

PATENT SPECIFICATION **RESERVE COPY**

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647,991



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PROVISIONAL SPECIFICATION

Improvements relating to Speed-Regulating Mechanism for Internal Combustion Engines

We, WOLSELEY MOTORS LIMITED, a Company incorporated under the laws of Great Britain, of Cowley, Oxford (formerly of Drews Lane, Ward End, Birmingham 8), do hereby declare the nature of this invention to be as follows:—

This invention relates to mechanism for automatically regulating the speed of an internal combustion engine, and, in particular, is concerned with improvements in mechanism of the kind in which a centrifugal governor, driven by the engine, is employed to actuate the throttle valve in accordance with load variations. According to the invention the regulating motion of the governor is imparted to a governor lever the pivotal axis of which is disposed substantially at right angles to that of the throttle valve, and the governor lever is coupled to an actuating arm on the throttle valve spindle by a ball-jointed link arranged so that its junction with the governor lever is at all times located outside the plane which contains the pivotal axis of that lever and the junction of the link with the throttle-actuating arm. This form of linkage between the governor and the throttle valve affords a greater mechanical advantage when the valve is nearly closed than when it is well open, and consequently makes more power available for moving the throttle valve over that portion of its travel for which the frictional resistance to movement of the throttle valve spindle is increased appreciably by the effect of the enhanced depression in the inlet manifold. Also, the rate of increase of the torque developed by the engine with the degree of opening of the throttle valve is much greater when the throttle valve is nearly shut than when it is well open, and the effect of the in-

vention is to produce a much more uniform change of torque in response to the control exercised by the governor.

The governor comprises the usual bob-weight assembly arranged to be driven from the engine crankshaft, and the thrust of the axially slidable spindle of the bob-weight assembly is arranged to act on a governor lever which extends outside the casing of the governor and is pivoted on an axis disposed substantially at right angles to that of the throttle valve. The latter has its spindle substantially parallel to the longitudinal axis of the engine, as this results in better distribution of the charge to the cylinders than would be the case if the throttle were placed transversely to that axis.

The governor lever is coupled to a crank-like actuating arm on the throttle valve spindle by a link which is ball-jointed to the governor lever and to the actuating arm, the arrangement being such that the joint between the link and the governor lever is at all times offset from the plane which contains the pivotal axis of the governor lever and the joint between the link and the throttle-actuating arm. The offset referred to is least when the throttle is closed, and the relative angular dispositions of the members of the linkage are then such that a large velocity ratio exists between that end of the link which is attached to the governor lever and that end which is attached to the throttle-actuating arm. In fact, the governor lever has to move appreciably before any motion of the throttle away from its closed position takes place. However, the aforesaid velocity ratio diminishes as the governor lever moves to increase the throttle opening. Otherwise expressed, the invention results in an

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increasing rate of opening of the throttle for a constant rate of movement of the governor lever.

Although the invention is of general application, it is especially intended for use with the engine of an agricultural tractor or similar vehicle.

Dated this 4th day of November, 1948.

For the Applicants,
A. H. STEED,
Chartered Patent Agent.

COMPLETE SPECIFICATION

Improvements relating to Speed-Regulating Mechanism for Internal Combustion Engines

We, WOLSELEY MOTORS LIMITED, a Company incorporated under the laws of Great Britain, of Cowley, Oxford (formerly of Drews Lane, Ward End, Birmingham 8), do hereby declare the nature of this invention and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

This invention relates to mechanism for automatically regulating the speed of an internal combustion engine, of the kind in which a centrifugal governor, driven by the engine, is employed to actuate the throttle valve in accordance with load variations.

According to the invention the regulating motion of the governor is imparted to a governor lever the pivotal axis of which is contained in a vertical plane disposed substantially at right angles to the vertical plane containing the axis of the throttle valve, and the governor lever is coupled to an actuating arm on the throttle valve spindle by a ball-jointed link so arranged that during pivotal motion of the governor lever in the direction associated with closing movement of the throttle valve the end of the governor lever attached to the link progressively approaches, and at the valve-closing end of its travel almost reaches, the plane containing the pivotal axis of the governor lever and the junction of the link with the throttle-actuating arm. This arrangement, in which the linkage between the governor and the throttle valve takes virtually the form of a three-dimensional toggle, affords a greater mechanical advantage when the valve is nearly closed than when it is well open, and consequently makes more power available for moving the throttle valve over that portion of its travel for which the frictional resistance to movement of the throttle valve spindle is increased appreciably by the effect of the enhanced depression in the inlet manifold. Also, the increments in the torque developed by

the engine for equal increments in angular movement of the throttle valve are greater when the throttle valve is nearly shut than when it is well open, and the effect of the invention is to produce a much more uniform change of torque in response to the control exercised by the governor.

