P. PAULSON.

GOVERNING MECHANISM FOR EXPLOSIVE ENGINES.

APPLICATION FILED MAY 10, 1909.

961,156.

Patented June 14, 1910.

3 SHEETS—SHEET 1.

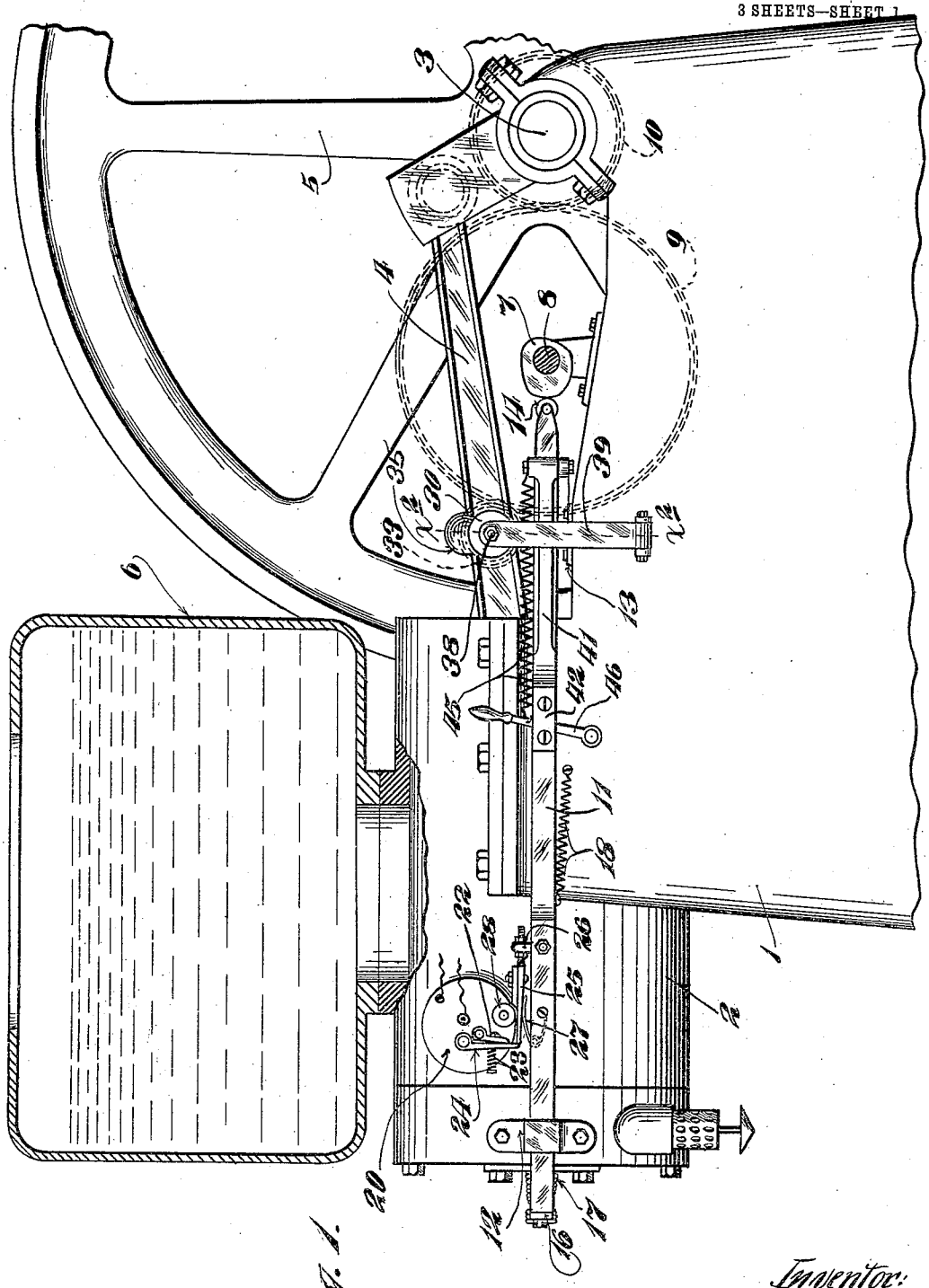

Fig. 1.

