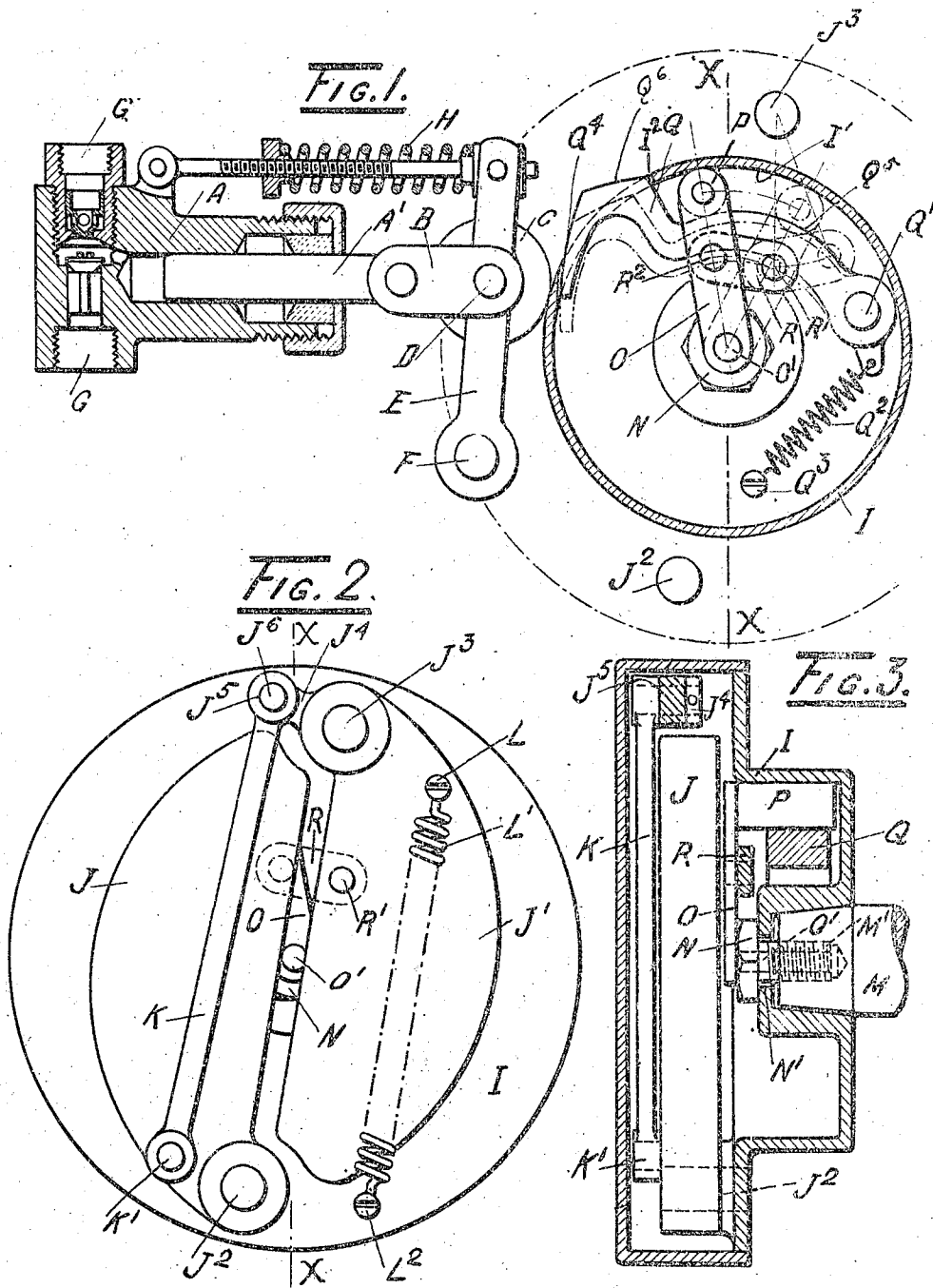


1,015,115.

Patented Jan. 16, 1912.



Witnesses:

25: A. B. Miller
Minnie J. Miller.

Inventor

Inventor
Leon Wogodsky
By his Attorney
Frank W. Schley

UNITED STATES PATENT OFFICE.

