Jan. 27. 1925. 1,524,445

M. MANICKI

SPEED CONTROLLING DEVICE

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Fig. 1.

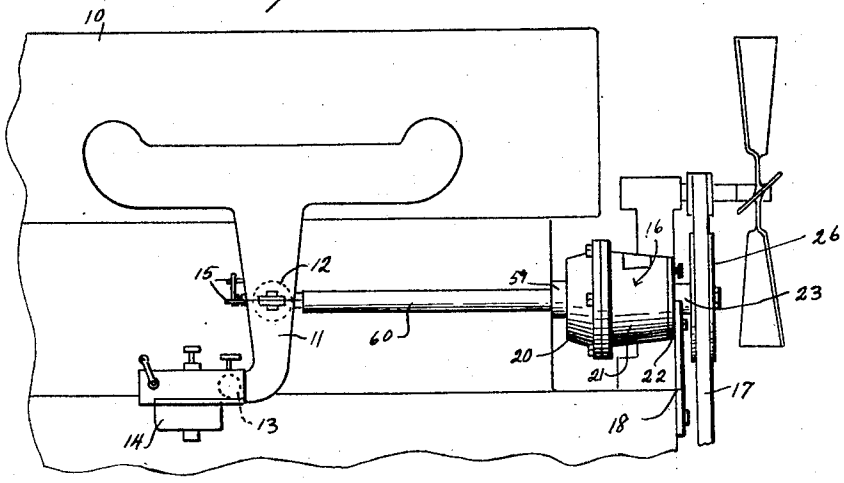


Fig. 7.

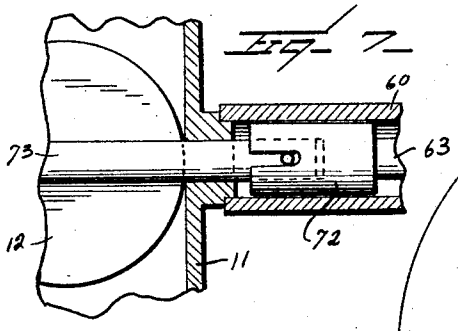


Fig. 5.

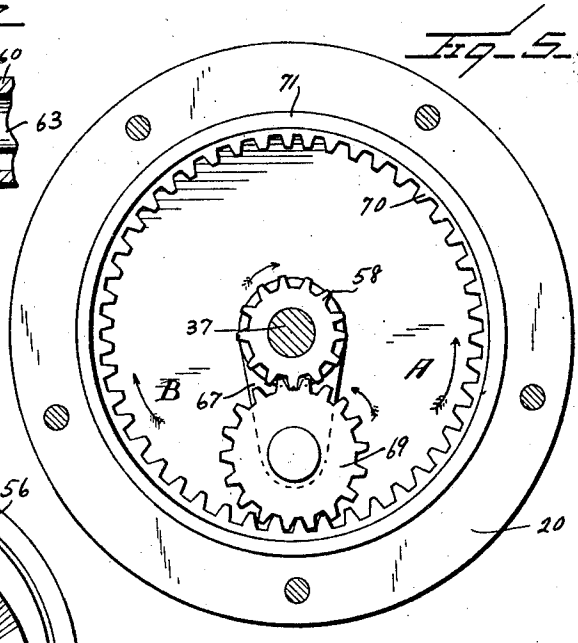
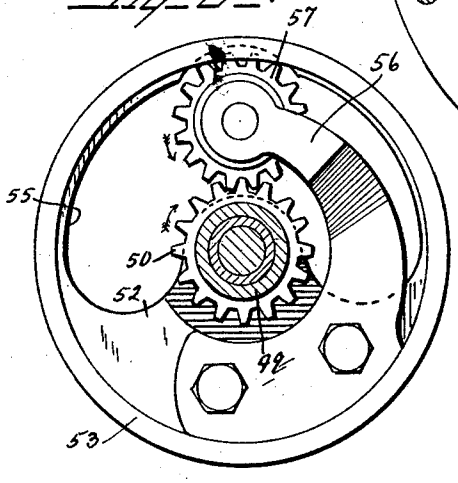


Fig. 6.



