No. 818,460. PATENTED APR. 24, 1906

J. S. MORELAND.

SPARKING IGNITION CONTROLLING MEANS FOR EXPLOSIVE ENGINES.

APPLICATION FILED APR. 21, 1904.

2 SHEETS—SHEET 1.

FIG. 1.

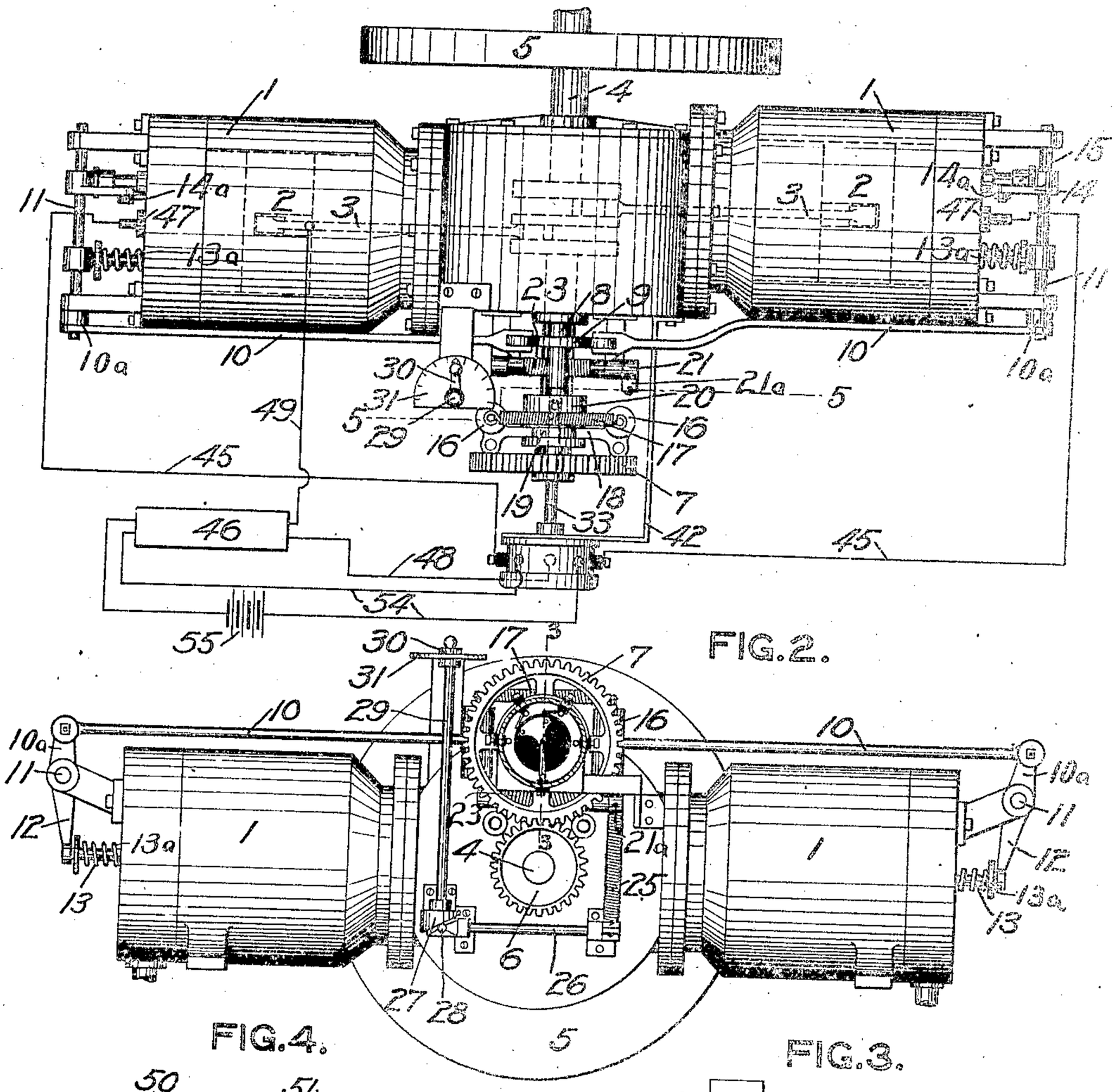
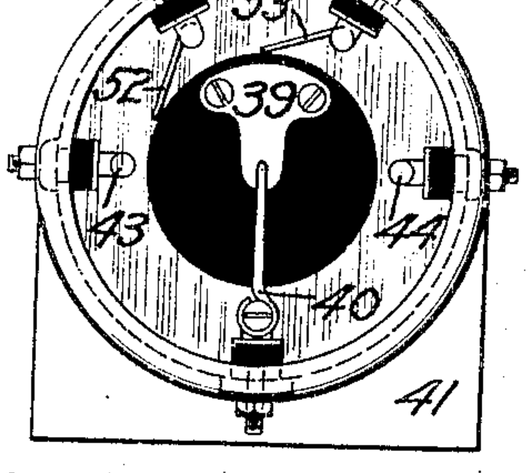
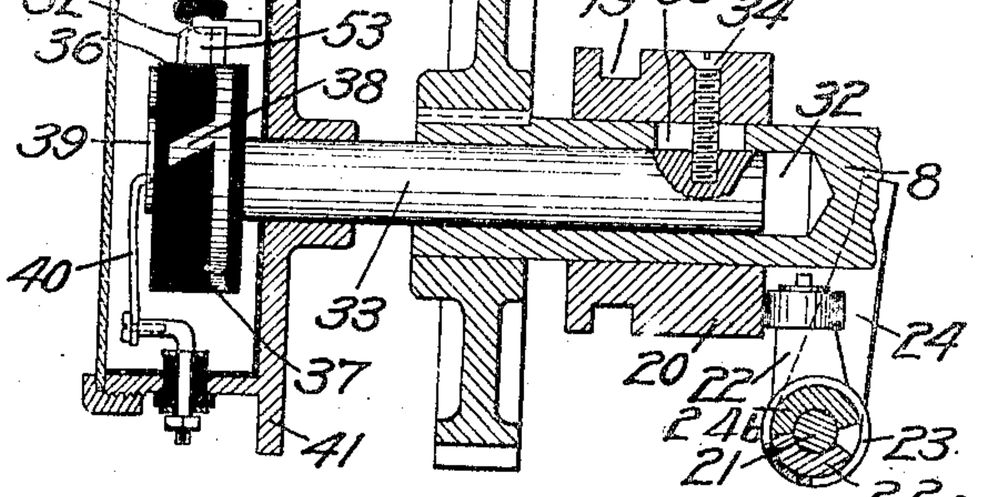


