(No Model.) 2 Sheets—Sheet 1.

J. H. HAMILTON.

GOVERNOR.

No. 455,533. Patented July 7, 1891.

Fig. 1.

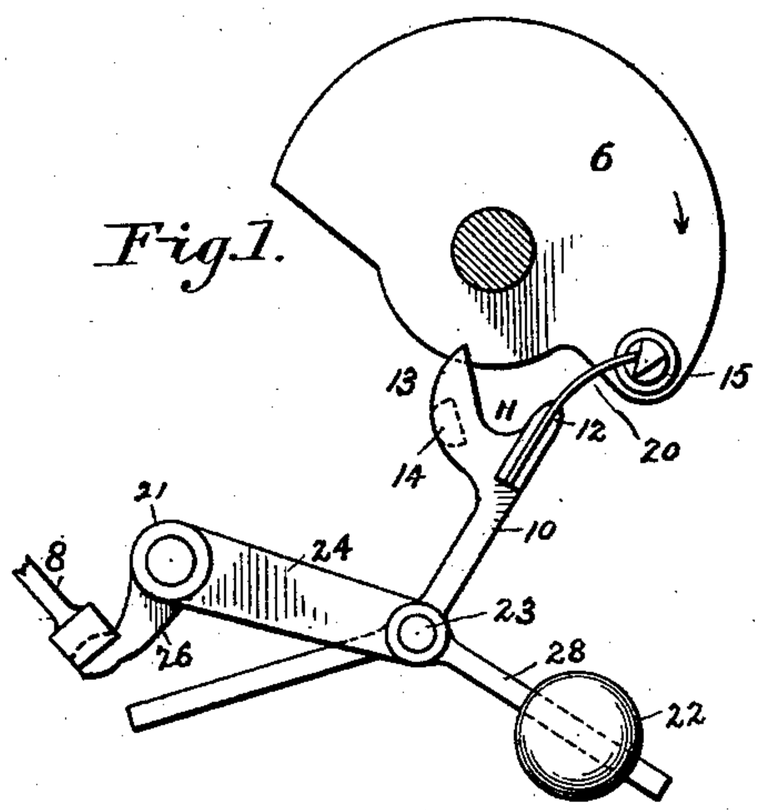


Fig. 2.

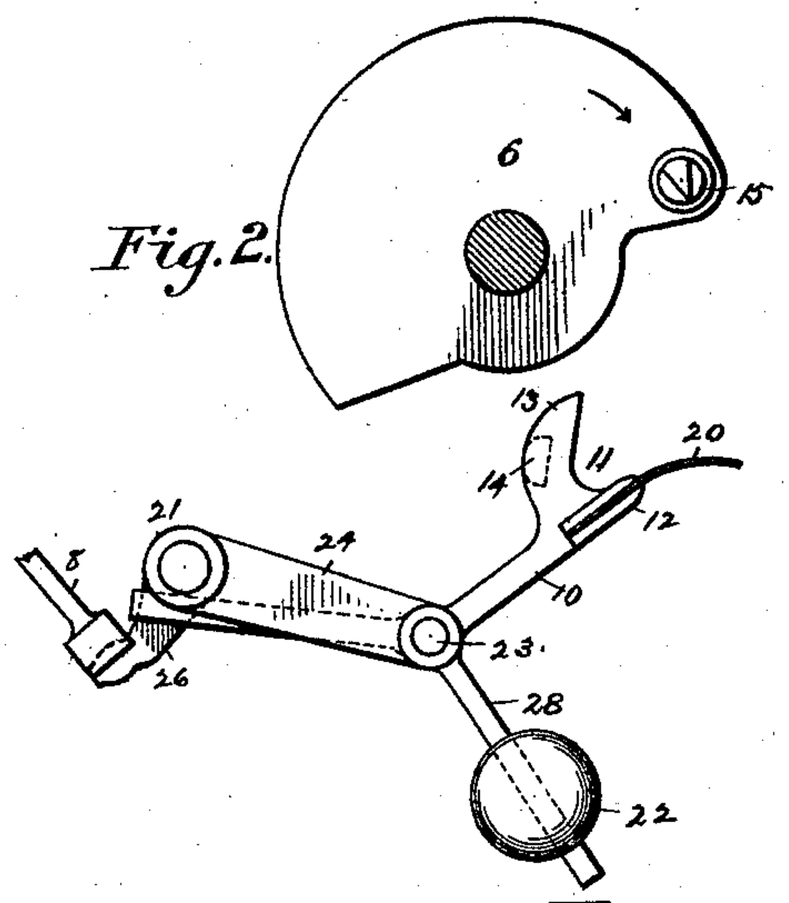


Fig. 3.

