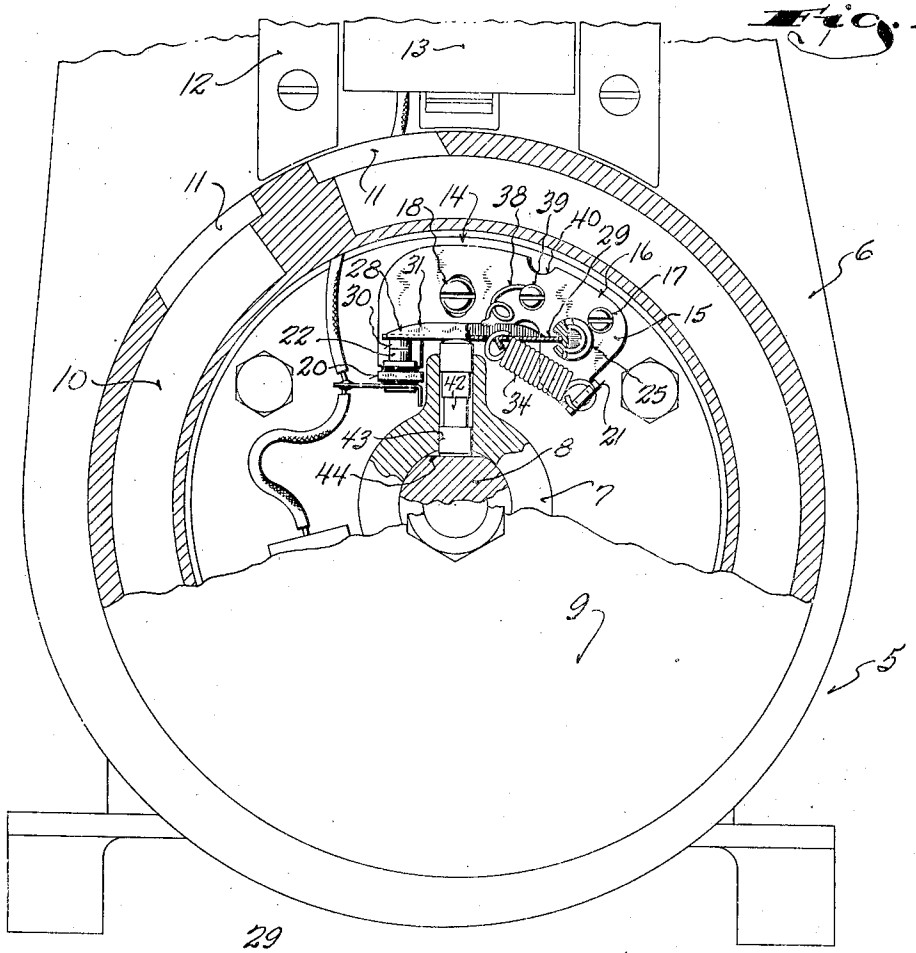
Sept. 13, 1938. P. E. MACK 2,129,953

MAGNETO ASSEMBLY

Filed July 18, 1936

Fig. 1.



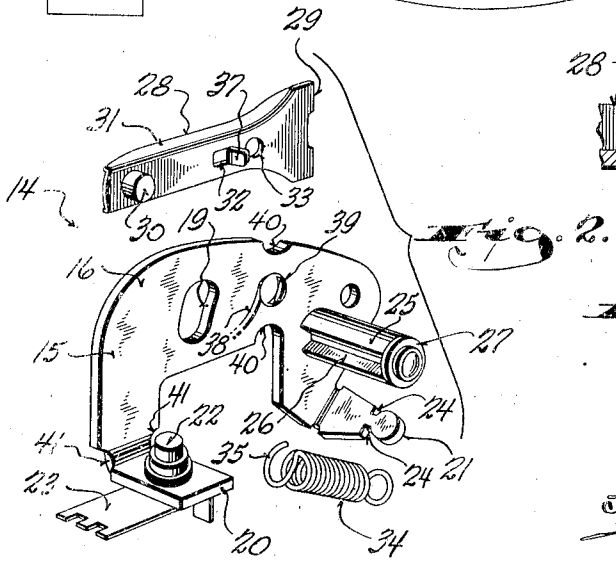


Fig. 2.

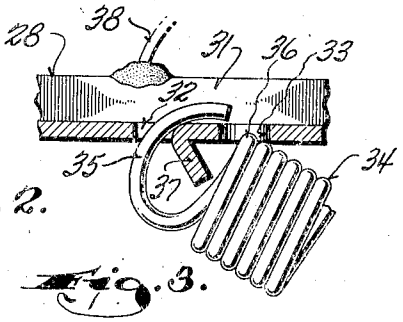


Fig. 3.