FIG. 2.

FIG. 4.

FIG. 3.





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2 SHEETS—SHEET 2

FIG. 5.

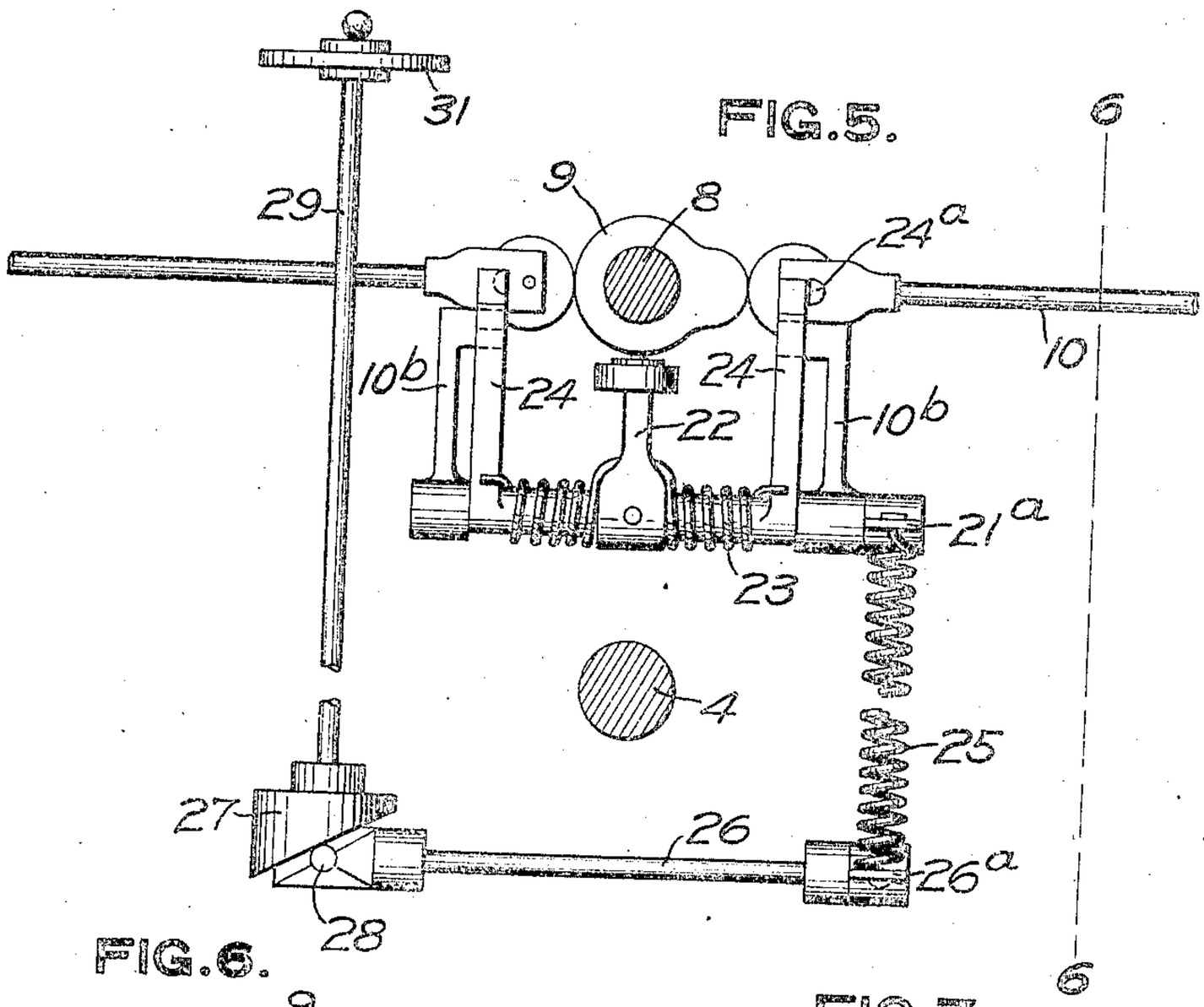


FIG. 6.

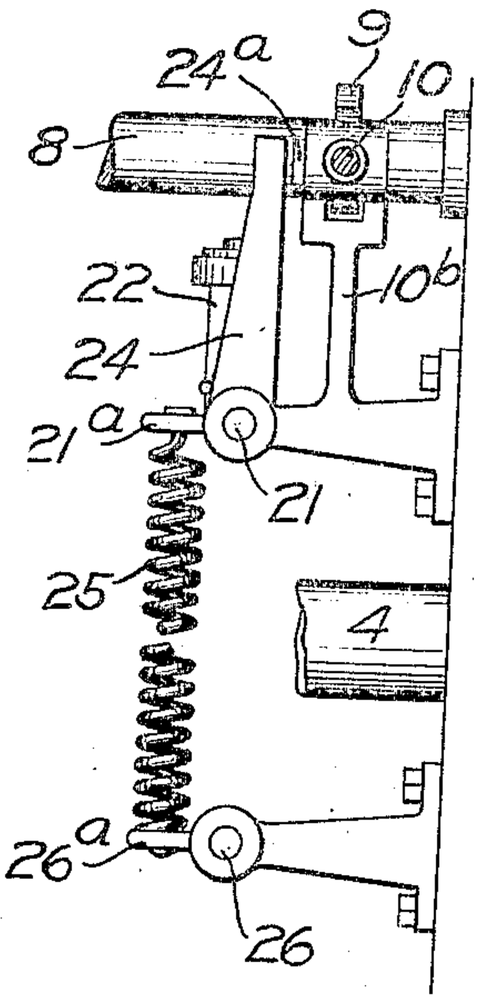
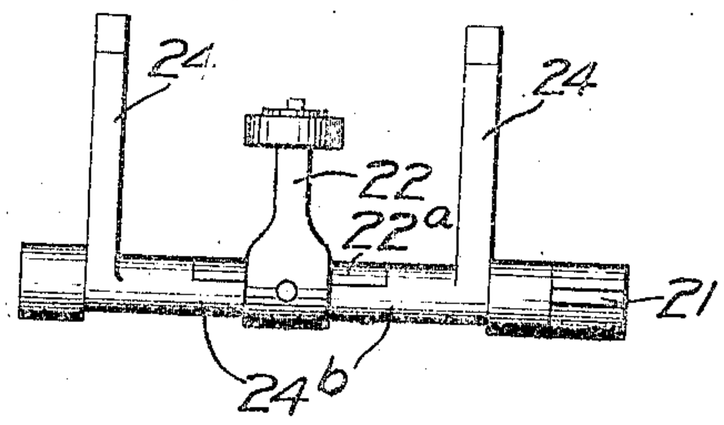


FIG. 7.



