J. E. GILSON.

INTERNAL COMBUSTION ENGINE.

APPLICATION FILED JUNE 14, 1909.

960,536.

Patented June 7, 1910.

2 SHEETS—SHEET 1.

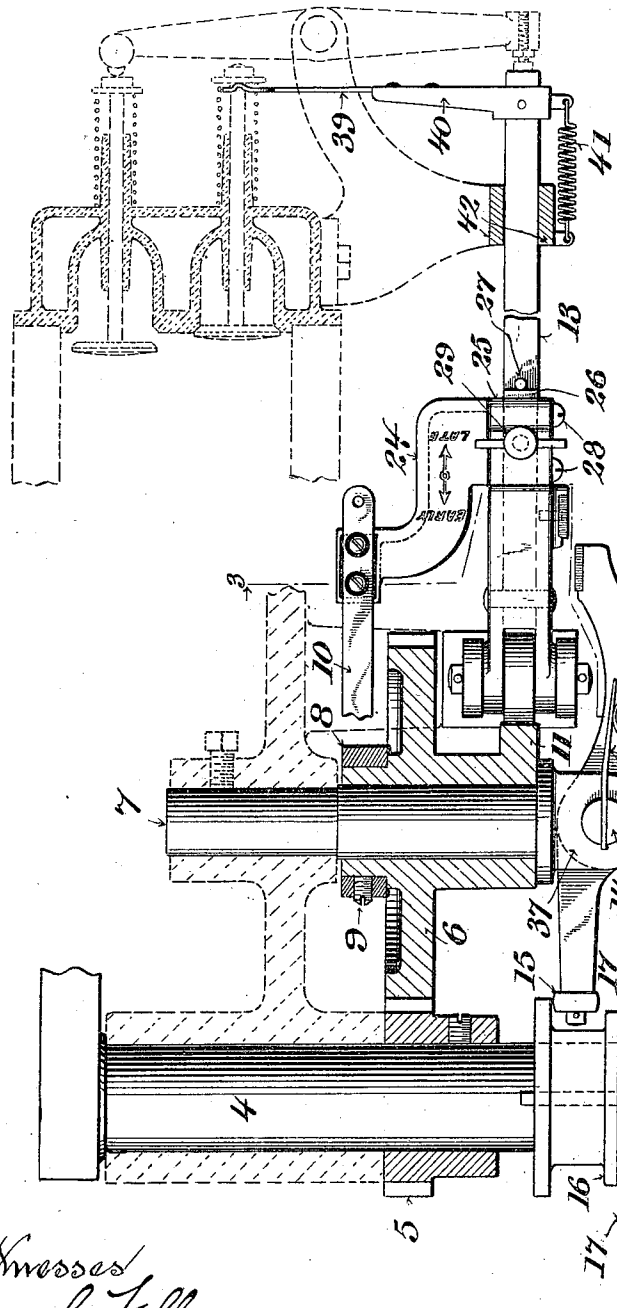

Fig. 1.

Witnesses
George G. Felber
Thos. J. Delahunt

Inventor
John E. Gilson
By Chapman & Young
Attorneys.

ANDREW B. GRAHAM CO., PHOTO-LITHOGRAPHERS, WASHINGTON, D. C.

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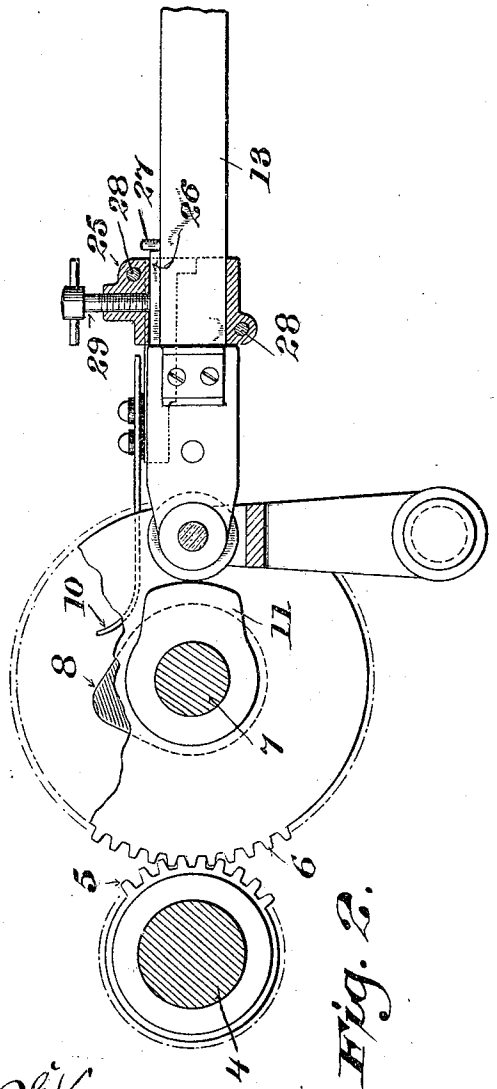

