Jan. 29, 1924. 1,482,167

R. VARLEY

CIRCUIT CONTROLLER

Filed Aug. 1, 1919 3 Sheets-Sheet 1

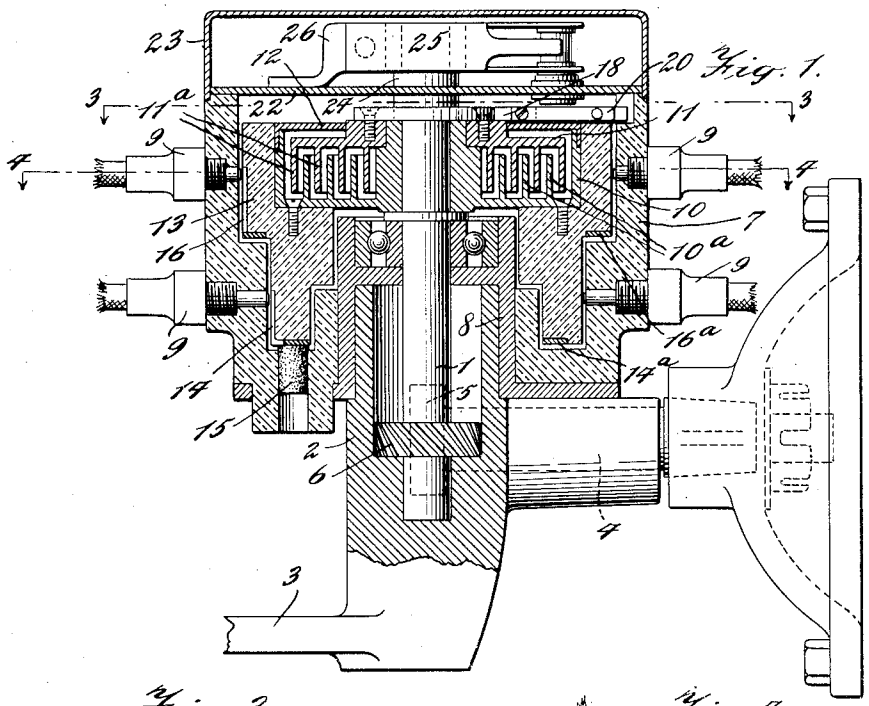

Fig. 1.

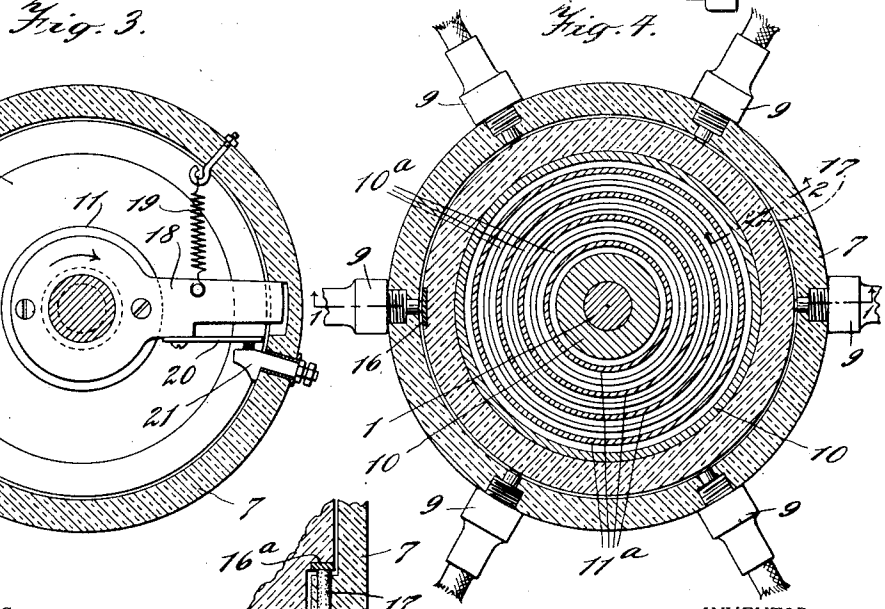

Fig. 3.

Fig. 4.

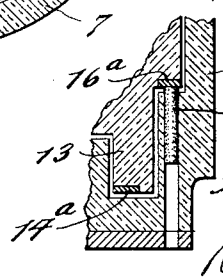

Fig. 2.