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Fig. 2.

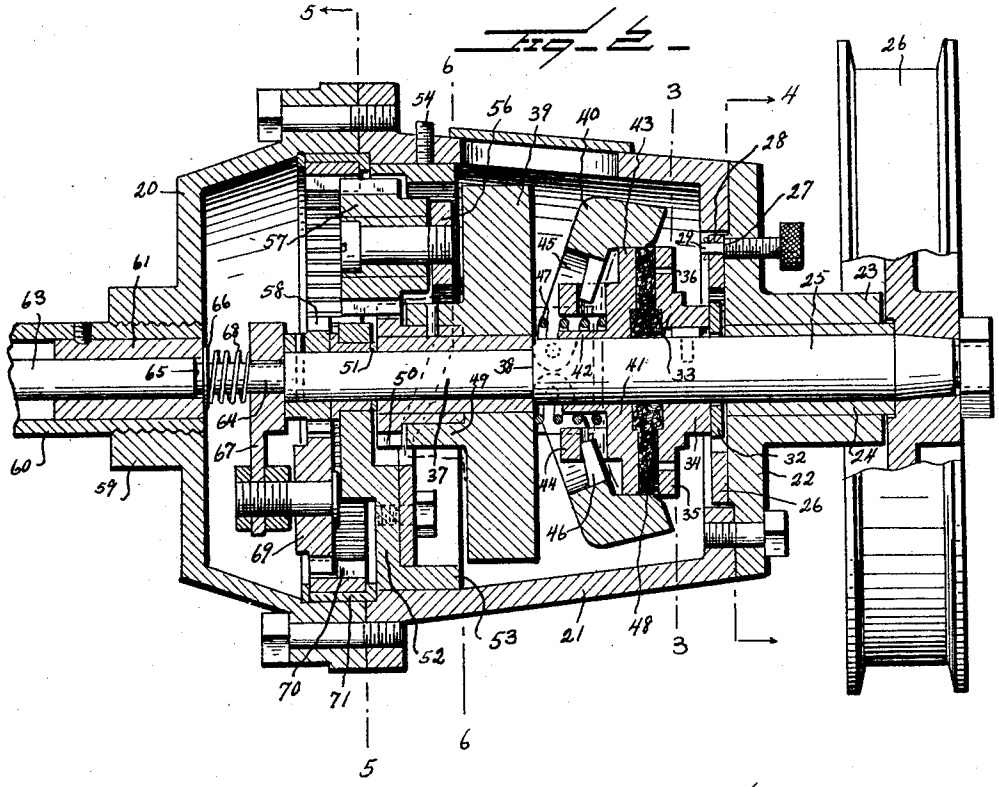


Fig. 3.

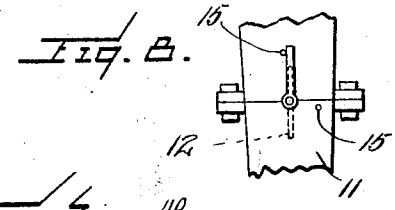


Fig. 4.

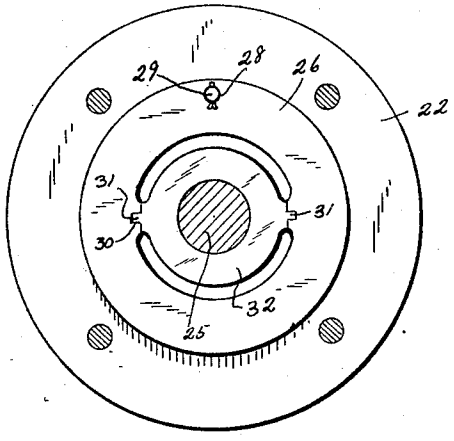
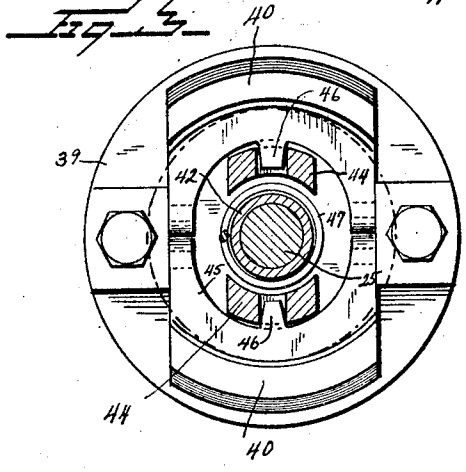


Fig. 5.



