

J. E. GILSON.
INTERNAL COMBUSTION ENGINE.
APPLICATION FILED JAN. 24, 1911.

1,044,514.

Patented Nov. 19, 1912.

2 SHEETS-SHEET 1.

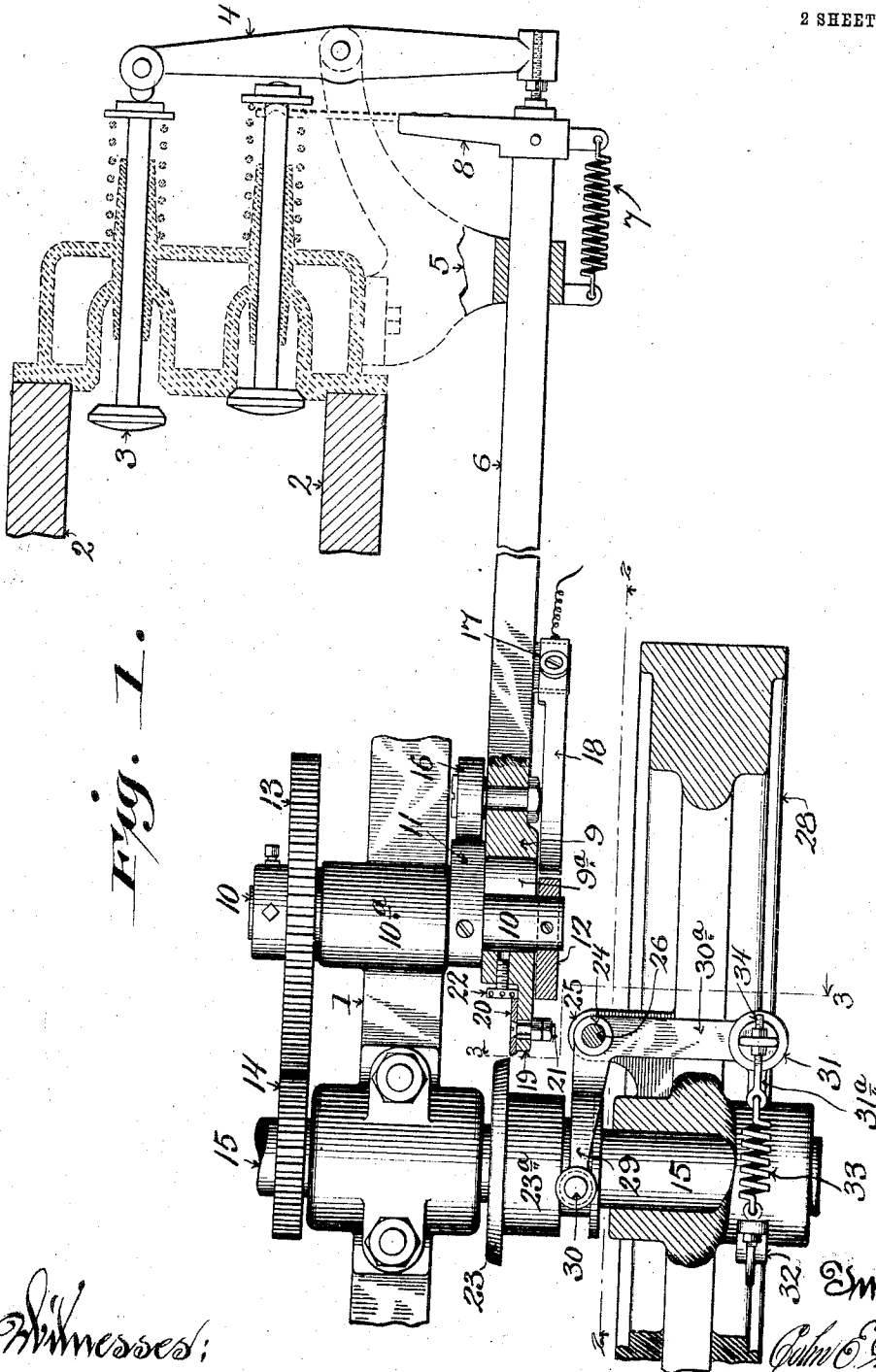


Fig. 1.

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2 SHEETS—SHEET 2.

Fig. 2.