WITNESS:

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Fig. 5.

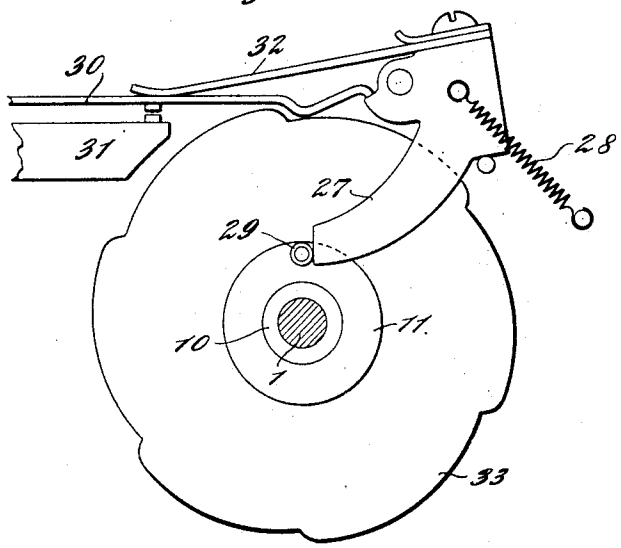
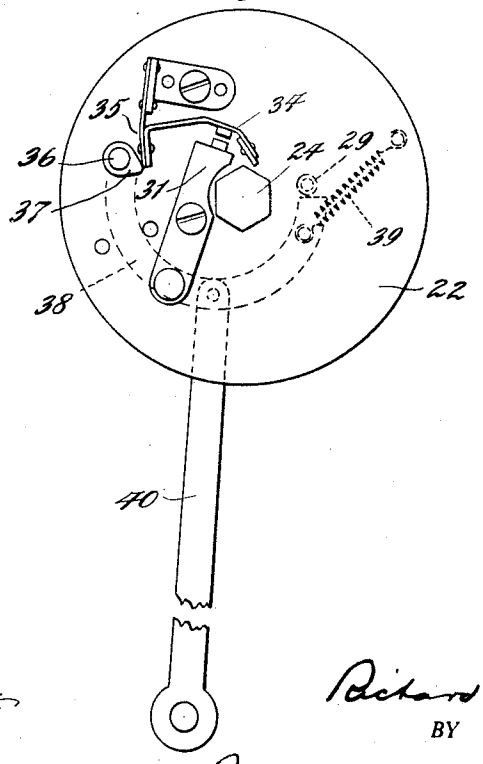


Fig. 6.



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CIRCUIT CONTROLLER

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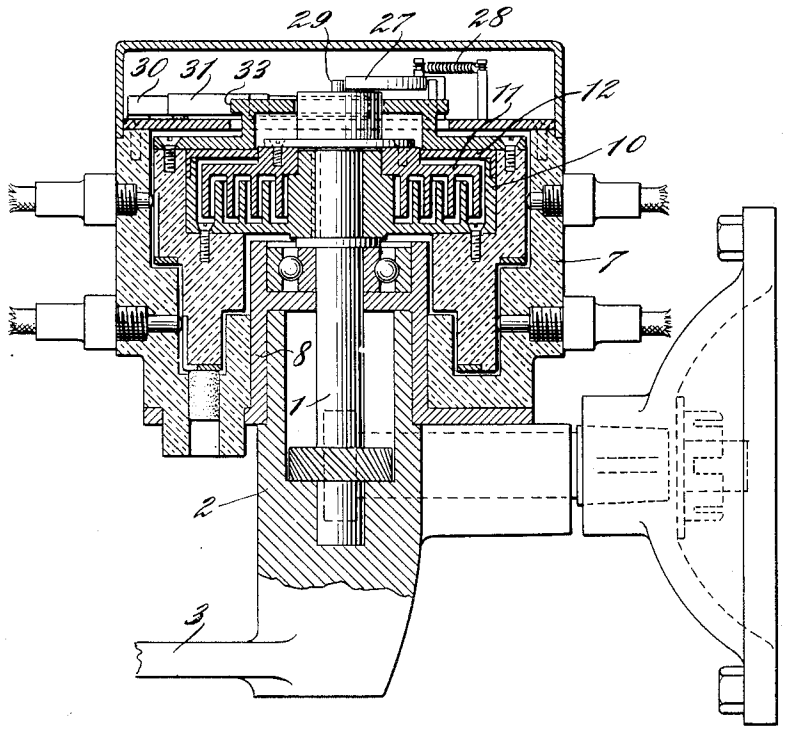
Fig. 7.



