No. 809,560. PATENTED JAN. 9, 1906.

D. F. GRAHAM & F. A. FOX.

COMBINED SPARKER AND GOVERNOR FOR GAS ENGINES.

APPLICATION FILED MAR. 11, 1903.

2 SHEETS—SHEET 1.

Fig. 2.

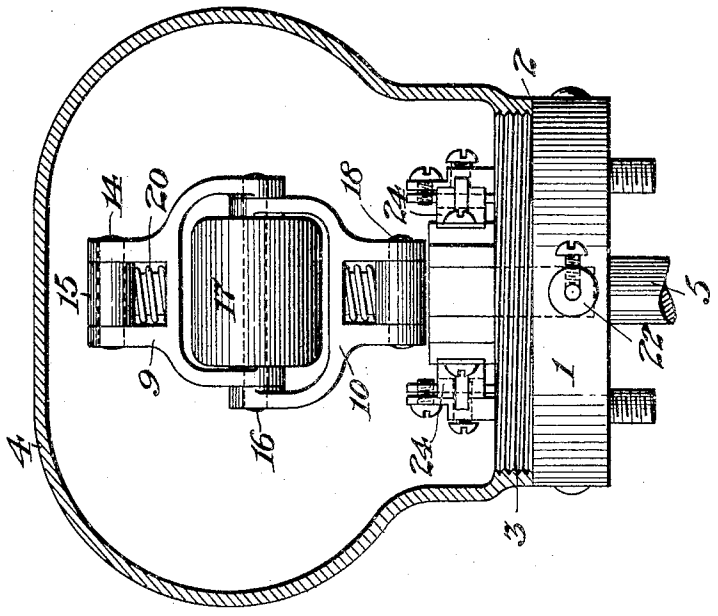
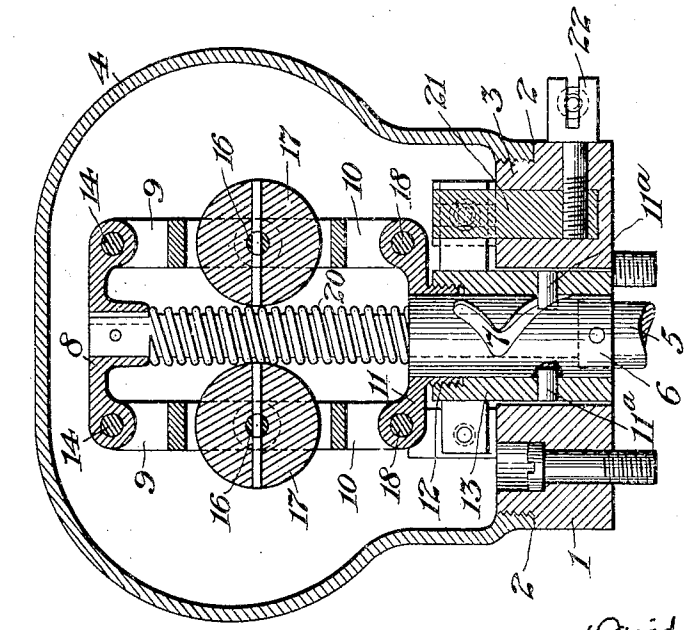


Fig. 1.



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Fig. 4.

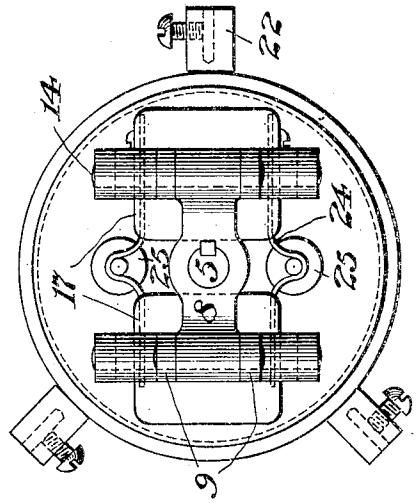
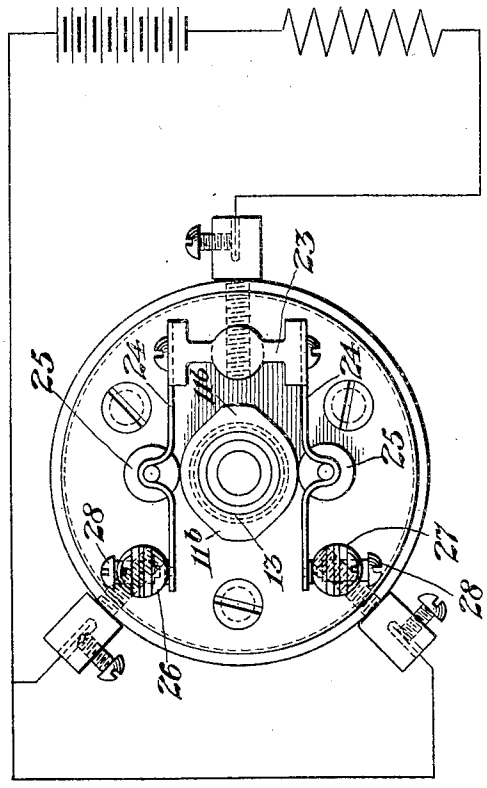


Fig. 3.