LEON WYGODSKY, OF NEW YORK, N. Y.

MEANS FOR OPERATING OIL-ENGINES.

1,015,115.

Specification of Letters Patent.

Patented Jan. 16, 1912.

Application filed August 19, 1910. Serial No. 577,965.

To all whom it may concern:

Be it known that I, LEON WYGODSKY, a subject of the Czar of Russia, and a resident of New York city, borough of Bronx, in the county of New York and State of New York, have invented certain new and useful Improvements in Means for Operating Oil-Engines, of which the following is a specification.

My invention relates to means for governing power engines and particularly to means employed to automatically control the amount of oil delivered to the cylinder of oil engines.

The object of my invention is to provide a governor by means of which the proper amount of oil can be injected to form a combustible charge.

A further object of my invention is to provide a governor which will start to inject the oil at the same point of rotation, that is to say when the main crank is in a certain position regardless of the load, the governor will act to start the injection of oil, and to govern the volume of oil delivered by the distance which the governor cam projects the pump piston.

A further object is to provide a governor which will automatically stop the action of the pump in case the engine should accidentally back-fire and run backward.

A further object is to provide a governor free from the reaction of the governed mechanism.

Referring to the drawings which form a part of this specification Figure 1 is a view of the governor and pump shown partly in section and embodying my invention. Fig. 2 is an end view of the governor with the cap removed and disclosing the fly-weights pivoted therein. Fig. 3 is a cross sectional view on line $x-x$ of Fig. 2.

A indicates the oil pump which is shown in cross section and provided with a piston A' and a connecting link B to which is connected a roller C which is mounted on a pin D which pin is carried by a rocking-lever E, the lower end of which is supported on a pivot F, which pivot is connected to a stationary portion of the machine.

G indicates a suction end of the pump and G' the delivery.

A spring H serves to draw the plunger in one direction to cause the suction stroke of

the piston and the cam. Q^4 on the governor acts to cause the delivery stroke of the piston as will be more fully explained hereinafter.

I indicates a governor casing within which are pivotally connected two fly-weights indicated by J and J' respectively, one end of the fly-weight J being hinged to a pivot J^2 which is connected to the casing and the fly-weight J' hinges on a pivot J^3 which is also connected to the casing at a point opposite the pivot J^2 .

The fly-weight J' is provided at its pivoted end with a projecting link J^4 which is formed integral therewith and its projecting end is provided with a hole J^5 in which is fitted a pivot pin J^6 on which is hinged a coupling rod K which extends downward and is connected to the fly-weight J by a pivot K' .

Fastened near the upper-end of the fly-weight J' by means of a screw L is a spring L' which extends to near the periphery of the casing I and is held to said casing by a screw L^2 , the spring being connected under a predetermined tension and in a proper position well understood in the art.

The casing is mounted on a governor shaft M which is provided with a screw threaded recess M' to receive the end of a screw N which passes through a hole N' in the casing adjacent to the shaft. The screw N is provided with a central hole which extends through the same longitudinally and serves to hold the shank O' of a radial lever O which extends at right angles to the shank O' , and carries at its extreme end a finger P which slides in contact with the top Q^5 of a cam-lever Q, which cam-lever is pivoted to the casing at Q' and is forced into its outer position by means of a coil spring Q^2 , one end of which is attached to an extension of the cam-lever Q and the other end of which is connected by means of a screw Q^3 to the casing.

A link R is pivoted at one end to the fly-weight J' by a pivot R' and its opposite end is pivoted to the radial lever O by a pivot R^2 . The dotted lines indicate the position of the link R and radial lever O when the cam is in a more depressed position into which position it is thrown by the action of the governor when the governor is worked at higher speed.

The casing I is provided with an opening

I² located in its lesser periphery and one end of the cam-lever Q projects through this opening beyond the outer periphery thereof and is formed so that its periphery presents an arc of a circle having its center at Q' so that in moving on its pivot it presents a cam-surface Q⁴ to the roller C, and the height of the cam is reduced as the cam-lever Q travels toward its lower position, thereby reducing the throw of the cam and consequently reducing the stroke of the pump while starting the action of the cam at the same point of its revolution. This cam-lever beside the curve Q⁴ described above, has two more curves Q⁵ and Q⁶. Curve Q⁵ is under the action of the finger P, which may occupy different positions, according to the opening of the governor weights, and is guided by the inner periphery I' of the circular rim of casing I, besides being pivoted at the center of this periphery at Q'. This curve Q⁵ is so constructed as to change the height of the cam Q⁴, in proportion to the angle described by the radial lever O.

