No. 745,474. PATENTED DEC. 1, 1903.

C. L. BARKER.

SPARKING DEVICE.

APPLICATION FILED JUNE 11, 1903.

NO MODEL. 2 SHEETS—SHEET 1.

Fig. 1.

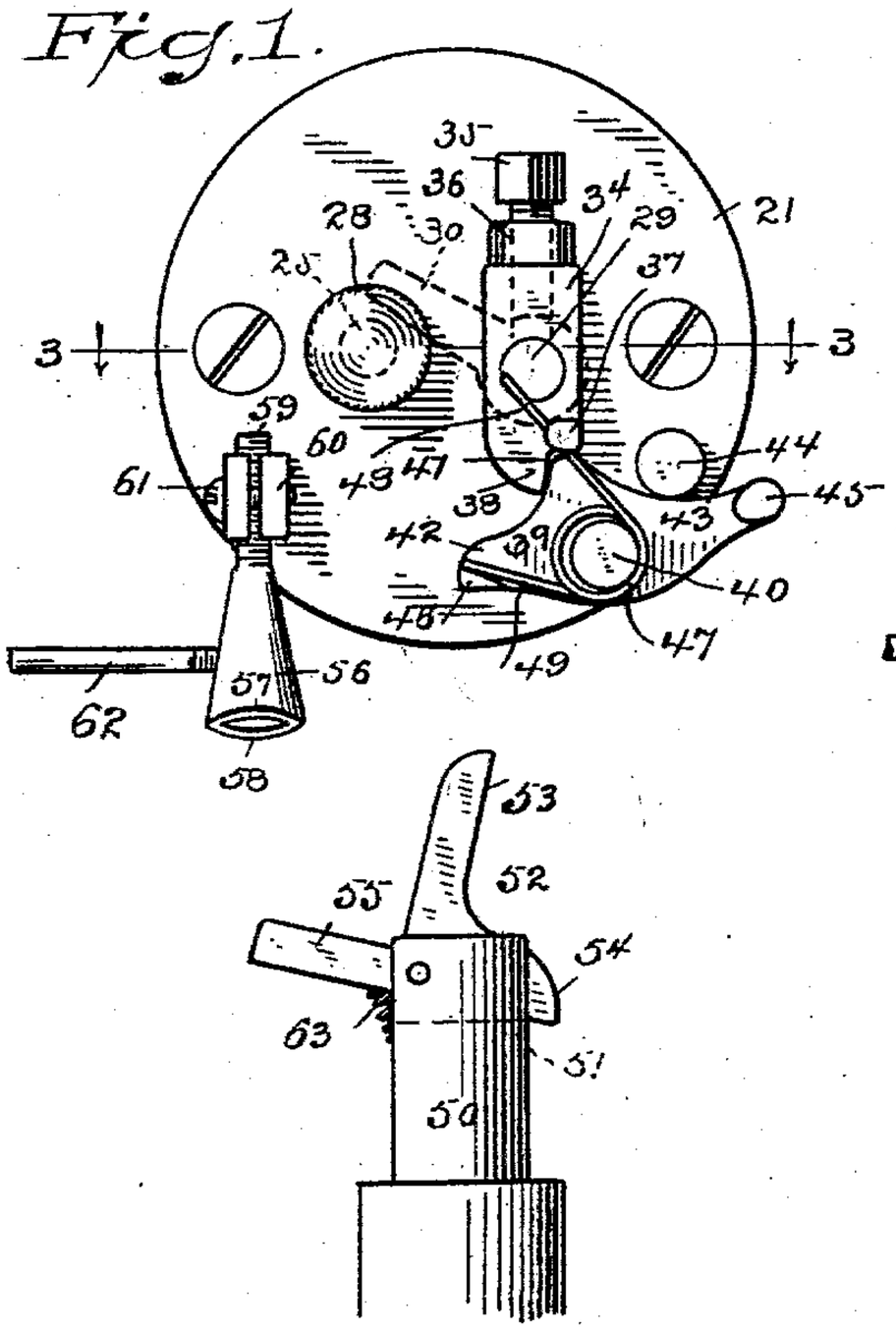


Fig. 2.