Referring to the accompanying drawings:—

Figure 1 is a side elevation showing the form of linkage employed in accordance with the invention between the governor and the throttle valve of an internal combustion engine;

Figure 2 is a plan of the arrangement shown in Figure 1;

Figure 3 is a corresponding end elevation; and Figure 4 is a graph representing the relation between the movements of the governor lever and the throttle valve.

The governor comprises the usual bob-weight assembly arranged to be driven from the engine crankshaft, and the thrust of the axially slidable spindle of the bob-weight assembly is arranged to act on a governor lever 1 which extends outside the casing 2 of the governor and is pivoted on an axis 3 contained in a vertical plane disposed substantially at right angles to the vertical plane containing the axis of the throttle valve 4. The latter has its spindle 5 substantially parallel to the longitudinal axis of the engine, as this results in better distribution of the charge to the cylinders than would be the case if the throttle spindle were placed transversely to that axis.

The governor lever 1 is coupled to a crank-like actuating arm 6 on the throttle valve spindle 5 by a link 7 which is ball-jointed to the governor lever and to the actuating arm, the arrangement being such that the joint 8 between the link and the governor lever is at all times offset from the plane which contains the pivotal axis 3 of the governor lever 1 and the joint 9 between the link 7 and the throttle-

- actuating arm 6. The offset referred to is least when the throttle is closed (namely with the linkage in the position shown in full lines in Figure 1), and the relative angular dispositions of the members of the linkage are then such that a large velocity ratio exists between the end 8 of the link which is attached to the governor lever and the end 9 which is attached to the throttle-actuating arm 6. However, the aforesaid velocity ratio diminishes as the governor lever moves to increase the throttle opening. Otherwise expressed, the invention results in an increasing rate of opening of the throttle for a constant rate of movement of the governor lever. The actual relation between the angular movements of the throttle valve and the governor lever is represented by the curve in Figure 4.
- Although the invention is of general application, it is especially intended for use with the engine of an agricultural tractor or similar vehicle.
- Having now particularly described and ascertained the nature of our said invention and in what manner the same is to be performed, we declare that what we claim is:—
1. Mechanism for automatically regulating the speed of an internal combustion engine, of the kind specified, in which the regulating motion of the governor is imparted to a governor lever the pivotal axis of which is contained in a vertical plane disposed substantially at right angles to the vertical plane containing the axis of the throttle valve, and the governor lever is coupled to an actuating arm on the throttle valve spindle by a ball-jointed link so arranged that during pivotal motion of the governor lever in the direction associated with closing movement of the throttle valve the end of the governor lever attached to the link progressively approaches, and at the valve-closing end of its travel almost reaches, the plane containing the pivotal axis of the governor lever and the junction of the link with the throttle-actuating arm.
 2. Speed-regulating mechanism for an internal combustion engine, constructed and arranged to operate substantially as described with reference to Figures 1 to 3 of the accompanying drawings.

