

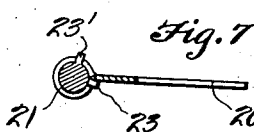
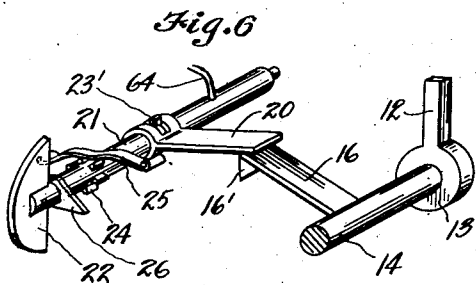
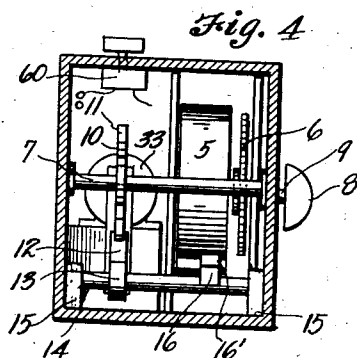
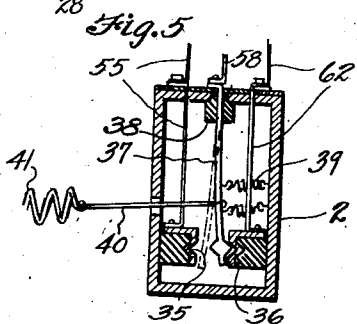
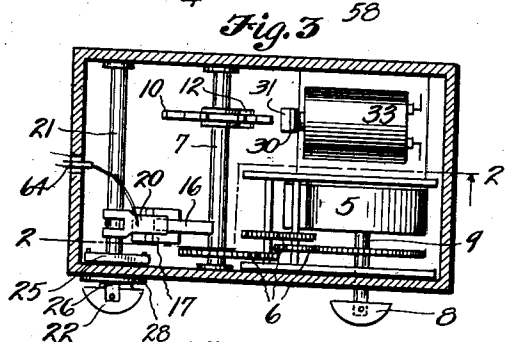
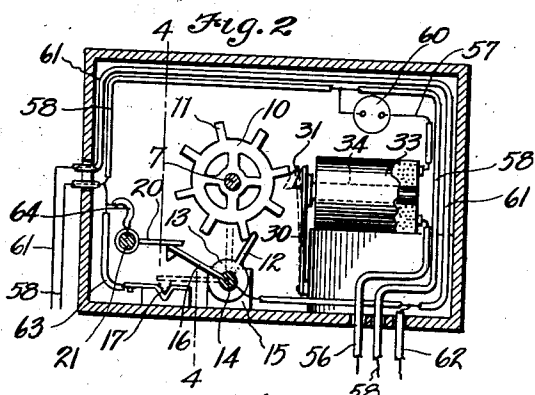
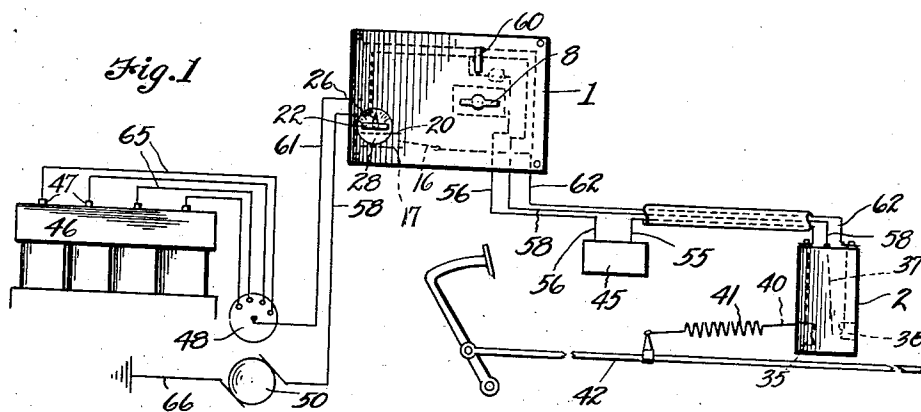
Apr. 10, 1923.

B. G. GERBIG

1,451,157

CIRCUIT BREAKER

Filed May 23, 1921



Inventor
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By *Richard J. Cook* Attorney

UNITED STATES PATENT OFFICE.

BERT G. GERBIG, OF SEATTLE, WASHINGTON.

CIRCUIT BREAKER.

Application filed May 23, 1921. Serial No. 471,578.

