

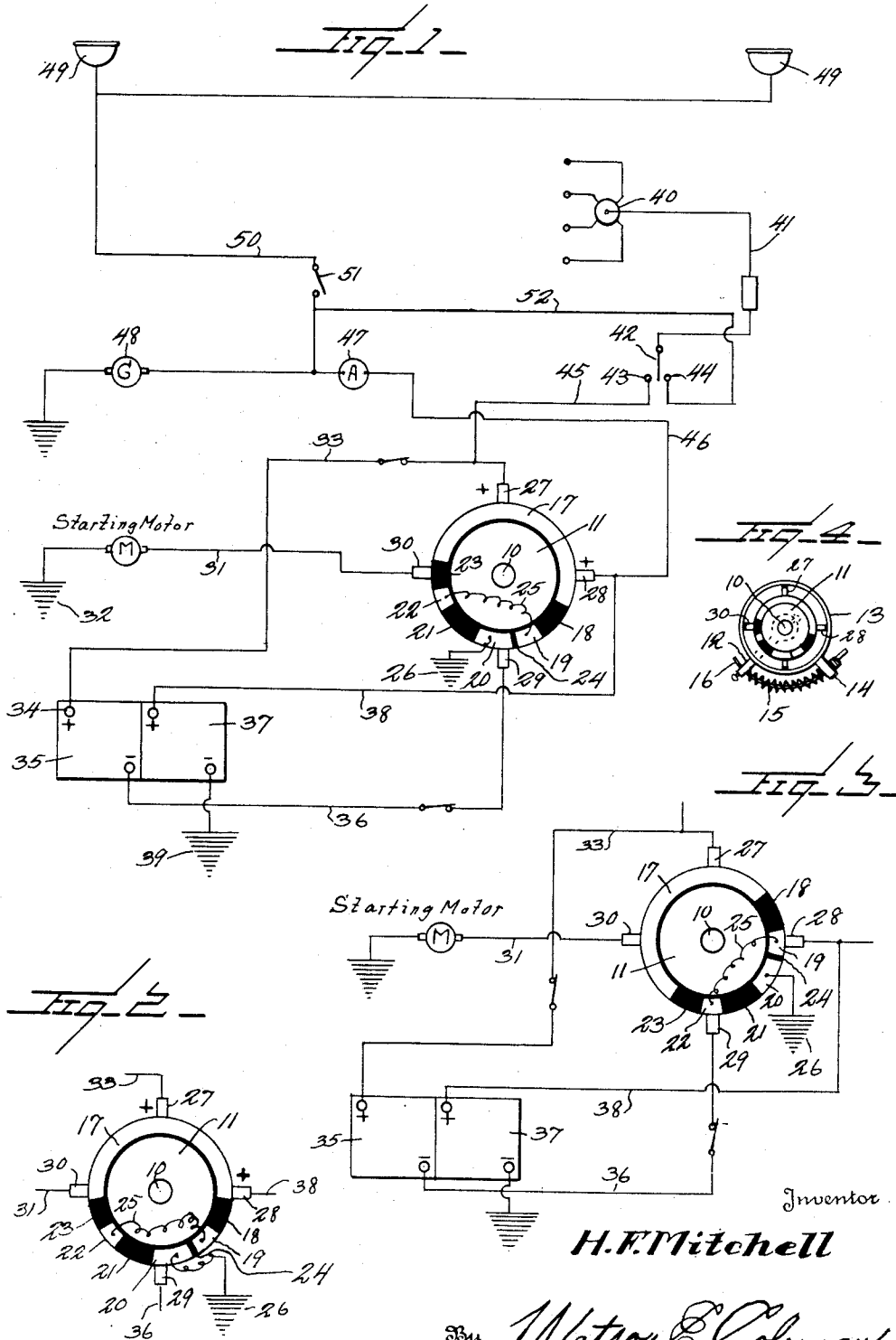
Oct. 19, 1937.

H. F. MITCHELL

2,096,378

ELECTRICAL STARTING SYSTEM FOR AUTOMOBILES

Filed July 25, 1936



Inventor.