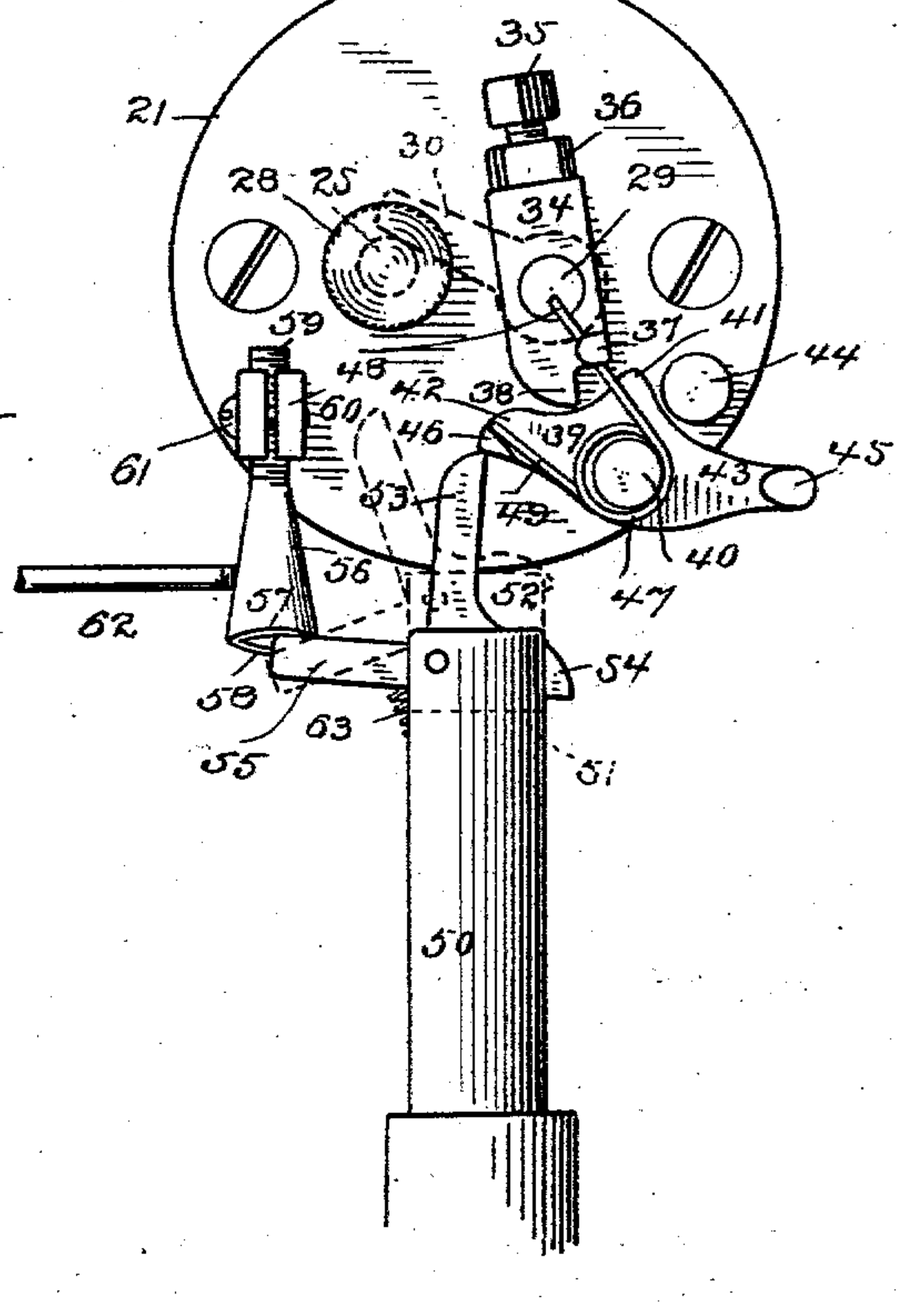


Fig. 3.