To all whom it may concern:

Be it known that I, BERT G. GERBIG, a citizen of the United States, and a resident of the city of Seattle, county of King, State of Washington, have invented certain new and useful Improvements in Circuit Breakers, of which the following is a specification.

This invention relates to a circuit breaking device, and more particularly to a device of that character to be used in automobiles, trucks, tractors, etc., using internal combustion engines, in connection with the electric circuit in which the spark plugs of the engine are located; the principal object of the invention being to provide means whereby the engine may be run on circuit and off circuit alternately at short intervals.

It has been learned by experimenting and by observation that in the operation of an automobile engine of the internal combustion type if, at intervals, hot fuel charges of gasoline are left unexploded within the engine cylinders, the valves thereof will be kept in better working condition than they are otherwise, since the gasoline serves as a means of keeping the carbon deposits on the valves in a softened condition and permits the valves to seat in a tight non-leaking joint, thereby insuring a more efficient operation of the engine.

It is therefore another object of the invention to provide means whereby the current can be interrupted when it is so desired, in order that certain fuel charges may not be exploded within the cylinders, also to provide means whereby the length of the periods of interruption may be varied accordingly as the operator desires.

It is also an object of the invention to provide a device of the above character which may be so connected with certain brake levers, foot brakes or the like, that it may be made to operate only at such times when work is not required of the engine.

Another object of the invention resides in the means for varying the length of the periods of time when the circuit is on and off.

Other objects of the invention reside in the details of construction and the combination of parts whereby a serviceable and efficient device is provided.

In accomplishing the objects of the invention, I have provided the improved details

of construction, the preferred forms of which are illustrated in the accompanying drawings, wherein—

Figure 1 is a diagrammatic illustration, showing the manner of connecting a circuit breaking device and its control switch with the electrical connections of an automobile engine, and the manner of connecting the switch with a brake rod whereby it is controlled.

Figure 2 is a sectional view through the circuit breaker housing, taken on the line 2—2 in Figure 3.

Figure 3 is a horizontal section of the same.

Figure 4 is a transverse section on the line 4—4 in Fig. 2.

Figure 5 is a sectional view of the switch mechanism.

Figure 6 is a detail, perspective view of the parts of the circuit breaker.

Figure 7 is a sectional view through the adjusting shaft.

Referring more in detail to the several views of the drawings, wherein like reference numerals designate the same or like parts:

1 and 2, respectively, designate the housings for the circuit breaker mechanism and the control switch therefor. These housings may be mounted at any conveniently accessible place within the automobile but it is preferred that the housing 1 be located back of, or just beneath the dash board where it will be conveniently accessible for winding and adjusting and that the housing 2 be located beneath the body of the vehicle or in any other position where it could be conveniently connected with one of the brake controlling rods. The electric connections between these members would be enclosed in suitable protecting conduits.

Referring first to the circuit breaking mechanism, this consists of a coiled spring motor designated at 5, Figures 3 and 4, which is connected through a series of intermeshing gears, designated at 6, with a shaft 7 which is supported revolutely at its opposite ends within opposite walls of the housing 1. The spring motor is mounted within a suitable frame, that is fixed within the housing, and the spring may be wound up by the turning of a knob, or handle, 8 which is

fixed at the outer end of the spring winding shaft 9.

Fixed on the shaft 7 is a wheel 10 provided at regularly spaced intervals with radially projecting arms 11 of equal length. Normally this wheel is prevented from rotating, by a means presently described, but when released and revolved through its connection with the spring 5, the arms thereof will be successively brought into engagement with the outer end of an arm 12 that is fixed to extend radially from a wheel 13 which in turn is fixed on an axle 14 revolubly supported upon bearing blocks 15 mounted on the base of the housing 1.

Also, fixed to the shaft 14, is an arm 16 which extends substantially horizontally and at its outer end has a contact head 16' of a wedge shape fixed thereon. This head is adapted normally to seat within a V-shaped socket provided in a contact block 17, but when the arm is raised by the action of the wheel 10, it is brought into engagement with the outer end of a contact arm 20 that is supported at a spaced distance above the block 17 from a shaft 21.

The shaft 21 is supported revolubly within the housing and extends through the forward wall thereof and is provided with a handle or head 22 whereby it may be rotated. On this shaft, just within the front wall of the housing, are provided teeth 24 against which a spring plate 25, that is fixed to the housing wall, engages to yieldingly hold the shaft at different positions of adjustment.