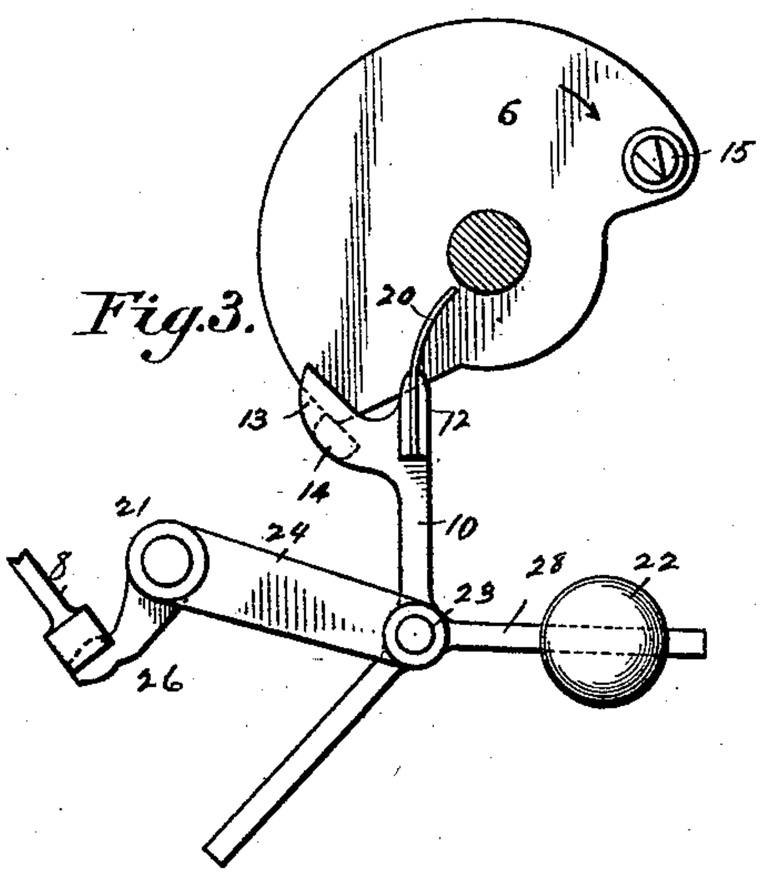


Fig. 4.

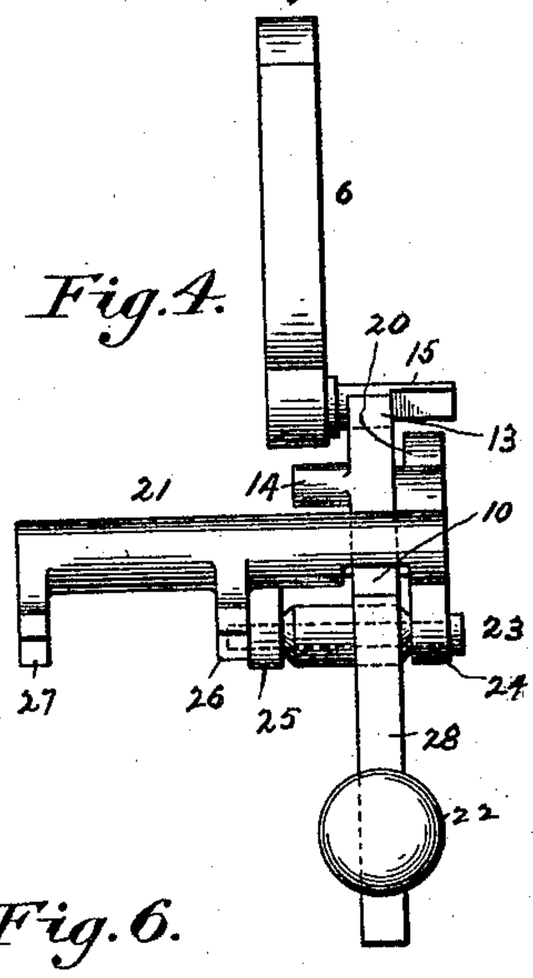


Fig. 5.