Fig. 2.

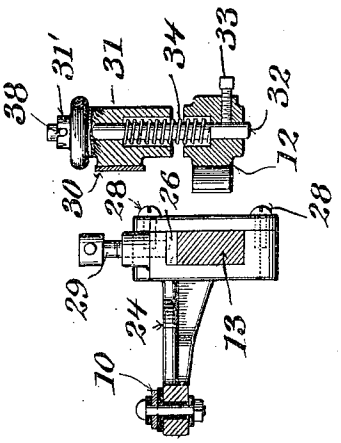

Fig. 3.

Witnesses:
George L. Telber
Thos. Delafield

Inventor:
John E. Gilson
By Upham & Young
Attorneys.

ANDREW B. GRAHAM CO., PHOTO-LITHOGRAPHERS, WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

JOHN E. GILSON, OF PORT WASHINGTON, WISCONSIN, ASSIGNOR TO GILSON MANUFACTURING COMPANY, OF PORT WASHINGTON, WISCONSIN.

INTERNAL-COMBUSTION ENGINE.

960,536. Specification of Letters Patent. **Patented June 7, 1910.**

Application filed June 14, 1909. Serial No. 501,925.

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 consists in what is hereinafter particularly set forth with reference to the accompanying drawings and pointed out in claims, its main object being to provide simple, economical means for regulation of the time of ignition in internal-combustion engines while the same are in operation, and for regulating speed without stopping said engines.

Figure 1 of the drawings represents a plan view, partly in horizontal section, of a fragment of an internal-combustion engine and illustrates my preferred means for ignition and speed regulation of the engine while the same is in operation, parts of said engine being shown by dotted lines; Fig. 2, a side elevation, partly in section, of an assemblage of parts in the engine, a gear-wheel in the assemblage being partly broken away, and Fig. 3, a transverse section on planes indicated by lines 3—3 in Fig. 1.

Referring by numerals to the drawings, 4 indicates the crank-shaft of an internal-combustion engine, 5 the crank-shaft pinion in mesh with a spur-wheel 6 and therewith constituting the half-time gear of the engine, the spur-wheel being loose on a stationary arbor 7 and having a spark-timing cam 8 adjustably secured on its hub by a set-screw 9, this cam being operative against an insulated spring-contact 10 in its path.

The exhaust-valve controlling-cam 11 of the engine is integral with the hub of the spur-wheel 6, and the automatically adjustable stop-lever 12 for the push-rod 13 of said engine is held by a pivot-pin 14 in a shouldered and forked end of the aforesaid arbor. One end of the lever 12 is provided with an antifriction roller 15 engaging one of a pair of annular grooves of the governor-sleeve 16 that has slidable engagement with the crank-shaft 4 upon which it is carried. The other of the sleeve-grooves is engaged by knob-ends of crank-extensions 17 of governor-arms 18 pivotally supported between branches 19 of a ring 20 that is fastened on the hub 21 of the engine fly-wheel 22 that is keyed upon the aforesaid crank-shaft, and the ball or weight ends of said governor-arms are in connection with a spring 23. Provision is had for adjustment of the tension of this spring and the general construction and arrangement of parts, as thus far described, is usual in internal-combustion engines as ordinarily built.

