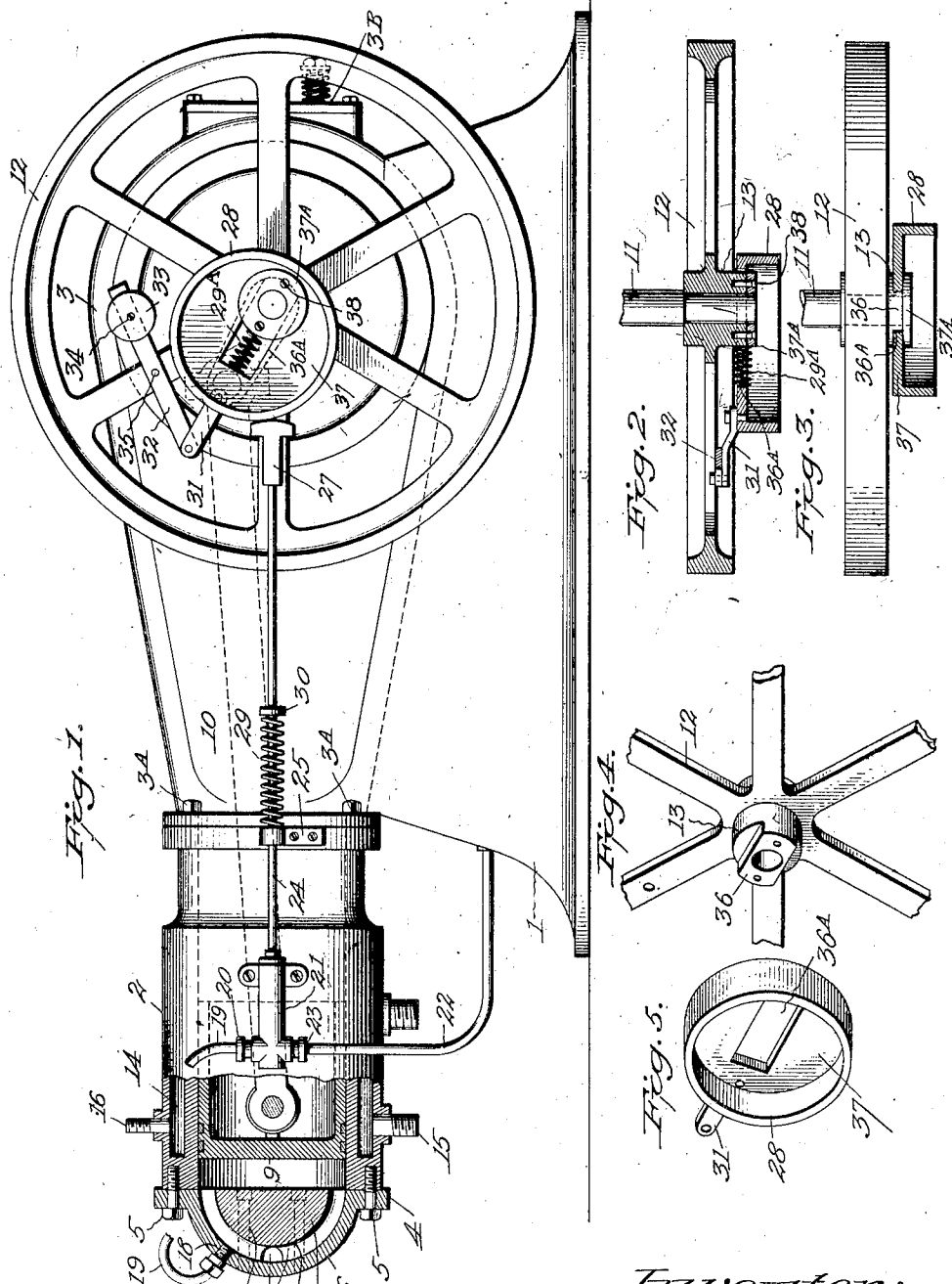


J. I. WOOD.
LIQUID FUEL OIL FEEDING GOVERNOR FOR INTERNAL COMBUSTION ENGINES.
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1,063,490.

Patented June 3, 1913.



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UNITED STATES PATENT OFFICE.

JAMES I. WOOD, OF DENVER, COLORADO.

LIQUID-FUEL-OIL-FEEDING GOVERNOR FOR INTERNAL-COMBUSTION ENGINES.

1,063,490.

Specification of Letters Patent.

Patented June 3, 1913.

Application filed April 18, 1911. Serial No. 621,818.

To all whom it may concern:

Be it known that I, JAMES I. WOOD, a citizen of the United States of America, residing in the city and county of Denver and State of Colorado, have invented a new and useful Liquid-Fuel-Oil-Feeding Governor for Internal-Combustion Engines, of which the following is a specification.

