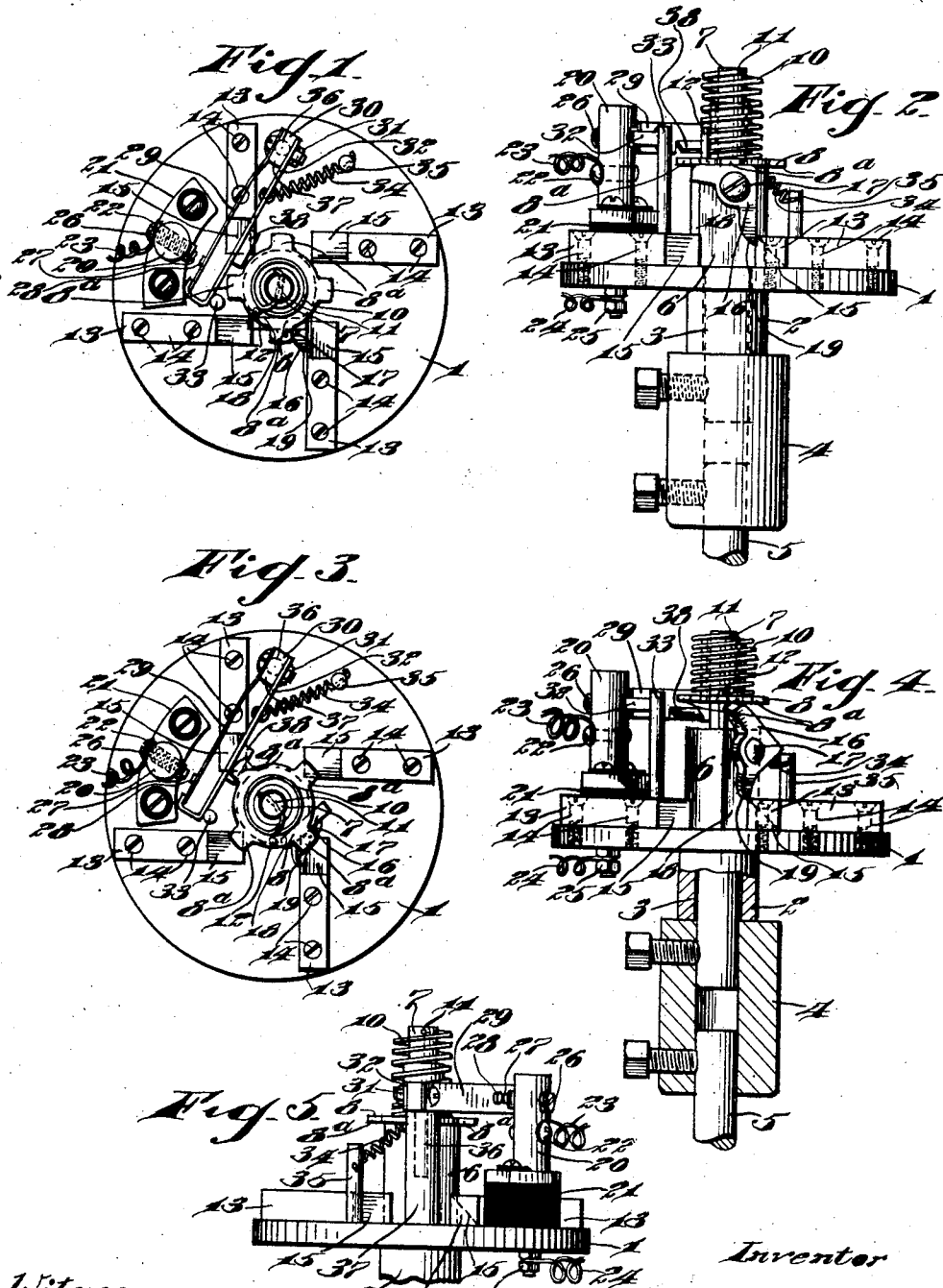
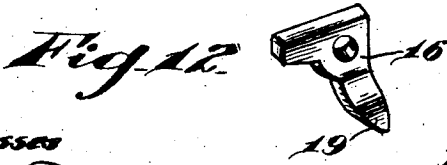
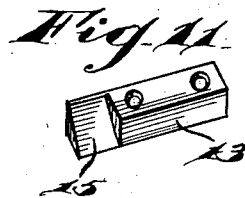
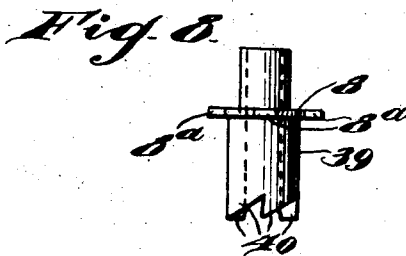
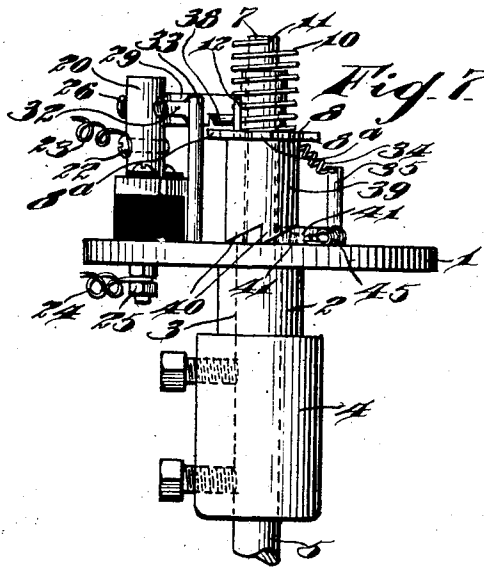
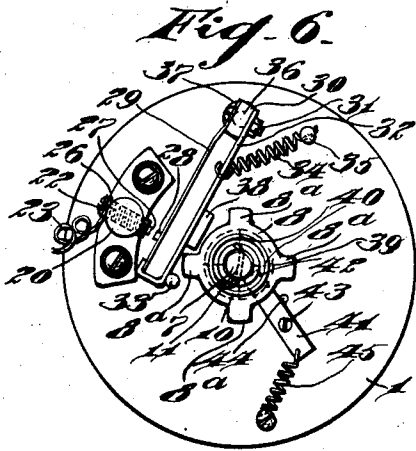