To regulate the time of ignition, the insulated spring-contact 10 is attached to an arm 24 of a slide 25 movable on the push-rod 13 and a grip-plate 26 mounted upon said rod between a shoulder of same and a pin 27 projecting therefrom, said shoulder and pin serving as stops to limit movement of the slide in opposite directions. To provide for engagement of the slide with the rod and plate aforesaid, one of its sides is detachable, screws 28 being employed to hold said side in connection with the remainder of said slide. To hold the slide in adjusted position, it is provided with a thumb-screw 29 that impinges on the grip-plate aforesaid. When the slide is adjusted against the pin 27 of the push-rod, late sparking results, and when said slide is adjusted against the adjacent push-rod shoulder, early sparking results, the arrangement of the aforesaid slide being such that either adjustment of the same may be readily effected while the engine is in operation.

The head of the pivot-pin 14 is longitudinally kerfed to provide a seat for a leaf-spring 30 that bears upon a cam 31 loose on a spindle 32 adjustably secured in the lever 12 by a set-screw 33, said cam and lever being chambered for the engagement of a spiral spring 34 that surrounds the spindle under tension, as shown in Fig. 3. The pivot-pin is held against turning by a set-screw 35 for which a ledge 36 of a fork-branch 37 of the arbor 7 is provided. The outer end of the cam 31 is annular and provided with a radially notched flange 31′ engageable with a cross-pin 38 extending through the aforesaid spindle in which it has driving-fit, said pin serving to hold said cam in rotary adjusted position. To adjust this cam, the same is pushed down against resistance of the spring 34 to clear the pin 38, then turned to the desired position and released to again engage said pin, the adjustment being effected to regulate the tension of the spring 30 that resists outward

movement of the governor-sleeve incidental to spread of the governor arms. The tension of the spring 30 determines the time of engagement of the stop-lever 12 with the push-rod 13, whereby the speed of the engine is automatically regulated, the disposition of the cam 31 being such that it may be readily adjusted to vary the tension of said spring while the engine is in operation. The spring 30 and adjustable cam 31 in the arrangement shown is a preferred construction but other means may be employed for variable tension resistance to movement of the push-rod stop-lever incidental to outward movement of the governor-sleeve without stopping the engine.

A flat lock-spring 39 for the intake-valve of the engine is fastened to an arm 40 fastened upon the push-rod 13 by which it is carried, this spring being opposed to the flange of the tension-nut that is run on the stem of said intake-valve against the usual valve-controlling spring shown in dotted lines.

A spring 41 controlling movement of push-rod 13 in one direction is shown in connection with the arm 40 and the guide 42 for said rod, this spring being auxiliary to the exhaust-valve controlling spring.

In practice, supposing the piston (not shown) to be at the valve-end of the cylinder (partly shown by dotted lines) its movement toward the opposite end of said cylinder during a one-half turn of the fly-wheel will create a suction sufficient to open the intake-valve, and during another half-turn of said fly-wheel, the piston moves back again to compress the charge between its end and the opposing cylinder-head. Just prior to the finish of the compression-stroke of the piston, the spark-timing cam 8 comes into engagement with spring-contact 10, to close the circuit of an electric spark-mechanism (not shown) whereby the compressed charge in the cylinder is fired to force the piston outward again to give impulse to the crank shaft and wheels of the engine. By the time the piston has again reached its outward position, the cam 11 on the half time gear begins to move the push-rod 13 which in turn operates to open the exhaust valve of the engine and keep it open until said piston has reached the end of its inward stroke, during which time the products of combustion are expelled from the engine-cylinder. Should the engine speed up beyond the number of revolutions to the minute for which the governor is set, outward movement of the governor-arms 18 results in a sliding motion of the sleeve 16, whereby the stop-lever 12 is actuated to cause the outer knife-end of same to catch under a projection of said push-rod, whereby the exhaust-valve is held open to prevent formation of a vacuum in the cylinder, thus preventing opening of the intake-valve until the speed slackens to permit return of the aforesaid arms, sleeve and stop-lever to normal position, this governing of the engine being on what is known as the hit and miss plan.

I claim:

1. In an internal-combustion engine, the combination of a push-rod provided with fixed stops, a slide adjustable on the rod between the stops, a spark-timing cam, a spring-contact connected to the slide to be in the path of said spark-timing cam, and means for holding the slide in adjusted position against one or the other of said stops.

