C. W. RICHARDSON.

INTERNAL COMBUSTION ENGINE GOVERNOR.

APPLICATION FILED OCT. 26, 1912.

1,068,008.

Patented July 22, 1913.

2 SHEETS SHEET 1.

Fig. 1.

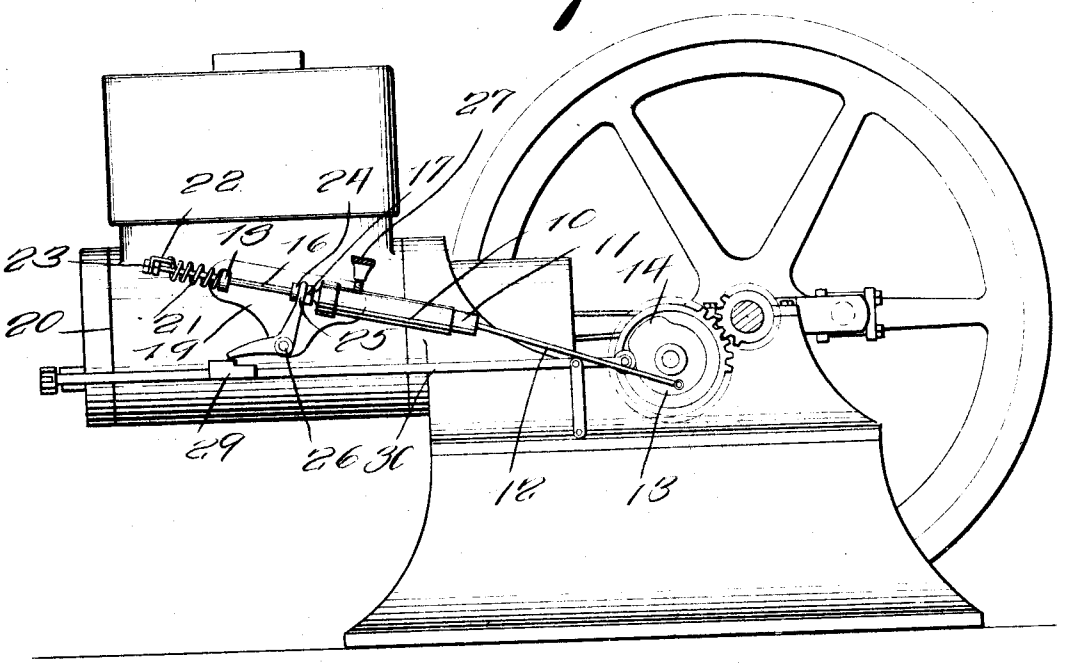
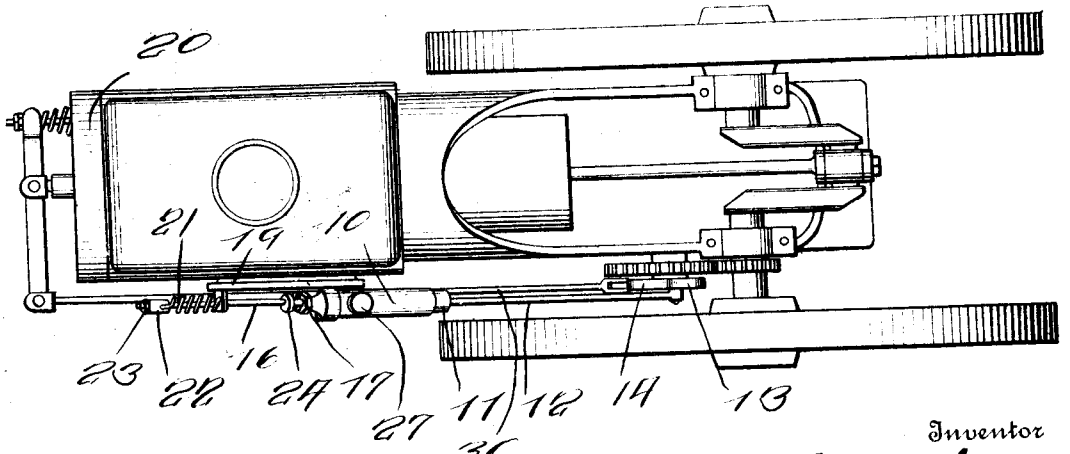


Fig. 2.