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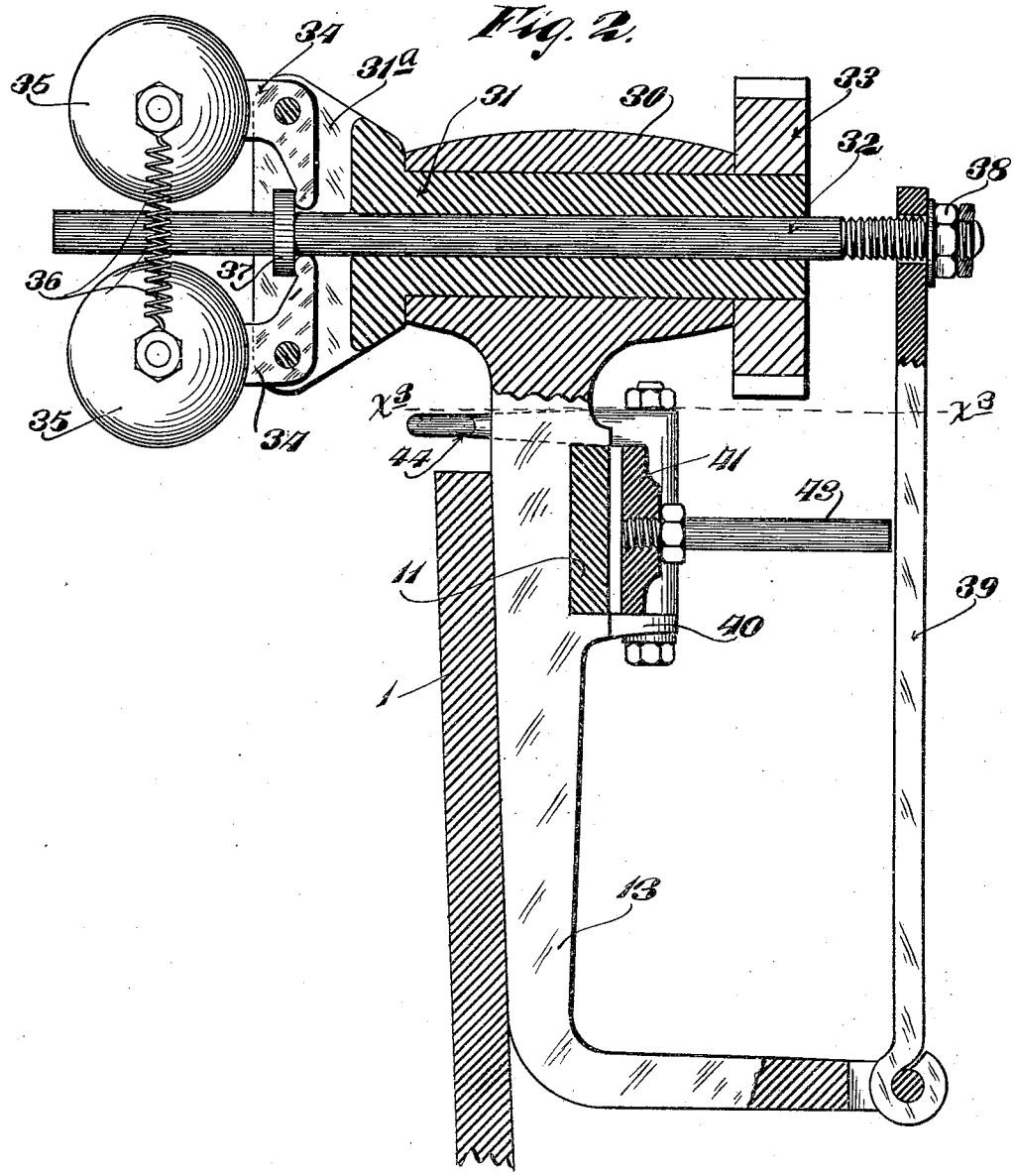
Fig. 2.