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UNITED STATES PATENT OFFICE.

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SPARKING-IGNITION-CONTROLLING MEANS FOR EXPLOSIVE-ENGINES.

No. 818,460. Specification of Letters Patent. Patented April 24, 1906

Application filed April 21, 1904. Serial No. 204,221.

To all whom it may concern:

Be it known that I, JOSEPH S. MORELAND, a citizen of the United States, and a resident of Rochester, in the county of Monroe and State of New York, have invented certain new and useful Improvements in Sparking-Ignition-Controlling Means for Explosive-Engines, of which the following is a specification.

My invention relates to controlling means for explosive-engines; and it consists in the parts, combinations, and arrangements herein described and claimed.

The objects of my invention are to provide an improved means for regulating explosive-engines in which, among other things, all dangers from premature or injurious ignition are avoided and which is simple in construction and certain in action.

In the accompanying drawings, Figure 1 is a plan view illustrating one embodiment of my invention. Fig. 2 is a side elevation of the construction shown in Fig. 1. Fig. 3 is a sectional view, on an enlarged scale, taken on the line 3 3 of Fig. 2 with the governor omitted for clearness. Fig. 4 is a detail end elevation of the parts shown in Fig. 3. Fig. 5 is a sectional view, on an enlarged scale, taken on the line 5 5 of Fig. 1. Fig. 6 is a sectional view on the line 6 6 of Fig. 5, and Fig. 7 is a detail view of parts shown in Fig. 5 with the springs omitted.

Referring to the drawings, 1 1 are two opposed cylinders of an explosive-engine provided with the usual pistons 2, which are shown connected by connecting-rods 3 to diametrically-opposed cranks on the engine-shaft 4. The shaft 4 carries a fly-wheel 5 and is connected by suitable gearing 6 and 7 with a counter-shaft 8.

A shiftable rod 33 is slidably mounted in a recess 32 in the shaft 8 and carries a commutator-drum 36, of insulating material. The sliding movement of said rod is limited by a screw 34, extending through a slot 35 in the shaft and connecting said rod to a sleeve 20, slidingly mounted on the shaft. A governor 16 16 is pivoted to the gear 7 and is provided with arms 18, engaging an annular groove 19 in the sleeve 20 for shifting said sleeve and its attached rod 33 upon the actuation of the governor against the tension of its governor-springs 17.

The commutator-drum 36 is rigidly secured to the rod 33 and is provided with a peripheral band 37 of conducting material having one or more angular extensions 38. An induction-coil 46 is arranged with its primary 54 normally in open circuit with a source of electrical energy 55 and two contacts 52 and 53, which are carried by insulated supports on a case 41. The contact 52 is constructed of sufficient width to engage the band 37 during all shifting of the commutator-drum within the speeds for which the device is set or adjusted, and the contact 53 is constructed to engage the angular extensions 38 at an earlier or later point according to the shifted position of the commutator-drum.

The secondary of the induction-coil is electrically connected to the engine-cylinders, as by a wire 49, and to a contact 40 by a wire 48. A plate 39, of conducting material, is secured on the end of the commutator-drum in position to be brought into sparking relation to two terminals 43 and 44, carried by insulated supports on the case 41 and suitably connected by wires 45 to the sparking device 47 in the engine-cylinders. The plate 39 is constructed to engage the contact 40 at approximately the axis of rotation of the drum, and the contact 40 is formed of resilient material or provided with resilient means for maintaining it in engagement with said plate in all shifted positions of the commutator-drum.

