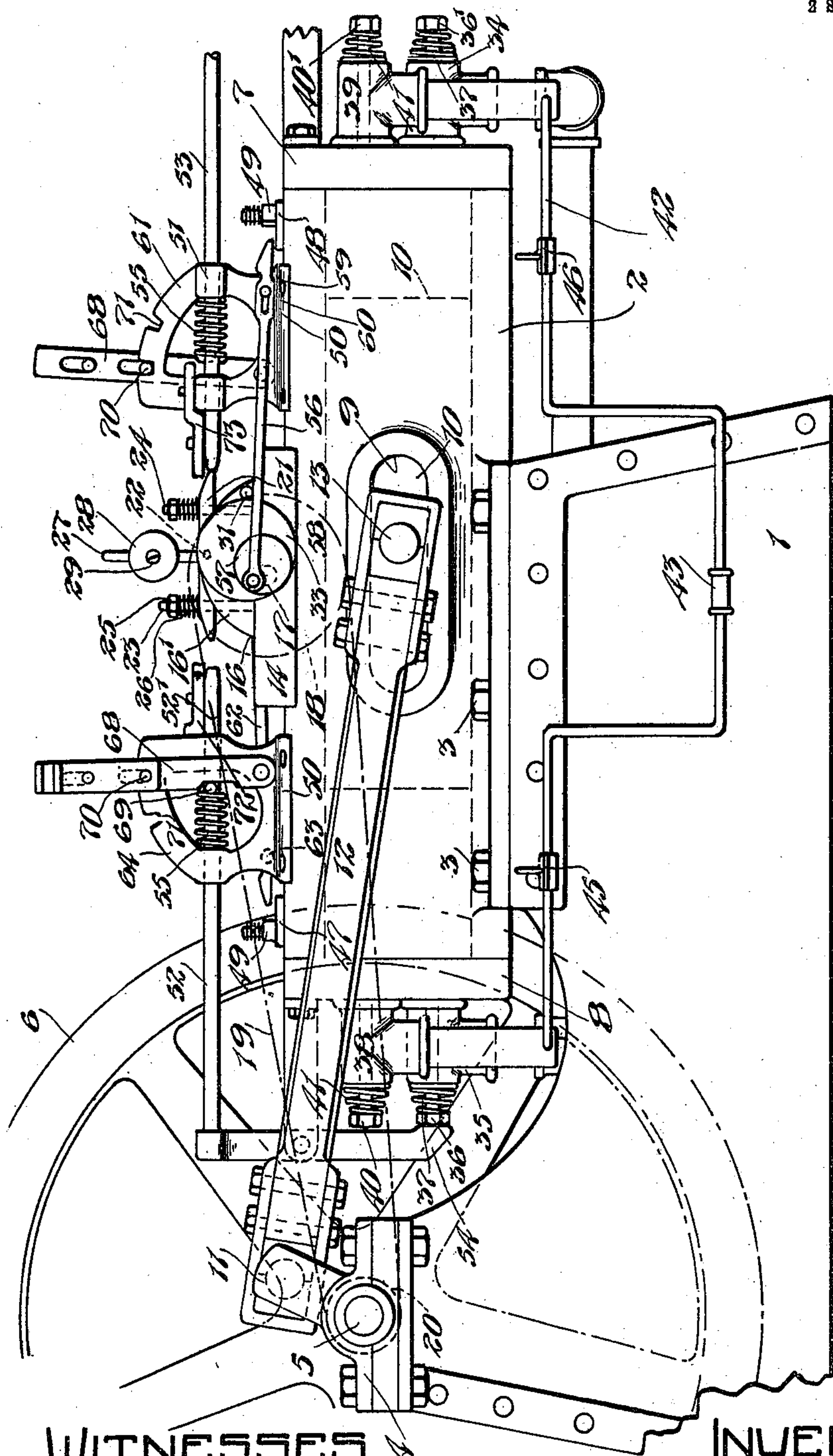


APPLICATION FILED OCT. 11, 1909.

Patented Nov. 8, 1910.