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Patented Jan. 29, 1924. 1,482,167

UNITED STATES PATENT OFFICE.

RICHARD VARLEY, OF ENGLEWOOD, NEW JERSEY, ASSIGNOR TO VARLEY DUPLEX MAGNET COMPANY, A CORPORATION OF NEW JERSEY.

CIRCUIT CONTROLLER.

Application filed August 1, 1919. Serial No. 314,643.

To all whom it may concern:

Be it known that I, RICHARD VARLEY, a citizen of the United States, residing at Englewood, in the county of Bergen and State of New Jersey, have invented certain new and useful Improvements in Circuit Controllers, of which the following is a full, clear, and exact description.

My invention has particular application to ignition circuits of internal combustion engines. For example, in automobiles where the current for ignition is supplied by a battery, in order to avoid a needless use of the battery it is essential that the primary of the ignition circuit be open when the engine is not running. One object of my invention is to provide a simple, reliable and effective expedient for automatically opening the circuit when the engine stops and for automatically rendering the circuit operative for ignition purposes when the engine is running.

In accordance with my invention this is effected by providing a suitable transmission, the primary element for which is operated by the engine and the secondary element of which is connected to operate a biased member, such as a circuit closer, to move against its bias and close its circuit, the primary and secondary elements being so coupled as to permit of a relative slip between them. The normally open contact in the primary circuit may be independent of the breaker contact, or it may conveniently be the breaker contact. Preferably the transmission is of such a character that the torque of the secondary element increases with the speed of the primary. This is desirable for instance, in a system in which the secondary element operates to close the breaker contact.

The resilient bias of the breaker contact against which it is moved by the breaker cam must be sufficiently strong at high engine speeds to overcome the inertia of the contact quickly, and commonly a comparatively strong closing spring is used for this purpose, with the result that the wear at low speed is greater than is necessary. In accordance with my invention I obviate this by regulating the closing tension according to the engine speed, and this regulation may advantageously be effected by a transmission of the preferred character referred to.

One example of such a transmission is what may be termed a liquid transmission, in which the primary and secondary elements are frictionally coupled by a liquid of suitable viscosity, such as lubricating oil, glycerine, or the like. The primary and secondary members have each a plurality of vanes, baffles, plates, flanges, discs, or the like, those of one member alternating with those of the other in closely spaced relation and both being contained in the liquid. Preferably the co-operating friction members are vertically disposed flanges to facilitate assembling.

My invention also comprehends a construction of distributor which affords a compactness of construction not otherwise obtainable. Commonly the distributor is arranged above the breaker on a vertical shaft which is supported and driven at its lower end. In accordance with my invention I arrange the distributor below the breaker, the stationary contacts being on the inside of an external hollow cylindrical member which surrounds and overlaps the bearing for the shaft, while the flier is carried on a member secured to the shaft below the breaker and has a depending skirt portion rotating between the external member and the bearing. In this way, the mechanism is brought down much lower on the shaft, and room is afforded to place my transmission device below the breaker and within the distributor. Such a distributor construction also conveniently accommodates a double set of distributor contacts.

My invention has other objects and advantages, and comprehends various other features of construction, as will hereinafter more fully appear.

I shall now describe the illustrated embodiments of my invention, and shall thereafter point out my invention in claims.

Fig. 1 is a sectional elevation of one embodiment of my invention, taken on the line 1—1 of Fig. 4;

Fig. 2 is a fragmentary sectional view on line indicated by 2—2 in Fig. 4;

Fig. 3 is a horizontal section on line 3—3 of Fig. 1;

Fig. 4 is a similar view on line 4—4 of Fig. 1;

Figs. 5 and 6 are schematic representations of different applications of my invention, and

Fig. 7 is a view similar to Fig. 1 of a

device embodying the application of my invention illustrated in Fig. 5.

In the construction illustrated in Figure 1, the operating shaft 1 is vertically disposed and is supported at its lower end in a hollow standard 2 which is integral with a base 3 and which serves as a bearing for the shaft. A stub shaft 4, which is coupled to be driven by the engine, is connected to drive shaft 1 through the spiral gears 5 and 6.