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Patented Jan. 27, 1925. 1,524,445

UNITED STATES PATENT OFFICE.

MICHAEL MANICKI, OF WAUSAU, WISCONSIN.

SPEED-CONTROLLING DEVICE.

Application filed January 14, 1924. Serial No. 686,242.

To all whom it may concern:

Be it known that I, MICHAEL MANICKI, a citizen of the United States, residing at Wausau, in the county of Marathon and State of Wisconsin, have invented certain new and useful Improvements in Speed-Controlling Devices, of which the following is a specification, reference being had to the accompanying drawings.

This invention relates to speed controlling devices for internal combustion engines and more particular to a throttle controlling device therefor.

An important object of the invention is to provide governor operated mechanism, the governor being driven from a rotating part of the engine or accessory thereof and having means for translating this rotating device to a partial rotation of the shaft connected with the throttle in one or the other direction, depending upon the speed of the engine as compared with a selected maximum speed, so that the throttle controlling operation is positive both as to opening and closing of the throttle.

A further object of the invention is to provide a device of this character including a relatively simple planetary action for translating the rotation.

A further object of the invention is to provide a device of this character employing the slip of a friction clutch for relieving the parts of the governor of strain when the throttle is in one of its extreme positions.

A still further object of the invention is to provide a device of this character which is durable and efficient in service, which may be cheaply and readily produced, and which will be a general improvement in the art.

These and other objects I attain by the construction shown in the accompanying drawings, wherein for the purpose of illustration is shown a preferred embodiment of my invention and wherein:—

Figure 1 is a fragmentary side elevation showing governor mechanism constructed in accordance with my invention applied to an engine;

Figure 2 is an enlarged longitudinal sectional view through the governor mechanism proper;

Figure 3 is a section on the line 3—3 of Figure 2, the casing being omitted;

Figure 4 is a section on the line 4—4 of Figure 2;

Figure 5 is a section on the line 5—5 of Figure 2;

Figure 6 is a section on the line 6—6 of Figure 2;

Figure 7 is a detail view showing the manner of connecting the throttle and the driven shaft of the governor mechanism.

Figure 8 is a detail view showing the limiting mechanism for the valve.

Referring now more particularly to the drawings, the numeral 10 indicates generally the engine of an internal combustion engine and 11 the manifold of the engine. In accordance with my invention this manifold is preferably provided with a control throttle valve 12 constructed and operating independently of the usual throttle valve 13 with which the carburetor 14 of the engine is provided. The throttle valve 12 of the intake manifold 11 is so constructed that its movement to open and closed positions is limited, this construction being generally illustrated at 15 and more particularly shown in Figure 8. In connection with this type of throttle valve I employ a governor mechanism 16 driven from any desired rotatable part of the engine. In the present instance I have disclosed this governor as being driven by the fan belt 17 of the engine. This governor may be supported in any desired manner, brackets 18 being generally indicated for this purpose.

Referring now more particularly to Figures 2 to 6 the governor embodies a casing consisting of three sections, these sections being hereinafter referred to as the base 20, the housing 21 and cover plate 22. This cover plate is provided with an elongated hub portion 23 which is bushed, as at 24, for the rotative reception of a main governor shaft 25. This shaft is adapted at its outer end for engagement with the drive, in the present instance being shown as provided with a pulley 26 for engagement by the belt 17. Mounted upon the inner face of the cover plate 22 is a thrust plate mounting 26 free to move toward and away from the

cover plate. Through the cover plate is directed a screw having a shoulder 27 abutting the adjacent face of the thrust plate mounting and a reduced portion loosely extending through an opening 28 formed in this mounting. The end of this reduced extension, which is indicated at 29, has a pin preventing disengagement of the mounting therefrom. This thrust plate mounting is provided with notches 30 forming a swivel mounting for lugs 31 formed at diametrically opposed points upon a thrust plate 32 which surrounds the shaft.