H. F. Mitchell

By *Watson E. Coleman*
Attorney

UNITED STATES PATENT OFFICE

2,096,378

ELECTRICAL STARTING SYSTEM FOR
AUTOMOBILES

Harry Floyd Mitchell, Salem, Ohio

Application July 25, 1936, Serial No. 92,624

6 Claims. (Cl. 290—37)

This invention relates to the starting mechanism of internal combustion engines and particularly to a starting switch and the circuits therefor.

Nearly all internal combustion engines used for driving automobiles use a six-volt starting system which, in weather below zero, as for instance, ten degrees below zero, does not work very well. A twelve-volt starting battery, however, will operate properly even at ten degrees below zero.

With these facts in view, my invention has for its main object to overcome the above mentioned defect and to this end, I have devised an electrical starting and ignition apparatus that is equipped with either a special twelve-volt battery with four posts (two negatives and two positives) or two six-volt batteries.

A further object is to provide means whereby the two batteries may be connected up in parallel with a generator and with the starting motor or the ignition mechanism or whereby the two batteries may be connected in series with the starting motor or the ignition system.

A further object is to provide a switch for this purpose which, after its actuation for the purpose of starting the motor, will return to its charging position where both batteries are charged in parallel. With this mechanism, an internal combustion engine may be started very quickly even in the coldest weather, thus saving gas and not running down the battery.

My invention is applicable to various types of internal combustion engines, and I do not wish to be restricted to the use of any one type.

My invention is illustrated in the accompanying drawing wherein:

Figure 1 is a diagrammatic view showing the position of my switch when the batteries are being charged from the generator;

Figure 2 is a diagrammatic view of the switch showing the switch thrown to a starting position with the batteries in parallel;

Figure 3 is a diagrammatic view showing the position of the switch when both batteries are connected up in series with the starting motor and with the ignition system;

Figure 4 is a top plan view of the switch showing means whereby it may be held in its normal position.

Referring to Figures 1 and 4, it will be seen that the switch includes a shaft 10. Mounted upon this shaft for rotation therearound is a disk 11, this disk having an outwardly projecting lug 12, as shown in Figure 4. Surrounding

the disk is a fixed ring 13 having an outwardly projecting lug 14, and extending between this lug 14 and the lug 12 is a compression spring 15 surrounding a guide 16. It will be obvious now that when the disk 11 in Figure 4 is turned in a counterclockwise direction that the spring will be compressed and that as soon as the disk is released, it will return to its normal position, which is that shown in Figure 1.

The disk 11 is provided adjacent its periphery with a relatively long arcuate sector or contact strip 17 which extends through an arc slightly greater than 180°. The remainder of the perimeter of the switch is provided with a series of contact plates or segments 19, 20 and 22, separated from each other by insulation 18, 21, 23 and 24. A wire 25 connects the contact 22 with the contact 19. To the contact 20 is connected a ground 26. Coacting with this switch are four brushes 27, 28, 29 and 30. The brush 30 is connected by the wire 31 to the motor of the starter designated M, the other side of the motor being connected to a ground 32. From the brush 27, a conductor 33 extends to the positive post 34 of a battery 35, which is supposed to be a six-volt battery. From the negative post of this battery a conductor 36 extends to the brush 29. The other six-volt battery 37 has its positive pole connected by the conductor 38 to the brush 28, while the negative pole of this battery is connected to a ground 39. The distributor for the ignition system is designated 40 in the diagram of Figure 1. This is connected by a wire 41 to a switch 42. This is a double throw switch and may be shifted to engage either the post 43 or the post 44. The post 43 is connected by a conductor 45 to the wire 33 and through this wire to the brush 27. The post 44 is connected by the conductor 52 to the cut-out and generator 48, whose other side is grounded. A wire 46 leads from the generator and cut-out 48 to the brush 28. The headlights 49 are connected in parallel to a conductor 50 and by a switch 51 this conductor may be connected to the conductor 52 which connects with the conductor 46 and thus is connected to the brush 28.

