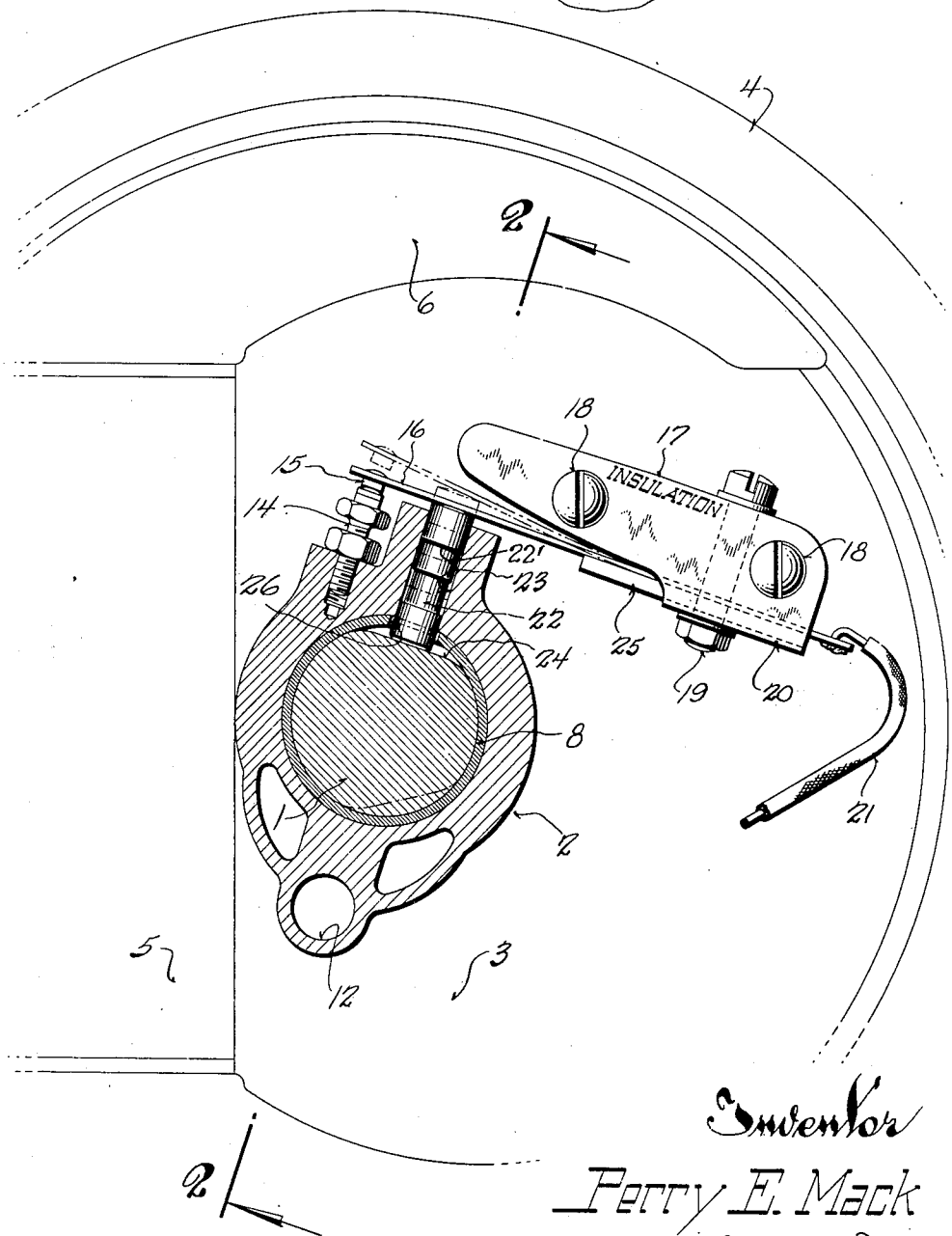
Aug. 13, 1935. P. E. MACK 2,010,957

CIRCUIT BREAKER

Original Filed July 13, 1933 2 Sheets-Sheet 1

Fig. 1.