Inventor

Perry E. Mack

By Smith & Jones

Attorneys

Patented Sept. 13, 1938

2,129,953

UNITED STATES PATENT OFFICE

2,129,953

MAGNETO ASSEMBLY

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

Application July 18, 1936, Serial No. 91,331

12 Claims. (Cl. 200—30)

This invention relates to improvements in circuit breakers for internal combustion engines and refers particularly to circuit breakers for use in small portable engines.

One of the objects of this invention is to provide a circuit breaker of unitary construction which may be assembled and tested as a unit prior to its assembly on the engine.

Another object of this invention is to provide a circuit breaker which can be more readily assembled and adjusted than devices of this character heretofore in use.

Another object of this invention is to provide a circuit breaker of the character described which is so designed that the contact pressure is not altered upon wearing away of the contacts so as to insure a good contact at all times.

Another object of this invention is to provide a circuit breaker of the character described wherein the pivotal mounting for the switch arm is greatly improved through the use of a V shaped notch or groove extending longitudinally of a mounting post.

And a further object of this invention is to provide a circuit breaker of the character described wherein the spring for the switch arm is so associated therewith that the spring itself coacts with the switch arm to hold these parts against relative displacement and to damp out vibrations and chattering on the part of the switch arm.

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 herein disclosed invention may be made as come within the scope of the claims.

The accompanying drawing illustrates 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 an end view showing part of a small portable internal combustion engine with parts of its fly wheel broken away to illustrate the application of this invention thereto;

Figure 2 is a perspective view showing the various parts of the circuit breaker disassembled;

Figure 3 is an enlarged detail section view through the switch arm showing the manner in which the spring is attached thereto.

Referring now more particularly to the accompanying drawing, in which like numerals indicate like parts throughout the several views, the numeral 5 designates generally an internal combustion engine of the small portable type having a crank case which is closed at one end by a mounting plate 6.

The plate 6 has a bearing 7 in which a crank shaft 8 is journaled. Mounted on the shaft 8 outwardly of the plate 6 is a fly wheel 9 in which a permanent ring magnet 10 is embedded with its poles 11 exposed on the outer periphery of the wheel. Coacting with the ring magnet to complete a magneto assembly is an armature core 12 having an induction coil 13 mounted thereon.

The core 12 is fixed to the mounting plate in such a manner that its pole pieces lie on an arc and are concentric to and spaced slightly from the outer wall of the fly wheel to be swept by the poles 11 of the ring magnet. Associated with the magneto assembly is a circuit breaker indicated generally by the numeral 14 and which forms the subject matter of this invention.

This circuit breaker is characterized by the fact that it is one unitary assembly mounted on the engine as a complete unit so that it may be tested and adjusted prior to its assembly on the engine.

It comprises a mounting bracket 15 stamped from sheet metal and having a flat attaching plate 16 which is secured to the mounting plate 6 by screws 17 and 18. For purpose of adjustment to be hereinafter more fully described, the screw 18 passes through an elongated hole 19 in the attaching plate.

Projecting out from the attaching plate 16 are two lugs or flanges 20 and 21 both substantially perpendicular to the plate 16. The lug 20 has a stationary contact 22 mounted thereon but electrically insulated therefrom. To facilitate connecting the stationary contact in the electrical circuit a terminal 23 is electrically connected thereto. The other lug 21 has its opposite side edges notched as at 24 and forms a stationary spring support.

Fixed to and projecting out from the attaching plate 16 is a post 25 which has a longitudinally extending substantially V shaped groove 26 in its side facing the stationary contact 22. The post 25 is preferably secured to the plate 16 by a rivet formed as an integral part of the post. The outer end of the groove 26 is closed by a washer 27 held in place by a rivet also integral with the post.

The groove provides a fulcrum for a switch arm 28 one end 29 thereof which may be considered the base of the arm being received in the

groove. The width of this end 29 of the arm is equal to the length of the groove so that when engaged therein it is restrained against longitudinal motion but is free to swing toward and from the stationary contact 22.

At its outer free end the arm 28 carries a movable contact 30 which is engageable with the stationary contact 22. The parts are so proportioned that when the end 29 of the arm is engaged in the V shaped groove the two contacts 22 and 30 come together properly.

Like the mounting bracket, the switch arm 28 is stamped from sheet metal and is re-inforced by longitudinal flanges 31 on its side edges which merge into its wider end or base 29, and medially of its ends the arm has two spaced openings 32 and 33. These openings provide for the attachment of one end of a coiled tension spring 34, to the arm. The other end of the spring is hooked onto the lug 21. The spring 34 pulls the switch arm towards the stationary contact 22 to provide contact pressure and also holds the end 29 of the arm in the groove 26.