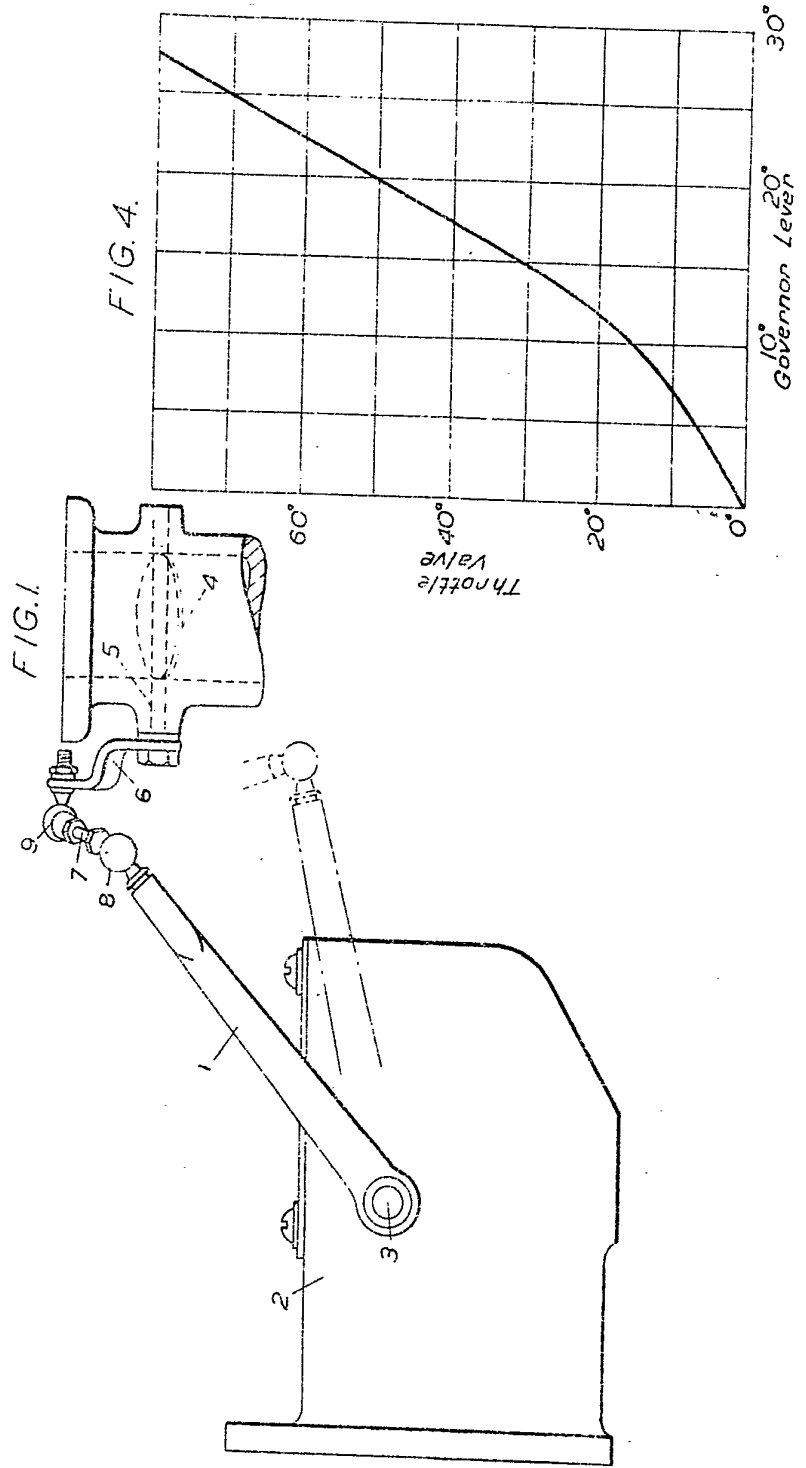
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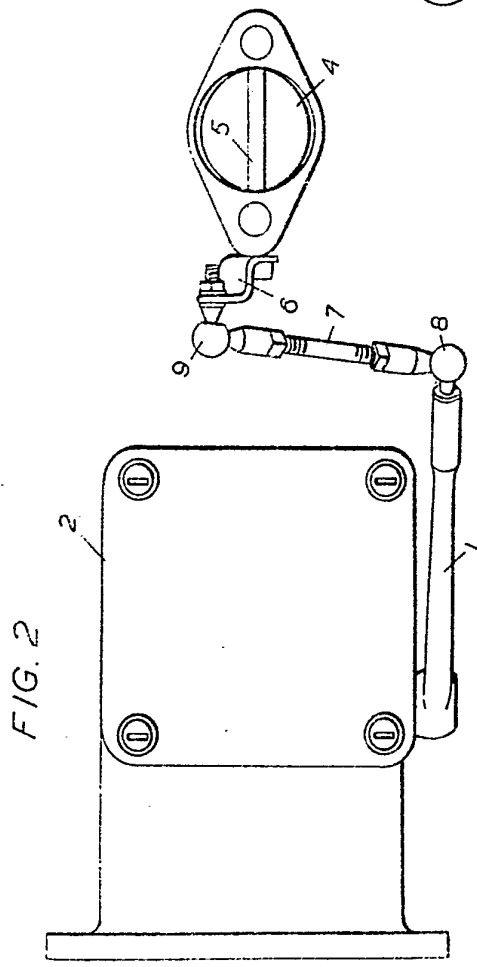
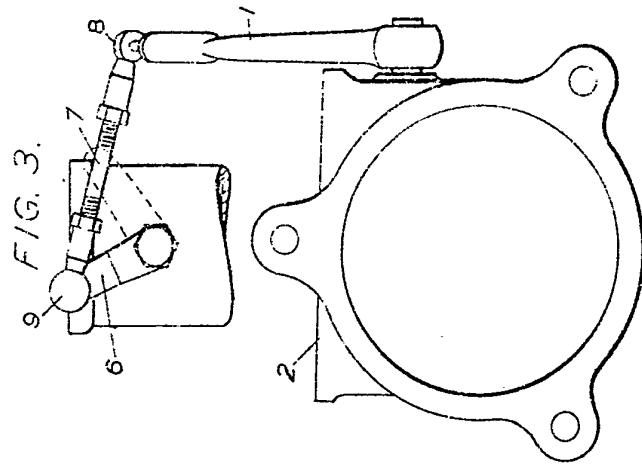
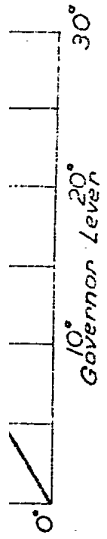