2 SHEETS—SHEET 1.



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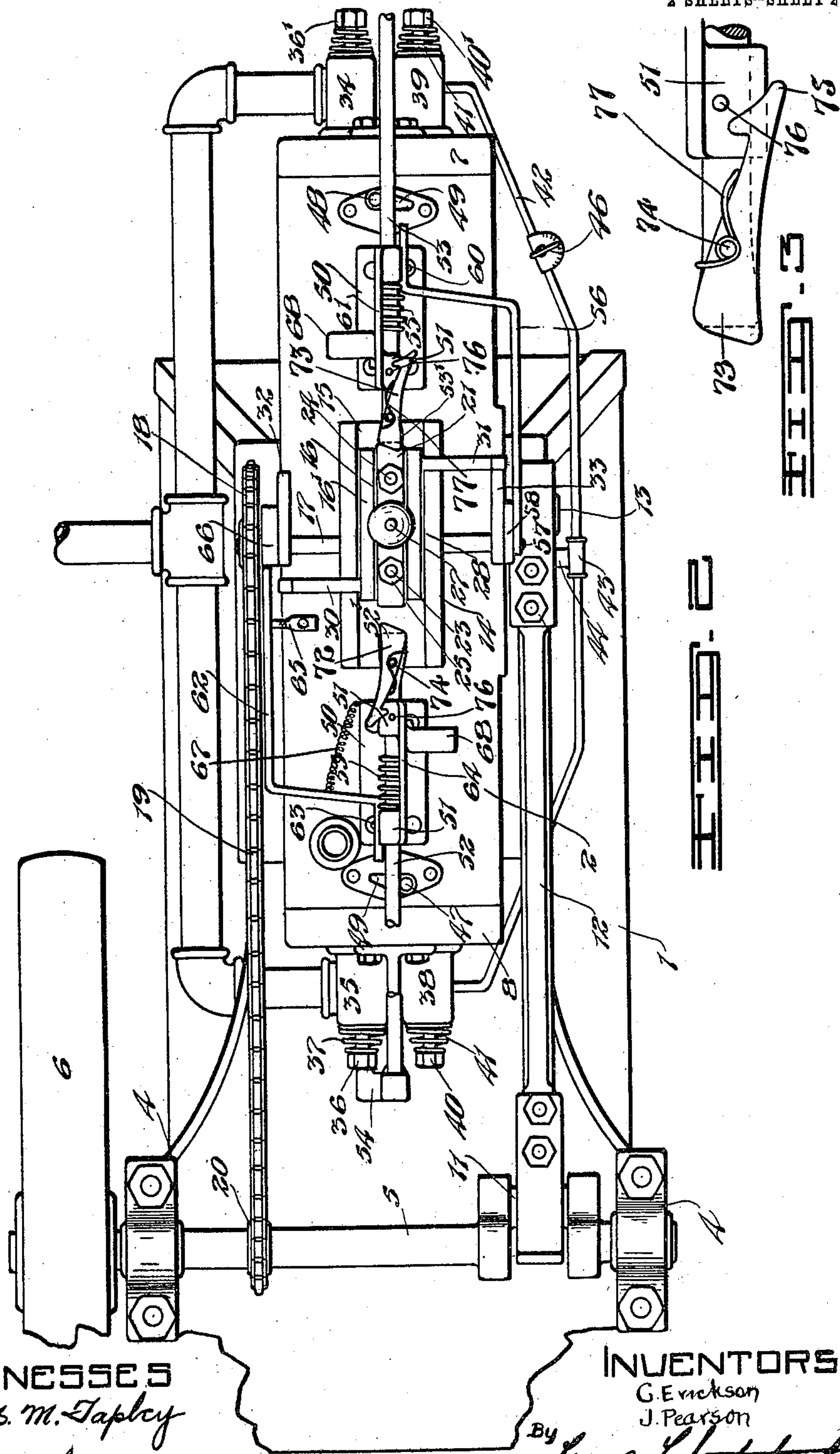
GAS ENGINE.

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CHARLES ERICKSON AND JOHN PEARSON, OF WINNIPEG, MANITOBA, CANADA.

GAS-ENGINE.

975,024.

Specification of Letters Patent.

Patented Nov. 8, 1910.

Application filed October 11, 1909. Serial No. 522,017.

To all whom it may concern:

Be it known that we, CHARLES ERICKSON and JOHN PEARSON, both of the city of Winnipeg, in the Province of Manitoba, Canada, have invented certain new and useful Improvements in Gas-Engines, of which the following is the specification.

Our invention relates to gas engines and the object of the invention is to provide an efficient and durable engine of this class having a large cylinder with a single piston there being provision made for an explosion at each end of the stroke when desired, the engine being also capable of being operated with either end of the cylinder and a single explosion.

A further object is to provide a simple governing mechanism for controlling the explosion at the ends of the cylinders.

The arrangement and operation of the parts will be fully described hereinafter and afterward pointed out in the claims.

Figure 1 is a side elevation of the complete engine. Fig. 2 is a plan view of the same. Fig. 3 is an enlarged detailed plan view of one of the latch bars.

