No. 830,898. PATENTED SEPT. 11, 1906.

S. A. HASBROUCK.

GAS ENGINE SPARKER.

APPLICATION FILED AUG. 26, 1903. RENEWED FEB. 10, 1906.

2 SHEETS—SHEET 1.

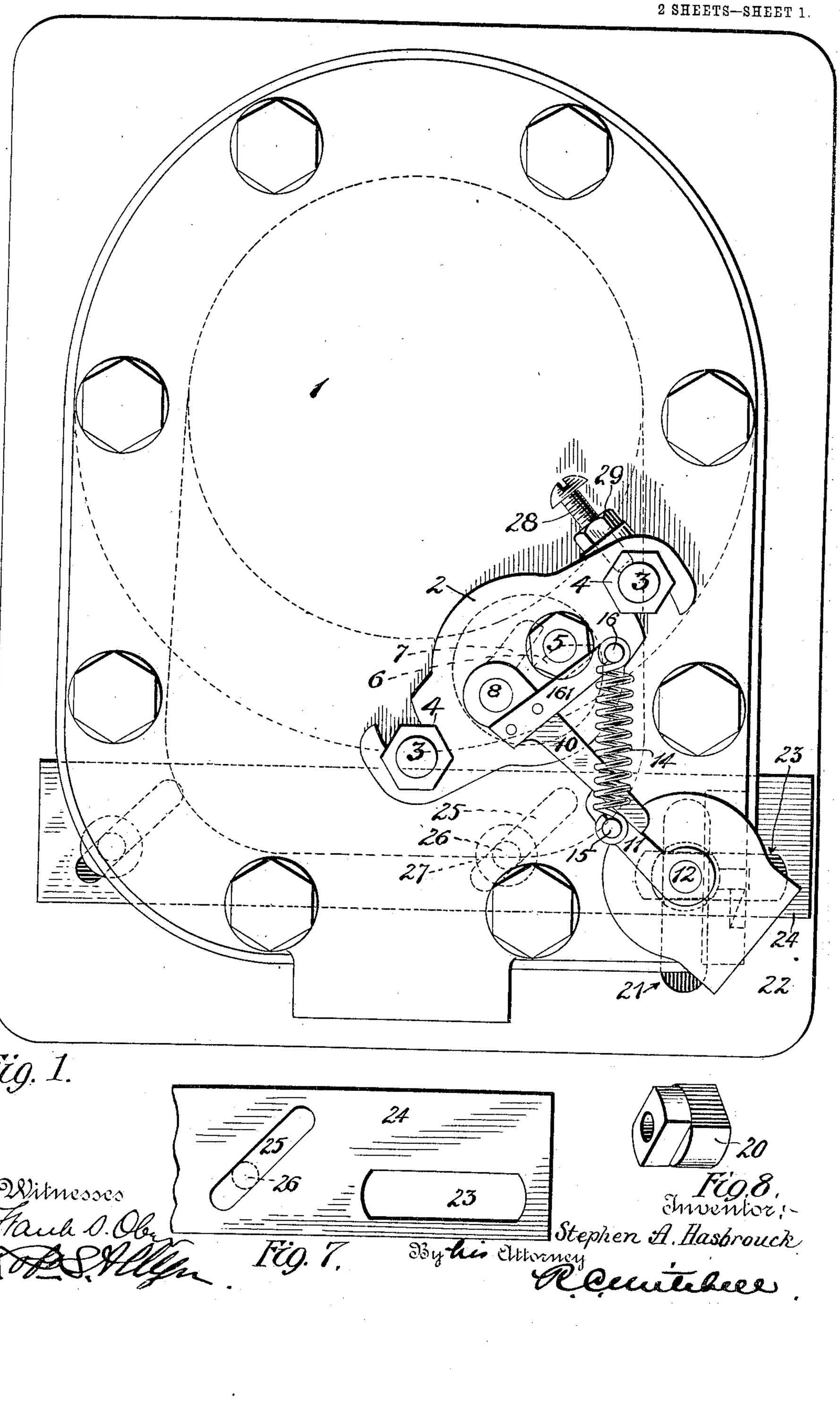

Fig. 1.

Fig. 7.

Fig. 8.

Witnesses
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2 SHEETS—SHEET 2.

Fig. 2.

