F. E. FISHER.

CENTRIFUGAL MERCURY CUT-OUT SWITCH.

APPLICATION FILED FEB. 2, 1912.

1,036,596.

Patented Aug. 27, 1912.

2 SHEETS—SHEET 1.

Fig. 1.

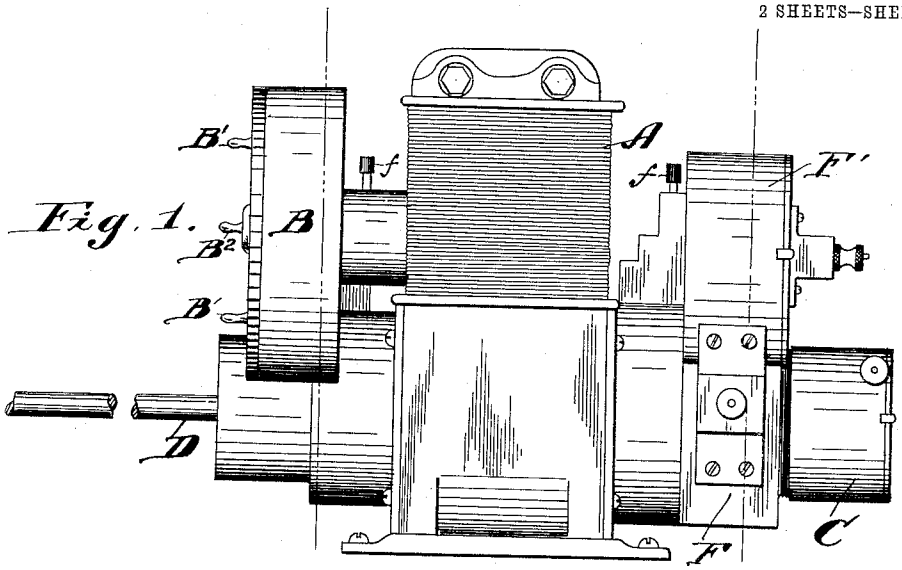
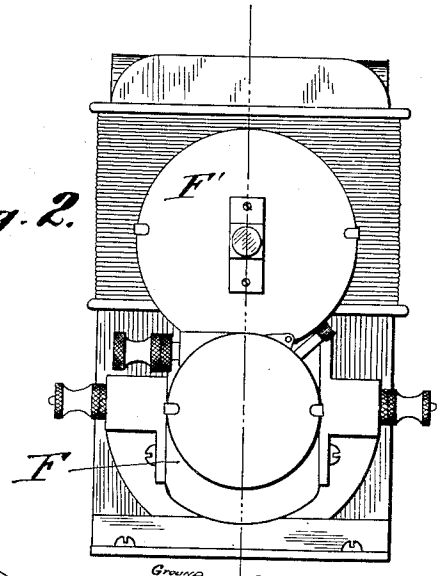


Fig. 2.



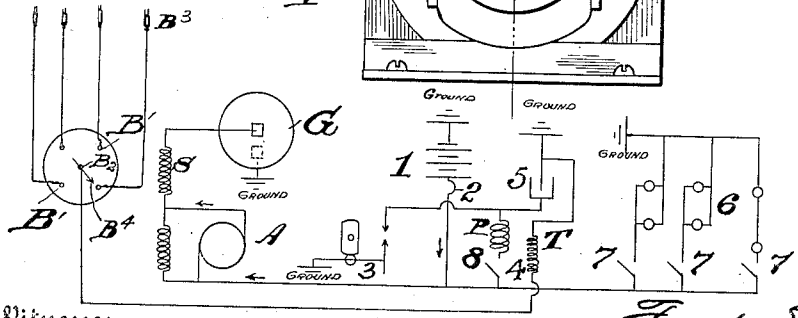


Fig. 5.

Witnesses

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Fig. 4.