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2 SHEETS—SHEET 2.

Fig. 3.

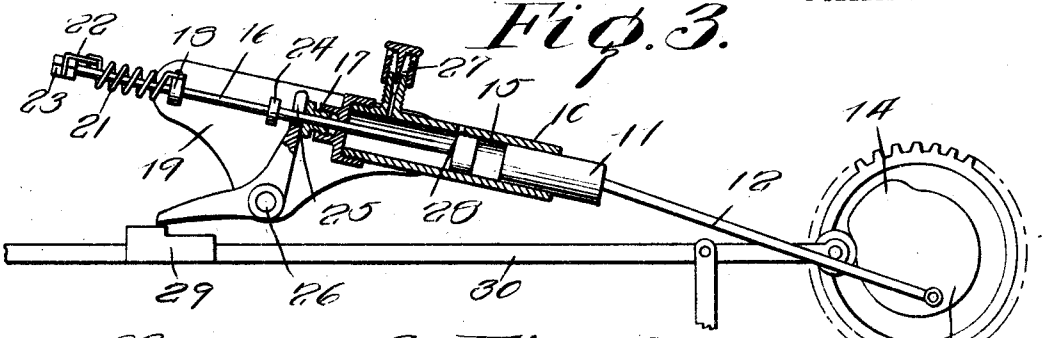


Fig. 4.

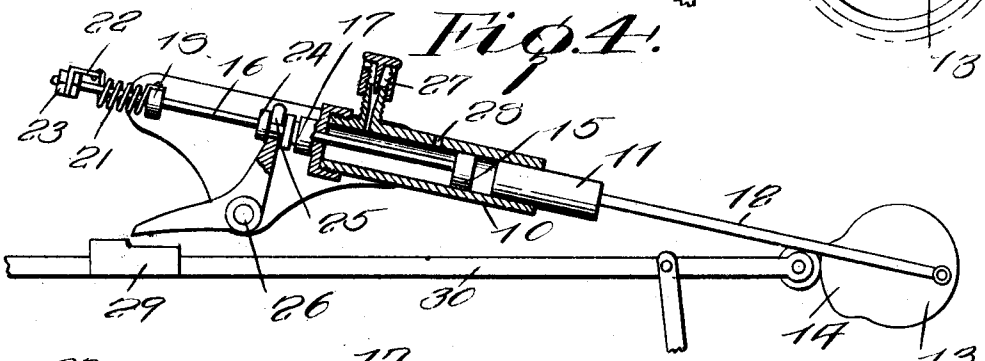


Fig. 5.

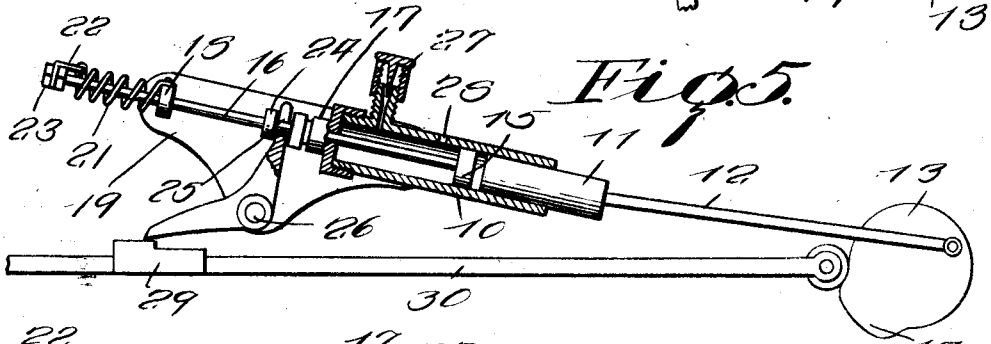
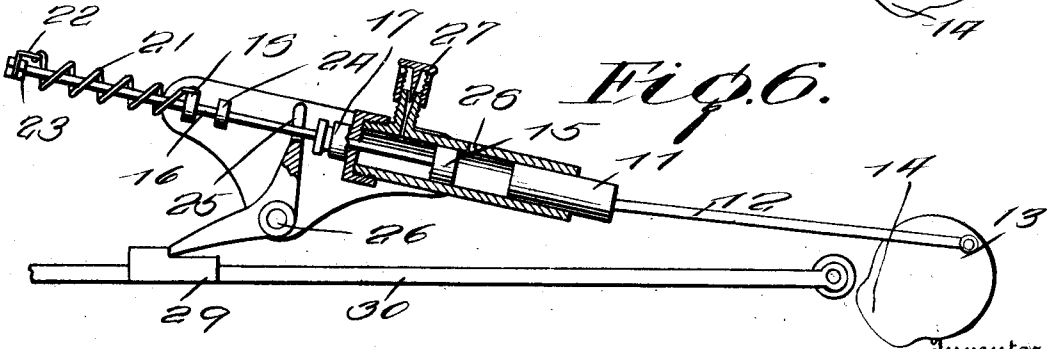