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UNITED STATES PATENT OFFICE.

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CURRENT-CONTROLLING MECHANISM FOR INTERNAL-COMBUSTION ENGINES.

966,768.

Specification of Letters Patent.

Patented Aug. 9, 1910.

Application filed November 8, 1909. Serial No. 526,752.

To all whom it may concern:

Be it known that I, LEWIS T. RHOADES, a citizen of the United States, residing at Mont Clare, in the county of Montgomery and State of Pennsylvania, have invented certain new and useful Improvements in Current-Controlling Mechanism for Internal-Combustion Engines, of which the following is a specification:

My invention relates to the current controlling mechanism for internal combustion engines, the object of the invention being to provide improved mechanism which will insure a uniform spark, regardless of the speed of the engine and which will prevent any spark when the engine is running backward.

A further object is to provide an improved continuously revolving member, with means for intermittently imparting to said rotary member, a reciprocating movement whereby electric contacts will be moved together to momentarily close the electric circuit, and when separated, will cause a spark in the engine cylinder, the duration of said closed circuit being uniform and of just the proper length of time to insure a spark when broken, hence preventing any waste of the current, and economizing the electricity used in sparking.

With these and other objects in view the invention consists in certain novel features of construction and combinations and arrangement of parts, as will be more fully hereinafter described and pointed out in the claims.

In the accompanying drawings: Figure 1 is a plan view illustrating my improvements. Fig. 2 is a view in side elevation of Fig. 1. Fig. 3 is a plan view similar to Fig. 1, but showing the parts in different relative relation to each other. Fig. 4 is a view in elevation of Fig. 3. Fig. 5 is a view in elevation at right angles to Fig. 2. Fig. 6 is a plan view of a modified form of my invention. Fig. 7 is a view in side elevation of Fig. 6. Fig. 8 is a detail view in elevation of the rotary reciprocating member, shown in Figs. 6 and 7. Figs. 9, 10, 11, and 12, are views of other details of construction.

1 represents a supporting plate or table, having a sleeve 2, in which a shaft 3 is mounted to turn, and at one end below sleeve 2, is connected by a coupling 4 with

the ordinary time shaft 5, so that the shaft 3 is turned with the time shaft 5.

The shaft 3 above support 1 is enlarged as shown at 6, providing an annular shoulder resting on support 1 and preventing any longitudinal movement of shaft 3. This shaft 3, at its extreme upper end, is made in the form of a restricted pin 7, and on this pin 7, my improved rotary reciprocating member 8 is mounted, and comprises a disk, 65 having an annular series of radial projections or lugs 8^a, as many of the said projections or lugs being provided as there are cylinders to be fired. This member 8 is normally held against the upper end of the enlarged portion 6 of shaft 3, by means of a coiled spring 10, located around pin 7, bearing downward on member 8, and having its upper end projecting through an opening 11 in pin 7. To compel the member 8 to turn with shaft 3, a stud 12 is secured to the upper end of the enlarged portion 6 and projects through an opening in member 8 so as to compel the parts to turn together, yet permitting member 8 to be moved longitudinally of pin 7, as will hereinafter appear.