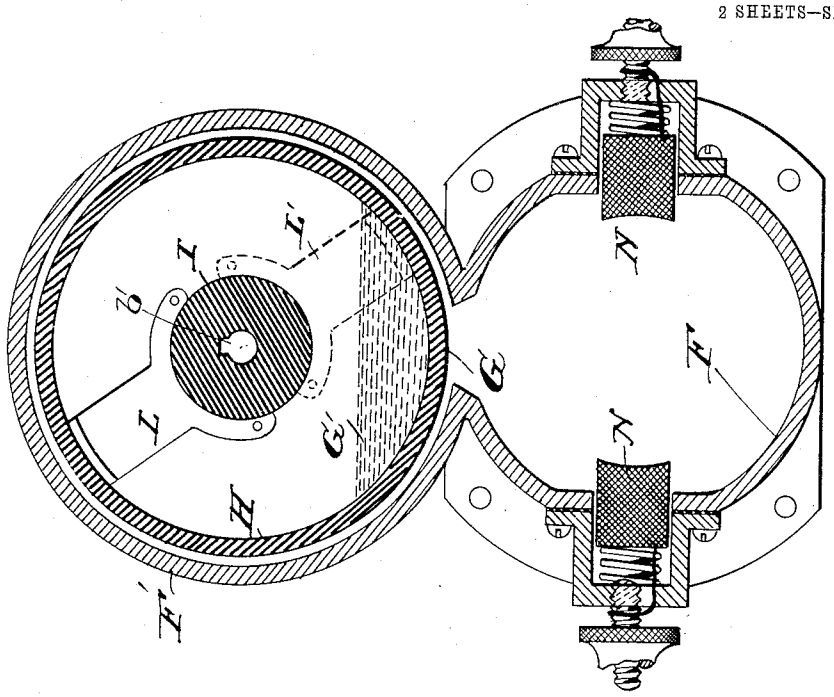
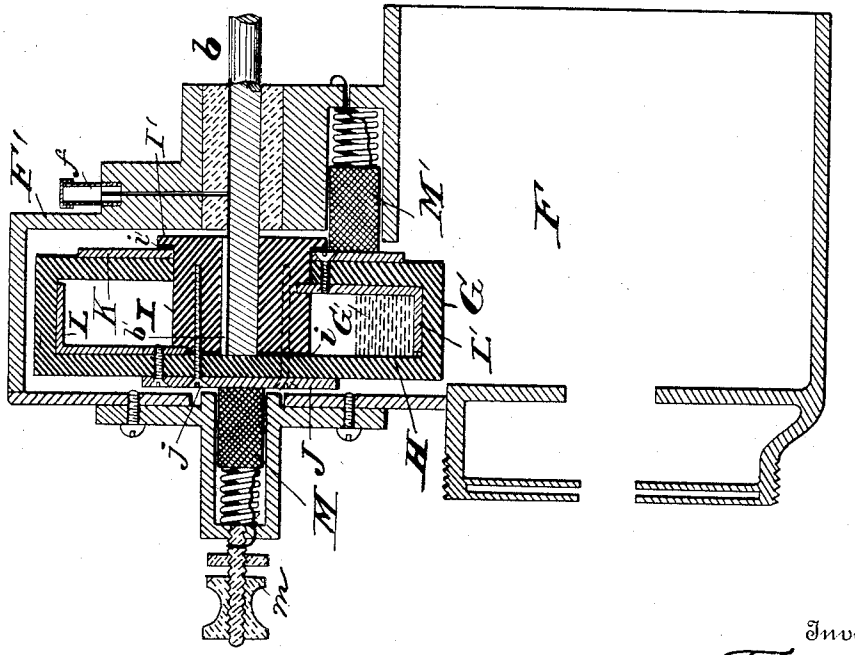


Fig. 3.



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CENTRIFUGAL MERCURY CUT-OUT SWITCH.

1,036,596. Specification of Letters Patent. Patented Aug. 27, 1912.

Application filed February 2, 1912. Serial No. 674,995.

To all whom it may concern:

Be it known that I, FRANK E. FISHER, a citizen of the United States, residing at Detroit, county of Wayne, State of Michigan, have invented a certain new and useful Improvement in Centrifugal Mercury Cut-Out Switches, and declare the following to be a full, clear, and exact description of the same, such as will enable others skilled in the art to which it pertains to make and use the same, reference being had to the accompanying drawings, which form a part of this specification.