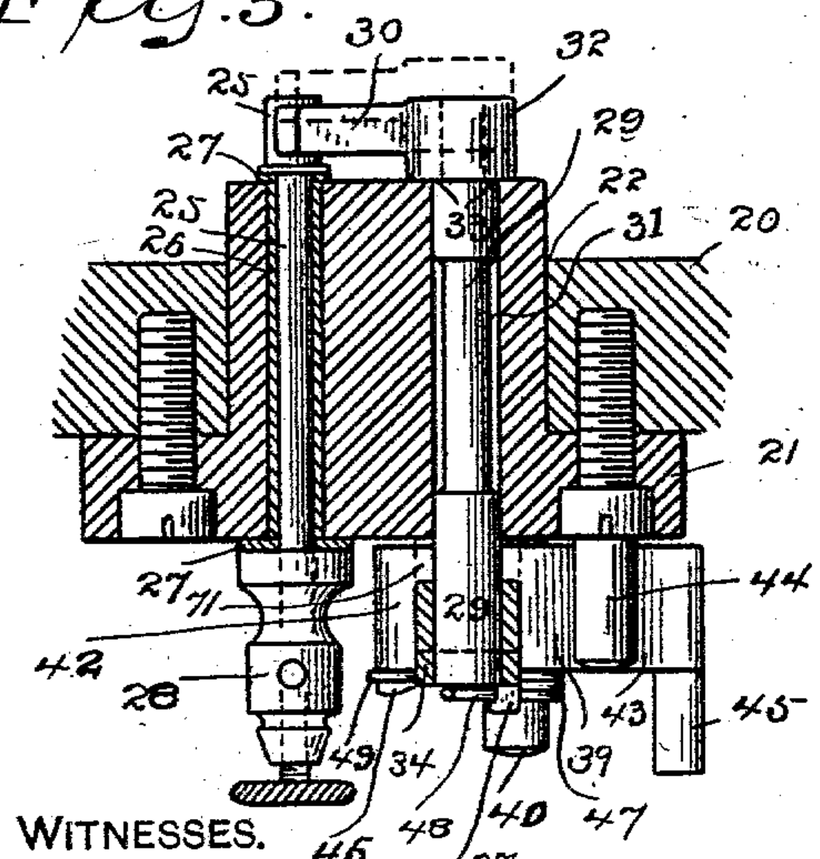
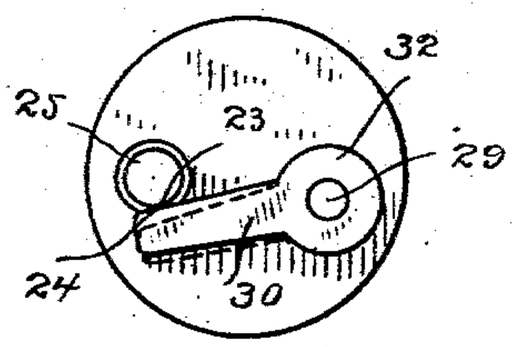


Fig. 4.



WITNESSES.

H. A. Lamb.

S. W. Atherton.

INVENTOR.

Charles L. Barker

By A. M. Wooster

Atty.

