No. 692,734. Patented Feb. 4, 1902.

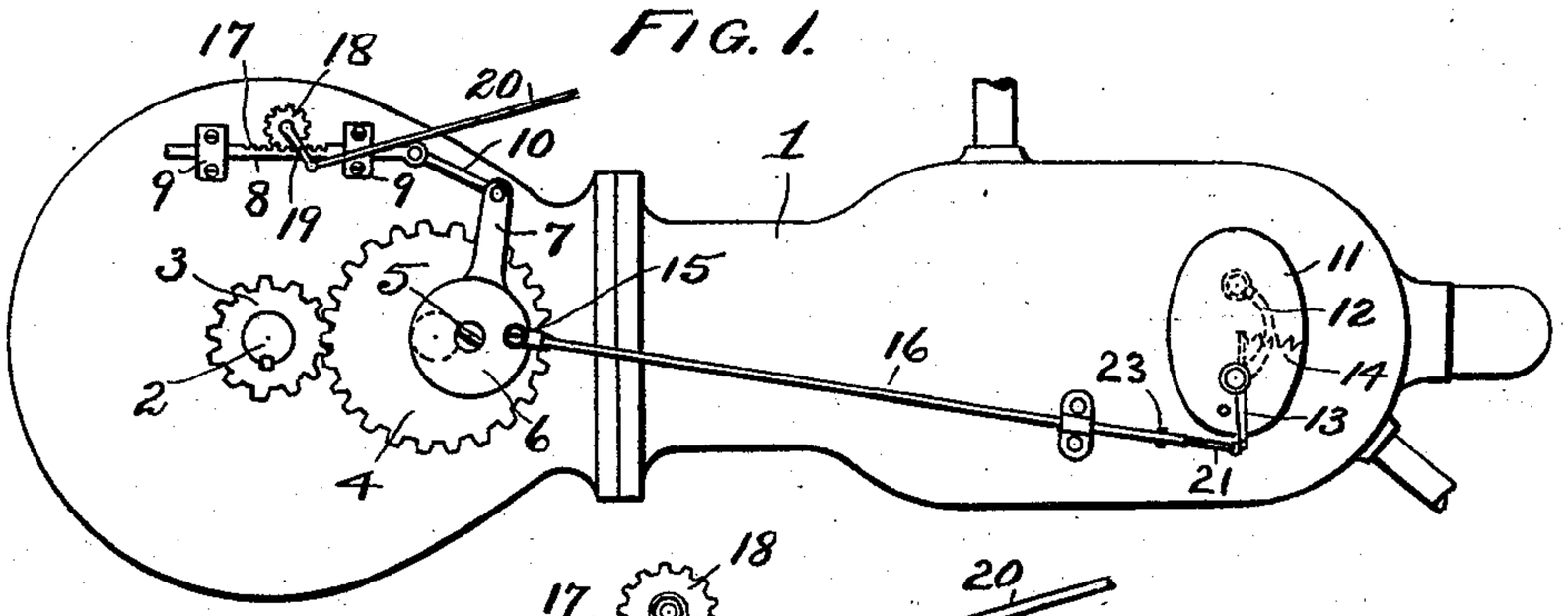
G. M. THOMPSON.

SPARKING IGNITER FOR EXPLOSIVE ENGINES.

(Application filed Mar. 30, 1901.)

(No Model.)

FIG. 1.



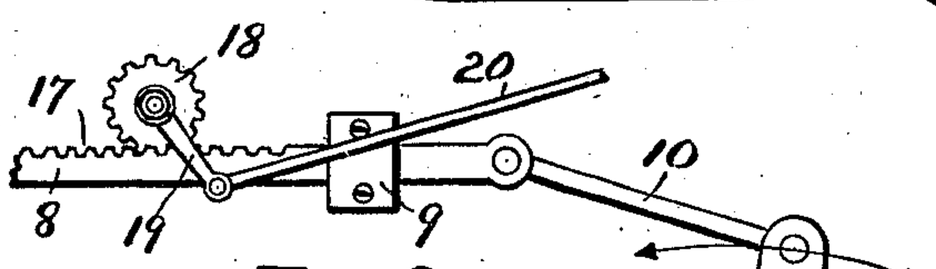


FIG. 2.