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Fig. 2.

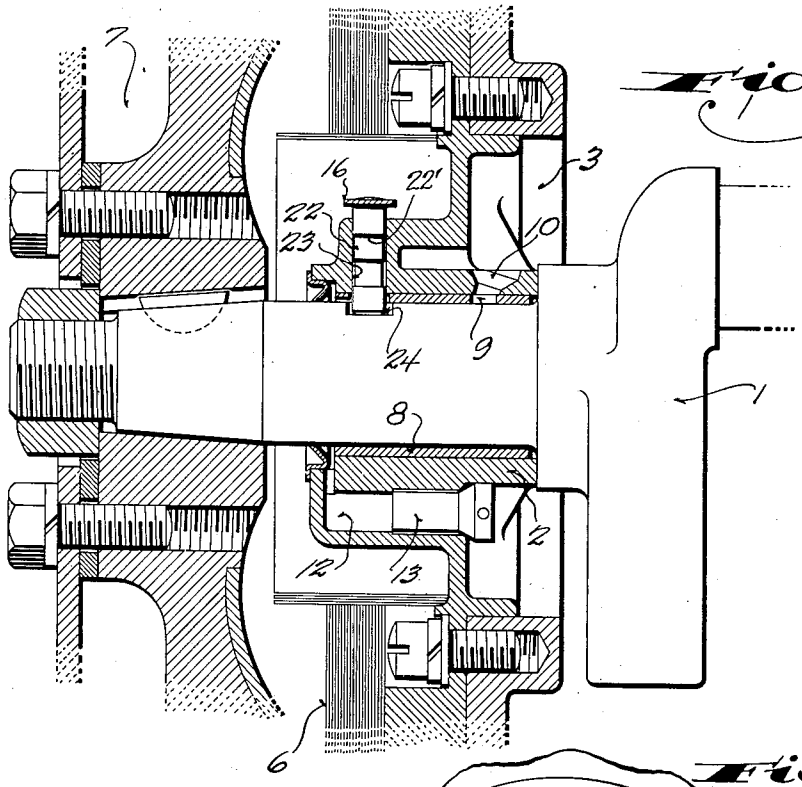


Fig. 3.

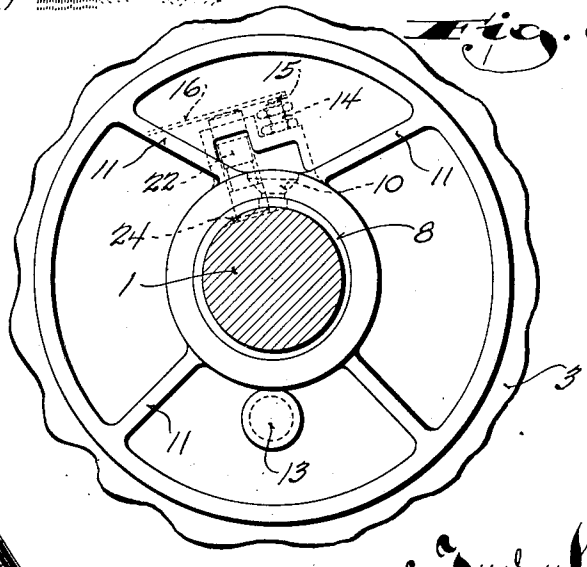
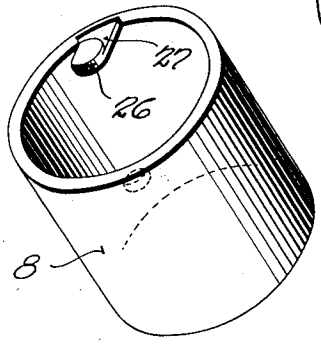


Fig. 4.