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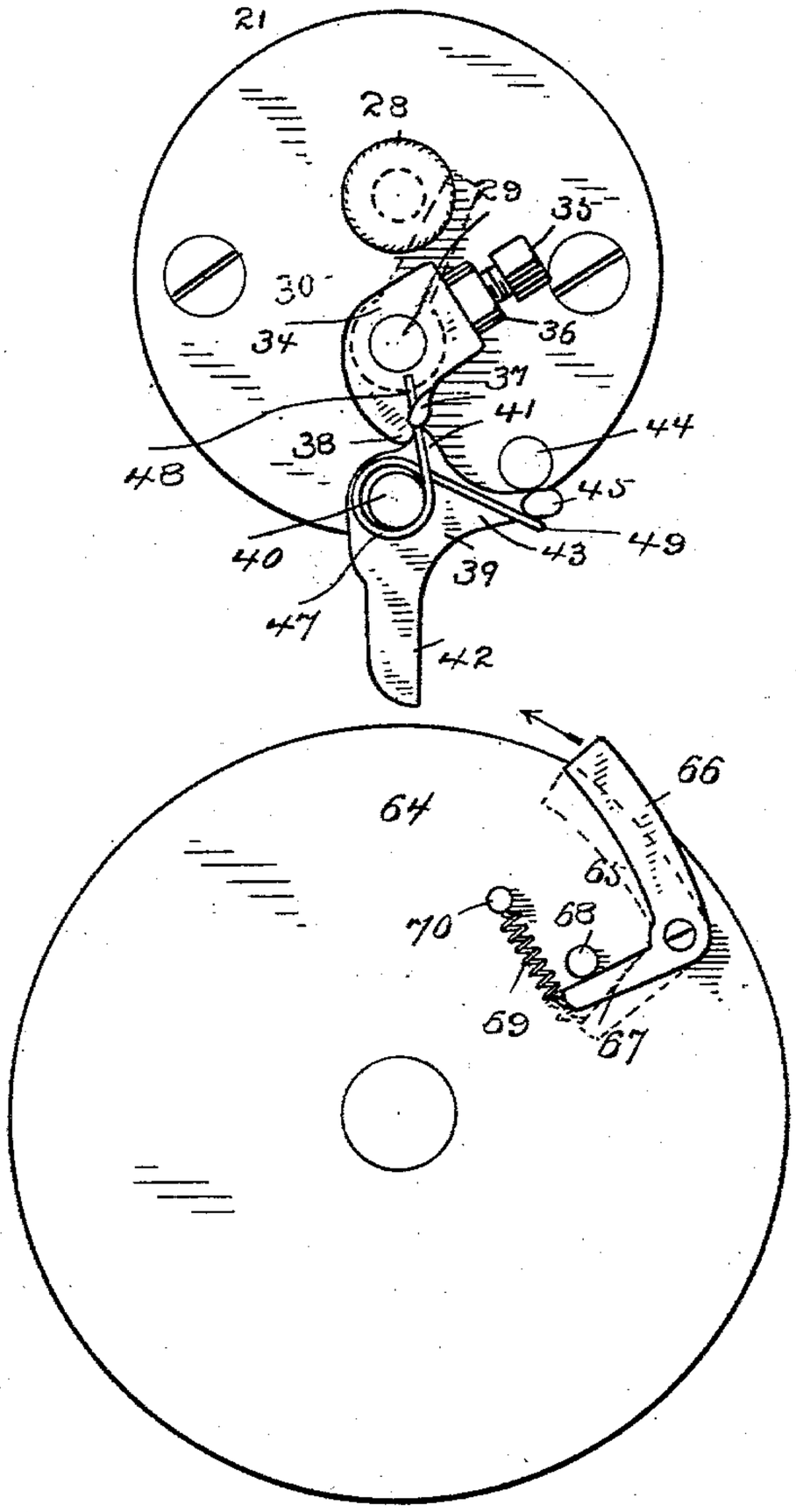
Fig. 5



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UNITED STATES PATENT OFFICE.

CHARLES L. BARKER, OF NORWALK, CONNECTICUT.

SPARKING DEVICE.

SPECIFICATION forming part of Letters Patent No. 745,474, dated December 1, 1903.

Application filed June 11, 1903. Serial No. 161,005. (No model.)

To all whom it may concern:

Be it known that I, CHARLES L. BARKER, a citizen of the United States, residing at Norwalk, county of Fairfield, State of Connecticut, have invented a new and useful Sparking Device, of which the following is a specification.

My invention relates to the class of sparking devices known to the trade as "snap" or "touch" sparkers.

It is one of the objects of this invention to produce a sparking device all parts of which, with the exception of the operating mechanism, shall be carried by a single block and shall all be removable from the engine with the block and at a single operation.

A further object of the invention is to provide a sparking device having but a single spring, which shall be so arranged and combined with the operative parts of the device as to normally hold the sparking-points separated, to throw the sparking-points together when acted upon by the operating device, to press the sparking-points together by compression, to separate the sparking-points when the hammer is released, to cushion the blow of the hammer on the dog, and to retain a hub against a ground seat, thereby preventing leakage of gas from the explosion-chamber.

With these and other objects in view the invention consists in certain constructions and in certain parts, improvements, and combinations, which will be hereinafter described and then specifically pointed out in the claims hereunto appended.

In the accompanying drawings, forming part of this specification, in which like characters of reference indicate like parts, Figure 1 is an elevation illustrating my novel sparking device with reciprocating operating mechanism, the parts being in the normal or inoperative position; Fig. 2, a similar view showing the position of the parts an instant before the latch releases the hammer; Fig. 3, a section on the line 3 3 in Fig. 1 looking toward the bottom of the sheet; Fig. 4, an elevation from a point of view opposite to that in Figs. 1 and 2, the position of the movable sparking-point in full lines corresponding with Fig. 2 and the dotted position of the movable sparking-point corresponding with Fig. 1; and Fig. 5 is an elevation illustrating a form in which the operation is precisely the same; but the shape of the hammer and dog are slightly changed to adapt them for use in connection with either rotary or oscillatory operating mechanism.

20 denotes a portion of the wall of the explosion-chamber of an engine, in connection with which the sparking device may be used, and 21 a block which carries the sparking device and which extends through and is tightly seated in an opening 22 in the wall, the block being rigidly but detachably secured in place by screws or in any preferred manner.