In the position of the parts shown in Figure 1, the switch 11 is in its charging position. Assuming that the switch 42 is thrown to the contact 44, the generator discharges through wire 52 to the wire 41 and thence to the distributor 40. The generator also discharges through the wire 46 to the conductor 38, thence to the positive pole of the battery 37, thence to the negative pole and the ground 39. The generator also discharges

from the brush 28 connected to the conductor 46, to the metallic sector 17 and from thence to the brush 27, from this contact by wire 33 to the positive pole of the battery 34, and thence from the negative pole 36 by wire to the brush 29 and thence to the ground 26. Thus the generator in the position of the parts shown in Figure 1, but with the switch 42 thrown to 44, will be charging both batteries and also delivering current to the ignition mechanism. If the switch 42 be thrown to the contact 43, the same result will occur, that the generator will discharge through the conductor 46 to the contact 28, thence to the brush 27, and the current will pass by way of conductor 45 to the switch 42 and thence to the ignition.

In Figure 2, I have shown the position of the switch when starting. It will be seen that the switch has been given a one-step counter-clockwise movement from the position shown in Fig. 1. This will electrically connect the brush 30 with the metallic sector 17. The battery current from battery 35 will pass from the brush 27 to the sector-shaped contact 17 and thence to the brush 30 and to the starting motor M. At the same time, current will pass from the strip 17 to the brush 28 and thus to the ignition system. The battery current will pass from the battery 37 by wire 38 to the brush 28, thence to the strip 17 and thence by way of brush 30 and conductor 31 to the motor so that both batteries will be in parallel with the motor.

In Figure 3, I have illustrated the position of the switch when it is desired to use both batteries in series and thus get twelve volts of current to actuate the starting mechanism. In this case, the switch is turned still further in a counter-clockwise direction so that the brush 28 is disposed to engage the contact plate 19 which is connected by the wire 25 with the contact plate 22. In this position of the switch, this contact plate 22 is engaged with the brush 29. Under these circumstances, the current from battery 35 will pass to brush 27, thence to the strip 17 and thence to the starting motor M. The current from the battery 37 will pass by way of the conductor 38 to brush 28, thence to plate 19, thence by wire 25 to plate 22, thence to the brush 29, and thence by wire 36 back to the negative pole of the battery 35. Thus both batteries will be connected in series with the motor M, and by throwing switch 42, Fig. 1, to contact 43, both batteries will be connected in series with the ignition 40 while the lights 49 remain connected to only one battery 37 through switch 51.

While I have described battery elements 35 and 37 as if they were two separate batteries, it is to be understood that one single battery may be used divided into two sections which will in effect be two batteries, and that by my mechanism both of the sections may be used where only one section may be used by disconnecting the wire 33 or 36 or both, which allows only the battery section 37 to be used. Of course, switches may be disposed in these wires 33 and 36 for the purpose of securing this disconnection. By the same means which I have described, either the full power of the double battery or only one of these battery sections may be used for ignition purposes. By my mechanism, I provide means whereby under normal circumstances and under ordinary temperatures and with the wires 33 and 36 disconnected, the starting motor may be driven by one six-volt battery, but that under extraordinary circumstances such as the lowering of

the temperature below zero, or whenever it is necessary, and with the wires 33 and 36 connected up, the power of both batteries, connected up either in series or parallel may be applied to the starting motor. Not only do I secure this advantage by my construction, but I secure the further advantage that in case one battery gives out, the other battery may be thrown in and utilized. Thus if battery 35 has been previously disconnected and if battery 37 runs down, the battery 35 may be connected in circuit with the starting motor.

While I have shown a hand-operated switch, I do not wish to be limited to this as it is obvious that the switch 11 might be operated by a foot pedal and secure the result desired. The switch 11 is a starting switch which takes the place of the ordinary foot-operated starting switch common in motor cars for connecting the battery with the starting motor.

It will be seen that with my construction, the ignition coil can be operated on a twelve-volt current, if desired or necessary, and that the starting motor may be operated either with the batteries 35 and 37 connected in parallel or in series and thus more battery capacity can be utilized to provide more ampere hours for operating the lights and other electrically actuated mechanism. Connecting the batteries in parallel to the starting motor does not cause the starting motor to pull much more than it would do under the action of one battery, but when the batteries are connected in series, they will cause the starting motor to pull several times as much as when the battery is in parallel. With my structure both batteries are charged simultaneously.