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Patented Aug. 13, 1935

2,010,957

UNITED STATES PATENT OFFICE

2,010,957

CIRCUIT BREAKER

Perry E. Mack, Milwaukee, Wis., assignor to Briggs & Stratton Corporation, Milwaukee, Wis., a corporation of Delaware

Original application July 13, 1933, Serial No. 680,209. Divided and this application June 11, 1934, Serial No. 730,012

9 Claims. (Cl. 184—11)

This invention is a division of that disclosed in the copending application of Perry E. Mack, Serial No. 680,209, filed July 13, 1933, and relates to improvements in circuit breakers for use in ignition systems of internal combustion engines and has as a general object to provide an improved magneto circuit breaker for use in conjunction with small gasoline engines.

It is a particular object of this invention to provide actuating means for the circuit breaker, so constructed that adequate lubrication is provided by having the same operate in oil while at the same time the oil is kept from reaching the contacts.

In this connection, it is a feature of this invention to provide novel means for conducting oil to the cam follower which actuates the circuit breaker and for preventing the cam follower from pumping oil out onto the contacts by draining excess oil from the cam follower.

With the above and other objects in view which will appear as the description proceeds, this invention resides in the novel construction, combination and arrangement of parts substantially as hereinafter described and more particularly defined by the appended claims, it being understood that such changes in the precise embodiment of the hereindisclosed invention may be made as come within the scope of the claims.

The accompanying drawings illustrate one complete example of the physical embodiment of the invention constructed according to the best mode so far devised for the practical application of the principles thereof, and in which:

Figure 1 is a section view through one end of the crank shaft of a conventional gasoline engine illustrating part of the magneto assembly and the application of this invention thereto;

Figure 2 is a section view through one bearing for the crank shaft, said view being taken on the plane of the line 2—2 in Figure 1;

Figure 3 is a detail view through Figure 2 on the plane of the line 3—3; and

Figure 4 is a perspective view of the bearing bushing showing the oil drain for the cam follower.

Referring now more particularly to the accompanying drawings, the numeral 1 represents the crank shaft of an internal combustion engine, one end of which is journalled in a bearing 2 carried by a stationary hub 3. The hub 3 forms one wall of the crank case and provides support for a magneto assembly indicated generally by the numeral 4. This assembly comprises an armature coil 5 wound on a laminated metal U-shaped frame 6 as is customary. Inasmuch as the specific construction of the magneto assembly forms no part of this invention, it has not been shown in detail and further description thereof is unnecessary.

The outer extremity of the crank shaft end shown mounts a fly-wheel 7, which overlies the magneto assembly.

The bearing 2 is lined with a bushing 8 having an oil inlet opening 9 which aligns with an oil passage 10 in the top portion of the bearing inner end. As best shown in Figure 3, the inner wall of the hub 3 above the bearing has two inclined ribs 11, which define a pocket or recess in which oil splashed upwardly by the revolving crank collects to flow through the passage 10 and the opening 9 into the bushing. The outer end of the bushing communicates with a drain passage 12, which leads back to the crank case, there being an automatic valve 13 in said passage.

The circuit breaker per se comprises a stationary contact 14 adjustably mounted on the bearing 2 to be engaged by a movable contactor 15 mounted on the free end of a spring blade 16. The blade 16 is anchored to a block 17 of insulating material secured by screws 18 to the adjacent wall of the hub 3, the spring blade 16 being secured to the block by a bolt 19. The blade is held against turning about the bolt by flanges 20 formed on the block and projecting down over the side edges of the blade.

The extreme end of the blade opposite the contactor projects beyond the block 17 to provide a terminal to which a conductor wire 21 is attached to connect the same in the electrical circuit in the customary manner.

The undersurface of the block 17 against which the spring blade 16 engages is curved away from the blade from a point approximately in line with the bolt 19 to afford a support against which the blade progressively rests as it is flexed during movement to open position. Such movement of the blade is effected by a push pin or cam follower 22 formed of insulating material and slidable in a radial bore 23 in the bearing 2 with its inner end aligned with a flat spot 24 forming a cam on the shaft. Obviously, upon each revolution of the shaft, and the consequent alignment of the flat spot 24 with the push pin, the breaker points are permitted to contact.