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UNITED STATES PATENT OFFICE.

DAVID F. GRAHAM AND FRANK A. FOX, OF STAMFORD, CONNECTICUT, ASSIGNORS, BY MESNE ASSIGNMENTS, TO THE EISENHUTH HORSELESS VEHICLE COMPANY, OF MIDDLETOWN, CONNECTICUT, A CORPORATION OF MAINE.

COMBINED SPARKER AND GOVERNOR FOR GAS-ENGINES.

No. 809,560. Specification of Letters Patent. Patented Jan. 9, 1906.

Application filed March 11, 1903. Serial No. 147,229.

To all whom it may concern:

Be it known that we, DAVID F. GRAHAM and FRANK A. FOX, citizens of the United States, residing at Stamford, in the county of Fairfield and State of Connecticut, have invented certain new and useful Improvements in a Combined Sparker and Governor for Gas-Engines, of which the following is a specification.

This invention relates to a combined sparker and governor for explosion-engines; and its primary object is to fire the charge at the proper point of the stroke of the piston with relation to the speed of the engine.

The importance of varying the time of explosion of the charge of a gas-engine with relation to the speed of the engine, so that the maximum pressure is attained at the extreme limit of the piston-stroke, is now well recognized in the art.

A perceptible time elapses after the contact is made before the gas is ignited and also between the instant of ignition and the time of total combustion, at which latter time the maximum pressure is produced.

The present invention accomplishes the objects in view by the employment of a ball-governor in combination with contact devices, whereby the contact-cam is advanced with relation to the forward revolution of the cam-shaft and directly in proportion to the speed of the engine.

The construction and characteristic features of the improved combination sparker and governor will be fully described hereinafter in connection with the accompanying drawings, which form part of the specification, and particularly set forth in the appended claims.

In the drawings, Figure 1 is a central vertical section of a combined sparker and governor embodying the invention. Fig. 2 is a side elevation at right angles to Fig. 1, the casing being shown in section. Fig. 3 is a horizontal section showing the electrical connections employed, and Fig. 4 is a top plan view with the casing removed.

Corresponding parts in all the figures are denoted by the same reference characters.

The reference-numeral 1 designates a circular base or support, of insulating material, recessed on its periphery to form an annular shoulder 2 and a neck 3, the latter being screw-threaded for the attachment of an internally-threaded globular cover or casing 4.

5 designates the revoluble cam-shaft, upon which is mounted a sleeve 6, having spiral grooves 7 on opposite sides thereof. To the upper end of the cam-shaft 5 is keyed the stationary head 8 of a governor, connected by two pairs of oppositely-disposed toggle-arms 9 and 10 with a lower movable head 11, having a central opening and depending externally-threaded annular flange 12, through which the grooved sleeve 6 extends.

13 designates a contact-cam recessed at its upper end and internally screw-threaded to receive the threaded flange of the movable governor-head 11 and having oppositely-projecting pins 11^a, extending into the grooves 7, and diametrically opposite projections 11^b.

The upper toggle-arms 9 are pivotally secured by pins 14 to the perforated lugs 15 of the governor-head 8, and the lower ends of said arms 9 are pivotally secured to the upper ends of the toggle-arms 10 by cross-pins 16, which serve as the axial supports of the governor-balls 17. The lower ends of the toggle-arms 10 are pivotally connected by pins 18 to the perforated end lugs 19 of the movable head 11 of the governor.

A coil-spring 20 surrounds the upper end of the shaft 5 between the heads 8 and 11, the tension of said spring being exerted against the movable head 11, as best shown in Fig. 1.

The insulating-base 1 is recessed to receive a block 21 of conducting material transversely bored and threaded at its lower end to receive the stem of a binding-post 22 and carrying at its upper end a bracket 23, to which are secured contact-springs 24, upon each of which is mounted a contact-roller 25. The free ends of the springs 24 bear against supports 26 and 27, respectively, in position to make sparking contact with screw-contacts 28, extending into the supports.