In the drawings like characters of reference indicate corresponding parts in each figure.

1 represents a suitable base to the rear end of which is secured the horizontal cylinder 2 by bolts 3. Forwardly on the base member are bearings 4 which receive rotatably the main shaft 5 to one end of which appears the fly wheel 6. The cylinder 2 is provided with the usual heads 7 and 8 and has centrally a longitudinal opening formed therein at 9 to admit of a pin hereinafter referred to which is connected to the piston. The piston 10 is in the form of a cylinder with closed ends and it is adapted to reciprocate within the cylinder 2 as will be understood it being necessary to provide the usual piston rings in order to prevent escape of gas.

11 represents a crank on the main shaft 5 to which is secured the crank shaft 12 having its extending end fastened to the side of the piston 10 by means of the pin 13 which passes through the opening or slot 9 already referred to.

14 represents a saddle permanently secured on the top of the cylinder such saddle having a longitudinal slideway 15 formed therein which receives the sliding block 16 carrying the governor, as later described.

17 is a shaft mounted in suitable bearings formed in the saddle and having secured to its outer end a sprocket wheel 18 which is connected through a chain 19 with a sprocket wheel 20 on the main shaft 5. The sliding block 16 has two upwardly directed and similar side pieces 16' between which we have placed the governor bar 21 which bar is pivotally secured to the side pieces centrally by a pivot bolt 22.

23 and 24 are vertically directed bolts extending upwardly from the sliding block and passing through the governor bar where they are threaded and provided with nuts 25. Spiral springs 26 are interposed between the governor bar and the latter nuts.

27 is a post extending vertically from the governor bar and located midway between the bolts 23 and 24. Upon the post we have placed a weighted member 28 which is adjustably held in position by a screw 29.

30 and 31 are contact bars extending outwardly and at right angles from the sliding block and at its opposite sides.

32 and 33 are similar cams keyed on the shaft 17 and adapted in their rotation to engage with the contact bars 30 and 31 thereby imparting to the sliding block a forward and backward motion with each rotation of the shaft 5. The shifting of the sliding block as above stated causes the post 27 to move and rock the governor bar 21 which action is utilized to control the explosions in the cylinders and consequently the speed of rotation of the engine.

34 and 35 represent the outlet or exhaust pipes which have the usual ports therein controlled by the usual valves 36 36', actuated by the springs 37.

38 and 39 are the inlet pipes having the usual ports therein controlled by the valves 40 and 40' actuated by the springs 41.

42 are tubes leading from the pipes 38 and 39 and connected with the T-elbow 43 from which passes a further pipe 44 leading to a convenient source of liquid supply such as gasoline housed within the base member 1.

45 and 46 are regulating cocks for controlling the supply of gasoline through the pipes 42. The pipes 38 and 39 are directed downwardly and have their lower ends open so as to allow air to mix with the gasoline which is drawn into the cylinder from the pipes 42.

47 and 48 represent spark plugs of any approved form located toward the ends of

the cylinder 2 and having an actuating arm 49 which engages with the spark controlling rods shortly to be described.

50 are a set of plates secured to the cylinder 2 adjoining the spark plugs and 51 are standards extending upwardly from the plates and having bearings therein for the rods 52 and 53 respectively, located at the opposite ends of the engine. The rods have their inner ends 52' 53' enlarged and notched so as to receive the opposing beveled edges of the governing bar 21. The outer ends of the rods are each butted against a downwardly directed arm 54 carried by a bracket 54' extending from the cylinder end which is designed to engage with the respective valves 36 and 36'. Spiral springs 55 tend to hold the rods in a set inward position.

56 is one of the spark plug controlling rods which is secured at its inner end by a pin 57 to an eccentric 58 located on the shaft 17. The outer end of the rod is slotted at 59 and is carried by a pin 60 which passes through the slot and into one of the standards secured to the cylinder.

61 is a quadrant formed at the side of the standard.

The extremity of the bar is adapted to engage in certain positions with the adjoining arm 49 of the spark plug.

62 is a second spark plug controlling rod having its outer end slotted in a similar manner to the rod 56 there being a pin 63 passing through the slot and into the base of one of the standards 51 extending from the cylinder.

64 is a quadrant formed at the side of the adjoining standards.

65 is a pin carried by the cylinder 2 and passing into and through a slot formed in the rod 62. The inner end of the rod abuts continuously against the face of a cam 66 keyed on the shaft 17 being held in engagement therewith by the springs 67. It will be understood that the slots allow the rod to have a longitudinal movement on the pins. The outer extremity of the rod 62 is adapted to engage with the arm 49 of the opposing spark plug.