The stationary distributor member is carried by the bearing or standard 2 and comprises the external cylindrical or cup-shaped shell 7 of bakelite or other insulating material attached to a metallic base which is extended upwardly internally of the shell in the form of a sleeve 8 which fits over the upper end of the standard 2 and thereby brings the whole device well down on the standard. A suitable anti-friction bearing is provided at the upper end of the sleeve 8 for the shaft 1. As illustrated, the distributor may be provided with a double set of distributor contacts, the shell 7 having a double set of contacts 9, shown as six in number for a six cylinder engine, and the two sets being disposed in different horizontal planes.

The internal or flier member of the distributor is carried by the primary of the liquid transmission, which comprises an annular cup-shaped metallic member 10 secured to the shaft 1 immediately above the anti-friction bearing from which it is spaced by a narrow collar on the shaft. The secondary member 11 rests on top of the primary member and is an annulus provided at its inner edge with a hub portion which loosely surrounds the center portion of the primary member, and therefore is free to turn thereon. A suitable cover 12 encloses the device.

The primary member 10 is provided with a plurality of concentric flanges 10^a upstanding from the bottom, intermediate of which are similar depending flanges 11^a on the secondary member. The device is partially filled with oil or other liquid which serves to couple the two members and transmit a torque to the secondary member. The vertical arrangement of the flanges prevents the liquid from flying away from the center from centrifugal force, with the result that the coupling effect on the two members is uniform from the inner to the outer edge at all speeds, and chattering or other unevenness in the drive is thereby eliminated.

The flier distributor member 13 is secured to the primary member 10, screws being used for this purpose in the illustrated construction, and consists of an annulus of bakelite or other suitable insulating material having a depending skirt portion fitting within the shell 7. The flier 14 which co-operates with the lower set of contacts 9 extends up from a conducting ring 14^a on the bottom edge of the flier member, to which current is conducted by a brush 15. The flier 16 which co-operates with the upper set of contacts 9 extends up from a conducting ring 16^a on an external overhanging shoulder of the member 13, to which current is conducted by a brush 17, shown in Figure 2.

In the illustrated embodiment the secondary member 11 of the transmission device serves as a circuit controller to close the battery circuit upon the initiation of the operation of the engine. A contact actuating member 18 is operatively connected to the secondary member of the transmission, being permanently secured thereto in the form shown in Figures 1 and 3. This contact actuating member is normally retracted by a spring 19 against a suitable stop, and is rotated by the transmission device in the direction indicated by the arrow in Fig. 3 against the tension of the spring. A contact member 20 is carried by the actuating member 18, which co-operates with a stationary contact member 21. As soon as sufficient drag is developed on the secondary member the actuating member 18 is rotated against the spring tension and the contact is closed, while the spring 19 immediately retracts the movable contact when the engine stops and breaks the battery circuit.

The transmission device can be designed to be sufficiently sensitive to close the contact when the engine is being cranked by an automatic starter, or a parallel ignition circuit controlled by a hand switch may be provided for cranking the engine.

At the upper end of the shaft 1 is the breaker mechanism of usual construction, supported on a plate 22 on the top of the shell 7, and covered by a removable cap 23. The shaft 1 extends centrally through the plate 22 and has the breaker cam 24 at its upper end, operating the pivoted contact member 25 which co-operates with the stationary contact member 26.

The torque of the secondary member 11 increases with the speed of the primary member 10, and in accordance with my invention I may utilize this to increase the closing tension of the breaker contact at high engine speeds. One way of doing this is diagrammatically shown in Figure 5, and also in Figure 7, which is a mechanical embodiment of the same principle, in which the contact actuating member 27 controls the breaker contact. The actuating member 27 is pivoted and is normally retracted against a stop by a spring 28. The secondary member 11 carries a stud or abutment 29 which bears against the end of the actuating member 27. A flat spring contact member 30 carrying the movable contact co-operates with a stationary contact 31, and

when unopposed it is positively held open by the spring 28 through the engagement of the end of the contact member 30 upon a catch or shoulder on the actuating member. A flat spring 32 carried by the actuating member bears upon the contact member 30 in such a way as to force the contact closed as the actuating member is rotated on its pivot by the abutment 29, and it is apparent that this closing tension is proportionate to the rotative moment of the abutment 29. A suitable breaker cam 33 opens the movable contact 30 against the tension of the spring 32.