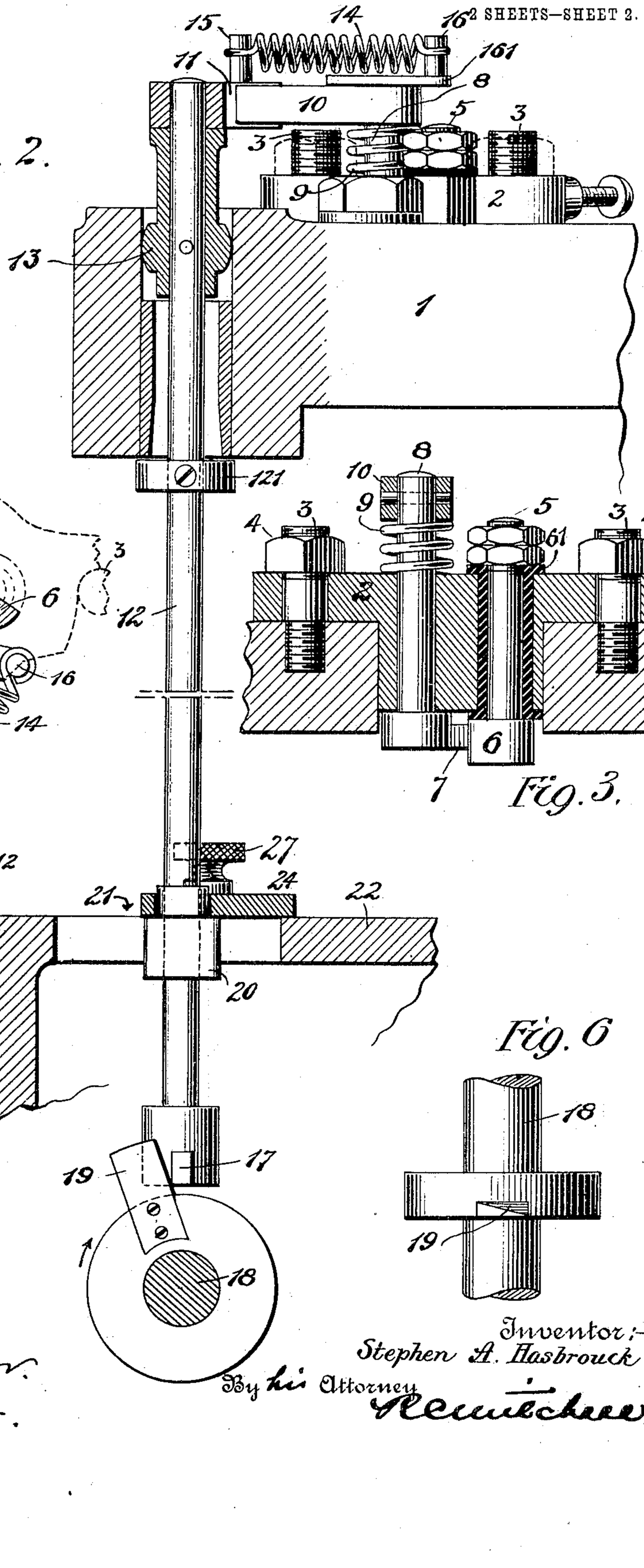

Fig. 4.