The arm 20 has a limited, rotatable movement on the shaft 21; it being limited in its downward movement by means of a boss 23 extending laterally therefrom and in its upward movement by means of a similar boss 23', that is spaced from the boss 22, and, by the adjustment of the shaft 21, the outer end of the arm 20 may be adjusted closer or farther from the block 17; it being apparent that should the arm 20 be positioned close to the block 17, the arm 15, when raised by the action of the wheel 10, will be in contact with it longer than it would if the arm 20 was raised farther from the block. This adjustment provides for the breaking of the circuit for longer or shorter periods of time, and the length of these periods for which the device is set may be determined by means of a pointer 26 that is fixed to the shaft 21 and which moves at its end adjacent a graduated scale on a plate 28 that is fixed to the outer face of the housing.

The means previously mentioned for normally preventing rotation of the wheel 10 consists of a spring arm 30 that is mounted within the housing and at one end has a latch head 31 thereon which is yieldingly retained by the arm in such position that it will be engaged by an arm 11 of the wheel 10. A solenoid 33 is mounted adjacent this

arm having a core 34 that is magnetized upon the energizing of the solenoid, so that it will draw the arm 30 outwardly and thereby release the latch head from the wheel and permit the latter to rotate.

The switch housing 2 contains two spaced apart contact members 35 and 36 and between these is disposed the movable end of a yieldable switch arm 37 that is mounted at its opposite end within a block of insulation 38 fixed to the upper wall of the housing. Normally, the arm is held in contact with the block 36 by means of springs, as shown at 39, but is connected by means of a rod 40 and spring 41 with a brake rod or cable 42 in such manner that movement of the latter to retard the travel of the vehicle or to set the brakes thereof, will move the switch arm into contact with the contact block 35.

As shown diagrammatically in Figure 1, 45 designates a storage battery within the automobile and 46 designates the vehicle's motor, equipped with spark plugs designated at 47. 48 designates the distributor or timer and 50 the high tension magneto.

The electrical connections consist of a wire 55 which connects one pole of the battery 45 with the switch block 35, and 56 is a wire leading from the other pole of the battery to a pole of the solenoid 33; the opposite pole of the solenoid being connected by means of a wire 57 with a wire 58 which extends from the switch arm 37, through the housing 1 and then to the magneto 50. A switch designated at 60 is interposed in the circuit wire 57, which may be turned on and off to control the circuit through the solenoid.

A wire 61 is connected at one end with the arm 16 and leads about the housing 1 and then to the timer 48. A wire 62 connects the switch block 36 with this wire 61, and the contact block 17 and arm 20 are respectively connected with the wire 58 by means of wires 63 and 64. Wires 65 lead from the timer 48 to the various spark plugs and the magneto has a grounded wire 66 which provides for the circuit through the plugs.

Assuming that the device is so constructed and that the parts are assembled and electrically connected as described, it is apparent that, when the foot brake is in such position that the switch arm 37 will be drawn into engagement with the switch block 36, the circuit to the spark plugs will be uninterrupted; the circuit then passing from the magneto 50 through wire 58 through switch arm 37, through block 36, wire 62, and wire 61 to the timer 48, from which it is distributed to the spark plugs 47 and returns to the magneto through the ground connections. With the switch arm in this position, there is no circuit through the solenoid

33, and consequently the arm 30, with its latch 31, retains the wheel 10 against rotation.

It will be seen, however, that with the switch 60 closed, should the brake lever 42 be moved to such position that it will draw the switch arm 37 into contact with the block 35, the circuit from the battery 45 will be closed through the solenoid 33; the circuit passing from the battery through the wire 56, solenoid 33, wire 57, switch 60, wire 58, arm 37, block 35 and wire 55, back to the battery. Upon energizing the solenoid, the arm 30 is drawn to release the wheel 10, so that it may be rotated through the connection with the spring motor 5. As it rotates, the arms 11 successively engage the arm 12 to rock the shaft 14 to raise and lower the arm 16 between the contact 17 and arm 20 that is fixed on the shaft 21. At such times, when the arm 37 is engaging the block 35, the spark plug circuit flows from the magneto 50 through the wire 58, wire 63 or 64, the arm 16 and wire 61, to the timer, and, when the wheel 10 is rotating to actuate the arm 16 between the contact 17 and arm 20, this circuit is interrupted or opened during the interval of time that the arm is passing between these points.

Fuel charges that are intaken into the cylinders while the spark plug circuit is open naturally will not be exploded and these will serve, as was previously stated, to soften the carbon deposited on the valves so that it will be removed by the engaging of the valves with their seats. In this way, the valves and seats are kept in true form and leakage prevented.