Another application of my invention to positively open the breaker contact when the engine is at rest is shown in Figure 6, in which the breaker contact is of the non-pivoted type. The movable contact 34 is normally held closed by a flat spring 35 which flexes as indicated to afford the necessary movement of the contact member. On the upper end of a rock stud 36 which extends through the plate 22, I provide a cam 37 adapted to bear against the flat spring 35 or an extension of the contact member beyond the flexing point of the flat spring and open the contact member 34. On the lower end of the rock stud 36 underneath the plate 22 a curved actuating strip 38 is attached and extends with its free end in the path of the abutment 29 on the secondary member of the transmission device. The movement of this strip is limited by stops, as shown, and a coiled spring 39 tends to pull the strip in the direction to rock the stud 36 and cause the cam 37 to open the contact. When the engine is running, the abutment 29 bears against the end of the strip 38 and holds the cam 37 out of engagement with the contact member, thereby permitting the contact to close under its normal tension. The strip 38 may be connected to the cranking lever through a link 40 which operates to remove the cam 37 and close the contact at the time the cranking operation is initiated.

It is obvious that various modifications may be made in the constructions shown in the drawings and above particularly described within the principle and scope of my invention.

I claim:

1. A circuit controller comprising a rotative primary member arranged to be driven by a prime mover, a rotative secondary member having a floating relation with the primary member when the latter is stationary and arranged in control of a circuit, and means for transmitting a torque from the primary member to the secondary member, said means being inoperative to couple the two members when the primary member is stationary.

2. A circuit controller comprising a rotative primary member, a rotative secondary member in proximity to the primary member arranged in control of an electric circuit and having a bias to open circuit position, and a liquid coupling the two members and operative to transmit a torque from the primary member and cause the secondary member to move to closed circuit position while permitting the secondary member to return to open circuit position without the primary member.

3. A circuit controller comprising a drive shaft, an annular cup member axially secured on the shaft, a liquid contained in the cup member, a primary member rotatable with the cup member, a rotative secondary member in proximity to the primary member and coupled thereto by the liquid and loosely surrounding the shaft and including a part operative to close an electric circuit as the secondary member is angularly moved by the primary member, and resilient retractile means operative to retract the secondary member to open circuit position.

4. A circuit controller comprising a rotative primary member arranged to be driven by a prime mover, a rotary secondary member having a floating relation with the primary member when the latter is stationary, resilient retractile means impelling the secondary member in one direction, a movable contact arranged to be closed by the secondary member when the latter is rotated against the force of the retractile means, and means for transmitting a torque from the primary member to the secondary member in excess of the force of the retractile means, said torque transmitting means being inoperative to couple the two members when the primary member is stationary, whereby the secondary member is free to be retracted and open the contact and rotates relative to the primary member to open contact position under the influence of the retractile means when the primary member stops.

5. For an internal combustion engine, a circuit controller comprising, in combination with a movable contact member, actuating means for the contact member biased to open contact position, a rotative primary member arranged to be driven by the engine, a rotative secondary member in proximity to the primary member and including a part operatively engaging the actuating means, and a liquid coupling the two members and operative to transmit a torque from the primary member and cause the secondary member to close the contact.

6. For an internal combustion engine, a circuit controller comprising, in combination with a movable contact member, actuating means for the contact member biased to open contact position, a shaft coupled to be driven by the engine, a cup member axially secured on the shaft, a liquid contained in the cup member, a primary member rotat-

able with the cup member, and a secondary member in proximity to the primary member and coupled thereto by the liquid and loosely surrounding the shaft and including a part operatively engaging the actuating means and adapted to move the actuating means against its bias and close the contact as the secondary member is rotated by the primary member.

7. For an internal combustion engine, a circuit controller comprising, in combination with a cam breaker and a movable contact member arranged to be periodically opened by the cam, actuating means for the contact member arranged to engage and close the contact member and having a bias to open position, a primary rotative member coupled to be driven by the engine, and a secondary member arranged to have a torque produced upon it by the rotating primary member and having a part operatively engaging the actuating means.

8. For an internal combustion engine, a circuit controller comprising, in combination with a cam breaker and a movable contact member arranged to be periodically opened by the cam, actuating means for the contact member arranged to engage and close the contact member and having a bias to open position, a shaft coupled to be driven by the engine, a cup member axially secured on the shaft, a liquid contained in the cup member, a primary member secured to the shaft, and a secondary friction member loosely surrounding the shaft and coupled to the primary member by the liquid and including a part operatively engaging the actuating means and adapted to move the actuating means against its bias and close the contact as the secondary member is dragged by the primary member.