In the above-described construction it will be clear that upon rotation of the commutator-drum the primary of the induction-coil will be periodically closed by engagement of the contact 53 with the angular extension 38 and that the time of such closure will be advanced or retarded according to the direction in which said drum is shifted by the governor. It will also be clear that all danger of injurious premature ignition, such as might occur through premature or accidental short-circuiting of the contacts 52 and 53, is obviated by constructing the conducting-plate 39 to travel in sparking relation to the terminals 43 and 44 during only those portions of the engine-piston travel at which ignition is permissible or desirable. In other words, such sparking relation between the conducting-plate 39 and the terminals 43 and 44 will occur during the angular movement of said plate past the terminals, and as the angular

movement of the plate 39 is not affected by the shifting of the controlling member, but maintains a constant and invariable relation to the rotation of the engine-shaft, the secondary circuit of the induction-coil will be placed in sparking relation during an invariable portion of the engine-piston travel. Said terminals 43 and 44 are formed of sufficient width for maintaining a constant length of sparking gap to the conducting-plate 39 during all shifting of the commutator-drum within the speeds for which the device is set.

My invention therefore provides a single shiftable member for controlling both the primary and secondary of an induction-coil, in which the control of the primary circuit is varied, while that of the secondary circuit remains invariable during all shifting of the controlling means.

An arm 22 is rigidly secured to a transverse shaft 21 in position to engage the sleeve 20, said arm being preferably provided with a roller for reducing friction. A crank 21^a, secured to the transverse shaft, is connected by a spring 25 with a crank 26^a on a shaft 26, carrying a lug 28 in engagement with a cam 27. The cam 27 is actuated by a suitable journaled spindle 29, provided with a lever 30, which coöperates with an index-plate 31 for enabling accurate adjustment of the cam-spindle. It will be obvious that adjustment of the cam-spindle 29 will, through the engagement of its cam 27 with the lug 28, swing the shaft 26 and vary the tension of the spring 25, thereby regulating the pressure of the arm 22 against the sleeve 20. This will vary the resistance exerted by said sleeve against the shifting action of the governor 16, and thus provide a simple and convenient means for controlling and adjusting the action of the governor with certainty during the operation of the engine.

Two arms 24 are shown loosely mounted on the transverse shaft 21, and provided with lugs 24^b, arranged to engage corresponding lugs 22^a on the arm 22 or shaft 21. These engaging lugs are proportioned to permit some play of the arms 24 on their shaft, and resilient means, such as a spring 23, engaging said arms, are provided for yieldingly maintaining the arms 24 in their extreme rearward position, as shown most clearly in Figs. 3, 5, and 6.

At the rear of each engine-cylinder is journaled a shaft 11, carrying an arm 12 in position to engage the head of an exhaust-valve stem 13, a spring 13^a being provided for normally maintaining the exhaust-valve closed in the usual manner. A crank 14 on the shaft 11 carries a link 14^a, constructed to engage a head 15 on the inlet-valve stem for locking said valve in its closed position. An actuating-crank 10^a on each shaft 11 is pivoted to a rod 10, arranged with its inner end in engaging relation to a cam 9 on the counter-shaft 8. The inner ends of said rods 10 may be supported in any suitable manner. In this construction the rods 10 are normally maintained in their inward position by the action of the exhaust-valve springs 13^a, although additional means may be employed, if desired, and are alternately moved to their outward position by engagement of the cam 9 with their inner ends. The arms 24 are constructed and situated to engage lugs or stops 24^a on the respective rods 10 for locking said rods in their outward position when said arms are swung inward by the sleeve 20.

The periphery of the conducting-plate 39 is constructed of sufficient extent to travel in sparking relation to the terminals 43 and 44 during only those portions of the engine-piston travel at which ignition is permissible or desirable. This obviates all danger of injurious premature ignition, such as might occur through premature or accidental short-circuiting of the contacts 52 and 53. Further, the sparking gap existing between the periphery of the conducting-plate 39 and the terminals 43 and 44 acts to prevent operation of the engine under conditions of inefficient ignition or explosion, such as would be produced by a material weakening of the sparking current.

What I claim is—

1. In an explosive-engine provided with the usual cylinder, piston and ignition devices, the combination of an induction-coil, a single shiftable controlling member constructed to vary the time of making and breaking the primary circuit of said coil and to place the secondary circuit thereof in sparking condition during an invariable portion of the engine-piston travel, and a governing means for automatically shifting said controlling member, substantially as described.