My invention relates to an improvement in centrifugal mercury cut-out switches employed in connection with the usual elements of an ignition and lighting plant for automobiles or similar installations;—which include a differentially compounded dynamo, storage battery, distributer, timer, ignition and lighting elements.

The purpose of the switch is to close the circuit between the dynamo and battery to charge the battery only when the speed of the dynamo driven by a prime mover is sufficiently high to generate a proper voltage,—the connection between the dynamo and battery being automatically cut off upon its ceasing to operate or when the speed of the dynamo falls below the proper value.

It is well known that great difficulty has been experienced in confining mercury in a closed chamber in switches constructed of several parts to provide for introducing the electrodes within the same together with the mercury for closing the circuit between the electrodes;—it being apt to escape along the line of the joints of the parts forming the chambered portion,—at the openings provided for the introduction of the electrodes from the outside,—and along the horizontal shaft on which the chamber is mounted.

It is therefore one of the objects of the present invention to provide a centrifugal switch especially adapted for mounting upon a horizontally revolving shaft in which the mercury employed to close the circuit between the electrodes may be securely confined.

A further object is to provide for housing electrodes having a relatively large contacting surface within the chamber, a connection being made between the electrodes and suitable disks secured to the walls of the chamber on the outside against which carbon or other brushes bear for conducting the current.

Other advantages and improvements will hereafter appear.

In the drawings accompanying this specification:—Figure 1 is a side elevation of a single unit consisting of a direct current differentially compounded dynamo, distributer, timer, and mercury switch. Fig. 2 is an end elevation of same looking toward the mercury switch. Fig. 3 is a cross-sectional view through the switch and inclosing frame showing a fragmentary portion of the half-time shaft of the dynamo. Fig. 4 is a sectional view through the switch at right angles to that shown in Fig. 3. Fig. 5 is a diagrammatic view of the ignition and lighting circuits.

Referring now to the letters of reference placed upon the drawings:—A denotes a direct current differentially compounded dynamo; B the inclosing case of a distributer; B′ its terminals through which connection is made with the ignition or spark plugs of the several cylinders of an internal combustion engine.

C is the case inclosing the timer (not shown). D the armature shaft. F the case inclosing the commutator (not shown) of the dynamo and F′ the case inclosing the centrifugal cut-off switch G. The switch G includes a chambered portion H, preferably formed of fiber or hard rubber mounted upon the end of the half-time shaft *b* though it may be mounted upon the end of the armature shaft if desired. One of the side walls of the chamber is provided with an enlarged aperture, through which projects a thimble I, of fiber or hard rubber, sleeved upon the shaft *b*. The thimble may bear directly against the inner surface of the opposing wall of the chamber, or against a gasket of soft rubber *i* or other suitable material interposed between the thimble and the wall of the chamber. *i′* is a similar gasket at the opposite end of the thimble.

J indicates a metallic disk secured to the chamber on the outside by suitable screws or rivets *j* which also engage the end of the thimble I.

K denotes an annular metallic ring sleeved over the projecting end of the thimble, the latter being provided with a flange I′, to break joints at this point.

L and L′ indicate electrodes housed with-

in the chamber and located diametrically opposite each other, of L-shaped formation in cross-section and respectively connected near the periphery of the thimble with the disk J and annular ring K as indicated at l and l'.

G′ denotes a suitable volume of mercury lodged in the chamber.

b' is a key or spline to secure the chamber to the shaft b that it may turn therewith.

M and M′ are brushes housed in the frame and provided with springs to force them respectively into contact with the disk J and ring K.

m is a binding post to receive the end of the wire circuit. The brush M′ may be grounded directly to the frame as shown or be provided with a binding post if desired.

f are oil cups with ports leading to the shaft b as indicated in Fig. 3.

N are brushes for the commutator (not shown) supported in the case F.

In the diagrammatic view (Fig. 5) in addition to the elements previously denoted by reference letters, 1 indicates a storage battery, 2 a fuse, 3 an interrupter, 4 an induction coil, 5 a condenser, 6, lamps, 7, switches controlling the respective lamp groups, 8 a switch to close the circuit through the soil.