On support 1 a series of blocks, 13, are secured by screws 14, as many of said blocks being provided as there are projections or lugs 8^a, and in accordance with the number of cylinders to be fired. These blocks are arranged with their inner ends located an equal distance apart, said inner ends beveled at one side, as shown at 15.

16 represents my improved tripping lever or dog, which is of general bell crank form, pivotally secured upon a screw 17, the latter secured to a flat face 18 on one side of the enlarged portion 6 of shaft 3, said screw being located adjacent the angle of the bell crank lever 16. One member of this bell crank lever normally lies parallel with and just below the member 8, while the other member 19 of lever 16 is bent outward slightly, at its lower end, forming a tongue which is adapted to engage the blocks 13 as the shaft turns, and it will be noted that as the shaft turns in the proper direction, this tongue portion 19 will engage the straight walls of the blocks 13, so as to swing the lever and momentarily elevate member 8 as shown in Fig. 4. When, however, the shaft is turned in the reverse direction, the tongue portion 19 will ride the beveled faces

of the blocks, and while it will be moved slightly on its fulcrum, will not impart any appreciable movement to member 8.

20 represents a post, which is secured upon support 1, but insulated therefrom by a block of insulation 21, the said post 20 having a screw 22, to which one of the electric wires 23, of the circuit is secured, while wire 24 is connected to a binding post 25, on support 1 and is preferably grounded, it being understood that in the circuits of the several cylinders sparking coils and other accessories in common use are provided.

In the upper portion of post 20, a contact screw 26 is provided, and is preferably made with a platinum contact 27 on its inner end, which is adapted to be engaged by a similar platinum contact 28 on a flat spring 29. This flat spring 29 is secured to one face of a block 30, while to the opposite face of said block a bar 32 is secured, a bolt 31 being provided, and passed through the spring 29, block 30 and bar 32 to secure all of said parts together. The free end of the bar 32 is bent into hook form, and overlaps the free end of spring 29, limiting the outward movement of said spring but permitting the latter to move backward so as to insure an elastic contact when the parts are moved toward screw 26.

33 represents a pin or post, which is secured to post 1, and against which bar 32 is normally held, by means of a coiled spring 34, connected at one end to bar 32 and at its other end to a pin or post 35, on support 1. This bar, 32, spring 29 and block 30 are pivotally supported, said block preferably having a depending journal 36, located in the recessed upper end of a post 37, and as the spring 34 is positioned at an incline, as shown more clearly in Fig. 5, the liability of disconnection between the block 30 and post 37 is obviated.

On one side of bar 32, adjacent member 8, and normally in a plane above the normal position of member 8, a cam 38 is located, and this cam 38 is properly positioned with relation to blocks 13, so that as the lugs or projections 8^a will, in their reciprocating movement, engage said cam 38, and move bar 32 and spring 29 to momentarily move contacts 27 and 28 together, and hence momentarily close the electric circuit which is promptly broken by spring 34 and this closure and break occurs at each block 13, when lever 16 is tripped by the block.

The operation of the structure set forth in Figs. 1, 2, 3, 4, and 5 is as follows: Assuming that shaft 3 is being turned by the time shaft 5 in the normal direction as the engines are driving forward, member 8 is being continuously revolved during the operation of the engine. When the lever 16 moves to the position shown in Fig. 2, its member 19 will engage the straight wall of a block 13, and