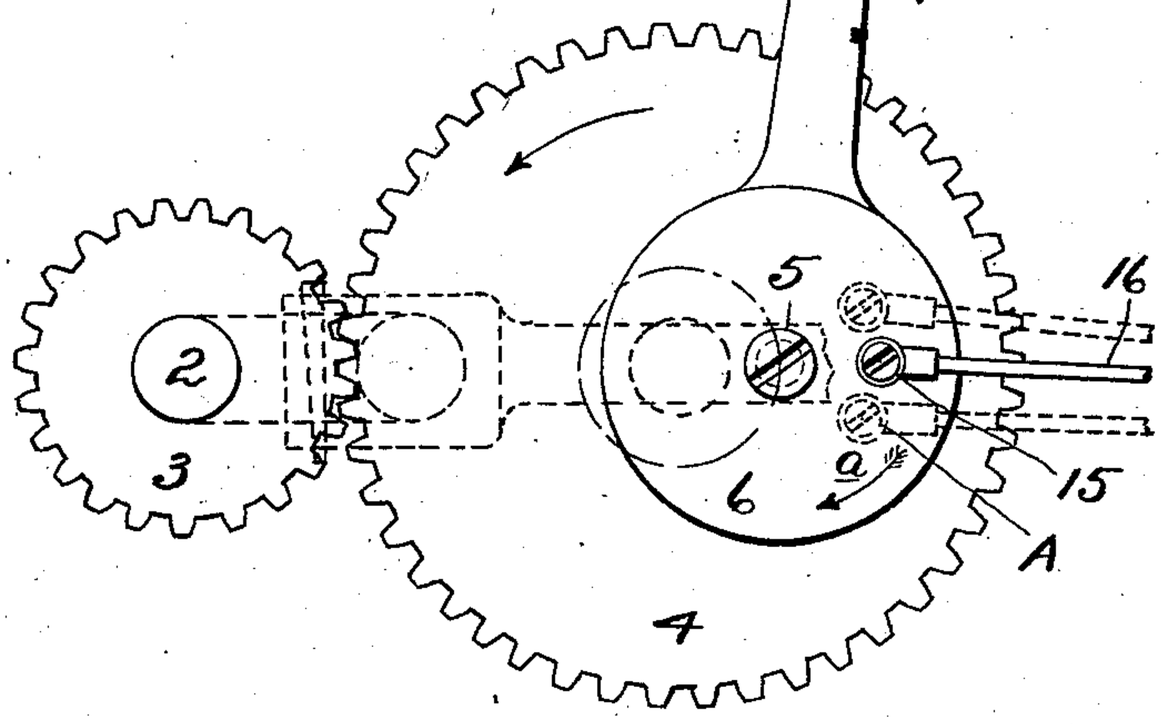
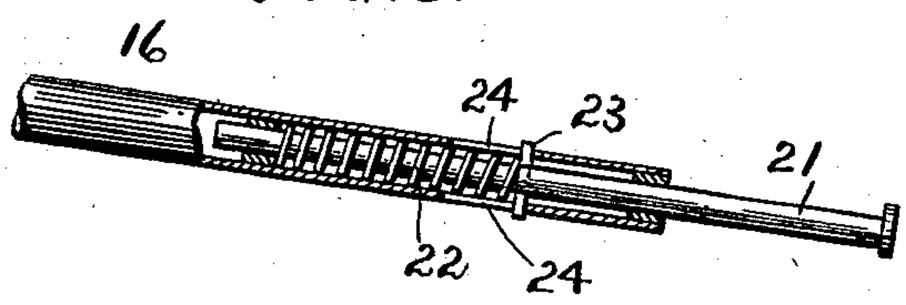


FIG. 3.



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SPARKING IGNITER FOR EXPLOSIVE-ENGINES.

SPECIFICATION forming part of Letters Patent No. 692,734, dated February 4, 1902.

Application filed March 30, 1901. Serial No. 53,583. (No model.)

To all whom it may concern:

Be it known that I, GEORGE M. THOMPSON, a citizen of the United States, residing at Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented certain new and useful Improvements in Sparking Igniters for Explosive-Engines, of which the following is a specification.

My invention relates to an igniter for explosive-engines, and has particular reference to the means for timing the explosion with reference to the maximum degree of compression of the gas.

In the art to which my invention belongs, as is well known, the greatest speed and power is obtained when the explosion occurs simultaneously with the greatest degree of compression of the gas, the speed and power being decreased correspondingly when the explosion occurs, as the piston recedes and the degree of compression of gas is lowered. Consequently it is necessary to control the speed and power of the engine to change the time of the ignition from a minimum speed and power in starting the engine to its maximum or normal speed and power in running. This feature of timing the spark is also necessary in starting the engine, for the reason that if the explosion occurred at the point of greatest compression the crank would be on a dead-center and there would be no certainty as to which way the crank-shaft would revolve, whereas when the explosion occurs after the point of greatest compression the crank has passed the center and the shaft revolves in the desired direction.

The object of my invention is to accomplish these results by simple and easily-controlled mechanism; and the invention consists in the parts and combination of parts shown in the drawings, and hereinafter described and claimed.