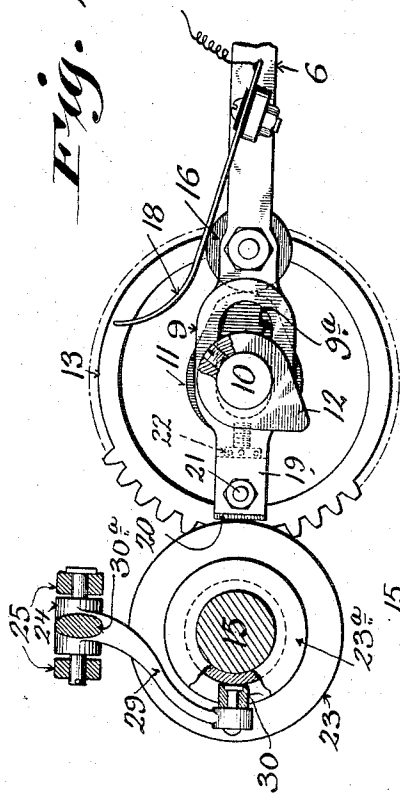


Fig. 4.

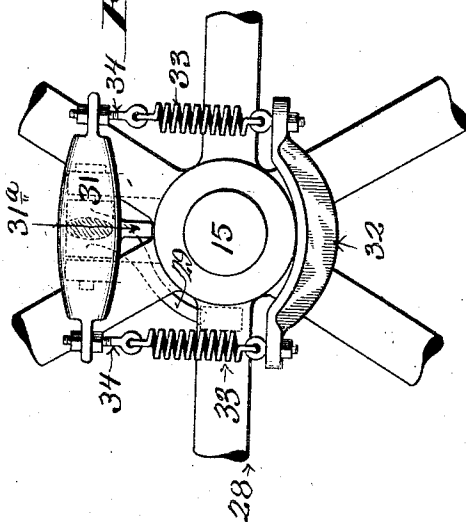
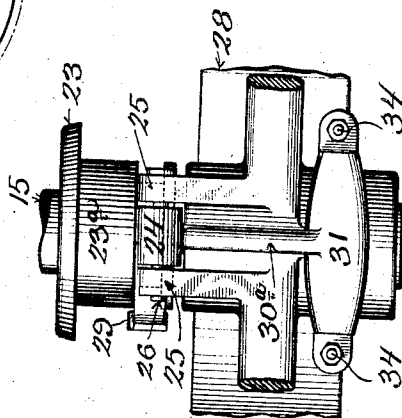


Fig. 3.



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UNITED STATES PATENT OFFICE.

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INTERNAL-COMBUSTION ENGINE.

1,044,514.

Specification of Letters Patent.

Patented Nov. 19, 1912.

Application filed January 24, 1911. Serial No. 604,363.

To all whom it may concern:

Be it known that I, JOHN E. GILSON, a citizen of the United States, and resident of Port Washington, in the county of Ozaukee and State of Wisconsin, have invented certain new and useful Improvements in Internal-Combustion Engines; and I do hereby declare that the following is a full, clear, and exact description thereof.

My invention refers to governor-controlled mechanism of the miss and hit type of internal combustion engines, the general object being to provide simple, effective, durable and positive means for automatically controlling charges of explosive vapor to the engine cylinder in conjunction with means under time-control for regulating the ignition of such charges.

Specific objects of my invention are to provide a governor-controlled disk adapted to be brought into the path of travel of a spring-controlled reciprocative valve-rod; to provide a simple and inexpensive centrifugal governor in connection with the engine-shaft and fly-wheel; to provide a valve-rod having a slot therein whereby said valve is guided at one end upon the engine cam-arbor; to provide for the disposition of the spark timing and valve cams upon opposite faces of the valve-rod whereby the same serve to hold said valve-rod against lateral play; to provide a tappet-plate for engagement with the stop-disk, and means for adjusting said tappet-plate.

With the above objects in view my invention consists in what is hereinafter described with reference to the accompanying drawings and subsequently claimed.

In the drawings Figure 1 represents a plan view partly in horizontal section of a fragment of an internal combustion engine embodying the features of my invention, parts of the engine being shown by dotted lines; Fig. 2, a detailed sectional elevation of the same as indicated by line 2—2 of Fig. 1; Fig. 3, a detail plan view of the governor mechanism with the fly-wheel and crank-shaft broken away, the said figure disclosing the parts of the device to the left of the line 3—3 Fig. 1, and Fig. 4, a side elevation of the same.

