May 16, 1961 J. H. PARKS 2,984,112

ENGINE GOVERNOR WITH STABILIZING MEANS

Filed April 13, 1959

Fig. 1

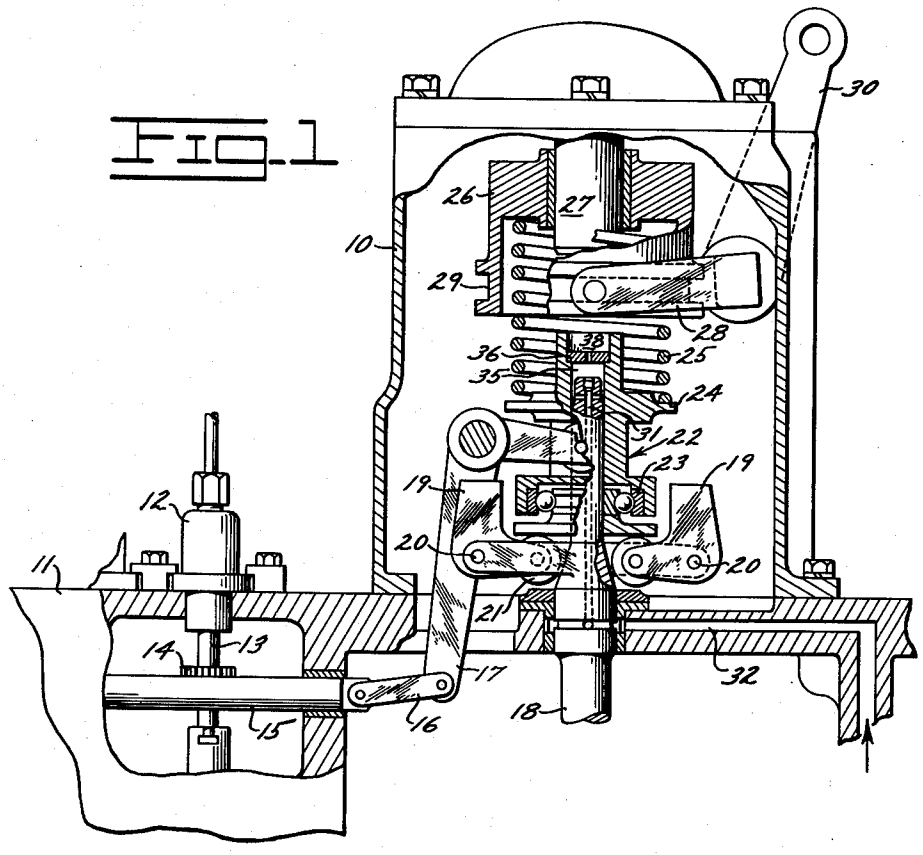
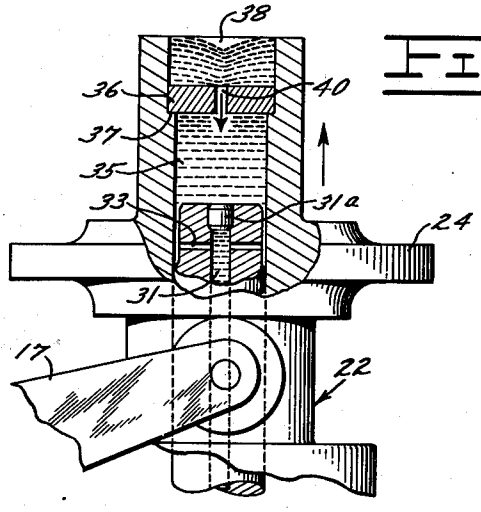


Fig. 2



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ENGINE GOVERNOR WITH STABILIZING MEANS

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This invention relates to governors and particularly to a governor having means to dampen or prevent erratic or surging operation which may be induced by harmonic or sympathetic vibratory motion of engine and governor parts under certain speed conditions.

In tractors and other engine driven vehicles or equipment, it is often found that a governor set for a certain speed will occasionally produce a surge or momentary increase of speed of the engine which is controlled thereby creating an undesirable and sometimes dangerous condition as for example when the tractor is approaching another vehicle or load to be pushed and the momentary increase of speed produces an unanticipated force at impact.

It is the object of the present invention to provide a governor which through very simple and inexpensive means prevents such undesirable surging without interfering with the normal function of the governor and the conventional loading or changing the tension of the main governor spring.

A further object of the invention is to provide a governor with means as described above effective to prevent rapid or uncontrolled adjustment of the spring tension in either direction.

Further and more specific objects and advantages of the invention are made apparent in the following specification wherein reference is made to the accompanying drawing in which a preferred form of the invention is shown.

In the drawing:

Fig. 1 is a vertical sectional view through a governor embodying the present invention illustrating its connection with fuel control means of an internal combustion engine, and

Fig. 2 is an enlarged fragmentary view partially in section of a portion of the damping means of the governor illustrated in Fig. 1.