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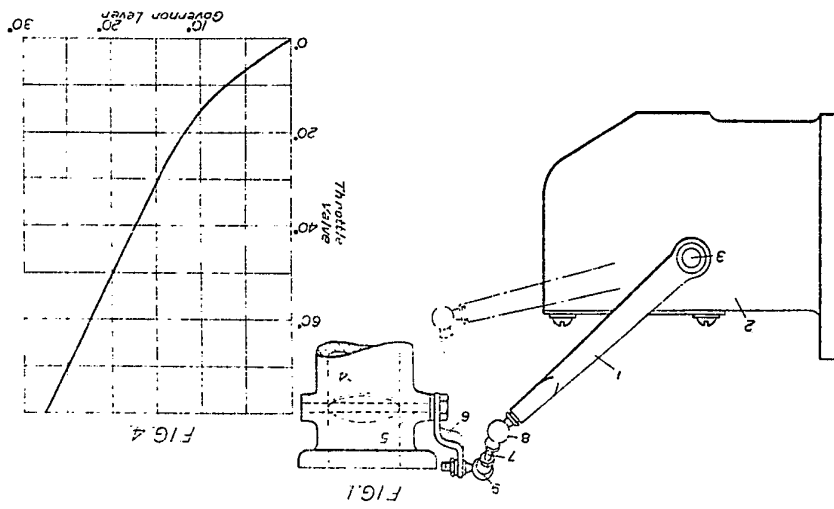
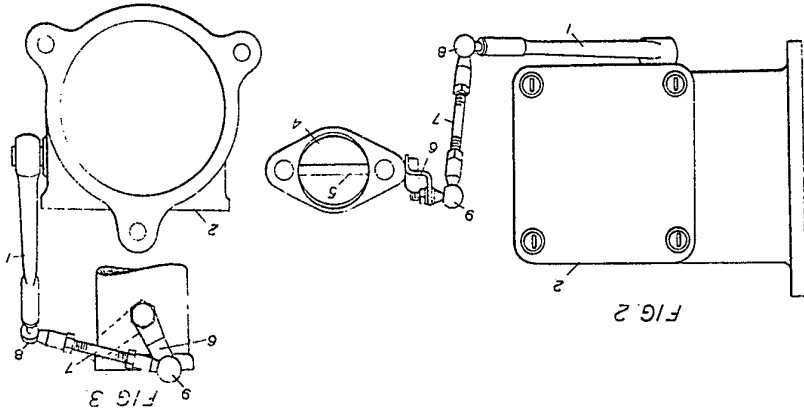
A. H. STEED,

Chartered Patent Agent.

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