My invention relates to improvements in governors for controlling the liquid fuel oil feeding force pumps of internal combustion engines; and the objects of my invention are: first, to provide an automatic liquid fuel feeding governing mechanism for internal combustion engines, and second, to provide a governing mechanism for the pumping apparatus of internal combustion engines, that will impart a variable stroke to the pump and thus feed a variable amount of liquid fuel oil to the combustion end of internal combustion engines. I attain these objects by the mechanism illustrated in the accompanying drawings, in which:

Figure 1, is a side view, partly in section, of an internal combustion engine, showing the improved fuel feed governor applied thereto. Fig. 2, is a horizontal sectional view through the fly wheel and eccentric, the section of the latter being taken lengthwise of its guide slot. Fig. 3, is a plan view of the fly wheel, showing the eccentric thereon in section, the section being taken transversely of its guide slot. Fig. 4, is a perspective view of the hub portion of the fly wheel, showing the squared end of the hub which receives the eccentric, and Fig. 5, is a perspective view of the eccentric.

Similar letters of reference refer to similar parts throughout the several views.

Referring to the drawings, the numeral 1 designates the foundation bed of an internal combustion engine. 2 designates its cylinder, and 3 its crank case, which is illustrated removably secured to the cylinder by cap screws 3^A, but which may be cast integral with it, if desired. This crank case is provided with an air inlet valve 3^B. The cylinder is provided with a cylinder head 4, that is secured to it by cap screws 5 or other suitable means. This cylinder head is provided with a rearwardly projecting hemispherical central portion 6, in which a hemispherical block 7, which I term the oil vaporizing and ignition block, extends. This block is provided in its periphery with semi-

circular explosion chambers 8, which extend at right angles to each other, and their ends open directly into the cylinder. The cylinder 2 is also provided with a piston head 9, which is reciprocally mounted therein, and to which one end of a connecting rod 10 is pivotally connected. The opposite end of this rod 10 extends into the crank case and is operatively connected to a crank shaft 11, which extends through and beyond the crank case, and one end is provided with a fly wheel 12, that is provided with a projecting hub 13. The cylinder is provided with a water jacket 14, having inlet and outlet pipes 15 and 16 arranged to permit a supply of cold water under pressure to circulate around the cylinder. The hemispherical block is secured in the cylinder head by screws 17, or other suitable means, and the cylinder head is provided with an oil inlet aperture 18, that is arranged to admit oil directly into the explosion chambers of the block 7, and to which one end of a liquid fuel oil supplying pipe 19 is secured, the opposite end of which extends and is connected to the discharge outlet 20 of a force pump 21. This force pump 21 is mounted on the side of the cylinder and is provided with a suction supply pipe 22, which extends from its suction inlet 23 to a supply of any suitable liquid fuel oil except gasoline, such as kerosene or distillate. This supply of oil may be confined in a tank portion formed in the foundation bed, and to which the suction or supply pipe of the pump is extended.

The force pump is provided with a piston or pump rod 24, which is reciprocally supported along the side of the cylinder in a bracket 25 that is secured to the side of the cylinder. This piston rod extends through this bracket and beyond it alongside of the adjacent fly wheel, to within a short distance of the hub 13 of the fly wheel, and to the crank shaft, and at its outer end it is provided with an anti-friction shoe 27, which is adapted to bear with a resilient pressure against the peripheral face of an eccentric disk 28, which is mounted on the hub of the adjacent fly wheel. The resilient pressure of the shoe against the disk is imparted to it by a coiled expansive spring 29, that is mounted on the piston rod of the pump and abuts with one of its ends against the bracket, and with its opposite end against

the collar 30, that is secured to the piston rod of the pump, and thus holds the shoe with a resilient engaging pressure against the peripheral face of the eccentric disk.

