulley are more fully set forth in my copending application of even date herewith.

The governor 7 comprises a frame 8 which is movable up and down and carries the pulley 4. Said frame is provided with rigid arms 9 extending laterally, preferably toward the motor, which arms at their outer ends are secured turnably as by pivots 10, to the upright arms 11 on the motor base 12. Said arms 9 serve as guide means adapted to limit the movement of said frame 8 so that its movement will vary the pressure of pulley 4 on belt 3, said movement being parallel to the plane of pulley 4 or vertical. Said governor is also provided with a relatively movable shaft 13 disposed centrally thereof in upright position and bearing at

14 on said base 12, said point 14 preferably being in the form of an anti-friction bearing. Said shaft 13 is provided with a peripheral shoulder at 15 to carry such part of the weight of the governor as is not supported by the belt, for which purpose the upper cross bar 16 of the centrifugal governor is perforated to receive the narrow projecting part of shaft 13 in such manner as to support said bar rotatably on the shoulder 15.

The outer ends of the part 16 are provided with downward arms 17 hinged to corresponding arms 18 which in turn are pivoted to a vertically movable member 19. The rods 17 and 18 support the governor weights 20 at the points where they are hinged together. Said member 19 is provided with a medial peripheral groove to receive a horizontal web member 21 rigid with the frame 8, whereby said member 19 is secured relative to said frame 8, as against axial movement.

The lower part of said member 19 is in the form of a beveled gear 22 and is arranged to coact with a similar beveled gear 23 fixed on the shaft 24, to which the pulley 4 is keyed, whereby rotation of said pulley causes corresponding rotation of the governor.

The upper end of the governor is provided with a manual adjusting screw 26 threaded into the tip 27 of said frame, the inner end of said screw being hollow to receive the upper end 28 of the shaft 13. A compression spring 29 is disposed concentrically on the shaft part 28 between the governor member 16 and said screw 26, with an anti-friction bearing 30 disposed between the adjacent ends of said spring and screw. Turning the screw downward increases compression on the spring, and vice versa.

The operation of the governor is as follows: With the device set for a predetermined constant speed, any diminution of speed, due for instance to an increase of load, will cause the governor weights to converge, thereby lowering the member 19 and consequently the governor frame 8 and the pulley 4, whereby the tension of the belt is increased, slippage is diminished, and the speed of the driven pulley brought up to normal.

If on the other hand, the driven machine attains too high a speed, as for instance, upon throwing off part of the load, the governor weights will be urged divergently, thereby pulling up the member 19 and consequently the governor frame 8 and pulley 4, which serves to lessen the tension on the belt and thereby permit an increase of slippage, thus permitting the speed of the driven machine to fall back to normal. In operation, the secondary speed is thus maintained substantially constant for varying loads so long as the primary speed is constant.

Moreover, it is apparent from the foregoing description and statement of operation, that the governor is adapted for adjustment to maintain any predetermined relation of primary and secondary speeds.

Although but one specific embodiment of this invention has been herein shown and described, it will be understood that numerous details of the construction shown may be altered or omitted without departing from the spirit of this invention as defined by the following claims.

I claim:

1. In combination, a pair of belt-connected pulleys, primary and secondary respectively, and a speed-controlled brakeless governor adapted and arranged to vary the tension of the belt, said pulleys being designed relative to each other to provide for slippage at the primary pulley, said governor including a movable frame carrying an idle pulley bearing more or less forcibly on the belt, guide means limiting the movement of said frame so that said movement will vary the pressure of said idle pulley on the belt, and means operatively connected to said frame for carrying such part of the weight of the governor as is not carried by the belt, the last said means being operatively connected to the governor mechanism for proportioning the weight in accordance with the belt speed.

2. A constant-speed motor provided with a belt pulley, a driven device also provided with a pulley, and a belt connecting said pulleys, in combination with a centrifugal free turning governor including an idle pulley bearing on said belt to vary its tension and in part support the governor, whereby belt slippage on the motor pulley may be controlled, said governor being provided with an independent supporting member connected and adapted to more or less relieve the idle pulley pressure to correspond with a predetermined belt speed.

3. A belt tension governor comprising a frame mounted for movement up and down and actuated in part by gravity, guide means for said frame, a pulley journaled on said frame adapted to rest substantially as an idler on the belt, extensible supporting means carried by said frame adapted and arranged to thrust downward more or less forcibly from said frame and also adapted to directly support part of the weight of the frame and pulley structure when the latter is in bearing contact with the belt, and speed-controlled means geared positively to said pulley and operatively connected to said downward means to adjust the relative gravity pressures on said pulley and supporting means to maintain a constant belt speed.

4. In a device of the character described, a governor comprising a frame, guide means for said frame, an idle pulley on said frame to carry part of its weight, a vertical shaft having an upwardly facing shoulder on which said frame more or less rests, and centrifugal means geared to said pulley and interposed between said frame and said shoulder whereby the elevation of said frame is varied in accordance with the speed of said pulley.

5. In a device of the character described, a governor comprising a frame, guide means to limit the movement of said frame to up-and-down oscillation, an idle pulley on said frame to carry part of its weight, a vertical shaft having an upwardly facing shoulder on which said frame more or less rests, a spring interposed between said frame and said shoulder, means to adjust the stress of said spring and consequent governor speed, and centrifugal means geared to said pulley and interposed between said frame and said shoulder whereby the elevation of said frame is varied in accordance with the speed of said pulley.

Signed at Chicago this 9th day of May, 1919.

AUSTIN KIMBLE.