as it engages block 13, the rotary member 8, will be in the position shown in Fig. 1, that is, in a position with its projections or lugs 8^a out of alinement with cam 38, so that as the parts continue to revolve, and member 8 is moved longitudinally of the shaft by the action of lever 18 as it is tripped by a block 13, the cam 38 will not obstruct the reciprocating movement of the rotary member in this direction. However, as this rotary member continues to revolve after the member 8 has been elevated in a higher plane than cam 38, one of the projections or lugs 8^a will be moved to a position above cam 38, as shown in Fig. 3, and when in this position the lever 16 rides over the block 13, and spring 10 immediately forces member 8 longitudinally of the shaft, and such movement moves projections or lug 8^a into contact with cam 38 and forces the bar 32 and spring 29 away from member 8, far enough to move contacts 27 and 28 together, and momentarily close the electric circuit, which, however, is immediately broken, when projection 8^a passes lug 38, by the spring 34 drawing the parts 32 and 29 to their normal position, which return movement is limited by pin 33. A reverse movement of the time shaft does not reciprocate member 8 to any appreciable extent, as the member 19 will ride the beveled faces 15 on blocks 13, and as the screw 17 is adjacent to angle of the bell crank lever 16, there will not be any appreciable movement of the member 8. It will thus be noted that the length of time the electric circuits are closed, depends only upon the time the projections or lugs 8^a are passing the cam 38 in the reciprocating movement of member 8, the speed of such movement being controlled by spring 10, hence the speed of the engine and the revolutions of the timing shaft, have nothing whatever to do with the length of the contact, but only increase the number of contacts in accordance with the speed, hence not only is the spark insured at every block 13, but a uniform spark and a uniform current is insured at every block 13, regardless of the speed of the engine, hence not only insuring the sparking of the cylinders at all speeds but also economizing the electric current used, for the device is so regulated that just sufficient time is permitted for the closing of the current, to allow the ordinary spark coil to cause the spark when the current is broken.

In Figs. 6 and 7 a modification is illustrated, in which the rotary member 8 is fixed to a cylinder 39 and the latter provided at its lower end with a series of ratchet teeth, as many of said teeth being provided as there are cylinders to be fired. In connection with this modification I employ the same construction of parts as in the preferred form, with the exception that but a

single block 41 is necessary, and this block 41 has a beveled inner end 42 located below and in the path of the teeth 40. Block 41 is pivoted between its ends on a pin or screw 5 43, secured in support 1 and is normally held against a stop 44 by means of a coiled spring 45. The operation of this modification is as follows; As the rotary member 8 and cylinder 39 revolve, the ratchet teeth 10 40 will ride up on block 41 and compel the member 8 to reciprocate as it revolves, and operate against cam 38 to close the electric contacts, as above described in connection with the preferred form. A reverse move- 15 ment of the shaft will swing the block 41 on its pivot against the action of spring 45, and will continue to throw it out from beneath the ratchet teeth while the parts move in a reverse direction to that of normal, 20 but when moved in the normal direction spring 45 will return the block to its position below the ratchet teeth.

Various other slight changes might be made in the general form and arrangement 25 to parts described without departing from my invention, and hence I do not restrict myself to the precise details set forth, but consider myself at liberty to make such changes and alterations as fairly fall within the scope of the appended claims. 30

Having thus described my invention what I claim as new and desire to secure by Letters Patent is:

1. In a device of the character described, 35 the combination with electric contacts, of a revolving shaft, an intermittently reciprocating member, keyed to slide upon and turn with the shaft, means for intermittently reciprocating the member, and means moved 40 by the member in its reciprocating movement to move the contacts together.

2. In a device of the character described, the combination with electric contacts, of a revolving shaft, a member keyed to slide 45 upon and turn with the shaft, means for intermittently transmitting a uniform reciprocating movement to said member, and means moved by said reciprocating member during its movement in one direction only, 50 to move said contacts together.

3. In a device of the character described, the combination with electric contacts, and a spring normally holding said contacts apart, of a revolving shaft, a member keyed 55 to slide on the shaft and turn with the shaft, means for intermittently transmitting a uniform rectilinear movement to said member in one direction, other means for transmitting a rectilinear movement to said member 60 in the opposite direction, and means operated by said member when moved in the last mentioned direction to momentarily move the electric contacts together.

4. In a device of the character described, 65 the combination with electric contacts, of a

revolving member, means for intermittently transmitting a uniform rectilinear movement to said member, in one direction, a spring transmitting a uniform rectilinear movement to said member in the opposite 70 direction, and means moved by said member during its movement by the spring, to momentarily move said contacts together.

5. In a device of the character described, the combination with electric contacts, of a 75 revolving member, an annular series of projections or lugs on said member, means for intermittently transmitting a reciprocating movement to said member, and means operated by said projections or lugs, during the 80 reciprocating movement of said member, to momentarily move said electric contacts together.

6. In a device of the character described, the combination with electric contacts, of 85 means normally holding said contacts apart, a revolving shaft, a member keyed to slide upon and turn with the shaft, and means intermittently transmitting a reciprocating movement to said member, and said member 90 adapted, during its reciprocating movement, to momentarily move said contacts together.