2. In an explosive-engine provided with the usual cylinder, piston and ignition devices, the combination of an induction-coil, a single shiftable controlling member constructed to vary the time of making and breaking the primary circuit of said coil and to place the secondary circuit thereof in sparking condition during an invariable portion of the engine-piston travel, a governing means for automatically shifting said controlling member, an adjustable means engaging said controlling member and constructed to resist the shifting action of the governing means thereon, and means for varying the resistance of said adjustable means during the operation of the engine, substantially as described.

3. In an explosive-engine provided with the usual cylinder, piston, and ignition devices, the combination of an induction-coil arranged with its primary in open circuit with a source of electrical energy and two contacts, and its secondary in open circuit

with the ignition devices and a terminal, a single shiftable controlling member constructed to engage said two contacts in the primary circuit to close said circuit at various points in the engine-piston travel and to close the secondary circuit through a spark-gap to said terminal during an invariable portion of the engine-piston travel, and a governing means constructed to shift said controlling member automatically, substantially as described.

4. In an explosive-engine provided with the usual cylinder, piston and ignition devices, the combination of an induction-coil arranged with its primary in open circuit with a source of electrical energy and two contacts, and its secondary in open circuit with the ignition devices and a terminal, a single shiftable controlling member constructed to engage said two contacts in the primary circuit to close said circuit at various points in the engine-piston travel and to close the secondary circuit through a spark-gap to said terminal during an invariable portion of the engine-piston travel, a governing means constructed to shift said controlling member automatically, adjustable means engaging said controlling member and constructed to resist the shifting action of the governing means thereon, and means for varying the resistance of said adjustable means during the operation of the engine, substantially as described.

5. In an explosive-engine provided with the usual cylinder, piston, and ignition devices, the combination of an induction-coil arranged with its primary in open circuit with a source of electrical energy and two contacts, and its secondary arranged in electrical connection with one electrode of the ignition device and with a contact, a terminal electrically connected to the remaining electrode of the ignition device, a single shiftable controlling member constructed to engage said two contacts in the primary circuit to close said circuit at various points in the engine-piston travel and to place said secondary contact in sparking relation to said terminal during an invariable portion of the engine-piston travel, and a governing means constructed to shift said controlling member automatically, substantially as described.

6. In a multiple-cylinder engine provided with the usual pistons and ignition devices, the combination of an induction-coil arranged with its primary in open circuit with a source of electrical energy and two contacts, and its secondary arranged in electrical connection with one of the electrodes of each of the several ignition devices and with a contact, a separate terminal for each of said ignition devices arranged in electrical connection with the remaining electrode thereof, a single shiftable controlling member constructed to engage said two contacts in the primary circuit to close said circuit at various points in the travel of the several engine-pistons and to place said secondary contact successively in sparking relation with each of said terminals during an invariable portion of the corresponding engine-piston travel, and a governing means constructed to shift said controlling member automatically, substantially as described.

7. In an explosive-engine provided with the usual cylinder, piston and ignition devices, the combination of an induction-coil arranged with its primary in open circuit with a source of electrical energy and two contacts, and its secondary arranged in electrical connection with one electrode of the ignition device and with a contact, a terminal electrically connected to the remaining electrode of the ignition device, a single shiftable controlling member provided with a peripheral element constructed to engage said two contacts in the primary circuit to close said circuit at various points in the engine-piston travel, and with an end plate constructed to place said secondary contact in sparking relation to said terminal during an invariable portion of the engine-piston travel, and a governing means constructed to shift said controlling member automatically, substantially as described.

8. In an explosive-engine provided with the usual cylinder, piston and ignition devices, the combination of an induction-coil arranged with its primary in open circuit with a source of electrical energy and two contacts, and its secondary arranged in electrical connection with one electrode of the ignition device and with a contact, a terminal electrically connected to the remaining electrode of the ignition device, a single shiftable controlling member provided with a peripheral element, constructed to engage said two contacts in the primary circuit to close said circuit at various points in the engine-piston travel, and with an end plate constructed to place said secondary contact in sparking relation to said terminal during an invariable portion of the engine-piston travel, means constructed to maintain said secondary contact in engagement with said plate in the several shifted positions of the controlling means, and a governing means constructed to shift said controlling member automatically, substantially as described.

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