When the governor rotates in a counter-clockwise manner, the roller C striking the cam Q⁴ tries to turn same in a clockwise manner, which motion is resisted by the finger P; this finger being thus jammed and held by the force of friction between the inner periphery of casing I' and cam-curve Q⁵.

In the case shown in the accompanying drawings, the governor is fixed at the free end of a shaft, and the radial link is pivoted in the center of this shaft, utilizing at the same time the turned inner part of the casing I as a guiding surface. Of course the governor may be fixed at any part of the shaft and the radial lever O may be pivoted in any other point of the casing and a special guiding surface I', concentric with the pivot may be provided for. Another alternative would be to connect the finger P, by means of a connecting link to a pivot R', properly attached on the fly-weight without any radial lever whatever, provided space permits. This link is introduced to obtain the necessary leverage for the transmission of motion from the fly-weight J' to the finger P. No matter what is the position of the cam-lever Q, the beginning of the action of the cam-surface Q⁴, owing to its circular shape is always the same. The cam-surface Q⁵ is used when the engine reverses, owing to back-firing, which often occurs when starting. The governor supposing is running in a clockwise direction, the roller C is striking first the surface Q⁵ and compels the cam-lever Q to collapse entirely, thus stopping the action of the pump and cutting off the fuel supply until the engine is running in the right direction, (in the case illustrated the governor is supposed to run in counter-clockwise direction.)

The coil spring Q² is only used to prevent

rattling of the parts in starting, since the lever Q would be kept in its outer position by centrifugal action. The weights J and J' are linked together as before described by the coupling rod K to effect a cooperative movement, thereby multiplying the power of the fly-weights in their action in controlling the levers.

It will be readily understood that the roller C rolls in contact with the outer surface of the casing I as illustrated, being held in contact by the spring H.

In operation, the casing is driven through the instrumentality of the shaft M which is usually driven from the main crank-shaft. As the cam-surface Q⁴ contacts with the pump roller C, the roller and piston A' is forced inward a certain distance depending on the position of the cam Q.

For illustration, if the speed of the governor is above normal, which is usually the case when the load on the engine is suddenly reduced, the fly-weights are forced apart by centrifugal action, thereby forcing the lever O toward its right hand position indicated in dotted lines, thereby depressing the cam-face Q⁴ correspondingly, and since the cam Q is pivoted at such a point to the casing as to bring its cam-surface Q⁴ within the casing when the governor is working at its highest speed, thereby withdrawing the cam from cooperative contact with the roller C under this condition, no action would be imparted to the oil pump and therefore the engine would slow down, and as the engine speed is reduced, the cam-lever Q would gradually raise and project the cam-surface Q⁴ beyond the periphery of the casing and causing it to contact with roller C and give a definite stroke to the piston, depending on the exact position of the lever Q. It is therefore obvious that the amount of oil delivered per stroke of the pump will vary according to the position of the lever Q, which position is directly controlled by the governor.

It is obvious that the governor is free from any external friction or reaction of the governed mechanism the same for only a short while stopping the free swinging of the fly-weights when the finger P is jammed between I' and Q⁵.

It is obvious that the fly-weight J might be dispensed with together with the coupling rod K, but where the governor is made small in dimensions and weight, for operating a pump working at a high pressure, I prefer to use a plurality of fly-weights in coupled relation as shown.

Having thus described my invention what I claim as new:

1. A governor comprising a casing having a circular periphery provided with an opening, a fly-weight hinged to said casing, a cam-lever hinged to said casing from another portion thereof and controlled by said fly-

weight, the cam-face being formed as an arc of a circle the center of which is its hinge, and projecting through said opening in the casing a distance depending on the speed of the casing, and having the periphery of the cam disposed at an angle to the periphery of the casing, and means operated by said cam lever for controlling the admission of the operating fluid to the cylinder of an engine.