Fig. 6.



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INTERNAL-COMBUSTION-ENGINE GOVERNOR.

1,068,008. Specification of Letters Patent. Patented July 22, 1913.

Application filed October 26, 1912. Serial No. 727,871.

To all whom it may concern:

Be it known that I, CONLEY W. RICHARDSON, a citizen of the United States, residing at Rugby, in the county of Grayson, State of Virginia, have invented certain new and useful Improvements in Internal-Combustion-Engine Governors; 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.

This invention relates to gas engine governors of the hit and miss type and has for an object to provide an extremely simple and durable governor in the nature of a spring controlled piston carried in a common cylinder with and movable by a piston controlled by the exhaust valve operating cam, the spring controlled piston under normal speeds releasing the detent lever from engagement with the detent just prior to the end of the exhaust stroke, but when the speed of the engine increases abnormally the spring controlled piston lags behind the cam operative piston and permits of the detent lever remaining in engagement with the detent on the exhaust valve operating rod whereby the exhaust valve is held open until the engine returns to normal speed.

With the above objects in view the invention consists of certain novel details of construction and combination of parts hereinafter fully described and claimed, it being understood that various modifications may be made in the minor details of construction within the scope of the appended claims.

In the accompanying drawings forming part of this specification:—Figure 1 is a side elevation of the device applied. Fig. 2 is a plan view of the parts shown in Fig. 1. Fig. 3 is an enlarged side elevation of the invention with the cylinder in section and showing the position of the parts at the beginning of the exhaust stroke under normal speed. Fig. 4 is a view similar to Fig. 3 but showing the position of the parts during the exhaust stroke under normal speed. Fig. 5 is a view similar to Fig. 3 but showing the position of the parts at the end of the exhaust stroke under normal speed. Fig. 6 is a view similar to Fig. 3 but showing the position of the parts at the end of the exhaust stroke under excess speed.

Referring now to the drawings in which like characters of reference designate similar parts, 10 designates the governor cylinder which is open at one end and working in the open end of this cylinder is a tubular piston 11 which is driven by a connecting rod 12 that is connected to the exhaust valve operating cam 13 on the opposite side thereof from the cam projection 14. Working behind this piston which I call the governor piston, is a plunger 15, the latter fitting the cylinder air-tight and being provided with a long stem 16 which passes through a stuffing box 17 that closes one end of the cylinder, and furthermore extends loosely through a guide lug 18 which extends outwardly from a plate 19 carried on the side of the engine cylinder 20. The guide lug also carries one end of a coil spring 21 which encircles the plunger rod, the opposite end of the spring being connected to a clip 22 which is adjustably secured to the end of the plunger rod by means of two nuts 23, the latter permitting of the tension of the spring being adjusted. The tension of the spring 21 tends to keep the plunger pressed against the governor piston, however, the plunger has not quite as long a stroke as the governor piston since its movement to the right is arrested by a small collar 24 fixed to the plunger rod and contacting with the upwardly extending forked arm of a detent lever 25 which is angular in outline and is pivoted at the elbow as shown at 26 to the plate 19. Near the closed end of the governor cylinder is a needle valve controlled air port 27 which governs the admission of air to the cylinder. When the plunger is nearly to the end of its stroke to the right, and just before the collar 24 impinges against the detent lever, the plunger passes beyond a small hole 28 formed in the wall of the cylinder, air being thus admitted to the cylinder in rear of the plunger. When the governor piston is pushed toward the left, pushing also the plunger to the left, the air is expelled from the cylinder through the air port 27, and furthermore the governor spring 21 is stretched while at the same time the collar 24 is carried to the left and allows the detent lever to engage with a notched detent 29 carried on the cam rod 30 which operates the exhaust valve 31.