Next adjacent the thrust plate upon the shaft 25 is feathered one member 33 of a friction clutch. This member 33 consists of a hub portion 34 the end of which abuts the thrust plate 32 and the flange 35 of a desired diameter. Through this flange 35 openings 36 are formed, the purpose of which will presently appear.

The shaft 25 is provided with a reduced extension 37 forming a shoulder 38. Mounted for rotation upon this reduced extension and abutting the shoulder 38 is a relatively heavy disk 39 forming the fly wheel or balance wheel of a governor mechanism. The governor mechanism proper includes a pair of centrifugal weights 40 pivoted to the balance disk 39 and a shiftable portion 41 forming the second member of the friction clutch hereinbefore referred to. This shiftable member embodies a hub portion 42 rotatably mounted upon the shaft 25 and a flange 43 corresponding in size to the flange 35 of the clutch member 33 hereinbefore described. This flange has projecting therefrom at diametrically opposed points lugs 44 which extend between the arms 45 connecting the centrifugal elements 40 to their pivots and are pivoted to these arms as indicated at 46. These arms further overlie the hub portion 42 in such manner as to provide a guide housing for a spring 47 extending between the disk 39 and the flange 43, which spring serves to urge the flange 43 into engagement with the flange 35. Between these flanges is disposed a felt washer 48 to which oil is applied during operation of the governor through the openings 36.

The disk 39 embodies a hub portion 49 to which is secured a gear 50. Abutting the face of the gear remote from the disk, through the medium of a thrust ring 51, is the inner face of a cup-shaped supporting plate 52. This cup-shaped supporting plate 52 has its rim portion 53 secured against rotation with relation to the housing 21 by means of set screws 54. Through this supporting plate an opening 55 is formed above which extends an arm 56 secured to the supporting plate and having rotatably mounted thereon a relatively wide gear 57, the teeth of which mesh with the teeth of the gear 50. Upon the opposite side of the supporting plate 52 from the gear 50 a second gear 58 is mounted upon and secured to the reduced extension 37 of the shaft, this gear having the same type of teeth as the gear 50 but having a lesser number of teeth.

The base portion 20 of the housing includes a hub portion 59 having secured therein a tube 60. Mounted within this tube 60 in a bearing 61 carried by the tube is a shaft 63, hereinafter referred to as the throttle control shaft. When the base 20 of the housing is applied to the remainder of the housing this shaft 63 is axially aligned with the shaft 25 and the reduced extension 37 thereof. This shaft has upon its inner end a reduced extension 64 providing a shoulder 65 against which abuts a plate 66 forming a spring seat. Upon the outer end of this reduced extension a radial arm 67 is mounted and a spring 68 extends between the plate 66 and arm 67 and normally maintains this plate firmly against the shoulder. The purpose of this construction will hereinafter appear. This arm is provided upon its free end with a gear 69 adapted to mesh with the gear 58 of the extension 37 and likewise to mesh with an internal ring gear 70 mounted in guides 71 carried by the base section 20 and free to rotate in such guides. When the sections of the housing are in assembled relation this ring gear is likewise engaged by the gear 57 carried by the arm 56 of the supporting plate 52, the engagement of these gears with the plate being such that the arm 67 with its gear is free to rotate and it does not engage the gear 57 during its passage. It is for this reason that the spring construction hereinbefore described is provided since such construction will permit the shaft 63 to yield longitudinally in event of longitudinal movement of the shaft 25 and prevent accidental engagement of the gears 69 and 57 with one another. The outer end of the shaft 63 is provided with a female member 72 of the joint, the male member of which is carried by the shaft 73 of the throttle valve 12, the point of connection between the shafts 73 and 63 preferably being within the tube 60 so that it is relatively inaccessible.