23 and 24 denote, respectively, the fixed and movable sparking-points. Sparking-point 23 is at the inner end of a rod 25, which extends through the block and is insulated therefrom by means of an insulating-sleeve 26 and insulating-washers 27 or in any preferred manner. Upon the outer end of rod 25 is a binding-post 28, to which one of the circuit-wires (not shown) is attached, the other circuit-wire (not shown) being connected in any convenient manner to block 21. Sparking-point 24 is at the end of a lever 30, carried by an oscillatory shaft 29, which extends through the block and is adapted to be moved longitudinally therein for the purpose of cleaning the contact-points by friction, as will be more fully explained. The central portion of shaft 29 is shown as reduced in diameter, as at 31, in order to lessen the bearing-surface upon the block. In order to prevent leakage of gas through the opening in the block for shaft 29, I grind the inner end of the hub 32 of lever 30 and the corresponding surface on the inner face of the block, as at 33, making, in fact, a ground joint, as the hub is retained closely in engagement with the surface of the block by means of the spring presently to be described. At the outer end of shaft 29 and rigidly secured thereto is a dog 34. I have shown the dog as secured to the shaft by means of a set-screw 35 and a set-nut 36. The dog is provided with an undercut lug 37 for engagement by one arm of the spring and with a projection 38 for engagement by a corresponding projection on a part 39, which for convenience I term a "hammer." This hammer is adapted to oscillate on a pin 40, which extends outward from the block at one side of the axis of the shaft 29 and its dog. The

hammer is provided with a projection 41, which is adapted to engage projection 38 on the dog with a projection 42, which is adapted to be engaged by a part which I shall term for convenience the "latch" of the operating mechanism, presently to be described, and with a projection 43, which is adapted to engage a stop 44, which also extends outward from the block to limit the oscillation of the hammer, said projection 43 being shown as provided with a finger-piece 45 for convenience in operating the hammer by hand. In the form illustrated in Figs. 1, 2, and 3 the hammer is additionally provided with a lug 46, which is engaged by the other arm of the spring. In the form illustrated in Fig. 5 lug 46 is dispensed with and the arm of the spring engages finger-piece 45.

47 denotes the spring already referred to, which is coiled loosely around pin 40, on which the hammer oscillates, and is provided with an arm 48 to engage undercut lug 37 on the dog and with an arm 49 to engage lug 46 or in the form illustrated in Fig. 5 to engage finger-piece 45 on the hammer. The operation of this spring is manifold, as will presently be fully explained.

As already stated, the special form of operating device used is not of the essence of the invention. In Figs. 1 and 2 I have illustrated the use of my novel sparking device in connection with an operating device, consisting of a reciprocating plunger 50, having at its forward end a slot 51, in which is pivoted a latch 52, said latch in this form being provided with an arm 53, which is adapted to engage projection 42 on the hammer, with an arm 54, adapted to engage the rear wall of slot 51, which serves as a stop to limit the backward movement of the latch, and with an arm 55, which is adapted to engage an adjustable regulating-cam 56, whereby the disengagement of the hammer from the latch may be hastened or delayed, thereby producing a quicker or a slower spark, as may be required. It will of course be obvious that the special shape of the regulating-cam is comparatively unimportant. It is simply essential that a low point and a high point be provided for engagement by arm 55. In the present instance I have shown a cam having a low point 57, a high point 58, and a threaded shank 59 engaging a split hub 60, which extends upward from the block. A cross-screw 61 above the shank causes the sides of the hub to clamp the shank tightly and lock the cam in any position in which it may be placed. The cam is shown as provided with an operating-arm 62 for convenience in making the adjustment.

63 denotes a spring which acts to retain the latch in operative position, as in Fig. 1, in which arm 54 is shown as thrown backward against the rear wall of the slot. When the plunger is moved forward, arm 53 on the latch engages projection 42 on the hammer and swings the hammer around from the position shown in Fig. 1 toward the position shown in Fig. 2, this movement continuing until arm 55 upon the latch engages the regulating-cam, which causes the latch to tilt backward against the power of spring 63 and causes arm 53 to slip past the end of projection 42 on the hammer, as indicated by dotted lines in Fig. 2, thereby releasing the hammer with a snap and causing the hammer, dog, and lever 30, carrying the movable sparking-point, to return to their normal position, as in Fig. 1 and in dotted lines in Fig. 4. In Fig. 2 arm 55 is shown as engaging the regulating-cam at a point intermediate the high point and the low point. To produce a quicker spark, the regulating-cam would be turned so as to place a higher portion thereof in position to be engaged by arm 55, thereby hastening the release of the hammer by the latch. To produce a slower spark—that is, to delay the sparking action—the cam would be turned so as to place a lower portion thereof in position to be engaged by arm 55, thereby delaying the tripping of the latch and the release of the hammer.