At the side of each of the quadrants 61 and 64 respectively we have pivoted a lever 68 the lower portion of which engages with a pin 69 carried by each of the rods 52 and 53. Slidable pins 70 are carried by the levers and are designed to enter the notches 71 provided in the quadrants whereby the levers can be held in adjustable positions and consequently the rods.

72 and 73 are latch bars pivotally secured to the inner ends of the rods 52 and 53 by pins 74. The inner ends of the latch bars are notched in the same manner as the inner ends of the bars 52 and 53 while the outer ends are hooked at 75, the hooked ends be-

ing designed to catch on the stationary pins 76 extending upwardly from the standards 51.

77 are springs adapted to hold the latch bars away from engagement with the pins.

In order to better understand the invention we will now describe its operation assuming the stop cocks 45 and 46 open to supply gases to the cylinder, and further assuming that the piston be in the position shown in the drawings and that the fly wheel be turned by hand or otherwise in the direction of the arrow. The piston accordingly is passed from the left to the right hand end of the cylinder and exhaust takes place at the right hand end of the cylinder while a charge is being drawn in at the left hand. Shortly after the crank passes the dead center position the exhaust valve 36' is closed, the governor bar 21 passing away from the inner end of the rod 53. A charge is consequently immediately sucked in through the valve 40' at the right hand end of the engine and the charge previously brought within the left hand end of the cylinder is compressed, it being noticed that the exhaust valve at the end of the cylinder is closed, the governor bar being away from the inner end of the bar 52. About the time the piston reaches the crank end of the cylinder the gases therein at the left hand end are ignited by the spark plug controlling rod 62 being brought into contact with the arm 49 through the motion of the cam 66. The explosion caused by ignition forces the piston to the opposite end of the cylinder thereby compressing the gases at that end which are ignited by the spark plug 48 the spark taking place when the rod 56 engages with the arm 49, it being noticed that the motion of the rod is controlled by the cam 58. Consequently there is an alternative explosion at each end of the cylinder. If the speed become too high at any time the governor bar will be considerably tilted and consequently will miss hitting the adjoining ends of the rods 52 and 53, but will hit the latch bars 72 and 73 with the result that the hooked ends of the latch bars will be caught by the pins 76 and held. When they are held in this position the bars 52 and 53 are held by them in a position which keeps the exhaust valves 36 and 36' open and consequently there will be no compression and explosion at either end of the cylinder. The speed will quickly reduce until the tilt of the controlling bar is such as to bring it into engagement with the rods 52 and 53 when the latches will be released from the pins 76 and thrown backwardly from engagement with them by the action of the spring 77. There will then be an explosion at each end of the cylinder in the regular way, the exhaust valves being alternately closed and opened and the compressed gases in the cylinder alternately ignited.

It is to be understood that the governor bar is lifted backwardly and forwardly by the action of the cams 32 and 33 on the extending arms 30 and 31.

5 If one end of the cylinder should at any time be out of order or if for any other reason it be desired to run the engine with only one spark plug this can be done by shifting either one or the other of the levers 68. If
10 the left hand lever be shifted in the direction of the arrow the exhaust valve 36 will be open and no explosion will take place at the end of the cylinder. Similarly if the
15 right hand lever be thrown in the direction indicated by the arrow the right hand end of the cylinder will be out of commission. It would of course be advisable to close either one or the other of the stop cocks 45,
20 46, depending on whatever end of the cylinder it is desired to use. One end of the cylinder could be thrown out of commission by closing the gasolene controlling stop cock but if the exhaust valve were not
25 also opened there would be a back pressure on the piston when operating as will readily be understood.

What we claim as our invention is:

1. In an engine of the class described the combination with a cylinder having suitable outlet ports controlled by normally closed valves located in the ends thereof, a reciprocating piston within the cylinder, and spark plugs located at the respective
30 ends of the cylinder, of cam actuated rods controlling alternately the action of the spark plugs, a longitudinally slidable block carried by the cylinder, means designed to slide the block in opposite directions with
35 each stroke of the piston, a set of longitudinally slidable spring pressed rods controlling the opening of the exhaust valves, and a governor bar carried by the slide block adapted to displace the latter rods longitudinally, as and for the purpose
40 specified.