In the operation of the device while the speed of the engine is below a given point the flanges 35 and 43 are engaged by the spring upon opposite side faces of the felt washer 48 and the disk 39 is rotated in conjunction with the shaft 25. As the speed increases, the centrifugal elements 40 moving outwardly from the shaft and toward the disk causing the flange 43 to be withdrawn against the action of the spring and accordingly the frictional engagement between the flanges 35 and 43 and the felt washer is relieved permitting the disk 39 to slow down the speed. Referring more particularly to the planetary gearing, it is

pointed out that the gear 58 is positively driven from the shaft 25 and accordingly the gear 69 of the arm 67 is positively driven and tends to positively drive the ring gear 70 for a given speed. The gear 50, on the contrary, is driven only from the balance disk 39 of the governor mechanism and the speed thereof will accordingly vary with relation to the speed of the gear 58 as the governor mechanism alternately is thrown into operation and disconnected. Since the drive of the governor is a frictional one this gear may be stated as frictionally driven and as frictionally driving through the gear 57 and the ring gear 70. Assuming the gears 50 and 58 to have sixteen and thirteen teeth respectively then the tendency is for the gear 50, through its associated gear 57, to drive the ring gear 70 at a greater rate of speed than the ring gear will be driven by the positive drive of the gear 58 and its associated gear 69 provided the disk 39 and shaft 25 are rotating at the same speeds. Since theoretically they are operating at the same speeds at all times when the clutch mechanism is engaged, there is a tendency of the ring gear at all such times to rotate in the direction of the arrow A, Figure 5 and to drag with it the gear 69 of the arm 67. The arm is accordingly at speeds below the set governor speed urged in this direction and while moving in this direction moves the throttle 12 to the fully open position when its rotative movement is checked. After the throttle has arrived at its fully open position then the ring gear acts as a brake upon the disk, through the gears 57 and 50, and the disk 39 accordingly operates at a slightly lower speed than the speed of the shaft, the flanges 43 and 35 slipping upon the felt washer 48. Therefore, at all speeds below a given engine speed frictional means are provided for holding the throttle valve 12 in its open position.

When the speed of the disk 39 increases sufficiently that the frictional engagement between the flanges 43 and 35 is reduced by movement of the centrifugal members 40 against the action of the spring of the governor and the speed of the friction disk 39 accordingly becomes less than the speed of the shaft 25 and its reduced extension 37, the conditions are reversed, particularly when this reduction in speed is sufficient that the tendency of the gear train, represented by the gears 50 and 57 to rotate the ring gear in the direction of the arrow is less than the tendency of the train of gears 58 and 69 to rotate the gear in the same direction. Under these conditions the gear 57 acts as a brake upon the ring gear with the result that the rotation of the gear 69 must be compensated for in some way. This is accomplished by movement of the arm 67 in the direction of the arrow B in Figure 5 with the result that the throttle 12 is moved to or toward the closed position. As the speed of the engine continues when the throttle arrives at its closed position, then the arm 67, being relatively fixed by its connections with this throttle and by the limiting stop of the throttle, will fix the position of the gear 69 with the result that the gear 70 is positively driven and drags with it the gears 57 and 50 and the disk 39. It will be seen that with a governor mechanism of this construction undue wear upon the various parts of the mechanism is prevented, the connection being such that under any circumstances no undue strain can be placed upon the governor and at the same time the governor action is positive to open and close the valve and a device is provided which may be very cheaply produced when compared with other mechanisms devised for this purpose. Since many changes are possible in the construction of the device as hereinbefore set forth without in any manner departing from the spirit of my invention, I do not limit myself to such specific structure except as hereinafter claimed.

I claim:—

1. In throttle controlling apparatus for internal combustion engines, a shaft connected to a throttle controlling the supply of fuel to the engine, the movement of the throttle being limited at opened and closed positions, a second shaft driven from the engine, a governor, a friction clutch connecting the governor and second shaft at speeds below a predetermined speed and disconnecting the governor therefrom at speeds above such predetermined speed, and planetary gearing connecting said second shaft and governor with the first shaft tending to rotate the first shaft in a direction to open the throttle while the clutch connects the second shaft and governor and in the opposite direction when the governor is disconnected from the second shaft.