The progressive engagement of the blade 16 with the curved surface of the supporting block causes the fulcrum point to move outwardly along the support and consequently, shortens the free

end portion of the spring. This changing of the effective length of the spring alters its period of vibration and effectively quenches all harmonic vibrations that tend to cause chattering at the contact points. Overstraining of the spring blade is also prevented by this construction.

A rebound guard 25, which consists of a strip of stiff metal is fixed to the support over the spring blade and extends a substantial distance out over the free end portion of the spring to limit outward swinging of the spring and cooperate with the supporting block 17 to prevent chattering.

It will be noted that the inner end of the push pin or cam follower passes through an opening 26 in the bushing sleeve 8. This opening, which obviously aligns with the radial bore 23 in the bearing, is sufficiently large to permit oil to flow up into the bore 23. The push pin consequently "floats" in oil.

To preclude the pumping of oil out through the radial bore 23 by the push pin 22, the push pin has its medial portion reduced in diameter as shown to provide an annular space in which the oil accumulates so as to maintain an adequate supply of oil for free lubrication of the pin, and to provide a sharply defined shoulder 22' which serves to scrape excess oil from the walls of the radial bore 23. The excess oil accumulating in the bore 23 is conducted therefrom by a diagonal drain slot 27 which leads from the hole 26 in the bushing 8 to the adjacent drained end of the bushing, the capacity of the slot being such that only the excess oil is carried away from the push pin.

To further insure that the oil will not be discharged from the outer end of the radial bore 23 and onto the contacts of the circuit breaker, a condition which is highly objectionable, the push pin is located above the bearing so that it works upwardly, as shown. Consequently, gravity assists in drawing the oil downward in the radial bore 23.

Another feature which aids in preventing oil from being discharged out through the radial bore 23 is the fact that the cam follower is located at the end of the bearing remote from the oil supply so that the diagonal drain slot 27 is short.

From the foregoing description taken in connection with the accompanying drawings, it will be readily apparent to those skilled in the art, that this invention materially simplifies the construction of magneto circuit breakers and eliminates wear from all active parts of its assembly. It is also apparent that while adequate lubrication is afforded and the cam follower which actuates the circuit breaker actually floats in oil, discharge of the oil out onto the contacts is effectually prevented.

What I claim as my invention is:

1. A device to actuate a circuit breaker comprising a cam shaft, a journal formed on the cam shaft and having a cam formed on its surface, a cam follower associated with the shaft and operable to move a circuit breaker part, a common bearing supporting the journal and guiding the cam follower for reciprocation, the outer end of the cam follower projecting beyond its opening in the bearing to be engageable with the circuit breaker part, means to supply said bearing with liquid lubricant so that the journal of the shaft and the cam follower run in said lubricant, and means to keep lubricant from passing to the outer end of the cam follower.

2. A device to actuate a circuit breaker comprising a bearing, a shaft having a journal revoluble in said bearing and having part of the journal circumferentially interrupted to form a cam, a follower reciprocably mounted in an opening through the wall of the bearing with its outer end portion projecting from the end of said opening to be engageable with a circuit breaker part located adjacent the outer end of said opening, means to supply the bearing and consequently the opening through the bearing wall with liquid lubricant whereby the cam follower operates in said liquid lubricant, and means to prevent the discharge of lubricant past the outer end of the cam follower onto the circuit breaker part.

3. A device to actuate a circuit breaker comprising a bearing, a cam shaft revoluble in said bearing and having a cam lying within the bearing, a cam follower operating in a radial opening entirely through the wall of the bearing, the outer end of the cam follower projecting from the radial opening to engage and transmit motion generated by the cam shaft to a circuit breaker part, means to supply the bearing and consequently the radial opening guiding the cam follower with fluid lubricant so that the cam follower operates in said fluid lubricant, means providing a drain through which excess lubricant is conducted from the radial opening, and means on the cam follower to keep lubricant from passing out through said opening.

