W. L. GILE.

GAS ENGINE CONTROLLER.

APPLICATION FILED APR. 15, 1907. RENEWED DEC. 17, 1909.

1,001,015.

Patented Aug. 22, 1911.

3 SHEETS—SHEET 1.

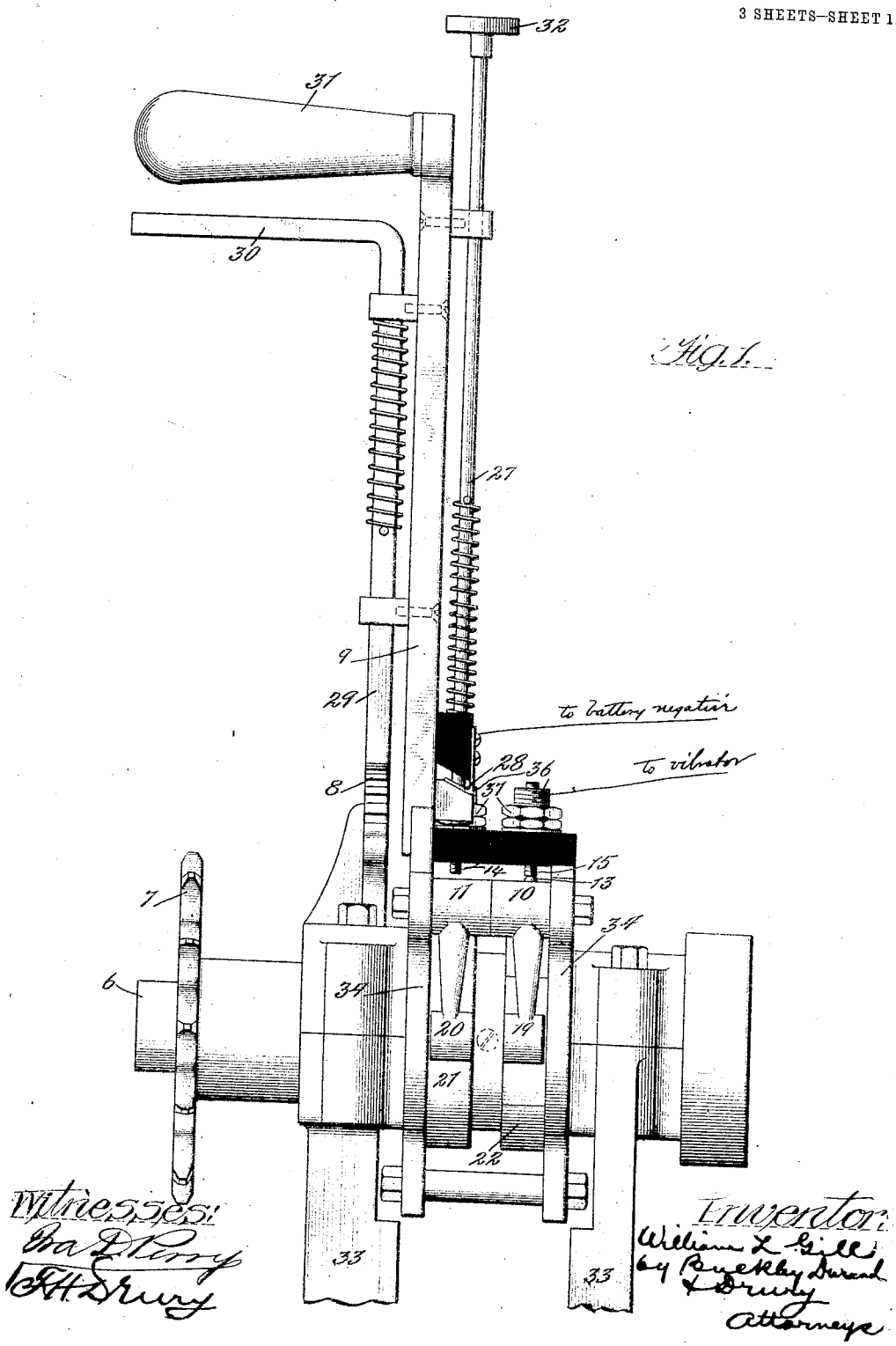


Fig. 1.

Witnesses:
Ba D Perry
H H Drury

Inventor:
William L. Gile
by Bakewell Durand & Drury
Attorneys

W. L. GILE.

GAS ENGINE CONTROLLER.