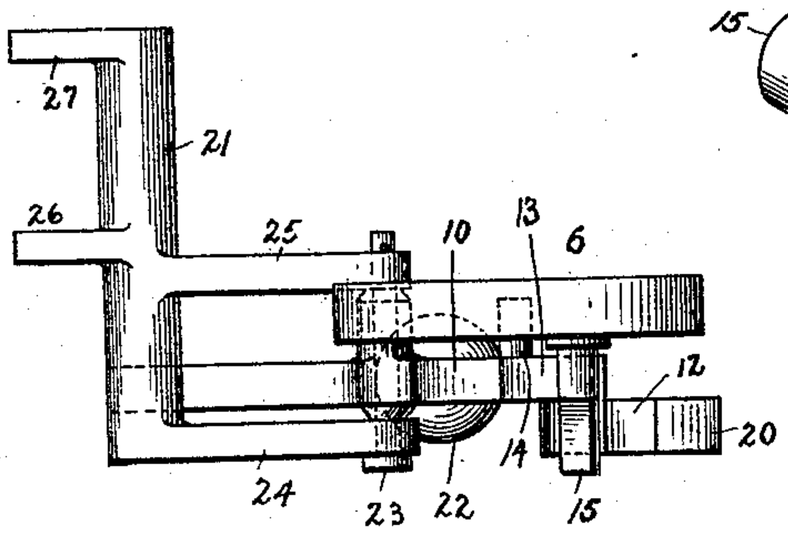
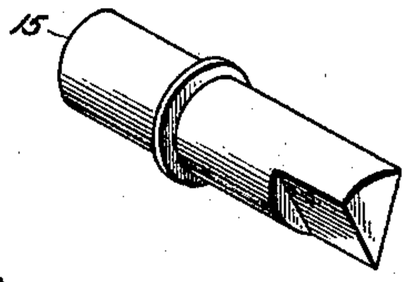


Fig. 6.



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(No Model.) 2 Sheets—Sheet 2.

J. H. HAMILTON.

GOVERNOR.

No. 455,533. Patented July 7, 1891.

Fig. 7.

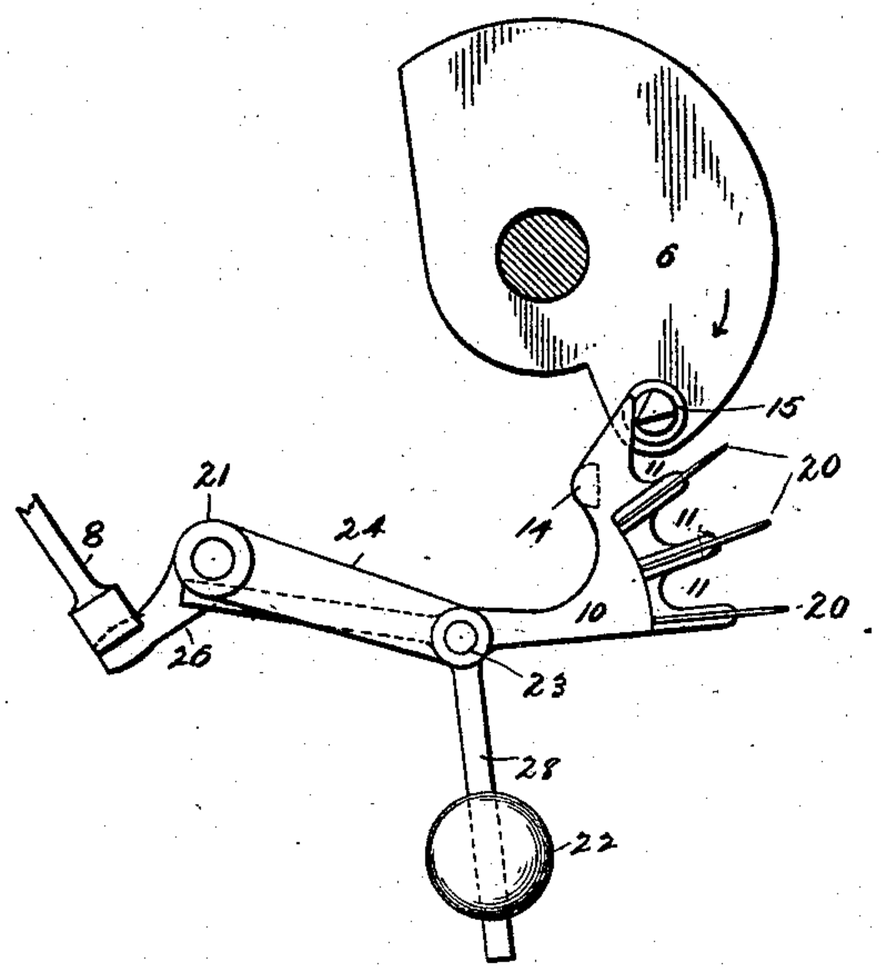


Fig. 8.