4. A device to actuate a cicuit breaker comprising a bearing, a cam shaft having a journal revoluble in the bearing, the journal having a cut out portion providing a cam, a cam follower reciprocable by the cam in an opening through the wall of the bearing and projecting from the outer end of the opening to move a circuit breaker part, means to supply the bearing and consequently the opening in which the cam follower reciprocates with fluid lubricant, and means to prevent splashing of the lubricant from the outer end of the opening in which the cam follower reciprocates.

5. A device to actuate a circuit breaker comprising a bearing, a cam shaft having a journal revoluble in the bearing, part of the journal being circumferentially interrupted to form a cam, a cam follower reciprocable by the cam in an opening through the wall of the bearing and projecting from the outer end thereof to move a circuit breaker part, means to supply the bearing and consequently the opening in which the cam follower reciprocates with fluid lubricant, and means to prevent lubricant from discharging from the outer end of said opening including a drain passage leading from said opening to one end of the bearing.

6. A device to actuate a circuit breaker, comprising a bearing, a cam shaft having a journal revoluble in the bearing, said journal having a cam formed in its surface, a cam follower reciprocable in an opening through the wall of the bearing and operable by said cam to move a circuit breaker part, means to supply the bearing and consequently the opening in which the cam follower reciprocates with lubricant, and the bearing having a drain slot communicating with the opening in which the cam follower reciprocates and leading to one end of the bearing to drain excess lubricant from said opening and prevent splashing of the lubricant out through the end of said opening.

7. A device to actuate mechanism on which the presence of oil is objectionable, comprising a bearing, a shaft having a journal revoluble in said

bearing, part of the journal being circumferentially interrupted to form a cam, the wall of the bearing having a radial opening in line with the cam on the journal, a push pin reciprocable in said radial opening with its inner end engageable with said cam and its outer end projecting from the radial opening to engage and impart motion generated by the cam to said mechanism, means to supply fluid lubricant to the bearing and consequently the radial opening so that said push pin is adequately lubricated, and means to prevent the passage of lubricant out through the radial opening and onto said mechanism comprising a sharply defined shoulder on the push pin adapted to scrape lubricant from the wall of the opening, and a drain for excess lubricant communicating with the inner end of the radial opening.

8. A device to actuate mechanism on which the presence of oil is objectionable, comprising a bearing, a shaft having a journal revoluble in said bearing, part of the journal being circumferentially interrupted to form a cam, the wall of the bearing having a radial opening in line with the cam on the journal, a push pin reciprocable in said radial opening with its inner end engageable with said cam and its outer end projecting from the radial opening to engage and impart motion generated by the cam to said mechanism, means to supply fluid lubricant to the bearing and consequently the radial opening so that said push pin is adequately lubricated, and means to prevent the passage of lubricant out through the radial opening and onto said mechanism comprising a sharply defined shoulder on the push pin adapted to scrape lubricant from the wall of the opening, a drain for excess lubricant communicating with the inner end of the radial opening, said drain comprising a slot communicating with the radial opening and leading to one end of the bearing, and a drain passage at said end of the bearing to carry lubricant therefrom.

9. A device to actuate mechanism on which the presence of oil is objectionable comprising a bearing, means mounting said mechanism with a movable part thereof overlying the upper wall of the bearing, a shaft having a journal revoluble in said bearing, and said journal having a portion near one end of the bearing circumferentially interrupted to form a cam, said upper wall of the bearing having a radial bore therethrough in line with the cam, a push pin reciprocable in said bore with its inner end engageable by the cam and its outer end projecting from the bore to engage the movable part of the mechanism, means to supply oil to the end of the bearing opposite its end at which the push pin is located so that oil flowing along the bearing enters the radial bore to lubricate the push pin, a drain for excess oil at the end of the bearing adjacent the push pin, and means to prevent oil passing outwardly up through the radial bore onto said mechanism comprising a sharply defined shoulder on the push pin adapted to scrape oil from the wall of the bore, and a drain passage leading from the inner end of the bore to said drain to carry oil directly from the bore to said drain.

PERRY E. MACK.