The several actions of the spring are as follows: In the normal position of the parts, as in Fig. 1, both arms of spring 47 are acting upon the dog, but in opposite directions. Arm 48 is directly in engagement with undercut lug 37 on the dog, and its normal action is to swing projection 38 of the dog toward the right, as seen in Fig. 1. Arm 49 of the spring bears against lug 46 on the hammer and throws projection 41 of the hammer against projection 38 of the dog. As the point of engagement of projection 41 with the dog is at a greater distance from the center of oscillation of the dog than the point of engagement with said dog of arm 48 of the spring, it necessarily follows on account of the greater leverage and the fact that the axis of the dog is at one side of or out of alinement with the axis of the hammer that the dog will be controlled by arm 49 of the spring through the hammer and that projection 38 of the dog will be swung toward the left, as seen in Fig. 1, by the engagement therewith of projection 41 upon the hammer until the oscillation of the hammer is stopped by engagement of projection 43 with stop 44, which will leave the sparking-points at their normal or separated position. What may be termed the "first" action of the spring is therefore to hold the sparking-points at their normal or separated position. When, however, the hammer is oscillated by the engagement therewith of the operating mechanism—for example, latch 52 in Figs. 1 and 2—the action of arm 49 of the spring upon the dog is overcome, the coil is tightened, and the spring acts, through arm 48, upon the dog to swing it in the opposite direction and throw the movable sparking-point into contact with the fixed sparking-point, as indicated by dotted lines in Fig. 2 and as shown in full lines in Fig. 4. The second action of the spring is therefore to throw the sparking-points together when the oper-

ating mechanism acts. The third action of the spring is a pressing of the movable sparking-point against the fixed sparking-point, which is produced by the compression of the spring as the latch swings the hammer from the position shown in Fig. 1 toward the position shown in Fig. 2, which compression continues and grows stronger until the hammer is released by the tripping of the latch. The fourth action of the spring is to separate the sparking-points upon the release of the hammer. This is effected in the same manner as the action first described. The compression of the spring and the pressure of the movable contact-point against the fixed contact-point ceases the instant arm 53 of the latch through the engagement of arm 55 with the regulating-cam and the continued forward movement of the plunger is caused to ride off from projection 42 of the hammer. The instant the hammer is released the pressure of arm 48 of the spring on the dog is overcome and the spring acts, through arm 49, to swing the hammer backward—that is, in the opposite direction from that in which it has been swung by the operating mechanism. The result is that projection 41 of the hammer is thrown against projection 38 upon the dog. This blow of the hammer upon the dog separates the contact-points instantly, which separation causes the production of a spark between them. The fifth action of the spring is to cushion the blow of the hammer on the dog. This action will be obvious when it is remembered that at the instant the blow of the hammer upon the dog takes place arm 48 of the spring is holding the movable contact-point against the fixed contact-point, and while this action is overcome by the action of arm 49 of the spring and the delivery of the blow arm 48 must still act to cushion the blow. The sixth action of the spring is a lifting action upon the dog through the engagement of arm 48 with undercut lug 37, the effect being to lift the dog, so as to draw the shaft 29 and lever 30 in the direction of the length of the shaft and press the ground surface of hub 32 of the lever against the corresponding ground surface upon the inner face of the block, as at 33, thus making a tight joint and preventing the leakage of gas from the engine around shaft 29.

It is an important feature of my invention that a simple and convenient way is provided for cleaning the contact-points by friction. It will be noted (see Fig. 3) that the normal position of the dog is at sufficient distance above the outer surface of the block to leave a clear space between them, which I have indicated by 71. To clean the contacts, the operator simply takes hold of the dog and moves it up and down, moving shaft 29 longitudinally and rubbing the surface of the movable contact over the surface of the fixed contact, the range of movement of the movable contact in this cleaning operation being indicated by dotted lines in Fig. 3. As soon as the cleaning movement is completed arm 48 of the spring will return hub 32 to the position shown in Fig. 3, which again makes a perfectly tight joint around the shaft.