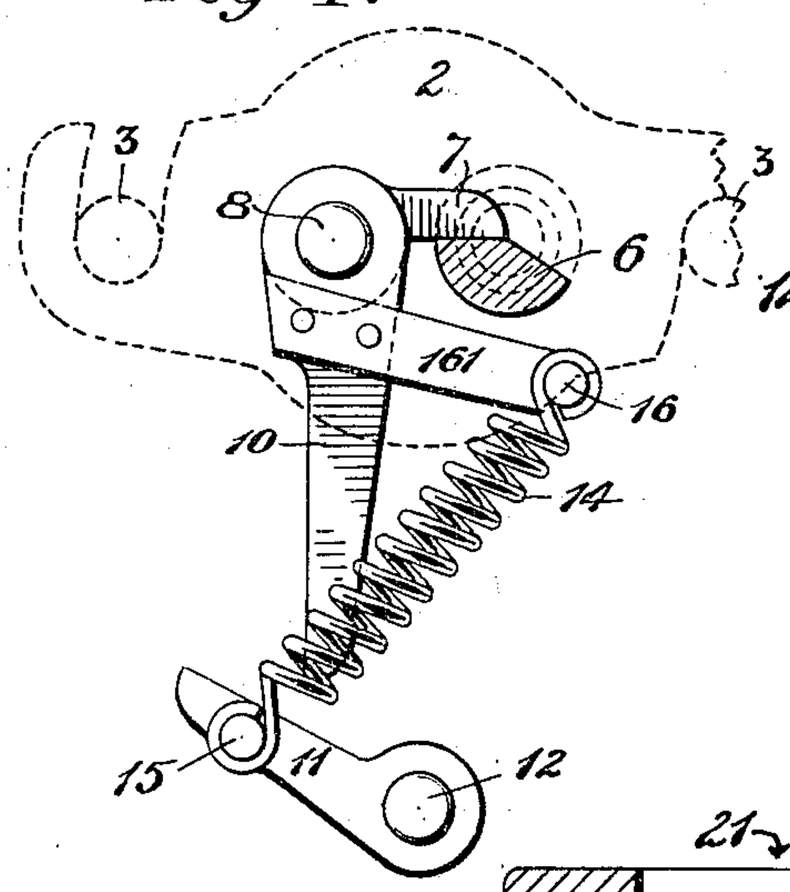

Fig. 5.

Fig. 3.

Fig. 6

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UNITED STATES PATENT OFFICE.

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GAS-ENGINE SPARKER.

No. 830,898. Specification of Letters Patent. Patented Sept. 11, 1906.

Application filed August 26, 1903. Renewed February 10, 1906. Serial No. 300,497.

To all whom it may concern:

Be it known that I, STEPHEN A. HASBROUCK, a citizen of the United States, residing at Yonkers, in the county of Westchester, State of New York, have invented certain new and useful Improvements in Gas-Engine Sparkers, of which the following is a full, clear, and exact description.

My invention relates to gas-engines, and particularly to an igniter or sparker.

The invention consists in the improvements hereinafter described in igniters of the "make-and-break" type, including a movable and stationary electrode and suitable operating means whereby the contact members are normally held apart, but are momentarily and intermittently actuated so as to close the circuit and then quickly break the same to form an arc of large and effective proportions, said arc being produced and ruptured so quickly that there is very little destructive action on the contact-points, such as usually results where the separation is relatively slow.

The object of my invention is to construct the said sparker so that it will be simple, effective, durable, and easily adjusted. The construction is also such that the moment of the spark may be timed, so as to give an early or late ignition to the gas.

In the drawings, Figure 1 represents the plan view of the head of a gas-engine cylinder fitted with my improved sparking mechanism. Fig. 2 is a fragmentary view thereof, partly in vertical section and partly in elevation. Fig. 3 is a vertical section through the spark-plug and the associated parts. Fig. 4 is a plan view of certain parts of the sparking mechanism shown in a different position from that indicated in Fig. 1, the spark-plug being indicated in dotted lines. Figs. 5, 6, 7, and 8 are views of details of construction.

1 represents the head of a gas-engine cylinder.

2 is the spark-plug, adapted to be removably secured in a circular opening in the head.

3 3 are studs secured in the head 1 and projecting into openings or slots in the ends of the plug 2, so that the said plug may be rotated slightly for adjustment.

4 4 are nuts mounted on the studs 3 and by which the plug may be held firmly in its adjusted position.

5 is a stem carried by the plug 2 and in turn carrying at its inner end a stationary electrode or contact member 6. The stem 5 and the contact member 6 are insulated from the plug, as shown at 61.

7 is a movable electrode or contact member, the same being in the form shown an arm eccentrically mounted on a stem 8, so as to have a rocking movement in the plug 2. A spring 9 serves to hold the inner end of the stem 8 firmly against the inner end of the plug 2 to aid in forming a gas-tight connection.

10 is what I shall term an "anvil-arm," which is suitably secured to the outer end of the stem 8 and projects laterally therefrom.

11 is what I shall term a "hammer-arm," the same being carried by a rock-shaft 12, which in the preferable form has an oscillating bearing 13 in the head 1. The ends of the arms 10 and 11 overlap each other and under normal conditions take a flat bearing, as best seen in Fig. 1. In this position the contact members 6 7 are spaced apart.

14 is a spring which is secured at one end to a suitable extension or stud 15 on hammer-arm 11 and at the other end to a suitable extension or stud 16, carried by the anvil-arm 10. The strain of this spring 14 extends across and preferably diagonally across the bearing-line of the overlapped ends of the arms 10 and 11, and hence no matter which way the hammer-arm 11 is swung said spring 14 will tend to restore said arms to the normal position. (Indicated in Fig. 1.) The rock-shaft 12 is provided with a lateral extension or arm 17. 18 may represent the cam-shaft of the engine. 19 is a finger thereon which rotates therewith and is arranged to intermittently and momentarily engage with the lateral extension or arm 17 on said rock-shaft to give a partial rotation to the same to retract the hammer 11. The arrow, Fig. 2, adjacent to the cam-shaft may indicate the direction of rotation thereof when the engine is running in the intended direction.