Referring by characters to the drawings, 1 represents a fragment of an engine bed, 2 the explosive end of the cylinder which is provided with the usual intake valve shown

in dotted lines, and 3 the exhaust valve. The exhaust valve 3 is actuated in opposition to spring pressure by a rocker arm 4 that is fulcrumed to a bracket 5 carried by the cylinder, the same also serving as a slide-bearing for a valve-rod 6, the rear end of which rod is arranged to engage and actuate the rocker-arm 4 in opposition to a coiled spring 7 that is connected to the bracket 5 and said valve-rod through an arm 8 carried thereby, which arm has a leaf-spring extension that engages the intake valve stem and serves to assist in holding said intake-valve closed when the valve-rod is positively moved in opposition to its spring-control, whereby the exhaust valve 3 is positively opened against spring pressure.

All of the above mentioned parts constitute no part of my present invention and are illustrated for the purpose of more clearly defining the novel features embodying my present invention.

The opposite or front end of the valve-rod is provided with a head 9 having an elongated slot 9^a, through which slot one end of an arbor 10 projects, the same being journaled in a bearing 10^a of the engine bed. Thus this end of the arbor serves as a support for the valve-rod due to its slotted connection, whereby the head end of said rod is guided. The valve-rod head is held against lateral play upon the arbor by being fitted between a valve-cam 11 and an ignition timing cam 12, both of which cams are secured to the arbor and arranged to abut the side faces of said valve-rod head. The valve cam 12 also serves as a thrust collar in opposition to end play of the arbor in one direction with relation to its bearing, end-play in the reverse direction being restricted by the hub of a gear-wheel 13 that is fast upon the arbor at its inner end. This gear-wheel meshes with a pinion 14 that is secured to the engine crank-shaft 15 and constitutes the usual drive mechanism for the spark timing and valve cams, whereby motion of the same is controlled with relation to the crank-shaft, said crank-shaft being journaled in the engine bed as shown.

The valve-rod head carries an anti-friction roller 16 that engages the valve-cam 11, whereby positive thrust of said valve-rod in opposition to its spring-control is had incidental to opening the exhaust valve, the aforesaid valve-rod being also provided with

an ear 17 to which is secured one end of a flat contact spring 18, the same being insulated from the ear by suitable fiber washers and is arranged to have its free end engage the ignition timing cam 12 at each revolution thereof, it being understood that said timing cam is arbitrarily set with relation to the valve-cam to determine closing of the electric spark circuit at the proper interval, which circuit is completed in the usual manner not shown.

The head 9 of the valve-rod terminates with an apertured web 19 to which is fitted a hardened metallic tappet-plate 20, being held thereto by a retaining bolt 21 that passes through the web aperture and a corresponding aperture in the tappet-plate. One edge of the tappet-plate is provided with a beveled face and its opposite edge is arranged to abut the head of an adjustable set screw 21, which screw is in threaded engagement with the adjacent end-face of the valve-rod head. By this construction the tappet-plate can be finely adjusted in or out upon the web by means of the screw, and after such adjustment the retaining bolt is tightened to firmly clamp said web and tappet together, the retaining bolt being secured by suitable lock nuts.

Loosely mounted upon the crank-shaft 15 is a beveled edge tappet-engaging member in the form of a disk 23 having an extended hub 23^a that is annularly grooved, the beveled edge of the disk, under governor-control, being adapted to move across the path of travel of the tappet-plate that is carried by the valve-rod, whereby movement of the latter is automatically checked in opposition to its spring pressure and the exhaust valve held open until such time as the speed of the engine is slowed down, the ignition timing cam and contact spring being also held apart during this checked movement of the valve-rod, whereby the sparking operation is cut out.

The governing mechanism comprises a bell-crank lever having a hub 24 that is fulcrumed between ears 25 that extend from the hub and spokes of the fly-wheel 28 which fly-wheel is fast upon the crank-shaft, the bell-crank hub being mounted upon a stud 26 carried by said ears. One arm 29 of the bell-crank extends inwardly to the crank-shaft and is provided with a pin having an anti-friction roller 30 that engages the disk hub-groove, the other arm 30^a of the bell-crank being extended outwardly between the spokes and approximately parallel with the fly-wheel axis, the said arm terminating with an elongated weight 31 having apertured end ears. Abutting the fly-wheel hub diametrically opposite the elongated weight is a stirrup 32 to each end of which is secured a coiled spring 33, the opposite ends of the springs being connected to tension-ad-

justing bolts 34 that are fitted within the weight apertures and retained by suitable adjusting nuts, whereby tension of the governor springs is regulated.