7. In a device of the character described, the combination with a support, of a rotary shaft projecting through said support, a 95 member around said shaft and constructed to turn with said shaft, electric contacts, and means for intermittently transmitting a reciprocating movement to said member, to momentarily move said contacts together. 100

8. In a device of the character described, the combination with a support, a rotary shaft projecting through the support, a member constructed to turn with said shaft, a series of blocks on said support, a tripping 105 lever mounted on said shaft and adapted to engage said blocks and at each block, to be moved so as to momentarily transmit a rectilinear movement to said member, a spring engaging said member and moving it 110 rectilinearly in the opposite direction, and means operated by said member during its rectilinear movement by the spring to momentarily move said contacts together.

9. In a device of the character described, 115 the combination with a support, of a rotary shaft projecting through said support, a member constructed to turn with said shaft, electric contacts, a series of blocks secured on said support, a bell crank lever, pivoted 120 on said shaft and having one of its members movable through a path to contact with said blocks, and be moved by said blocks to momentarily transmit a rectilinear movement to said member, a spring returning said lever 125 and member to normal position after passing a block, and means operated by said member, during its movement by the spring, to momentarily close said electric contacts.

10. In a device of the character described, 130

the combination with a support and a shaft projecting through said support, of a series of blocks secured on said support and located at an equal distance apart, a member mounted to turn with said shaft, electric contacts, a bell-crank-lever fulcrumed adjacent its angle on said shaft, below the said member and movable into contact with said blocks, whereby when said shaft turns in one direction, the engagement of the lever with the said blocks will move the member rectilinearly on the shaft, and when turned in the opposite direction, will not move the member an operative distance, a spring on the shaft moving the member in the opposite direction and means operated by said member during its operative reciprocating movement to momentarily move said contacts together, substantially as described.

11. In a device of the character described, the combination with a support of a rotary shaft projecting through the support, a member mounted on said shaft and having an opening therein, a stud on the shaft projecting through said opening and compelling the member to turn with the shaft, a spring normally holding said member in one position, a lever movable with the shaft, means on the support engaged by said lever, to intermittently transmit a reciprocating movement to said member, electric contacts, and means operated by the said member, during its return movement by the spring, to momentarily move the contacts together.

12. In a device of the character described, the combination with a support, of a rotary shaft projecting through the support, a member mounted on said shaft and having an opening therein, a pin on the shaft projecting through said opening and compelling the member to turn with the shaft, a lever movable with the shaft, means on the support engaged by said lever to intermittently transmit a rectilinear movement to said member, a spring engaging said member and moving it rectilinearly in the opposite direction, electric contacts, a spring normally holding said contacts apart, and projections on said member adapted to momentarily move said contacts together, during the rectilinear movement of said member by the spring.

13. In a device of the character described, the combination with a support, and a rotary shaft projecting through said support, of a stationary contact on the support, a movable contact on the support, a spring normally holding said movable contact away from the stationary contact, a member mounted to turn with said shaft, a series of projections on said member, means intermittently transmitting a reciprocating movement to said member, and means operated by said projections, during the reciprocating movement

of the member, to momentarily move the contacts together.

14. In a device of the character described, the combination with a support, and a rotary shaft, of a stationary electric contact on said support, a swinging bar on said support having a hooked end, a flat spring movable with said bar and having its free end normally disposed against the inner face of the hooked end of said bar, and adapted to make contact with the stationary contact when moved away from its normal position a spring normally holding the bar so as to maintain the two contacts separated, a cam on said bar, a member mounted to turn with said shaft, and an annular series of projections or lugs on said member, means for intermittently moving said member rectilinearly during its rotary movement so as to position the projections in line with the cam, and a spring moving said member in the opposite direction and at a uniform speed, whereby the projections will engage the cam and momentarily move the contacts together.

15. In a device of the character described, the combination with a support, a shaft projecting through the support, and electric contacts normally apart, of a series of blocks on said support, a member mounted to turn with said shaft and adapted when reciprocated to momentarily move the contacts together, a bell-crank-lever fulcrumed on said shaft adjacent its angle, and having one member so located that when the lever swings in one direction, said member will move the first mentioned member rectilinearly, and the other member of said lever movable in a path to engage said blocks so that when turning in normal direction the lever will engage the said blocks and move the first mentioned member rectilinearly, but when the shaft turns in the reverse direction, the first mentioned member will not be operatively reciprocated, substantially as described.

16. In a device of the character described, the combination with a support, a rotary shaft projecting through the support, electric contacts normally apart, a member mounted to turn with said shaft, an annular series of devices on said rotary member adapted to momentarily move said contacts together when said member is reciprocated, and means for intermittently transmitting to said member reciprocating movements at each revolution in accordance with the number of said devices.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

LEWIS T. RHOADES.

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