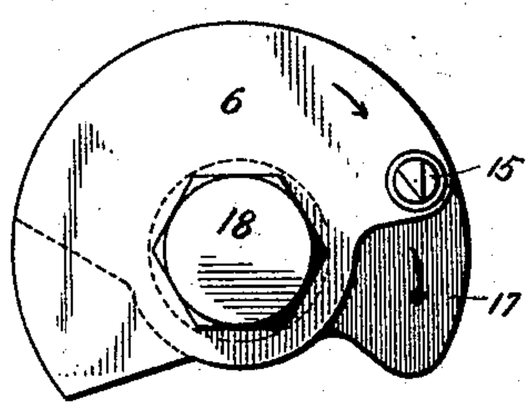
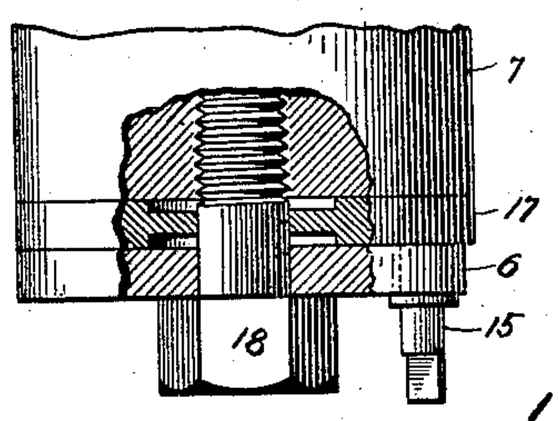


Fig. 9.



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UNITED STATES PATENT OFFICE.

JOHN HENRY HAMILTON, OF SANDIACRE, ENGLAND.

GOVERNOR.

SPECIFICATION forming part of Letters Patent No. 455,533, dated July 7, 1891.

Application filed May 11, 1891. Serial No. 392,294. (No model.) Patented in England October 18, 1889, No. 16,434.

To all whom it may concern:

Be it known that I, JOHN HENRY HAMILTON, a British subject, residing at Sandiacre, in the county of Derby, England, have invented certain new and useful Improvements in Governors, (patented in Great Britain, No. 16,434, dated October 18, 1889;) and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

In an application for Letters Patent of the United States, filed by Arthur Rollason and myself March 26, 1891, and bearing Serial No. 386,530, there is shown and described a gas or vapor engine provided with an admission-chamber for the entrance of the explosive mixture, and wherein the gas-ports are governed by a spring-seated valve provided with operating-stems extending outwardly, so as to be operated independently of the operation of the valve governing the opening between the admission-chamber and the combustion-chamber.

The object of the present invention is to control the speed of the engine by placing the gas-port valve of the admission-chamber under the control of a governor of novel construction and arrangement, which governor will permit the said gas-valve to be opened or operated when the engine is running at or below the normal speed, but which will not actuate the said gas-valve when the engine is running at too high a speed, the construction being of a simple and durable character, applicable with economy where it is not specially advantageous to use a separate automatic throttle-valve on the gas-supply pipe.

The governor which is the subject-matter of the present application is also adapted by suitable adjustment to vary the normal speed of the engine, and provision is also made in one of the modified forms of the invention for varying the strength of the explosive mixture by admitting a greater or less quantity of gas through the gas-ports, according to the speed at which the engine is running.

In the accompanying drawings, illustrative of the invention, Figure 1 represents an end view of a governor embodying my improvements. Figs. 2 and 3 represent like views thereof at different stages or phases of the operation. Fig. 4 represents a side elevation. Fig. 5 represents a top plan view. Fig. 6 represents on a larger scale a perspective view of the cam-plate pin forming a part of the governor. Fig. 7 represents an end view of a modified form of governor embodying my improvements; and Figs. 8 and 9 represent, respectively, an end view and a top plan view, partly in section and partly broken away, of means for adjusting the normal rate of speed of the engine.

Similar numerals of reference indicate similar parts throughout the several views.

Referring to the drawings, 6 represents a disk or cam plate adapted to be connected to the lay-shaft or other rotating part of the engine—as, for instance, the part 7 (shown in Fig. 9)—and so as to rotate therewith. The disk or cam plate is cut away, as shown, and is provided at one of the ends of the cut-away portion with a pin 15, projecting outwardly therefrom, and formed at its outer portion into a knife-edge, as shown.