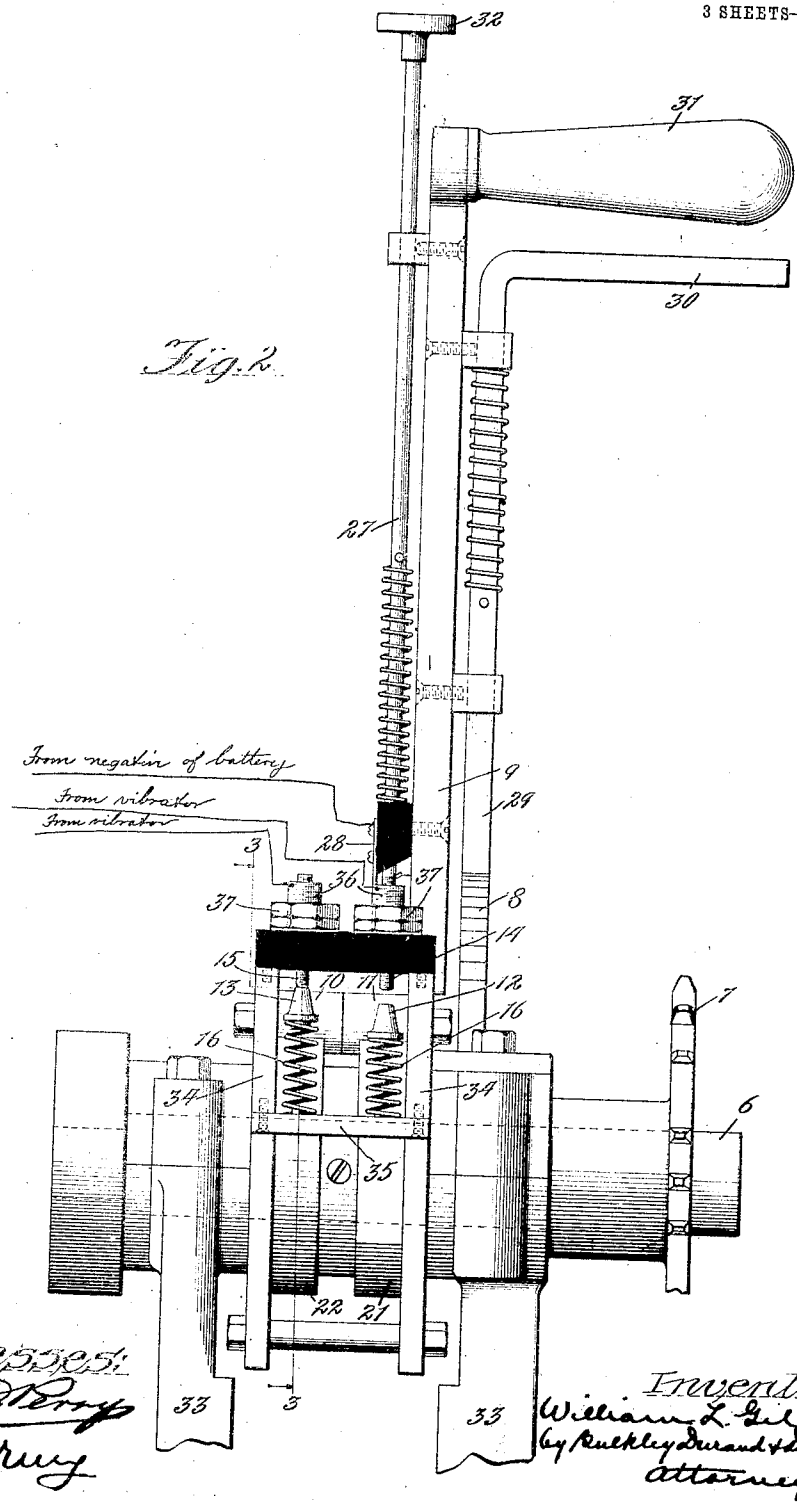
APPLICATION FILED APR. 15, 1907. RENEWED DEC. 17, 1909.

1,001,015.

Patented Aug. 22, 1911.

3 SHEETS—SHEET 2.

Fig. 2.



Witnesses:

Inventor:
William L. Gile
by Buckley Durand & Drury
attorneys

W. L. GILE.

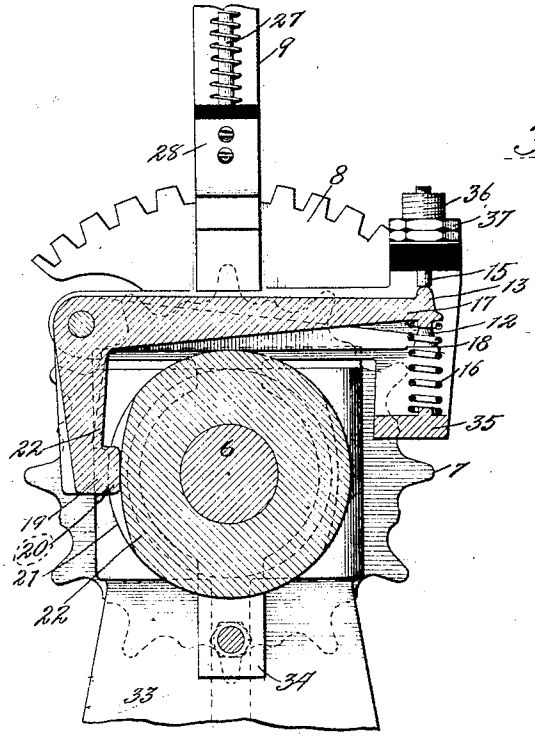
GAS ENGINE CONTROLLER.

APPLICATION FILED APR. 15, 1907. RENEWED DEC. 17, 1909.

1,001,015. Patented Aug. 22, 1911.

3 SHEETS—SHEET 3.

Fig. 3.



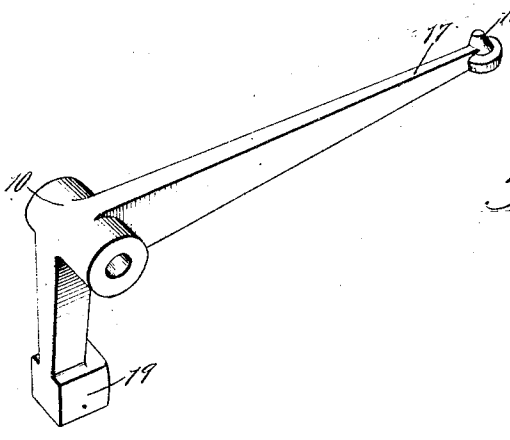


Fig. 4.

Witnesses:
Jas. D. Perry
F. H. Drury

Inventor:
William L. Gile
by Buckley, Durand & Drury
Attorneys

UNITED STATES PATENT OFFICE.

WILLIAM L. GILE, OF GREENVILLE, MICHIGAN.

GAS-ENGINE CONTROLLER.

1,001,015. Specification of Letters Patent. Patented Aug. 22, 1911.

Application filed April 15, 1907, Serial No. 368,177. Renewed December 17, 1909. Serial No. 533,697.

To all whom it may concern:

Be it known that I, WILLIAM L. GILE, a citizen of the United States of America, and resident of Greenville, Michigan, have invented a certain new and useful Improvement in Gas-Engine Controllers, of which the following is a specification.

My invention relates to improvements in control mechanism for gas engines, and has for its object the production of a device in which the entire control of the engine is centered in one lever.

A further object is the production of a device in which the positive control of each cylinder is regulated by different parts thereof.

A further object is the production of a device by means of which the length of time of the sparks may be varied while the engine is in motion.

A further object is the production of a durable device which can be cheaply constructed, and one that is not liable to get out of order.

These and such other objects as may hereinafter appear are attained by my device, embodiments of which are illustrated in the accompanying drawings, in which—

Figure 1 represents a side elevation of my device. Fig. 2 represents a side elevation opposite to that of Fig. 1. Fig. 3 is a sectional view on line 3—3 in Fig. 2, looking in the direction indicated by arrows. Fig. 4 is a perspective view of one of the bell crank levers.

Like numerals of reference indicate like parts in the several figures of the drawings.

The device as shown is applied to a two-cylinder, two-cycle engine.

Referring by numerals to the accompanying drawings, 6 represents a countershaft to which is keyed a sprocket wheel 7 driven from the main shaft at the same speed as the latter. A fixed segment 8 is secured adjacent to a lever 9, which lever carries two bell-crank levers 10 and 11, and is mounted concentrically with the counter-shaft, and is free to revolve about it. One end of each bell crank lever carries a contact-point 12 and 13, for the completion of the primary of the electric ignition circuit through the medium of contacts 14 and 15. Springs 16 are placed under the arms 17 and 18 of the bell crank lever, tending to keep the heads 19 and 20 of the opposite arms of the lever in the desired position. Keyed to the counter-shaft 6 are two disks 21 and 22, each disk having a portion of its periphery flattened. One disk controls the ignition of each cylinder, and as the cranks of the engine are set 180 degrees apart, the flattened portion of the disks differ in that degree. A rod 27 controlled by the operator is mounted on the lever 9, and carries a switch 28 of any desired form, for breaking the primary of the ignition circuit independently of the contact points of the bell crank levers. A latch 29 is also mounted on the lever, engages the segment 8 and controls the position of the levers. The latch 29 has a handle 30, and the lever 9 is also provided with a handle 31. The rod 27 of the switch terminates in a button 32. The positions of the handle 31 and the button 32 are such that they are all under the direct control of the operator, making it easy for him to operate the entire mechanism with one hand, and practically at will. The entire mechanism is mounted on a forked frame 33, while a housing 34 surrounds the disks 21 and 22, and is secured to the lever 9. A bar or shelf 35 is secured to said housing, forming a seat for the bases of the springs 16.