2. A governor comprising a casing having a circular periphery provided with an opening, a plurality of fly-weights coupled together in coöperative engagement, each of which is hinged to said casing, a cam-faced lever hinged to said casing and controlled by said fly-weights, said cam-face being formed as an arc of a circle having same center with its hinge and projecting through said opening in the casing a distance depending on the speed of the casing, and having the periphery of the cam disposed at an angle to the periphery of the casing, and means operated by said cam-lever for controlling the admission of the operating fluid to the cylinder of an engine.

3. A governor comprising a casing having a circular periphery provided with an opening, a fly-weight hinged to said casing, a cam-lever hinged to said casing and controlled by said fly-weight, said cam-face being formed as an arc of a circle the center of which is in line with the axis of its hinge and projecting through said opening in the casing a distance depending on the speed of the casing, and having the periphery of the cam disposed at an angle to the periphery of the casing, and means operated by said cam-lever for controlling the admission of the operating fluid to the cylinder of an engine.

4. A governor comprising a casing having a circular periphery provided with an opening, a fly-weight hinged to said casing, a cam-faced lever hinged to said casing and controlled by said fly-weight, said cam-face being formed as an arc of a circle having same center with its hinge and projecting through said opening in the casing a predetermined distance depending on the speed of the casing, and having the periphery of the cam disposed at an angle to the periphery of the casing, means for holding the cam in a fixed position when the casing is rotating in one direction and for permitting the cam to be pressed into said casing when rotating in the opposite direction, and means operated by said cam-lever for controlling the admission of the operating fluid to the cylinder of an engine.

5. A governor comprising a casing having a circular periphery provided with an opening, a plurality of fly-weights hinged together at points diametrically opposite to each other and near the periphery thereof, a

coupling rod connecting said fly-weights in pivotal relation therewith, a cam-face lever hinged to said casing near one end thereof, said cam-face being formed in an arc of a circle the center of which is the pivotal point and projecting through said opening in the casing, a radial lever pivoted at one of its ends to said casing and carrying a projection or finger at its opposite end which contacts with the said cam-lever and its guiding surface, a link connecting said fly-weights with said radial lever, the circular face of said cam-face lever being arranged at an angle to the periphery of said casing, and means operated by said cam-lever for controlling the admission of the operating fluid to the cylinder of an engine.

6. A governor comprising a casing having a circular periphery provided with an opening, a plurality of fly-weights hinged together at points diametrically opposite to each other and near the periphery thereof, a coupling rod connecting said fly-weights in pivotal relation therewith, a cam-face lever having a curved top hinged to said casing near one end thereof, said cam-face being formed in an arc of a circle having same center with its hinge and projecting through said opening in the casing, a radial lever pivoted at one of its ends to said casing and carrying a projection or finger which finger is adjusting the distance between its guiding surface and the curved surface of said cam-lever, a link connecting said fly-weights with the radial lever for directing the position of said cam-lever, the face of said cam-face lever being arranged at an angle to the periphery of said casing, and means operated by said cam-lever for controlling the admission of the operating fluid to the cylinder of an engine.

7. A governor comprising a casing having an outer circular periphery provided with an opening, a cam-lever the cam of which projects through said opening, a fly-weight hinged to said casing, a radial lever controlled by said fly-weight and having a finger which projects between said lever and the inner surface of said casing and is in contact with each of same and adapted to be held between them by friction, and means operated by said cam-lever for controlling the admission of the operating fluid to the cylinder of an engine.

8. A governor comprising a casing having a circular periphery provided with an opening, a fly-weight hinged to said casing, a cam-faced lever hinged to said casing and controlled by said fly-weight, said cam-face being formed as an arc of a circle and projecting through said opening in the casing a predetermined distance depending on the speed of the casing, and having the periphery of the cam disposed at an angle to the periphery of the casing, means for holding

the cam in a fixed position when the casing is rotating in one direction and for permitting the cam to be pressed within said casing when rotating in the opposite direction, and means operated by said cam-lever for controlling the admission of the operating fluid to the cylinder of an engine.