In the form illustrated in Fig. 5 rotary or oscillatory operating mechanism is substituted in lieu of the reciprocatory operating mechanism illustrated in Figs. 1 and 2. 64 denotes a disk which may either rotate or oscillate, and 65 a latch having the shape of a bell-crank lever, which is pivoted to the disk. The shape of both hammer and dog in this form is modified, but without change of principle, to correspond with a rotating or oscillating latch instead of a reciprocating latch. The latch illustrated is provided with an arm 66, which is adapted to engage projection 42 on the hammer, and with an arm 67, which is normally held in contact with a stop 68 by means of a spring 69, one end of which is connected to the arm of the latch and the other to a pin 70, extending from the disk.

The operation will be obvious from the drawings. The movement of the disk is in the direction of the arrow, the end of arm 66 of the latch engaging projection 42 of the hammer and swinging said projection toward the left from the position shown in Fig. 5, the action being precisely the same as in the other form. If the disk rotates, it is obviously not necessary that the latch should yield, it being simply required that the latch should be so shaped as to engage the hammer, oscillate it sufficiently for the purpose required, and then release it, as in the other form.

If the movement of the disk is oscillatory, the latch must necessarily yield in order to clear projection 42 of the hammer on the return movement. In the form illustrated the action of operating the latch is precisely the same whether the disk rotates or oscillates. When the disk oscillates, it moves in the direction of the arrow until after the latch has been operated and then moves backward in the opposite direction. In the backward movement the latch engages the back of projection 42 on the hammer and is oscillated against the power of spring 69 until the latch clears the hammer, (the retracted position of the latch being indicated by dotted lines,) when the spring will instantly return the latch to its normal or operative position, as in full lines.

Having thus described my invention, I claim—

1. A sparking device comprising a fixed sparking-point, an oscillatory shaft carrying at one end a lever whose outer end forms a movable sparking-point, and at the other end a dog, an oscillatory hammer adapted to engage the dog, the axes of the dog and hammer being out of alinement, a spring bearing against the dog and against the hammer, the point of engagement of the hammer with the dog being at a greater distance from the center of the shaft than the point of engagement of the spring with the dog, and operating mechanism whereby the hammer is oscillated

against the power of the spring and then released with a snap, the spring acting normally to hold the contact-points separated owing to the greater leverage exerted by the spring on the dog through the hammer, then when said leverage is overcome by oscillation of the hammer acting to throw the movable contact-point into engagement with the fixed contact-point and pressing the movable contact-point against the fixed contact-point when the spring is compressed, then when the hammer is released separating the contact-points and cushioning the blow of the hammer upon the dog.

2. In a device of the character described the combination with an oscillatory shaft and a dog carried thereby, of an oscillatory hammer adapted to engage the dog, the axes of the dog and hammer being out of alinement, a spring bearing against the dog and against the hammer, the point of engagement of the hammer with the dog being at a greater distance from the center of the shaft than the point of engagement of the spring with the dog so that the shaft will be controlled by the hammer, and means for oscillating the hammer against the power of the spring and then releasing it with a snap so that when the leverage of the hammer on the dog is overcome, the spring will oscillate the shaft in the opposite direction, and when the hammer is released the parts will return to their normal position, substantially as and for the purpose set forth.

3. In a device of the character described the combination with an oscillatory dog and an oscillatory hammer adapted to engage the dog, the axes of the dog and hammer being out of alinement, of a spring bearing against the dog and against the hammer, the point of engagement of the hammer with the dog being at a greater distance from the center of oscillation of the dog than the point of engagement of the spring with the dog so that the dog will normally be swung in the direction the hammer is swung by the spring, and means for oscillating the hammer against the power of the spring and then releasing it with a snap, whereby the leverage of the hammer on the dog is overcome and the dog is swung in the opposite direction by the spring until the hammer is released, when the leverage of the hammer on the dog will overcome the power exerted on the dog by the spring and will return the dog to its normal position.