20 is a collar, part of which projects into a slot 21 in the engine-frame 22, while another portion of said collar 20 projects into a slot 23 in an operating-slide 24, which is employed in the manner hereinafter described to shift the position of the rock-shaft to produce an early or a late spark.

25 is a diagonal slot in the slide 24, into

which a pin 26 may project. The pin 26 is a stationary pin mounted on the frame 22, so that when the side 24 is shifted longitudinally the said pin 26, acting in the slot 25, will necessarily impart a forward or rearward movement to the slide 24, and hence because a part of the collar 20 projects into the slot 23 the said movement will shift the said collar 20 forward or backward in the slot 21. Thus the rock-shaft 12 will be swung on its bearing 13 slightly and the contact-arm 17 will be moved so as to be engaged earlier or later by the operating-finger 19. In this simple manner an early or a late spark may be produced. A thumb-nut 27 may be mounted on the stud 26 by means of which the slide 24 may be set in any desired position.

28 is an adjusting-screw which may be carried by one end of the plug 2. The inner end of this screw may bear against one of the studs 3, so that when the nuts 4 4 are loosened the said plug may be rotated readily and accurately to effect the desired adjustment and position of the electrodes and incidentally the position of the anvil-arm 10 relatively to the position of the hammer-arm 11 when the latter is retracted—for example, to the position indicated in Fig. 4. A nut 29 may be mounted on the screw 28 to set it in the desired position. To cause the spring 14 to stand at the proper angle, so as to produce the diagonal strain across the overlapped bearing ends of the arms 10 and 11, I have provided an arm 161 on one of said parts—for example, 10. Obviously this is merely one convenient arrangement.

121 is a collar which may be adjustably mounted on the rock-shaft 12 to overcome any lifting tendency of the operating-finger 19 when it engages the arm 17 on said rock-shaft.

The operation of the sparking mechanism from the foregoing description will be readily understood. The rotation of the part 18 carries the finger 19 in a circular path. The finger 17 projects into this path and is engaged intermittently and momentarily by the finger 19. This engagement rocks the shaft 12 and retracts the hammer-arm 11 to the position indicated in Fig. 4. The first part of this movement removes the said hammer-arms from the position indicated in Fig. 1, whereupon the arm 10 follows until the contact-points engage, checking the further movement of said arm. Now, in order to get an effective blow and a quick arc the hammer-arm is retracted still further, so as to become free from the end of the anvil-arm. (See Fig. 4.) This further movement puts the spring 14 under still more tension, so that when the finger 19 frees the arm 17 said spring by its retractive action will quickly draw the hammer-arm back to cause it to impart a quick sharp blow to the anvil-arm, rupturing the circuit instantaneously and producing a large and effective spark. The spring 14 then causes the arms 10 11 to resume their normal positions (shown in Fig. 1) until the finger 19 shall again engage the arm 17. It will be observed that but one spring is employed to produce all of these functions. For example, it first holds the operative members in such a position that the contact-points are held apart and the arm 17 in the proper position to be engaged by the finger 19. It next draws the contact-points into engagement when the hammer is retracted, and it finally stores the necessary force in the hammer-arm to rupture the circuit and produce the spark. The oscillating bearing 13 is located so near the upper end of the rock-shaft 12 that the movement at the lower end of the rock-shaft necessary to produce a substantial change in the timing of the spark does not disturb the position of the hammer-arm 11 relatively to the anvil-arm 10. It is obvious that this invention is applicable to any form of gas-engine. The arrangement herein shown indicates that the part 18 revolves clockwise. It is obvious to any mechanic that the parts could be reversed so that the travel could be in the opposite direction. Even assuming that with the arrangement illustrated the part 18 should be revolved in a direction opposite to that indicated by the arrow it will not injure the igniter in any way, but will simply throw the hammer-arm 11 in the opposite direction from that indicated. This, however, would not result in any harm, for although the arc would not occur, nevertheless the spring 14 would restore the parts to their normal position.