It will be noted that the head 11 is not firmly attached to the cam 13. The relative construction and operative connection between the head 11 and cam 13 are as follows: The cam 13 is provided at its inner end with the internal-threaded portion which screws loosely onto the external-threaded portion of the head 11; but said threaded connection is

screwed only partially home. The effect of the construction just stated is that the longitudinal movement of the head 11 gives a longitudinal movement to the cam 13, owing to the limited threaded engagement of these two parts; but this threaded connection, which is screwed only partially home, while it enables longitudinal movement of the cam 13 does not prevent said cam 13 from having also a rotary motion, which is caused by the slot 7. The extent of this rotary motion is not sufficient to withdraw the threaded portions of the head 11 and cam 13 from engagement with each other, but is ample to allow said parts the full degree of rotary motion produced by the slot 7.

The utility and operation of the mechanism constructed as thus described will be readily understood by those skilled in the art to which the invention relates. As the camshaft 5 revolves it carries with it the grooved sleeve 6, and when the governor-balls spread a rotative longitudinal movement is imparted to the contact-cam 13 by the projection of its pins 11^a into the grooves of the sleeve 6. The diametrically opposite projections 11^b of the contact-cam are thus brought into position to strike the rollers 25 and force the contact-springs 24 apart and into contact with the contacts 28. It will thus be seen that the firing of the charge is controlled with respect to the speed of the engine and effected at the proper point of the stroke of the piston.

While the construction shown and described is a practical embodiment of the improvement, we would have it understood that we reserve the right to make all such variations and modifications in the construction and relative arrangement of the elements of the mechanism as may be included within the spirit and scope of the invention as defined and set forth in the following claims.

Having thus described our invention, we claim and desire to secure by Letters Patent—

1. A combined sparker and governor for explosive-engines, comprising a revoluble cam-shaft; a spirally-grooved sleeve mounted upon said shaft; a cam surrounding said sleeve and provided with projections entering the grooves of the sleeve and having an internally-threaded recess at its upper end; ignition-contacts operated by said cam; and a governor comprising an upper head fixed to said shaft, a lower movable head having an externally-threaded extension engaging the threaded recess in the cam and screwed partially home, toggle-levers connecting said heads, and weights on said levers, whereby the cam is given both a reciprocatory and a rotary movement, substantially as set forth.

2. A combined sparker and governor for explosive-engines, comprising a revoluble cam-shaft, a sleeve mounted upon said shaft and having oppositely-located exterior spiral grooves, a cam surrounding said sleeve and provided with interiorly-projecting pins entering said grooves, ignition-contacts operated by said cam, a movable governor-head connected to said cam by a threaded connection screwed partially home, a stationary governor-head carried by said shaft, and a centrifugally-acting connection between the two heads, for the purpose set forth.

3. A combined sparker and governor for explosive-engines, comprising a revoluble cam-shaft, a sleeve mounted upon said shaft and having exterior spiral grooves, a cam surrounding said sleeve and provided with interiorly-projecting pins entering said grooves, ignition-contacts operated by said cam, a movable governor-head connected to said cam by a threaded connection screwed partially home, a stationary governor-head secured on said shaft, weighted toggle-arms connecting the two heads, and a coil-spring on said shaft tending to move the movable governor-head away from the stationary governor-head, whereby the cam is given both a reciprocatory and a rotary movement on said shaft, substantially as set forth.

4. A combined sparker and governor for explosive-engines, comprising a base, contact-springs secured to said base, ignition-contacts for said springs, contact-rollers carried by said springs, a revoluble cam-shaft extending through said base, a stationary governor-head carried by said shaft, a spirally-grooved sleeve mounted on said shaft, a cam surrounding said sleeve between said contact-springs and having projections entering the grooves of the sleeve, a movable governor-head connected to said cam by a threaded connection screwed partially home, and pivotal connections between said governor-heads, for the purpose set forth.

5. A combined sparker and governor for explosive-engines, comprising a revoluble cam-shaft, a spirally-grooved sleeve mounted on said shaft, a cam surrounding said sleeve and provided with pins entering the grooves of the sleeve and also provided with diametrically opposite cam-surfaces, a contact-spring on each side of said cam, rollers carried by said springs, contacts for the free ends of said springs, and a movable governor-head connected to said cam by a threaded connection screwed partially home, whereby said cam will be advanced and rotated to spread said springs apart and against their contacts, substantially as set forth.

In testimony whereof we have signed our names in the presence of the subscribing witnesses.

DAVID F. GRAHAM.
FRANK A. FOX.

Witnesses:
F. O. McCLEARY,
J. CLARK PYBAS.