A conventional governor housing **10** is shown in Fig. 1 as secured to a fuel pump housing **11** where one of the fuel pumps **12** of an internal combustion engine, not shown, is illustrated. The fuel pump **12**, for purposes of illustration is of the type in which axial adjustment of its plunger shown at **13** varies its effective stroke and thereby the volume of fuel injected into the engine. The plunger is conventionally adjusted through a gear **14** and rack bar **15** meshing therewith and adapted to slide in an axial direction in response to movement of the governor to which it is connected by a link **16** and bellcrank **17**.

The governor comprises a spindle **18** rotatable at a speed proportional to engine speed through the medium of gearing, not shown, by which it is connected to a moving part of the engine. The spindle carries a pair of fly-weights **19** pivoted as at **20** to brackets on the spindle and having anti-friction rollers **21** which engage beneath a collar or spring riser, generally indicated at **22**, including a thrust bearing **23** and a seat **24** for the governor main spring shown at **25**. A spring seat **26** for the

opposite end of the governor spring is slidably mounted on a trunnion **27** and is adjustable by a yoke **28** which cooperates with a collar groove **29** formed in the seat and is controlled by a lever **30** which is connected by means not shown to a governor control lever disposed at a convenient location outside the governor housing.

Through the conventional governor thus far described, a desired engine speed is obtained by varying the force applied to the spring **25** through the adjustable spring seat **26**. Due, however, to unpredictable forces in some cases ascribed to harmonic vibratory conditions, changes occur in the position of the governor flyweight **19** accelerating or declerating the engine unexpectedly.

The present invention insures against such unexpected changes in engine speed or surges by providing a hydraulic damping means to resist quick action of the spring riser **22**. The spring riser has a central bore to provide a sliding fit on the spindle **18** and the spindle is provided with an axial oil passage **31** communicating with a passage **32** in the housing which in turn communicates with a source of oil under pressure, not shown, such for example as the lubricating oil system of the engine itself. The passage **31** in the spindle is closed as by a plug **31***a* at its upper end and, as best shown in Fig. 2, a radial passage **33** communicates with a space between the outside diameter of the spindle and the inside diameter of the riser **22** to communicate oil under pressure to a chamber **35** formed by the upper end of the bore in the riser. A baffle **36** closes the upper end of its chamber where it is pressed against a shoulder **37** somewhat below the top of the spring riser to provide a small reservoir **38** at its upper end. A small orifice **40** is provided in the baffle **36** and limits the rate at which oil may pass through the baffle between the reservoirs **35** and **38**. Consequently when there is a tendency toward surging or any rapid adjustment of engine speed through vertical movement of the riser on the spindle, the action is damped because of the restricting orifice **40**. Upon any tendency toward rapid downward movement of the riser, oil in the reservoir **35** is forced upwardly through the orifice **40**. Upon rapid upward movement of the riser, oil in the reservoir **38** is drawn downwardly through the orifice **40** as indicated by the arrow in Fig. 2. In order to insure that oil will be drawn downwardly and that the reservoir **35** is not filled as rapidly as the riser moves upwardly, the flow of oil into the reservoir **35** is purposely limited by the space between the reduced upper end of the spindle and the bore of the riser which in practice is a clearance of about 4–6 thousandths of an inch. The excess oil constantly flowing through the reservoirs spills over the top of the reservoir **38** serves to lubricate the moving parts of the governor and returns by gravity to the lubrication system of the engine through conventional channels.

I claim:

1. In combination with a governor having a vertically disposed rotatable spindle carrying flyweights, a riser slidable on the spindle adjacent the upper end thereof and urged in one direction by the flyweights and in the opposite direction by a governor spring, means to damp sudden motion of the riser which comprises a cylindrical extension thereon projecting upwardly beyond the top of the spindle, and a baffle with a restricted orifice in said extension intermediate the top of the spindle and the top of the extension to form two fluid chambers between which fluid must flow through said restricted orifice upon relative vertical movement of the riser and spindle, and means to direct oil under pressure upwardly through the spindle to enter the lower of said chambers and pass through said orifice to the upper of said chambers and overflow the upper end of the extension on said riser.

2. In combination with a governor having a vertically disposed rotatable spindle carrying flyweights, a riser slidable on the spindle adjacent the upper end thereof and urged in one direction by the flyweights and in the opposite direction by a governor spring, means to damp sudden motion of the riser which comprises a cylindrical extension thereon projecting upwardly beyond the top of the spindle, and a baffle with a restricted orifice in said extension intermediate the top of the spindle and the top of the extension to form two fluid chambers between which fluid must flow through said restricted orifice upon relative vertical movement of the riser and spindle, means to direct oil under pressure upwardly through the spindle to enter the lower of said chambers and pass through said orifice to the upper of said chambers and overflow the upper end of the extension on said riser, and means to restrict the flow of oil into said lower chamber to a rate that will insure downward flow through the restricted orifice when the riser moves upwardly suddenly with respect to the spindle.

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