The contact members are only conventionally shown. Obviously the usual special points might be added thereto. Should the contact-points wear down so as to vary the adjustment of the parts and allow of too little separation of said arms at the back position, it is merely necessary to rotate the block 2 to a sufficient extent to bring the stationary contact member nearer to the movable member, which movement also shifts the angular position of the stem 8 and anvil-arm 10, so that the hammer-arm 11 will upon the limit of its retractive movement become freed or spaced apart from the end of the anvil-arm a sufficient distance to insure the sharp quick blow essential to the instantaneous rupturing of the circuit.

What I claim is—

1. In a sparking mechanism for gas-engines, two contact members, an oscillatory stem eccentrically supporting one of said members, an anvil-arm extending laterally of said stem, a rock-shaft, a hammer-arm extending laterally thereof, the sides of said arms taking a flat bearing against each other toward their ends under normal conditions, a

spring connected to said stem and said shaft and exerting a strain across said bearing, and means to rock said shaft and quickly release the same.

2. In a sparking mechanism for gas-engines, two contact members, an oscillatory stem eccentrically supporting one of said members, an anvil-arm extending laterally of said stem, a rock-shaft, a hammer-arm extending laterally thereof, the sides of said arms taking a flat bearing against each other toward their ends under normal conditions, a spring connected to said stem and said shaft and exerting a strain across said bearing, and means to rock said shaft to draw the contacts together, to separate said arms slightly and then release said shaft to permit the hammer-arm to strike said anvil-arm a short quick blow.

3. In a sparking mechanism for gas-engines, two contact members, an oscillatory stem eccentrically supporting one of said members, an anvil-arm extending laterally of said stem, a rock-shaft, a hammer-arm extending laterally thereof, the sides of said arms taking a flat bearing against each other toward their ends under normal conditions, a spring connected to said stem and said shaft and exerting a strain across said bearing, and means to rock said shaft and quickly release the same, said means comprising a finger driven by the engine and having a circular path, and a lateral extension from said rock-shaft located in the path of movement of said finger.

4. In a sparking mechanism for gas-engines, two contact members, an oscillatory stem eccentrically supporting one of said members, an anvil-arm extending laterally of said stem, a rock-shaft, a hammer-arm extending laterally thereof, the sides of said arms taking a flat bearing against each other toward their ends under normal conditions, a spring connected to said stem and said shaft and exerting a strain across said bearing, and means to rock said shaft and quickly release the same, said means comprising a lateral extension on said shaft and a finger moved by a part of said engine and arranged to intermittently engage said extension and rock said shaft.

5. In a sparking mechanism for gas-engines, two contact members, an operating means therefor comprising an oscillating rock-shaft, a hammer carried thereby, a lateral extension from another part of said shaft, a finger carried and driven by a part of said engine and arranged to intermittently engage said extension and rock said shaft, and means to swing said rock-shaft and shift the position of said extension relatively to the angular position of said finger to vary the moment of operation.

6. In a sparking mechanism for gas-engines, two contact members, an operating means therefor comprising a rock-shaft, a hammer carried thereby, a lateral extension from another part of said shaft, a finger carried and driven by a part of said engine and arranged to intermittently engage said extension and rock said shaft, and means to cause said finger to rock said shaft sooner or later relatively to the angular position of said finger.

7. In a sparking mechanism for gas-engines, two contacts, a pivotally-mounted anvil-arm, a hammer-arm pivotally mounted independently thereof one end of said arm overlapping one end of the other arm, a flexible connection between said arms arranged to draw the overlapped portions of said arms against each other and to a neutral position, operating means to intermittently and momentarily rock the hammer-arm, while the means for drawing said arms against each other causes the anvil-arm to bring said contacts together, and quickly returns the hammer-arm to the normal position breaking said connection when said operating means releases its hold.

8. In a sparking mechanism for gas-engines, two contacts, a pivotally-mounted anvil-arm, a hammer-arm pivotally mounted independently thereof one end of one arm overlapping one end of the other arm, a flexible connection between said arms arranged to draw the overlapped portions of said arms against each other and to a neutral position, and means to momentarily and intermittently rock said hammer to and fro to bring said contacts together and quickly break said connection.

9. In a sparking mechanism for gas-engines, two contact members, a swinging anvil-arm carried by one of said members, a swinging hammer-arm, the ends of said arms overlapping and bearing upon each other, a spring connected to both of said arms and exerting a strain diagonally across the plane of the said bearing of said arms, means to retract said hammer momentarily, said spring being arranged to drag the contact members into engagement and to return said hammer-arm to its normal position to separate said contacts when said hammer-arm is free.

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