In the drawings I have illustrated the invention as applied to the side of the frame of a gas-engine, the frame being shown diagrammatically, in which—

Figure 1 is a side elevation of the frame with the igniter constructed and arranged in accordance with my invention as a part thereof. Fig. 2 is a detail view of the means *per se* for changing the time of explosion; and Fig. 3 is a detail view, partly in section, of the mechanism upon the reciprocating trip-rod.

Journaled in suitable bearings carried by the frame 1 is a crank-shaft 2, upon which is secured a pinion 3, and meshing therewith is a gear 4, also journaled upon a suitable bearing carried by the frame. The gear 4 is of a size and number of teeth to be revolved once by the pinion while the pinion has made two revolutions. Consequently the explosion which occurs upon each full revolution of the gear 4 takes place after the crank-shaft, and consequently the piston, has completed two full strokes. This arrangement, however, of gear 4 and pinion 3 can be varied to meet the requirements of any engine to which it may be attached.

Journaled upon the outer face of gear 4, eccentrically thereto, upon a stud 5 is a disk 6, and projecting upwardly from said disk is an arm 7, by which the disk is held from revolution as it is revolved around the axis of the gear-wheel 4. To hold the disk from revolution, I have provided a slide-rod 8, sliding in suitable ways 9 arranged upon the side of frame 1, the slide-rod and arm 7 being connected by a link 10. Consequently when the slide-rod is stationary the disk is held from revolution through the medium of arm 7 and link 10.

Arranged upon the frame in close proximity to the point of greatest movement of the piston is the sparker 11, which can be of the preferred or any well-known construction, the movable electrode 12 being projected to form a contact and to make the spark when an arm 13, projecting outside the sparker, is actuated, a spring 14 normally holding the movable electrode retracted. Pivotally secured upon the disk 6 at 15 is one end of contact-rod 16, the opposite end of said rod moving in its reciprocation in alinement with the end 13. Consequently upon each revolution of the gear 4 rod 16 is projected against the end of the arm 13, the electrodes are caused to contact, a spark is produced, and an explosion occurs.

As shown in Fig. 2 in full lines the point of attachment of the rod 16 to the disk 6 is positioned so as to time the spark simultaneously with the greatest degree of compression of the gas. Consequently when the disk 6 is

revolved upon its pivot 5 in the direction of the arrow *a* the point of attachment of the rod 16 to the disk 6 is moved from the point 15 to the point designated as A, Fig. 2. Consequently the piston will have commenced its back stroke, and the degree of compression of the gas will be decreased when the rod 16 is projected its full movement, which will be when the point marked *a* has moved to the point marked 15. The degree of movement of the arm 7 will consequently regulate the time of the spark with reference to the time of greatest degree of compression of the gas.

In order to move the arm 7, I have provided a rack 17 upon the one face of slide-rod 8, with which a pinion 18 meshes, and upon the shaft of said pinion I arrange a crank 19, to the outer end of which is pivotally secured one end of arm 20, the opposite end of said arm passing to a point within easy reach of the engineer or person in charge of the engine. Consequently as the rod 20 is moved slide-rod 8 is reciprocated, and arm 7, and consequently disk 6, is revolved upon its pivot, with the result heretofore mentioned.

Arranged upon the outer end of rod 16 is a supplemental resilient portion 21, which telescopes into the rod and is normally projected by a spring 22, a pin 23, carried by the portion 21 of the rod and passing through a slot 24 in the rod, limiting the movement of part 21 in either direction. Consequently as the end of the rod 21 contacts with arm 13 a positive contact with increasing pressure is formed until the pin 23 contacts with the end wall of the slot 24, at which time the rod is projected beneath the arm, which is released. I consider this feature of the resilient end of rod 16 of great value, as it allows of positive contact of the electrodes upon each reciprocation as contradistinguished from a strike-contact and the consequent uncertainty of spark which occurs when the arm is rigid.

What I claim is—

1. In an igniter for explosive-engines a sparker having a fixed electrode, a movable electrode attached to an oscillating shaft, an arm attached to said shaft, a crank-shaft, a gear-wheel actuated thereby, an adjustable disk pivoted eccentrically to the gear-wheel, a rod pivoted at one end to the disk, the opposite end having a movement in alinement with the sparker-arm to actuate the same and means for holding the disk in adjusted position.

2. In an igniter for explosive-engines a sparker having a fixed electrode, a movable electrode attached to an oscillating shaft, an arm attached to said shaft, a crank-shaft and a gear-wheel actuated thereby, an adjustable disk pivoted eccentrically to the gear-wheel, a rod pivoted at one end to the disk the opposite end having a movement in alinement with the sparker-arm to actuate the same, an arm projecting from the disk, a rod connected with the arm by a link and means for holding the arm, and thereby the disk fixed in adjusted position.

In testimony whereof I affix my signature in presence of two witnesses.

GEORGE M. THOMPSON.

Witnesses:
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