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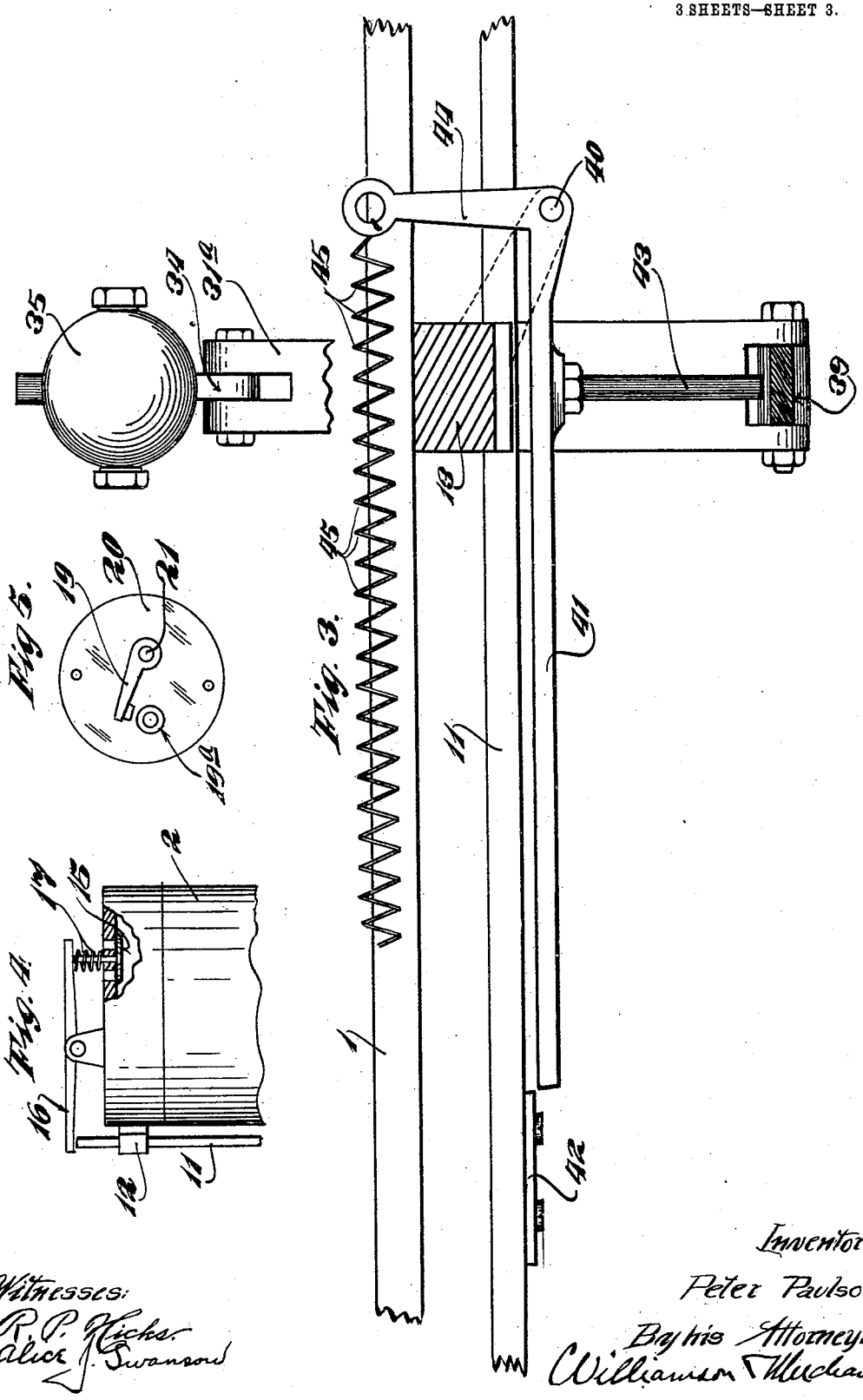

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UNITED STATES PATENT OFFICE.

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GOVERNING MECHANISM FOR EXPLOSIVE-ENGINES.

961,156. Specification of Letters Patent. Patented June 14, 1910.

Application filed May 10, 1909. Serial No. 495,147.