The operation of the device is as follows. Suppose the engine to be running under normal speed. At the beginning of the exhaust stroke, see Fig. 3, it will be seen that when the projection on the cam strikes the roller

32 on the end of the cam rod, the governor piston has already traveled the major portion of its stroke toward the right. During the exhaust stroke, the cam rod is held far enough toward the left to allow the detent lever to drop into the detent, see Fig. 4. At the end of the exhaust stroke, see Fig. 5, the governor piston has reached the limit of its stroke toward the right and has again started toward the left, but has not moved far enough to meet the plunger. While these movements are taking place with the governor piston, and the engine is making the power and exhaust strokes, let us follow the movements of the plunger. As the governor piston recedes, see Figs. 3 and 4, the plunger under tension of the governor spring follows it toward the right. The speed of the plunger however, is limited by the partial vacuum created behind it and is easily adjusted by changing the size of the opening in the air inlet port by manipulation of the needle valve. When the engine is running under normal speed, the plunger follows the governor piston closely, and the collar 24 arrives at the upright arm of the detent lever and lifts the lever from engagement with the detent just prior to the end of the exhaust stroke. However, if the engine is exceeding normal speed, see Fig. 6, the plunger does not travel fast enough for the collar to lift the detent lever, and as the cam rod begins to move slightly toward the right, the notch of the detent engages the detent lever and the cam rod is held stationary. The exhaust valve is thus held open, and air only admitted to the engine cylinder for another revolution of the cam, the governor however repeating its strokes each revolution and not lifting the detent until the engine speed has fallen to normal. It will thus be seen that the speed of the plunger on its rightward stroke, and consequently the speed of the engine, depends upon the size of the opening in the air inlet port of the governor cylinder.

The object of the small hole 28 in the governor cylinder, which plunger passes over just before it reaches the end of its stroke, is to let in air and allow the plunger to jump forward sharply and raise the detent lever quickly. This occurs when the engine is running at normal speed, when the governor piston is slightly in advance of the plunger, and cam rod is almost ready to recede, as best shown in Fig. 4. The advantage of this quick movement is obvious, it obviates probability of the detent lever catching on extreme top point of the notch in the detent.

What is claimed, is:—

1. In a governor, opposing spring controlled and cam operated pistons, the spring controlled piston being moved against the tension of its spring by the cam operated piston, and being moved by the tension of its spring to recede with the cam operated piston, and means for causing the spring controlled piston to recede slower than the cam operated piston.

2. In a governor, opposing spring controlled and cam operated pistons, the spring controlled piston being moved against the tension of its spring by the cam operated piston, and being moved by the tension of its spring to recede with the cam operated piston, and air operated means opposing the action of the spring controlled piston and causing the latter to recede slower than the cam operated piston when the cam operated piston exceeds a predetermined speed.

3. In a governor, the combination of a detent lever, opposing spring controlled and cam operated pistons, a common cylinder inclosing said pistons, means carried by said spring controlled piston adapted to release detent lever from active position under normal engine speed, the spring controlled piston and the cam operated piston normally moving simultaneously in the same direction in said cylinder, a manually adjustable air valve in one end of said cylinder in rear of said spring controlled piston, the action of said spring controlled piston being opposed by the partial vacuum created in rear of said spring controlled piston and causing the latter to recede slower than the cam operated piston when the cam operated piston exceeds a predetermined speed with a resultant failure of said spring controlled piston to release detent lever from active position by said detent lever controlling means.

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

CONLEY W. RICHARDSON.

Witnesses:
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Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."