It will be seen that not only do I have by my system a reserve battery which may be thrown in to assist the first battery under abnormal circumstances for either ignition or starting the motor, but that in case one battery runs down so that it does not secure enough power, the second battery may be utilized.

While I have shown a particular form of switch which is thoroughly effective for the purpose intended, I do not wish to be limited to the individual type of switch shown as this switch could be made in a number of ways without departing from the spirit of the invention as defined in the appended claims.

What is claimed is:—

1. In a starting system for internal combustion engines, the system including a starting motor, a generator and two batteries; operable means shiftable into a position electrically connecting the generator with both batteries or into a position connecting both of said batteries in parallel with the starting motor or into a position connecting both of said batteries in series with each other and the starting motor.

2. In a starting system for internal combustion engines, the system including a starting motor, a generator and two batteries; a single manually operable means shiftable into a position electrically connecting the generator with both batteries and disconnecting both batteries from the starting motor or into a position connecting the generator with both batteries and connecting both of said batteries in parallel with the starting motor or into a position connecting both of said batteries in series with each other and the starting motor.

3. In a starting system for internal combustion engines, a starting motor, a generator and two batteries; a manually operable switch in its normal position electrically connecting the gen-

erator with both batteries but electrically disconnecting the starting motor from the batteries, the switch being shiftable into a position electrically connecting both of said batteries in parallel with the starting motor or shiftable into a position electrically connecting both of said batteries in series with each other and the starting motor.

4. In an electrical ignition and starting system for automobiles, the system including a generator, a starting motor and an ignition system; two batteries and a single manually operable switch, in its normal position electrically connecting the generator in circuit with both of said batteries but disconnecting the starting motor from the batteries and electrically connecting the generator in circuit with the ignition system; in another position electrically connecting both batteries in parallel with the starting motor and with the ignition system and in another position electrically connecting both batteries in series circuit with the starting motor and the ignition system.

5. In an electrical ignition and starting system for automobiles, this system including a generator, a starting motor and an ignition means, two batteries and a single manually operable rotatable switch, the switch having a relatively long contact strip concentric to the center of rotation of the switch, two contacts separated from the ends of the first-named strip by insulation but electrically connected to each other, an intermediate contact connected to a ground but insulated from the last-named contacts, a brush electrically connected to a pole of one battery, a second brush disposed at right angles to the first-named brush and electrically connected to the starting motor, a third brush disposed opposite the first-named brush and electrically connected to the other pole of the same battery, a fourth brush disposed opposite to the second-named brush and electrically connected to the generator and to one pole of the other battery, the other pole of this battery being grounded, and means urging the switch to a position where the first and fourth brushes are in engagement

with the relatively long contact, the second brush engaging insulation and the third brush engaging the grounded contact, the switch being movable to a position where the first, second and fourth brushes are in engagement with the relatively long strip and the third brush is in engagement with the grounded contact, the switch being further movable into a position where the first and second-named brushes are in engagement with the long strip and the third and fourth-named brushes are electrically connected to each other.

6. In a system of the character described, a generator, a starting motor, an ignition system, two batteries and four brushes arranged in a quartering relation, one of said brushes being electrically connected with one pole of one battery, the second brush being electrically connected to the starting motor, the fourth brush being electrically connected to the generator and one pole of the other battery, the other pole of this battery being grounded and a third brush being electrically connected with the other pole of the first-named battery, a rotatable switch with which the brushes coact, the switch having a relatively long arcuate contact strip of such length as to in one position electrically connect the first, second and fourth named brushes with each other, two contacts insulated from the ends of the long contact strip and electrically connected to each other, and an intermediate contact insulated from the last-named contacts and connected to a ground, the switch in its normal position electrically connecting the first and fourth named brushes and electrically connecting the grounded contact with the third named brush; in another position electrically connecting the first, second and fourth named brushes and electrically connecting the third named brush with the grounded contact; said switch in another position electrically connecting the first and second brushes with each other and electrically connecting the third and fourth brushes with each other.

HARRY FLOYD MITCHELL. 45