5 The liquid fuel oil pumping action of the reciprocal movements of the piston rod is regulated to control the feeding of the supply of oil into the cylinder head and onto the ignition block, as required by the varying speeds of the engine to maintain a continuous practical variable load carrying speed by means of a governing mechanism, of which the eccentric disk 28 forms an essential part. This governing mechanism comprises, in addition to the eccentric disk 10 28 a link 31 and a lever 32, on which a weight 33 is slidably mounted and is adjustably secured by a screw 34. The lever 32 is pivotally connected intermediately of its ends to one of the spokes of the fly wheel by a cap screw 35. The hub 13 is provided with a reduced flattened and parallel sided guideway portion 36, and the eccentric disk is provided with an oblong slot 36^A in its flange portion 37, which fits slidably and reciprocally on the flattened hub portion of the fly wheel. A retaining plate 37^A fits over the crank shaft and fits against the end of the hub of the fly wheel, and is secured 15 there by cap screws 38, in diametrical alignment with the slot. This plate extends over the slot 36^A and holds the disk on the flattened guideway of the hub. The eccentric disk 28 is normally held yieldingly in eccentric relation to the crank shaft by means of a coiled spring 29^A, which is arranged between the hub of the fly wheel and the end of the slot that is farthest from the axial center of the disk, against which it abuts with an expansive tension, and thus holds the eccentric disk under a resilient tension at the limit of its eccentric throw. The link 31 is pivotally secured at one end to the disk adjacent to its slot 36^A, and between this slot and the 20 peripheral face of the disk, and its opposite end extends outwardly from the disk and is pivotally secured to the opposite end of the weighted lever farthest from its adjustable weight. The lever 32 being pivotally connected to the fly wheel, is arranged to lie in the plane of the fly wheel's rotary movement, and it normally acts through the medium of its weight, which is thrown outwardly by the centrifugal force of the rotary movement of the fly wheel to move the eccentric disk back against its expansive pressure spring; and consequently decreases the throw of the eccentric to the extent of its outward throw movement; and the peripheral face of this disk being arranged to 25 receive the resilient bearing contact pressure of the shoe 27 through the medium of the spring 29, a variable eccentric throw movement is imparted to the eccentric disk and a variable reciprocal movement is im-

parted by the eccentric disk to the shoe 27 and the pump piston rod 24, which variable reciprocal movement of the pump piston rod automatically varies the feed of the liquid fuel oil from the force pump into the cylinder head and onto the vaporizing and igniting block. 70

The operation is as follows: When the speed of the engine increases beyond the regular speed at which the engine is set to run, the centrifugal force of the rotary movement throws the weighted lever outward and consequently moves the eccentric disk inward against its spring 29^A and toward the axial center of the crank shaft, which movement decreases the reciprocal stroke of the piston rod of the pump and lessens the amount of the charges of oil fed to the explosion cylinder head; while should the speed of the engine decrease below the speed at which the engine is set to run, the amount of the outward throw movement of the weighted lever will be decreased, and the eccentric disk will slide outward on its guideway on the hub under the influence of its expansive spring, which will increase the throw of the eccentric disk and the reciprocal stroke of the piston rod of the pump and increase the quantity of the oil fed into the explosive cylinder head, until the speed of the engine is increased to its normal predetermined speed. 75 80 85 90 95

My invention is simple and makes a sensitive and accurately operating governor; and while I have illustrated and described the preferred construction of my invention, I do not wish to be limited to the construction shown, as many changes might be made without departing from the spirit of my invention and the scope of the appended 100 105 claims.

Having described my invention, what I claim as new and desire to secure by Letters Patent, is:

1. In an automatic governing mechanism for internal combustion engines, the combination with a cylinder, the piston, its cooperating crank shaft and fly wheels, and the pump and its pump rod and cooperating mechanism secured to the side of said cylinder, one of the said fly wheels being provided with a flattened reduced hub portion, of an eccentric disk provided with an oblong slot slidably mounted on the flattened reduced portion of said fly wheel, an expansive spring between the end of said elongated aperture and the hub of said fly wheel, arranged to normally hold said disk at the limit of its eccentric throw, a link pivotally secured at one end to said disk, a lever pivotally secured intermediately of its ends to one of the spokes of said fly wheel, and pivotally secured at its opposite end to the opposite ends of said link, and a weight slidably mounted on and adjustably secured to said 110 115 120 125 130

lever, said pump being arranged to engage the peripheral surface of said sliding eccentric disk.

2. In a governing mechanism for internal combustion engines, a fly-wheel having a flattened hub portion, an eccentric comprising a shallow cylinder having a rectangular slot in its bottom and slidably mounted on said hub portion, means for yieldingly maintaining the cylinder in its eccentric position, a weighted member pivotally mounted on said fly-wheel and adapted as moved by centrifugal force to move said eccentric against the action of said yielding means, and a fuel pump controlled by said eccentric.

3. In a governing mechanism for internal combustion engines, a fly-wheel having a flattened reduced hub portion, a shallow cyl-

inder having a rectangular slot in its bottom and slidably mounted on said hub portion, a spring for yieldingly maintaining the cylinder in an eccentric position, a removable plate for securing the eccentric to said hub portion in its slidable relation, a weighted member pivotally mounted on said fly-wheel and adapted as moved by centrifugal force to move said eccentric against the action of said spring, and a fuel pump controlled by said eccentric.

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

JAMES I. WOOD.

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."