9. For an internal combustion engine, an ignition circuit controller comprising, in combination with a cam breaker and a movable contact member arranged to be periodically opened by the cam, resilient means tending to close the contact member, and means responsive to the speed of the engine arranged in control of the resilient means and operative to increase the tension thereof with the engine speed, whereby the closing tension is relatively small at low engine speeds and relatively large at high engine speeds.

10. For an internal combustion engine, an ignition circuit controller comprising, in combination with a cam breaker and a movable contact member arranged to be periodically opened by the cam, resilient means acting to close the contact member, a rotative primary member driven by the engine, and a rotative secondary member arranged to receive a torque from the primary member varying with the speed of the latter and having operative connection with the resilient means, whereby the closing tension upon the contact member is regulated by the engine speed.

11. For an internal combustion engine, an ignition circuit controller comprising, in combination with a cam breaker and a movable contact member arranged to be periodically opened by the cam, resilient means acting to close the contact member, a rotative primary member arranged to be driven at a speed proportionate to that of the engine, a rotative secondary member having operative connection with the resilient means, and a liquid coupling the two members, whereby the closing tension upon the contact member varies with the engine speed.

12. For a multiple cylinder internal combustion engine, a circuit controller comprising a liquid container, a rotative primary member in the container arranged to be driven by the engine, a rotative secondary member in the container arranged in control of a circuit and having a bias to open circuit position and coupled by the liquid to the primary member and rotatable thereby to closed circuit position, a plurality of stationary distributor contacts, and a distributor flier carried by the primary member and co-operating with the distributor contacts.

13. For a multiple cylinder internal combustion engine, a circuit controller comprising a shaft driven by the engine, an annular cup member axially secured on the shaft, a liquid contained in the cup member, a primary member in the liquid rotatable with the cup member, a rotative secondary member loosely surrounding the shaft and coupled to the primary member by the liquid and including a part operative to close an electric circuit as the secondary member is angularly moved by the primary member, resilient retractile means operative to retract the secondary member to open circuit position, a plurality of distributor contacts, and a distributor flier rotated by the shaft and co-operating with the distributor contacts.

14. A circuit controller comprising a drive shaft, a bearing for one end of the shaft, a stationary hollow cylindrical distributor member surrounding and substantially overlapping the bearing and having a plurality of internal distributor contacts, and a distributor flier member secured to and rotatable by the shaft and having an annular skirt portion extending within the stationary distributor member and having a distributor flier co-operative with the distributor contacts.

15. A circuit controller comprising a vertical drive shaft, a supporting bearing for the lower end of the shaft, a stationary hollow cylindrical distributor member surrounding the shaft and having a plurality of internal distributor contacts, a distributor

flier member secured to the shaft and having a distributor flier co-operative with the distributor contacts, a breaker cam carried by the shaft above the distributor flier member, and a movable contact member arranged to be operated by the cam.

16. A circuit controller comprising a vertical drive shaft, a supporting bearing for the lower end of the shaft, a stationary hollow cylindrical distributor member surrounding and substantially overlapping the bearing and having a plurality of internal distributor contacts, a distributor flier member secured to the shaft above the bearing and having an annular depending skirt portion extending within the stationary distributor member and having a distributor flier co-operative with the distributor contacts, a breaker cam carried by the shaft above the distributor flier member, and a movable contact member arranged to be operated by the cam.

17. A circuit controller comprising a vertical drive shaft, a supporting bearing for the lower end of the shaft, a hollow cylindrical distributor member surrounding and substantially overlapping the bearing and having a plurality of internal distributor contacts, the primary member of a transmission secured to the shaft above the bearing, a distributor flier member carried by the said primary member and having an annular depending skirt portion extending within the stationary distributor member and having a distributor flier co-operative with the distributor contacts, the secondary member of the transmission surrounding the shaft above the primary member in co-operative relation thereto, and a circuit closer operatively connected with the secondary member.

In witness whereof, I subscribe my signature in the presence of two witnesses.

RICHARD VARLEY.

Witnesses:
N. P. HAMILTON,
WALDO M. CHAPIN.