Under different conditions of operation, it is desired that the length of the periods that the circuit is open be varied and to provide for the varying of these periods, I have provided that the shaft 21 be adjusted to raise or lower the arm 20, it being apparent that when it is lowered close to the contact point 17 the time required for the arm 16 to pass between the block and the arm 20 will be shorter than that required, should the arm 20 be raised to its upper length. The scale provided on the plate 25 makes possible the setting of the shaft so that these periods may be determined.

If it is not desired that the device be used at all times, the switch 60 may be opened. This will prevent the energizing of the solenoid and the wheel 10 will be locked against rotation.

By attaching the spring 41 to the brake lever 42, as I have described, it will be seen that the device operates only at such times when work is not required of the engine, and therefore, otherwise wasted fuel charges are used for the cleaning of the valves.

Having thus described my invention, what

I claim as new therein and desire to secure by Letters Patent, is:

1. The combination with the electric circuit for the spark plugs of an internal combustion engine, of a circuit breaking device connected with said circuit and operable to open the circuit intermittently for predetermined periods of time, and an adjustable means for varying the duration of the open periods.

2. In a motor vehicle, in combination with the electric circuit for the spark plugs of the vehicle engine and a brake rod for the vehicle, a motor driven circuit breaking device interposed in the spark plug circuit and through which the circuit is normally closed, a solenoid adapted, when energized, to effect the release of the circuit breaking device, so that it may operate to open said circuit intermittently for pre-determined periods of time, an electric circuit for the solenoid, a switch in said circuit operatively connected with the brake rod whereby movement of the latter to effect braking of the vehicle will close the circuit through the solenoid.

3. The combination with the electric circuit for the spark plugs of an internal combustion engine, of a circuit breaking device comprising a switch arm and means for oscillating it at regular intervals of time through a definite arc; said arm being connected with one terminal of the spark plug circuit and movable at its end between and into circuit closing relation with spaced apart contact members connected with the other terminal of the circuit, to cause the circuit to be opened during the intervals that the arm is disengaged from said contact members.

4. The combination with the electric circuit for the spark plugs of an internal combustion engine, of a circuit breaking device comprising a switch arm and means for oscillating it at regular intervals of time through a definite arc; said arm being connected with one terminal of the spark plug circuit and movable at its end between and into circuit closing relation with spaced apart contact members connected with the other terminal of the circuit, to cause the circuit to be opened during the intervals that the arm is disengaged from said contact members, one of said contact members being yieldable and adjustable toward and from the other to provide for varying the length of the periods that the circuit will be open.

5. The combination with the electric circuit for the spark plugs of an internal combustion engine, of a circuit breaker comprising a motor driven shaft, a wheel fixed on said shaft having radially extending arms thereon, a rocker shaft provided with an arm adapted to be engaged by the arms of the said wheel as the latter rotates, to effect rocking of the shaft, a switch arm fixed to

the rocker shaft having electrical connection with one terminal of the spark plug circuit and movable by the shaft between and into circuit closing contact with adjustably spaced apart contact members electrically connected with the other terminals of the circuit.

6. The combination with the electric circuit for the spark plugs of an internal combustion engine, of a circuit breaker comprising a motor driven shaft, a wheel fixed on said shaft having radially extending arms thereon, a rocker shaft provided with an arm adapted to be engaged by the arms of the said wheel as the latter rotates, to effect rocking of the shaft, a switch arm fixed to the rocker shaft having electrical connection with one terminal of the spark plug circuit and movable by the shaft between and into circuit closing contact with adjustably spaced apart contact members electrically connected with the other terminals of the circuit, a latch normally engageable with the wheel fixed to the motor driven shaft to prevent its rotating and a solenoid adapted, when energized, to magnetically draw the latch to releasing position.

7. In a motor driven vehicle, the combina-

tion with the electric circuit for the spark plugs of the vehicle's engine and a brake rod for the vehicle, of a circuit breaking device comprising a motor driven shaft, a wheel fixed on said shaft provided with radially extending arms, a rocker shaft provided with an arm adapted to be engaged by the arms of said wheel when the latter is rotated to effect the rocking of the shaft, a switch arm fixed to the rocker shaft having electrical connection with one terminal of the spark plug circuit and movable by the shaft between the contact block and an adjustable arm that are electrically connected with the other terminal of the spark plug circuit, a yieldable latch bar normally engageable with arms of the wheel, to prevent rotation thereof, a solenoid adapted, when energized, to magnetically move the latch to releasing position, an electric circuit for the solenoid, a switch arm in said circuit operatively connected with said brake rod, whereby movement of the latter to effect braking of the vehicle will move the arm to close the solenoid circuit.

Signed at Seattle, Washington, this 14th day of May, 1921.

BERT G. GERBIG.