In the operation of the gas engine,—due to unusually high compression in the crank-case, and to the fact that the cranks are set 180 degrees apart, the pistons come to rest at mid-stroke, with a partially compressed charge in each cylinder. The drawings represent the disks ninety degrees from the position which they would occupy with the piston at mid-stroke and the engine at rest. In other words, when the engine is stopped, the flattened portions of the disks will be directly above and below the axis of the counter-shaft. In starting the engine in either direction, the lever 9 is thrown into horizontal position to bring the end of the proper bell crank in contact with the flattened portion of the disk. This makes the electrical contact and explodes the charge in the corresponding cylinder. The lever is then brought back into upright position, so that the end of the second bell crank lever will pass over the flattened portion of the surface of the second disk, which is advanced with the revolution of the counter-shaft (started by explosion in the first cylinder). This fires the charge in the second cylinder, when the piston has reached the end of the

up stroke. The lever 9 being now practically vertical, the bell crank levers are in proper position to automatically make contacts and fire the charges at the proper time.

If it is desired to start the engine in a reversed direction, the lever is thrown into the opposite horizontal position, exploding the charge in the second cylinder first. The action of the bell cranks will then be the same as described above. The rod 27, mounted on the lever, carrying the primary circuit switch, facilitates the stopping of the engine, so that the operator may throw in the reversing mechanism, thus giving an opposite impulse before the engine has completely come to rest. The contact points 14 and 15 are also made adjustable through the medium of screws 36 and nuts 37, seated on the top of the housing 34, so that by proper adjustment of such points with relation to the spring 16, the length of time of contact, and hence the length of time of sparks, may be varied, even when the engine is in motion. As explained above, the engine equalizes in stopping, so that both cylinders are partially charged when at rest and ready to start.

It will thus be noted that by the assembling of the different parts as shown above, the control of the engine—starting, stopping and reversing—is centered in one lever.

It will further be observed that by mounting the switch handle or rod 27 on the control lever in the manner shown the operator may conveniently break the primary circuit and stop the engine at any point in the throw of the lever. It will be observed also that by mounting the bell cranks on the same pivot and locating said pivot in such position that the contact carrying arms shall lie parallel to each other and shall extend over the top of the cams, a very compact and accurately working device is obtained, ample movement being provided for the tappet heads 19 and 20 and the contacts 12 and 13.

It will be observed that with this device the usual circuit arrangement may be employed, the plate 28 of the switch being connected to the negative pole of the battery and the two stationary contacts 15 and 14 being respectively connected to the vibrators or tremblers, as indicated in Fig. 2.

I claim:

1. In an internal combustion engine the combination of a rotatable shaft, a flattened or cam-shaped disk on said shaft, a controlling lever pivotally mounted on said shaft and carrying a downwardly pointing contact, a bell crank lever pivoted on said lever on an axis parallel with the axis of said shaft, said lever having a depending arm adapted to impinge against the periphery of the cam-shaped disk and a horizontal arm extending over above the cam-shaped disk and adapted to make contact with the aforesaid contact, a spring for normally bringing these contacting parts together, means for positively locking the lever at any point in its throw, a switch on the lever adapted to make and break the ignition circuit and means on the lever for operating this switch from a point adjacent to the handle of said lever at any point in the throw of the lever.

2. In an internal combustion engine controller, the combination of a support and a rotatable shaft journaled therein, a stationary toothed segment on the support, a lever pivoted on the shaft adjacent to said segment, a locking bolt on said lever adapted to engage said segment and lock the lever at various points in its throw, said bolt being operable from a point adjacent to the handle of the lever, a switch on the lever and means on the lever for operating this switch from the point adjacent to the handle of the lever and at any point in the throw of the lever, a flattened or cam-shaped disk on said shaft, a bell-crank lever pivotally mounted on said controlling lever and having one arm depending and adapted to impinge against the periphery of said cam-shaped disk and its other arm extending across over the top of the cam-shaped disk, a spring for normally pressing this latter arm upwardly, and a downwardly facing contact carried by said lever, substantially as and for the purpose set forth.

Signed by me at Greenville, Michigan, this 11th day of April, 1907.

WILLIAM L. GILE.

Witnesses:

C. L. RARDIN,

JENNIE D. ROSE.