Having now indicated the several elements by reference letters, the operation of my device will be readily understood.

The dynamo has a suitable driving connection with the prime mover (not shown) and upon being driven by said prime mover at a suitable speed, the mercury G′ will by centrifugal action close the circuit through the electrodes L, L′, between the dynamo and storage battery to recharge the latter. In the event of the prime mover ceasing to operate or of its operating at a relatively slow speed, it is obvious that the connection established between the dynamo and battery through the switch by the mercury through centrifugal action, will be automatically broken.

Referring to the diagrammatic view, it will be seen that the flow of the current to charge the battery will be as follows:— From the generator A it will pass in the direction of the arrow through the series coil S, to the mercury switch G, to the electrode L, through mercury G′ to electrode L′ out to ring K, through brush M′ to ground, from ground through storage battery 1, fuse 2, in direction of arrow back to generator A.

Referring to the ignition circuit, current flows from the battery 1 to ground, thence to interrupter 3, through primary P of coil 4, switch 8, through fuse 2, back to the battery 1: from high tension side T to center post B^2 of the distributer B^4, thence through terminals B^1, to the spark plugs B^3, to ground and from ground back to coil 4. The lighting circuit starts from the battery 1 to ground, from ground to lights 6, to switch 7, to fuse 2, and thence back to battery.

Having thus described my invention, what I claim is:—

1. In a centrifugal electric switch, a rotatable horizontal shaft, a chambered shell mounted upon the shaft and rotatable therewith, a thimble sleeved on the shaft extending into the chambered portion of the shell and secured thereto, electrodes housed within the shell, a volume of mercury lodged in the shell and adapted to close the circuit through the electrodes by centrifugal action, metallic plates secured to the outside of the shell and connected with the electrodes, and suitable brushes adapted to bear upon the disks to conduct the current.

2. In a centrifugal electric switch, a rotatable horizontal shaft, a chambered shell keyed to the shaft provided with an aperture in one of its side walls to receive a thimble, the thimble sleeved upon the shaft extending into the chambered shell, its end brought into abutting contact with the side walls of the chamber and secured thereto, oppositely disposed electrodes housed within the chamber, a volume of mercury adapted to close an electric circuit through said electrodes by centrifugal action, a pair of metallic disks respectively secured to the opposing walls of the chamber on the outside, each being connected to one of the electrodes, and suitable brushes adapted to bear upon the disks to convey the current.

3. In a centrifugal electric switch, a rotatable horizontal shaft, a chambered shell mounted on the shaft having one of its side walls apertured to receive a thimble sleeved on the shaft, the thimble extending into the chambered portion of the shell, its end in abutting relation with the wall of the shell, a pair of oppositely disposed electrodes housed within the shell, mercury lodged within the shell, a disk and ring respectively secured to the opposing walls of the shell and connected to the respective electrodes within the shell, and brushes suitably supported adapted to bear against said disk and ring to conduct the current.

4. In a centrifugal electric switch, a rotatable horizontal shaft, a chambered shell mounted on the shaft having one of its side walls apertured to receive a thimble sleeved on the shaft, the thimble extending into the chambered portion of the shell, gaskets between the thimble and shell, a pair of oppositely disposed electrodes housed within the shell, mercury lodged within the shell, a disk and ring respectively secured to the opposing walls of the shell and connected to the respective electrodes within the shell, and brushes suitably supported adapted to bear against said disk and ring to conduct the current.

5. In a centrifugal electric switch, a ro-

tatable horizontal shaft, a chambered shell mounted on the shaft having one of its side walls apertured to receive a thimble sleeved on the shaft, the thimble extending into the chambered portion of the shell, gaskets between the thimble and shell, L-shaped electrodes extending radially along the sides and inner periphery of the shell, mercury lodged within the shell, a disk and ring respectively secured to the opposing walls of the shell and connected to the respective electrodes within the shell, and brushes suitably supported adapted to bear against said disk and ring to conduct the current.

In testimony whereof, I sign this specification in the presence of two witnesses.

FRANK E. FISHER.

Witnesses:

GRACE E. WYNKOOP,

SAMUEL E. THOMAS.