To all whom it may concern:

Be it known that I, PETER PAULSON, a citizen of the United States, residing at Marshfield, in the county of Wood and State of Wisconsin, have invented certain new and useful Improvements in Governing Mechanism for Explosive-Engines; 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.

My invention relates to explosive engines and has for its object to provide an improved governing mechanism therefor.

To the above ends, the invention consists of the novel devices and combinations of devices hereinafter described and defined in the claim.

This improved governing mechanism may be arranged to operate either on the igniter or on the exhaust valve, or on both, and the latter arrangement is the one that is preferred and which is illustrated in the drawings.

In the accompanying drawings, which illustrate the invention, like characters indicate like parts throughout the several views.

Referring to the drawings, Figure 1 is a view partly in side elevation and partly in vertical section, with some parts broken away, illustrating my improved governing mechanism applied to an explosive engine of the four-cycle horizontal type; Fig. 2 is an enlarged view, partly in vertical section on the line x^2 x^2 of Fig. 1 and partly in elevation; Fig. 3 is a detail view, partly in plan and partly in section, on the line x^3 x^3 of Fig. 2, some parts being broken away; Fig. 4 is a detail view in plan, showing one end portion of an engine cylinder; and Fig. 5 is an elevation looking at the inner end of a sparker head.

The numeral 1 indicates the engine base, the numeral 2 the cylinder, the numeral 3 the engine crank shaft, the numeral 4 the crank rod and the numeral 5 the fly wheel.

The numeral 6 indicates a water tank shown as secured on top of the cylinder 2 and in communication with the water jacket thereof.

The numeral 7 indicates a cam carried by a shaft 8 mounted in suitable bearings on the engine base 1 and provided with a spur gear 9 that meshes with a spur gear 10 and the engine crank shaft 3. Said gears 9 and 10 are indicated diagrammatically in Fig. 1. The gear 9 is twice the diameter of the gear 10, so that the cam 7 will be rotated once for several rotations of the engine crank shaft, this being the customary arrangement in a four-cycle engine. The cam 7 operates on one end of a so-called valve rod 11 that is mounted for horizontal sliding movements in the bearing 12 on the cylinder 2 and in a bearing bracket 13 on the engine base 1. As shown, the rod 11 is provided at one end with a roller or small wheel 14 with which the cam 7 directly engages. The other end of this valve rod 11 is connected in the customary way to an exhaust valve 15, through a lever 16 but subject to a spring 17. As is evident, each time the rod 11 is forced outward or toward the left in respect to Fig. 1 by the cam 7, the exhaust valve 15 will be forced into an open position against the tension of the spring 17. As shown, the rod 11 is also retracted by a coiled spring 18 attached thereto and to the engine base 1. The reciprocating rod 11 also operates the igniter mechanism and, hence, the said rod is herein designated in a broad sense as a controller rod which may operate either the igniter or the exhaust valve, or both.

The igniter mechanism illustrated in the drawings is of a form disclosed and claimed in a companion application filed by me of even date herewith, entitled "Igniters for explosive engines" and, hence, the parts of this igniter may herein be briefly noted.

The numeral 19^a indicates the fixed electrode and the numeral 19 the movable arm or electrode, the former of which is rigidly secured to and the latter of which is a stem journaled and projecting into a bearing head 20 suitably secured to an opening in the cylinder. The stem or shaft 21 of the movable electrode 19 is secured, at its outer end, to an arm 22 that is yieldingly connected by a spring device 23 to an arm 24 that is independently pivoted to the igniter head 20. Normally, the spring device 23 holds the arms 22 and 24 pressed flatwise together and the electrodes 18 and 19 separated. An igniter tappet 25 is secured to a short arm 26 that is pivotally connected to the controller rod 11. A light spring 27, carried by the rod 11, yieldingly holds the tappet 25 pressed upward against a roller 28 on the igniter head 20. Said igniter tappet 25 is provided with a tripping roller 28, under movement of the rod 11 from the right toward the left, forcing said tappet