2. In an internal-combustion engine, the combination of a push-rod provided with a stop-pin, a slide adjustable on the rod between the pin and a shoulder of same, a spark-timing cam, a spring-contact connected to the slide in the path of a spark-timing cam, and means for holding the slide in adjusted position.

3. In an internal-combustion engine, the combination of a push-rod provided with a stop-pin, a grip-plate on the rod between a shoulder of same and said pin, a slide adjustable on said rod and plate between said shoulder and pin, a thumb-screw carried by the slide in opposition to the grip-plate, a spark-timing cam, and a spring-contact in connection with said slide in the path of the spark-timing cam.

4. In an internal-combustion engine, the combination of a push-rod provided with fixed stops, a slide adjustable on the rod between the stops and provided with an arm, a spark-timing cam, a spring-contact in insulated connection with the slide-arm in the path of the spark-timing cam, and means for holding the slide in adjusted position against one or the other of said stops.

5. In an internal-combustion engine, the combination of a push-rod provided with fixed stops, a slide adjustable on the rod between the stops, means for holding said slide in adjusted position against one or the other of said stops, a spark-timing cam, and a spring-contact connected to the aforesaid slide to be in the path of the spark-timing cam.

6. In an internal-combustion engine, the combination of a governor, a governor-controlled push-rod stop-lever, a rotary adjustable cam carried by the lever, and a spring arranged to impinge the cam in opposition to governor movement of said lever, adjustment of said cam serving to regulate the spring-tension against governor movement of the aforesaid lever.

7. In an internal-combustion engine, the combination of a governor, a governor-controlled push-rod stop-lever and a stationary pivot-pin for same, a leaf-spring in connection with the pin, and a rotary adjustable cam carried by said lever in opposition to

the spring, adjustment of the cam serving to regulate the spring tension against governor movement of the aforesaid lever.

8. In an internal-combustion engine, the combination of a governor, a governor-controlled push-rod stop-lever and a stationary pivot-pin for same having a kerfed head, a leaf-spring engaging the kerf of the pin-head, and a rotary adjustable cam carried by said lever in opposition to the spring, adjustment of the cam serving to regulate the spring tension against governor movement of the aforesaid lever.

9. In an internal-combustion-engine, the combination of a governor, a governor-controlled push-rod stop-lever and a stationary pivot-pin for same, a leaf-spring in connection with the pin, a spindle extending from said lever, a cross-pin extending through the spindle, a spring-opposing cam loose on the spindle and provided with radial notches engageable with the cross-pin, and a cam-supporting spring surrounding said spindle in chambers of the lever and cam, adjustment of said cam serving to regulate the spring-tension against governor movement of said lever.

10. In an internal combustion-engine, the combination of a governor, a governor-controlled push-rod stop-lever and a stationary pivot-pin for same, a leaf-spring in connection with the pin, a spindle in adjustable connection with said lever, a cross-pin extending through the spindle, a spring-opposing cam loose on the spindle and provided with radial notches engageable with the cross-pin, and a cam-supporting spring surrounding said spindle in chambers of the lever and cam, adjustment of said cam serving to regulate the spring tension against government movement of said lever.

11. In an internal-combustion engine, the combination of a governor, a governor-controlled push-rod stop-lever and pivot-pin for same, a ledge extending from the support for the pin, and a set-screw extending through the ledge against said pin, a leaf spring in connection with the aforesaid pin, and a rotary adjustable cam carried by said lever in opposition to the spring, adjustment of the cam serving to regulate the spring tension against governor movement of the aforesaid lever.

12. In an internal-combustion engine, the combination of a push-rod provided with fixed stops, an arm fastened to the rod by which said arm is carried, a slide adjustable on the rod between the stops, a spark-timing cam a spring-contact connected to the slide to be in the path of the spark-timing cam, means for holding the slide in adjusted position against one or the other of said stops, and an intake-valve locking spring in connection with the arm of said rod.

13. In an internal combustion engine, the combination of a push-rod provided with fixed stops, an arm fastened to the rod by which said arm is carried, a slide adjustable on the rod between the stops, a spark-timing cam a spring-contact connected to the slide to be in the path of the spark-timing cam, means for holding the slide in adjusted position against one or the other of said stops, an intake-valve locking-spring in connection with the arm of said rod, and a recoil-spring connecting the arm with a guide for said rod.

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,
A. J. BOERGER.