Co-operating with the disk or cam plate 6 is the drop-bar 10, which, in the form of my invention shown in Figs. 1 to 5, is provided with a single notch 11 at its outer end, but which may be provided with a series of notches, as shown in Fig. 7, for a purpose hereinafter described.

I will first explain the invention with reference to the simpler construction shown in Figs. 1 to 5. In said figures the notch 11 is located between or formed by projections 12 and 13, the projection 13 being provided with a pin 14, extending laterally therefrom and having a flattened face, as indicated in dotted lines, for resting upon the edge of the cam-plate. The drop-bar 10 is further provided at its notched end with a projecting point or leaf 20, of spring metal, connected to the projection 12. The drop-bar is pivoted by means of the pin 23 to the arms 24 25, which are formed integral with the rock-bar 21, said rock-bar having arms 26 27, whose free ends engage within slots in the ends of the gas-valve spindle or spindles 8. The drop-bar is also provided with an arm 28, carrying an adjustable weight 22.

The mode of operation is as follows: When the cut-away portion of the disk or cam plate 6, which disk or cam plate revolves in the di-

rection of the arrow, comes around to the pin 14 of the drop-bar 10, as indicated in Fig. 3, the support of the drop-bar being thus removed, the drop-bar begins to fall. If the engine is going too fast, the pin 15 will have come around so far that the projecting spring 20 falls upon it, as indicated in Fig. 1, in which case the bar is merely rocked back again upon its pivot and held up by the edge of the disk or cam plate 6 until the cut-away portion again comes around, when the bar again drops. If the engine is now going slow enough, the rear end of the drop-bar 10 will strike against the rock-bar 21, which will serve to stop the further fall of the bar, as indicated in Fig. 2, before the pin 15 comes around far enough to intercept the bar. In this case the pin 15 will engage the notch 11, and in raising the bar will impart to it a longitudinal or end movement, which movement will be transmitted to the valve stem or stems 8 by the rocking arms 26 27.

The weight 22 may be adjusted toward or from the pivot-pin 23, thereby varying the time taken by the bar to drop, and thus regulating the speed of the engine, as will be readily understood, and this adjustment can be made with facility without stopping the engine.

It is obvious that instead of the adjustable weight 22 a spring of adjustable strength may be used either to retard or accelerate the speed of the bar, so as to vary the time taken for the bar to drop, and may be applied in any convenient manner.

Fig. 3 illustrates the governor at the time the bar is raised and about to drop. Fig. 1 shows what happens when the speed of the engine is too great and there is a gas-charge to be cut out, and Fig. 2 shows the position of parts at the slower speed and when a gas-charge is to be admitted.

Instead of regulating the normal speed of the engine by varying the time which the bar takes to drop or execute its free movement, the same result may be secured by varying the time at which the bar is released. Means for retaining this end are illustrated in Figs. 8 and 9. In this instance the disk or cam plate 6 has behind it another disk or cam plate 17 of similar shape, the cam-plates 6 and 17 being angularly adjustable with respect to each other by means of the binding-screw 18, said binding-screw passing through openings in the cam-plates, as shown. One of the cam-plates is made thinner at its middle portion through which the binding-screw passes, in order to augment or increase the binding effect. It will of course be understood that the pin 14 is of sufficient length to rest on the edges of both of the cam-plates 6 and 17. By means of the construction shown in Figs. 8 and 9 the width of the gap or cut-away portion of the cam-plate may be adjusted, and consequently the time of release of the drop-bar may be correspondingly varied. It is evident that the normal rate of speed of the engine may thus be regulated within wide limits.

In Fig. 7 I have illustrated a modified form of the invention, wherein provision is made for varying the strength of the explosive mixture by admitting a greater or less quantity of gas through the gas-ports, according to the speed at which the engine is running. In this case the drop-bar 10, connected with the gas-port valve in the manner already described, is provided with a series of notches 11 at increasing distances from its pivot-pin 23, so that when the pin 15 engages with the uppermost notch the gas-port valve will open more than when it engages with an intermediate notch and still more than when it engages with the lowermost notch. This arrangement gives a graded series of gas-valve openings, according to the speed of the engine.

It is obvious that the drop-bar might be so arranged as not to operate the gas-valve spindle 8 directly, but through a lever or system of levers or the like, which would communicate the motion of the bar to the gas-valve spindle. In fact, as the essential parts of the governor consist of the disk or cam plate and the drop-bar with their accessories, the mode of connection between the drop-bar and the gas-valve may be varied at will without departing from the spirit of the invention.