2. In an engine of the class described the combination with a cylinder having suitable outlet ports controlled by normally closed valves located in the ends thereof, a reciprocating piston within the cylinder, and spark plugs located at the respective
50 ends of the cylinder, of cam actuated rods controlling alternately the action of the spark plugs, a longitudinally slidable block carried by the cylinder, means designed to slide the block in opposite directions with each stroke of the piston, a set of longitudinally slidable spring pressed rods controlling the opening of the exhaust valves,
60 and a pivotally supported governor bar carried by the slide block adapted to hit or miss the adjoining ends of the latter rods according to the variations in the speed of rotation of the engine, as and for the purpose
65 specified.

3. In an engine of the class described the combination with a cylinder having suitable outlet ports controlled by normally closed valves located in the ends thereof, a reciprocating piston within the cylinder, 70 and spark plugs located at the respective ends of the cylinder, of a saddle permanently secured to the engine, a rotatable cross shaft mounted in the saddle, oppositely disposed
75 cams located at the ends of the shaft, rods operated by the cams and controlling alternately the action of the spark plugs, a slide rod carried by the saddle having contact bars extending therefrom in opposite directions, cams secured on the shaft and
80 engageable with the contact bars in their rotation, spring pressed longitudinally slidable rods abutting downwardly directed arms bearing on the exhaust valves, a pivotally supported governor bar carried by
85 the slide block having a post extending therefrom with an adjustable weighted member thereon said governor bar being adapted to engage with the latter longitudinally extending rods, and spring means
90 engaging with the governor bar adapted to minimize the oscillation thereof, as and for the purpose specified.

4. In an engine of the class described the combination with a cylinder having suitable 95 exhaust ports normally closed by spring pressed valves at the ends thereof there being a reciprocating piston within the cylinder, of a governor comprising a longitudinally slidable block carried by the cylinder, means for sliding the block alternately backwardly and forwardly with each stroke of the piston, longitudinally extending spring pressed rods carried by the cylinder abutting downwardly directed pivotally supported arms located at their outer
100 ends adapted to engage with the exhaust ports, with their inner ends notched, a pivotally supported bar carried by the slide block having its ends tapered, stationary vertically
110 directed bolts passing upwardly through openings provided in the bar and supplied at their upper ends with nuts, springs interposed between the nuts and the ends of the bar, and a post extending vertically and
115 centrally from the bar and having an adjustable weighted member thereon, as and for the purpose specified.

5. In an engine of the class described the combination with a cylinder having a reciprocating piston therein, there being suitable means for introducing an explosive charge into either end of the cylinder and for igniting the same, and suitable exhaust valves controlling the exhaust ports located
120 in the ends of the cylinder, of pivotally supported arms carried by brackets extending from the cylinder ends having one end resting on the exhaust valves, a set of spring pressed slidably supported rods having their
125 130

outer ends abutting the free ends of the arms aforesaid, means consisting in levers for shifting the rods longitudinally, and an oscillating governor bar carried by a reciprocating slide block located on the cylinder, said governor bar being designed to engage alternatively with the rods, as and for the purpose specified.

6. In an engine of the class described the combination with a cylinder having a reciprocating piston therein, there being suitable means for introducing an explosive charge into either end of the cylinder and for igniting the same, and suitable exhaust valves controlling the exhaust ports located in the ends of the cylinder, of a set of spring pressed longitudinally slidable rods adapted in the outward movement to open the exhaust valves, spring pressed latch bars pivotally secured to the rods and having one end hooked, a stationary pin adapted to receive and hold said hooked ends, and an oscillatory governor bar carried by a reciprocating slide block located between the ends of the rods, said governor bar being designed to engage with the adjoining ends of the rods or with the adjoining ends of the latch bars depending on the oscillatory position of the governor bar, as and for the purpose specified.

7. In an engine of the class described the

combination with a cylinder having a reciprocating piston therein, there being suitable means for introducing an explosive charge into either end of the cylinder and for igniting the same, and suitable exhaust valves controlling the exhaust ports located in the ends of the cylinder, of a set of aligned longitudinally slidable spring pressed bars carried by the cylinder and abutting pivotally supported arms engaging the exhaust valves, an oscillatory governor bar carried by a reciprocating slide block adapted in the normal speed conditions of the engine to engage alternately with the adjoining ends of the rods, and latch bars pivotally secured to the inner ends of the rods having hooked ends engageable with a stationary pin, said latch bars having their inner ends adapted to engage with the ends of the reciprocating governor bar when the speed of the engine is above normal thereby hooking the latch bar on the stationary pins, as and for the purpose specified.

Signed at Winnipeg, in the Province of Manitoba, this 24th day of September 1909.

CHARLES ERICKSON.
JOHN PEARSON.

In the presence of—

G. S. ROXBURGH,
M. A. SOMERVILLE.