9. In a governor, a casing having a circular periphery provided with an opening, a lever hinged thereto on the inside thereof, having a cam-faced end formed as an arc of a circle described from its pivot center, and having a curved upper surface; said casing having a fixed curved surface on the inside thereof located opposite said curved surface of said lever, a radial lever having a finger inserted between said curved surface and the curve of said cam-lever for fixing the position of said cam-lever, a fly-weight hinged to said casing, and means for transmitting the movement of said fly-weight to said finger, for the purpose described.

10. In a governor, a casing having a circular periphery provided with an opening, a lever hinged thereto on the inside thereof, having a cam-faced end formed as an arc of a circle described from its pivot center, and having a smooth upper surface; said casing having a fixed smooth surface on the inside thereof located opposite said smooth surface of said lever, a radial lever having a finger inserted between said smooth surfaces for fixing the position of said cam-lever, a fly-weight hinged to said casing, and means for transmitting the movement of said fly-weight to said finger, for the purpose described.

11. In a governor, a casing having a circular periphery provided with an opening, a lever hinged thereto on the inside thereof, having a cam-faced end formed as an arc of a circle described from its pivot center, and having a curved upper surface; said casing having a fixed curved surface on the inside thereof located opposite said curved surface of said lever, a radial lever having a finger inserted between said curved surface and the curve of said cam-lever for fixing the position of said cam-lever, a fly-weight hinged to said casing, means for transmitting the movement of said fly-weight to said finger, and means operated by said cam-lever for controlling the admission of operating fluid to the cylinder of the engine, for the purpose described.

12. In a governor, a casing having a circular periphery provided with an opening, a lever hinged thereto on the inside thereof, having a cam-faced end formed as an arc of a circle described from its pivot center, and having a smooth upper surface; said casing having a fixed smooth surface on the inside thereof located opposite said smooth surface of said lever, a radial lever having a finger inserted between said smooth surfaces for fixing the position of said cam-

lever, a fly-weight hinged to said casing, means for transmitting the movement of said fly-weight to said finger, and means operated by said cam-lever for controlling the admission of operating fluid to the cylinder of an engine, for the purpose described.

13. In a governor, a casing having a circular periphery provided with an opening, a lever hinged thereto on the inside thereof, having a cam-faced end formed as an arc of a circle described from its pivot center, and having a curved upper surface; said casing having a fixed curved surface on the inside thereof located opposite said curved surface of said lever, a finger inserted between said curved surface and the curve of said cam-lever for fixing the position of said cam-lever, a fly-weight hinged to said casing, and means for transmitting the movement of said fly-weight to said finger, for the purpose described.

14. In a governor, a casing having a circular periphery provided with an opening, a lever hinged thereto on the inside thereof, having a cam-faced end formed as an arc of a circle described from its pivot center, and having a smooth upper surface; said casing having a fixed smooth surface on the inside thereof located opposite said smooth surface of said lever, a finger inserted between said smooth surfaces for fixing the position of said cam-lever, a fly-weight hinged to said casing, and means for transmitting the movement of said fly-weight to said finger, for the purpose described.

15. In a governor, a casing having a circular periphery provided with an opening, a lever hinged thereto on the inside thereof, having a cam-faced end formed as an arc of a circle described from its pivot center, and having a curved upper surface; said casing having a fixed curved surface on the inside thereof located opposite said curved surface of said lever, a finger inserted between said curved surface and the curve of said cam-lever for fixing the position of said cam-lever, a fly-weight hinged to said casing, means for transmitting the movement of said fly-weight to said finger, and means operated by said cam-lever for controlling the admission of operating fluid to the cylinder of the engine, for the purpose described.

16. In a governor, a casing having a circular periphery provided with an opening, a lever hinged thereto on the inside thereof, having a cam-faced end formed as an arc of a circle described from its pivot center, and having a smooth upper surface; said casing having a fixed smooth surface on the inside thereof located opposite said smooth surface of said lever, a finger inserted between said smooth surfaces for fixing the position of said cam-lever, a fly-weight hinged to said

casing, means for transmitting the movement of said fly-weight to said finger; and means operated by said cam-lever for controlling the admission of operating fluid to the cylinder of an engine, for the purpose described.

Signed at New York city, in the county of

New York and State of New York, this 16th day of August, A. D. 1910.

LEON WYGODSKY.

Witnesses:

FRANK M. ASHLEY,
MINNIE S. MILLER.