out of engagement with the arm 24 after the latter has been separated from the arm 22 and the electrode 19 engaged with the electrode 18. It is, of course, understood that the spark is produced when the two electrodes 19 and 19ª are separated by movement imparted to the arms 22 and 24 by the spring device 23. At its upper end, the bracket 13 is provided with a bearing sleeve 30, which, as shown, extends transversely of the engine. In this sleeve, a tubular shaft 31 is journaled, and a non-rotary endwise movable plunger 32 is extended through said tubular shaft. At one end, the tubular shaft 31 is provided with a spur pinion 33 that meshes with a spur gear 9. At its other end, the tubular shaft 31 is provided with a bifurcated head 31ª to which a pair of opposing bell crank levers 34 are intermediately pivoted. The outer ends of the bell cranks 34 are provided with quite heavy fly balls 35 that are yieldingly drawn together or toward the plunger 32 by a coiled spring 36. The inner ends of the bell cranks 34 engage with a collar 37 on the said plunger 32. The outer end of the plunger 32 is shown as threaded and adjustably connected by a nut 38 to the upper end of a trip lever 39, the lower end of which is pivoted to the outturned lower end of the bracket 13. Extending approximately parallel to the controller rod 11 and pivotally connected to an arm 40 of the bracket 13 is a so-called controller latch 41, the free end of which is normally disengaged from but is adapted to be engaged with a shoulder on the rod 11 afforded by a plate 42 rigidly secured to said rod. A stud or pin 43 is rigidly attached to the intermediate portion of the latch 41 and its outer end normally extends close to the intermediate portion of the trip lever 39. At its pivoted end, the latch 41 is provided with a laterally projecting arm 45 to which one end of a coiled spring 45 is attached. The other end of this coiled spring 45 is attached to a lever 46 shown as pivotally connected to the engine base 1. This lever 46 is adapted to be set in different positions and it may be held in its differently set positions either by friction or by any of the well known latch and segment devices. The important function performed by this spring will appear in the following description of the operation.

As is evident, when the engine acquires a predetermined speed, the fly balls 35 of the centrifugal governor will be thrown outward against the tension of the spring 36, thereby moving the plunger 32 inward or toward the left in respect to Fig. 2 and thereby forcing the trip lever 39 against the pin 43 of the controller latch 41. Normally, said latch 43 is by the spring 45 held out of the line of movement of the latch plate 42 of the reciprocatory controller rod 11, so that until the engine has acquired a certain predetermined speed, the said latch remains inoperative and the reciprocating movements of the rod 11 will open the exhaust valve and operate the igniter with properly timed actions. When, however, the engine exceeds a predetermined speed, the centrifugal force acting on the fly balls 35 will overcome the spring 36 and the spring 45 and will force the latch 41 into an operative position, so that it will catch the controller rod 11 and hold the same in its extreme position toward the lever, in respect to Fig. 1, until the speed of the engine has again been reduced below the predetermined desired running speed. When the rod 11 is held by the latch 41, as above stated, the exhaust valve will be held in its open position, so that vapor will not be drawn into the cylinder under movements of the cylinder and, furthermore, the igniter will remain idle during this same period of time.

The predetermined speed at which the latch 41 will be thrown into action is variable and may be regulated while the engine is running simply by setting the lever 46 in different positions, so as to vary the tension of the spring 45, which spring, as already stated, acts as an auxiliary in conjunction with the spring 36 to hold the controller latch 41 in an inoperative position. However, I believe it to be broadly new to provide means for variably setting the spring tension mechanism of a centrifugal governor while the latter is in motion.

The mechanism described has been put into actual use and has been found highly efficient for the purposes had in view.

What I claim is:

The combination with an explosive engine having a reciprocating engine driven controlling rod and an igniter and an exhaust valve controlled by said rod, of a pivoted latch for intercepting the movement of said controlling rod, a centrifugal governor having a pair of spring-connected weighted levers, a plunger having a collar against which weighted levers are adapted to pull, a trip lever pivotally supported at one end and having at its other end a perforation through which said plunger projects, and an adjusting nut on the projecting end of said plunger and the intermediate portion of said trip lever arranged to operate on said trip lever, substantially as described.

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

PETER PAULSON.

Witnesses:
P. N. CHRISTENSEN,
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