By utilizing a single bell-crank of the before mentioned construction and stirrup in spring connection therewith, a very cheap and effective governor is produced and superfluous parts eliminated.

It is apparent from the foregoing description that when a predetermined speed is attained by the engine crank-shaft, centrifugal movement of its governor will cause the stop disk to move into the path of travel of the tappet-plate and when the valve-cam recedes from its engagement with the valve-rod roller 16, said valve-rod will be locked against its spring-controlled movement due to engagement with the beveled face of the disk and beveled edge of the tappet-plate thus holding the exhaust valve open, whereby one or more free revolutions of the engine crank-shaft is permitted. The disk being loosely mounted and rotatable about the crank-shaft, will at all times present an engaging face to the tappet-plate, which engaging face is constantly shifting, and consequently the life of the parts is thereby materially increased, the construction and arrangement being simple, effective and capable of material reduction in the cost of manufacture.

I claim:

1. In an internal combustion engine having a crank-shaft, an exhaust valve, an arbor in gear connection with the crank-shaft, a spark-timing cam and a valve-cam carried by the arbor; the combination of a spring-controlled valve-rod having a slotted end engaged by the arbor between the cams, a roller carried by the valve-rod for engagement with the valve-cam, a contact spring carried by said valve-rod for engagement with the spark-timing cam, and a governor-controlled disk mounted upon the crank-shaft adapted to oppose movement of the valve-rod in one direction.

2. In an internal combustion engine having a crank-shaft, a fly-wheel secured thereto, an exhaust valve, an arbor in gear connection with the crank-shaft; a valve-cam and spark-timing cam spaced apart and carried by the arbor, a bell-crank governor fulcrumed to the fly-wheel, and a grooved hub mounted upon said crank-shaft with which groove one arm of the bell-crank governor is engaged; the combination of a spring-controlled valve-rod having one end interposed between the arbor cams, a roller carried by the valve-rod for engagement with the valve-cam, a contact spring carried by said valve-rod for engagement with the spark-timing cam, an adjustable tappet-plate carried by said valve-rod, and a disk carried by the governor-controlled hub

adapted to have movement in and out of the path of travel of the tappet.

3. In an internal combustion engine having a shaft, an exhaust valve, and a reciprocative valve-rod for the same; the combination of a governor-controlled disk mounted upon the shaft, a tappet-plate carried by the valve-rod, a retaining bolt for the tappet-plate, and an adjusting bolt in threaded engagement with said valve-rod, the head of which bolt is adapted to abut one edge of said tappet-plate in opposition to force applied thereto by its engagement with the disk.

4. In an internal combustion engine having a shaft, an exhaust valve, a reciprocative valve-rod for the same, and a tappet-plate rigidly secured to one end of the valve-rod; the combination of a governor-controlled member loosely mounted about the shaft, said member being provided with a tappet-abutting face adapted to be moved across the path of travel of the valve-rod tappet-plate whereby movement of said valve-rod in one direction is checked incidental to engagement of the tappet with the abutting face of said governor-controlled member when the latter is moved in the path of travel of the valve-rod tappet.

5. In an internal combustion engine having a crank-shaft, a fly-wheel secured thereto, an exhaust valve, an arbor in gear-connection with the crank-shaft, a valve-cam and spark-timing cam spaced apart and carried by the arbor, a bell-crank governor ful-

crumed to the fly-wheel, and a grooved hub mounted upon said crank-shaft with which groove one arm of the bell-crank governor is engaged; the combination of a valve-rod having one end interposed between the arbor cams, a roller carried by the valve-rod for engagement with the valve-cam, a contact spring carried by said valve-rod for engagement with the spark-timing cam, an adjustable tappet-plate carried by said valve-rod, and a tappet engaging member carried by the governor-controlled hub adapted to have movement in and out of the path of travel of the tappet.

6. In an internal combustion engine having a shaft, an exhaust valve, and a reciprocative valve-rod for the same; the combination of a governor-controlled tappet mounted upon the shaft, a tappet-plate carried by the valve-rod, a retaining bolt for the tappet-plate, and an adjusting bolt in threaded engagement with said valve-rod, the head of which bolt is adapted to abut one edge of said tappet-plate in opposition to force applied thereto by its engagement with the tappet.

In testimony that I claim the foregoing I have hereunto set my hand at Port Washington in the county of Ozaukee and State of Wisconsin in the presence of two witnesses.

JOHN E. GILSON.

Witnesses:

T. A. BOERNER,

H. W. BOLENS.