4. In a device of the character described the combination with a fixed sparking-point, an oscillatory shaft carrying at one end a lever whose outer end forms a movable sparking-point, and at the other end a dog, of an oscillatory hammer adapted to engage the dog, the axes of the dog and hammer being out of alinement, a spring bearing against the dog and against the hammer, the point of engagement of the hammer with the dog being at a greater distance from the center of the shaft than the point of engagement of the spring with the dog and operating mechanism whereby the hammer is oscillated against the power of the spring and then released with a snap, substantially as and for the purpose set forth.

5. The combination with a block having on its inner face a fixed contact-point and a ground-seat, an oscillatory longitudinally-movable shaft passing through the block at the ground-seat, a lever having a hub ground on its inner face to correspond with the seat whereby it is attached to the shaft and leakage at the shaft is prevented, the outer end of said lever being adapted to engage the fixed contact-point and forming a movable contact-point and a dog at the other end of said shaft, of an oscillatory hammer adapted to engage the dog, the axes of the dog and hammer being out of alinement, a spring bearing against the dog and against the hammer, the point of engagement of the hammer with the dog being at a greater distance from the center of the shaft than the point of engagement of the spring with the dog and the action of the spring on the dog being to lift the dog, shaft and lever and retain the hub of the lever in contact with the seat, and operating mechanism whereby the hammer is oscillated against the power of the spring and then released with a snap.

6. In a device of the character described the combination with a fixed sparking-point, an oscillatory longitudinally-movable shaft carrying at one end a lever whose outer end forms a movable sparking-point, the longitudinal movement of said shaft permitting said contact-points to be cleaned by rubbing against each other and a dog at the other end of said shaft, of an oscillatory hammer adapted to engage the dog, the axes of the dog and hammer being out of alinement, a spring bearing against the dog and against the hammer, the point of engagement of the hammer with the dog being at a greater distance from the center of the shaft than the point of engagement of the spring with the dog, and operating mechanism whereby the hammer is oscillated against the power of the spring and then released with a snap, substantially as shown, for the purpose specified.

7. In a device of the character described the combination with an oscillatory dog and an oscillatory hammer adapted to engage the dog, the axes of the dog and hammer being out of alinement, of a spring bearing against the dog and against the hammer, the point of engagement of the hammer with the dog being at a greater distance from the center of oscillation of the dog than the point of engagement of the spring with the dog and a reciprocating plunger carrying a spring-controlled latch which is adapted to engage the hammer, tilt the latter and then release it with a snap, substantially as shown, for the purpose specified.

8. In a device of the character described the combination with an oscillatory dog and an oscillatory hammer adapted to engage the dog, the axes of the dog and hammer being out of alinement, of a spring bearing against the dog

and against the hammer, the point of engagement of the hammer with the dog being at a greater distance from the center of oscillation of the dog than the point of engagement of the spring with the dog, a reciprocating plunger, a spring-controlled latch carried thereby which is adapted to engage a hammer and tilt the latter, and a regulating-cam which is adapted to be engaged by the latch to hasten or retard the release of the hammer and thereby produce a quick or slow spark.

9. In a device of the character described the combination with an oscillatory dog and an oscillatory hammer adapted to engage the dog, the axes of the dog and hammer being out of alinement, of a spring bearing against the dog and against the hammer, the point of engagement of the hammer with the dog being at a greater distance from the center of oscillation of the dog than the point of engagement of the spring with the dog so that the dog will be normally controlled by the hammer, a stop for limiting the operation of the hammer in that direction and operating mechanism for oscillating the hammer in the opposite direction, whereby the spring is compressed, for the purpose set forth, and then the hammer is released with a snap.

10. In a device of the character described the combination with an oscillatory dog and a pivoted oscillatory hammer adapted to engage the dog, the axes of the dog and hammer being out of alinement, of a two-armed coil-spring carried by the hammer-pivot, one arm of said spring bearing against the dog and the other arm against the hammer, the point of engagement of the hammer with the dog being at a greater distance from the center of oscillation of the dog than the point of direct engagement of the spring with the dog, for the purpose set forth, and means for oscillating the hammer against the power of the spring and then releasing it with a snap.

11. The combination with a fixed sparking-point, an oscillatory shaft carrying at one end a lever whose outer end forms a movable sparking-point and at the other end a dog, an oscillatory hammer adapted to engage the dog, the axes of the dog and hammer being out of alinement, and a spring bearing against the dog and against the hammer, substantially as described and shown, of a block by which all of said parts are carried and with which they are removable.

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

CHARLES L. BARKER.

Witnesses:
C. P. TAYLOR,
W. F. KIESWETTER.