Having thus described my invention, what I claim is—

1. A governor consisting of a swinging push-bar connected to the governed device and having a limited swing, the end of said push-bar being in the path of movement of a rotating part of the engine when at the limit of its swing, substantially as described.

2. A governor consisting of a swinging push-bar, a rock-bar to which the push-bar is jointed, said rock-bar being in operative connection with the governed device and one end of the push-bar at the limit of its swing being in the path of movement of a rotating part of the engine, substantially as described.

3. A governor consisting of a swinging push-bar, a rock-bar to which the push-bar is jointed, said rock-bar being in operative connection with the governed device and one end of the push-bar at the limit of its swing being in the path of movement of a rotating part of the engine, and means for varying the duration of swing of the push-bar, substantially as described.

4. A governor consisting of a swinging push-bar connected to the governed device and having a limited swing, one end of said push-bar at the limit of its swing being in the path of movement of a rotating part of the engine, and means for varying the duration of the swing of the push-bar, substantially as described.

5. A governor consisting of a swinging push-bar, a rock-bar to which the push-bar is jointed, said rock-bar being in operative connection with the governed device and one end of the push-bar at the limit of its swing being in the

path of movement of a moving part of the engine, and an adjustable weight upon the push-bar for varying the duration of its swing, substantially as described.

6. A governor consisting of a cam connected to a rotating part of the engine, a swinging push-bar connected to the governed device and having a projection riding upon the cam, and a projection rotating with the cam and intersecting the plane in which the push-bar is located, substantially as described.

7. A governor consisting of a cam connected to a rotating part of the engine and made in parts adjustable with respect to each other so as to vary the cam-gap, a swinging push-bar connected to the governed device and having a projection riding upon the cam, and a projection rotating with the cam and intersecting the plane in which the push-bar is located, substantially as described.

8. A governor consisting of a cam connected to a rotating part of the engine, a swinging push-bar connected to the governed device and notched at its free end, a projection from the push-bar riding upon the cam, and a projection rotating with the cam and intersecting the plane in which the push-bar is located, substantially as described.

9. A governor consisting of a cam connected to a rotating part of the engine, a swinging push-bar, a rock-bar to which the push-bar is jointed, said rock-bar being in operative connection with the governed device, a projection from the push-bar, said projection riding upon the cam, and a projection rotating with the cam and intersecting the plane in which the push-bar is located, substantially as described.

10. A governor consisting of a cam connected to a rotating part of the engine, a swinging push-bar, a rock-bar to which the push-bar is jointed, said rock-bar being in operative connection with the governed device, a projection from the push-bar, said projection riding upon the cam, and a projection rotating with the cam and intersecting the plane in which the push-bar is located, and an adjustable weight upon the push-bar for varying the duration of its swing, substantially as described.

11. A governor consisting of a cam connected to a rotating part of the engine, a swinging push-bar, a rock-bar to which the push-bar is jointed, said rock-bar being in operative connection with the governed device, a projection from the push-bar, said projection riding upon the cam, and a projection rotating with the cam and intersecting the plane in which the push-bar is located, and means for adjusting the cam and push-bar with respect to each other, so as to vary the normal speed of the engine, substantially as described.

12. A governor consisting of a cam connected to a rotating part of the engine, a swinging push-bar connected to the governed device and having a plurality of notches at its free end varying in distance from the center of swing of the push-bar, a projection from the push-bar riding upon the cam, and a projection rotating with the cam and intersecting the plane in which the push-bar is located, substantially as described.

13. A governor consisting of a cam connected to a rotating part of the engine, a swinging push-bar connected to the governed device and having a plurality of notches at its free end varying in distance from the center of swing of the push-bar, springs forming continuations of the lower parts of the several notches, and projections from the push-bar riding upon the cam, and a projection rotating with the cam and intersecting the plane in which the push-bar is located, substantially as described.

14. In a governor of the kind described, the combination, with the body portion of the drop-bar, of a downwardly-curved spring projection at the free end thereof, substantially as described.

15. In a governor of the kind described, the cam pin or projection of general cylindrical contour and cut away to form a knife-edge at its forward end, substantially as described.

In testimony whereof I affix my signature in presence of two witnesses.

JOHN HENRY HAMILTON.

Witnesses:

ARTHUR ROLLASON,

WILLIAM BROOM.