2. In throttle controlling apparatus for internal combustion engines, a shaft connected to a throttle controlling the supply of fuel to the engine, the movement of the throttle being limited at opened and closed positions, a second shaft driven from the engine, a governor, a friction clutch connecting the governor and second shaft at speeds below a predetermined speed and disconnecting the governor therefrom at speeds above such predetermined speed, planetary gearing connecting said second shaft and governor with the first shaft tending to rotate the first shaft in a direction to open the throttle while the clutch connects the second shaft and governor and in the opposite direction when the governor is disconnected from the second shaft, including an outer rotatable ring gear, a connection be-

tween the ring gear and the governor, and a connection between the first shaft and the governor, the connection between the first shaft and the governor including a planetary gear mounted upon an arm carried by the first named shaft, the connections between the governor and the second shaft and the outer ring gear tending to drive the outer ring gear in the same direction.

3. In throttle controlling apparatus for internal combustion engines, a shaft connected to a throttle controlling the supply of fuel to the engine, the movement of the throttle being limited at opened and closed positions, a second shaft driven from the engine, a governor, a friction clutch connecting the governor and second shaft at speeds below a predetermined speed and disconnecting the governor therefrom at speeds above such predetermined speed, and planetary gearing connecting said second shaft and governor with the first shaft tending to rotate the first shaft in a direction to open the throttle while the clutch connects the second shaft and governor and in the opposite direction when the governor is disconnected from the second shaft, said friction clutch permitting slip between the second shaft and the governor when the throttle valve is fully opened or closed.

4. In throttle controlling apparatus for internal combustion engines, a shaft connected to a throttle controlling the supply of fuel to the engine, the movement of the throttle being limited at opened and closed positions, a rotatably mounted ring gear, the shaft connected to the throttle having an arm, a gear rotatable on said arm and meshing with the ring gear, a second shaft driven from the engine, a gear on said second shaft meshing with the gear of said arm, governor gearing connecting the governor and ring gear, a clutch controlled by the governor connecting and disconnecting the governor and second shaft, and a connection between the governor and ring gear tending to drive the ring gear in the same direction as the gear of said arm.

5. In throttle controlling apparatus for internal combustion engines, a shaft connected to a throttle controlling the supply of fuel to the engine, the movement of the throttle being limited at opened and closed positions, a rotatably mounted ring gear, the shaft connected to the throttle having an arm, a gear rotatable on said arm and meshing with the ring gear, a second shaft driven from the engine, a gear on said second shaft meshing with the gear of said arm, governor gearing connecting the governor and ring gear, a clutch controlled by the governor connecting and disconnecting the governor and second shaft, and a connection between the governor and ring gear tending to drive the ring gear in the same direction as the gear of said arm and at a higher speed while the governor is connected to the second shaft and at a lower speed when the governor is disconnected from the second shaft.

6. In throttle controlling apparatus for internal combustion engines, a shaft connected to a throttle controlling the supply of fuel to the engine, the movement of the throttle being limited at opened and closed positions, a gear coaxial with the shaft, the shaft having an arm, a gear on the arm meshing with the first named gear, governor mechanism controlling a clutch connection and disconnecting the governor from a member driven from the engine, a driving connection between the governor and gear, a driving connection between the engine driven member and the gear, the governor connection to the gear normally driving said gear in the same direction and at a greater speed than the driving speed of the engine operated member when the governor is connected to the engine operated member and retarding the gear when the governor is disconnected from the engine driven member.

7. In throttle controlling apparatus for internal combustion engines, a shaft connected to a throttle controlling the supply of fuel to the engine, the movement of the throttle being limited at opened and closed positions, a second shaft driven from the engine, a governor, a friction clutch connecting the governor and second shaft at speeds below a predetermined speed and disconnecting the governor therefrom at speeds above such predetermined speed, planetary gearing connecting said second shaft and governor with the first shaft tending to rotate the first shaft in a direction to open the throttle while the clutch connects the second shaft and governor and in the opposite direction when the governor is disconnected from the second shaft, said friction clutch permitting slip between the second shaft and the governor when the throttle valve is fully opened or closed, and means for adjustably regulating the clutching engagement of the governor and shaft operated sections of said clutch.

In testimony whereof I hereunto affix my signature.

MICHAEL MANICKI.