The notches 24 in the lug 21 hold the adjacent end of the spring in a plane which bisects the length of the groove 26 and as the point of attachment of the other end of the spring to the switch arm is also centrally disposed with respect to the length of its bearing, the spring holds the arm without the imposition of any sidewise strain, thus assuring proper engagement of the movable contact 30 with the stationary contact 22.

To guard against any tendency on the part of the spring to rock on its axis and thereby impose force having an objectionable sidewise or lateral component on the switch arm, the attaching loop 35 which is hooked into the opening 32 is so shaped and proportioned that at least the adjacent end coil 36 of the spring engages into the opening 33. In this way, the spring has a two point contact with the arm which serves to restrain the spring against rocking on its own axis and also serves to damp out vibrations and chattering on the part of the switch arm.

A double wall thickness at the edge of the opening 32 engaged by the spring loop 35 prevents excessive wear and cutting of the spring loop into the edge of the opening. This double thickness is provided by bending back the metal struck from the arm to form the opening 32 into an angularly extending tongue 37.

While the pivotal mounting of the switch arm provided by the engagement of the base end 29 in the longitudinal groove 26 provides a ground connection between the arm and the mounting structure, a more positive electrical connection is obtained by a pigtail 38 soldered to the switch arm and secured to the mounting bracket as at 39.

As hereinbefore brought out the parts are so designed and proportioned that the movable contact 30 will be properly aligned with the stationary contact 22 when the base end 29 of the switch arm is engaged in the V groove in the post.

However, in production it is probable that the post 25 and the flange or lug 20 will not be properly positioned with respect to each other so as to necessitate some adjustment to insure proper engagement between the contacts. Such adjustment is facilitated by the provision of notches 40 in the side edges of the attaching plate 16 between the post and the flange 20 and similar notches 41 at the junction of the flange 20 with the attaching plate.

These notches weaken the mounting bracket at these points so as to facilitate twisting the same to effect the proper disposition between the post 25 and the stationary conact.

As shown in Figure 1, the switch arm is actuated by an insulated plunger 42 slidable in a radial bore 43 in the bearing 7. One end of the plunger or pin 42 bears against the switch arm and its opposite end enters the bore of the bearing 7 to be engageable with the adjacent portion of the crank shaft. A flattened part 44 on the crank shaft in line with the radial bore 43 allows the circuit breaker to close once each revolution.

Proper adjustment in the location of the circuit breaker assembly with respect to the actuator pin 42 is obtained by loosening the screw 18 and moving the entire assembly about the axis of the screw 17. It is for this purpose that the elongated slot 19 is provided.

From the foregoing description taken in connection with the accompanying drawing, it will be readily apparent to those skilled in the art to which this invention appertains, that this invention provides an exceptionally compact circuit breaker mechanism, which, being a complete unit in itself, may be tested and adjusted prior to its attachment to the engine and that by virtue of its exceptional simplicity it is well suited to economical manufacture.

What I claim as my invention is:

1. In a circuit breaker, a switch arm, a post having a longitudinal groove to receive one end of the switch arm and pivotally support the arm, a contact carried by the opposite end of the arm, and a single spring engaging the switch arm at a point between the pivotal support and the contact whereby the spring force is divided to yieldingly urge the arm toward one circuit controlling position and to hold the switch arm in the groove.

2. In a circuit breaker, a post having a substantially V-shaped longitudinal groove, a switch arm carrying a contact at one extremity thereof and having its other extremity engaged in said V-shaped groove so that the arm is pivotally supported on the post, a tension spring hooked onto the arm near the post pulling the arm angularly toward the post to retain the arm seated in the groove and to yieldingly hold the arm in circuit closing position, and means engageable with the arm medially of its contact and the point of spring attachment for moving the arm to open circuit position.

3. In a circuit breaker, a stationary contact, a switch arm having a contact at one end thereof for engagement with the stationary contact to close a circuit, a pivotal support for the switch arm engaged by the opposite end of the arm, a tension spring attached to the arm near its pivotal connection with the support pulling the arm toward the support and the stationary contact, and means engageable with the arm between its contact and the point of spring attachment for moving the same against the tension of the spring to disengage its contact from the stationary contact.

4. In a circuit breaker, a mounting plate, a stationary contact on the mounting plate, a switch arm having a movable contact at one end engageable with the stationary contact, a post fixed on the plate and having a longitudinal groove facing the stationary contact to receive the end of the switch arm opposite the movable contact so as to provide a pivotal mounting for the switch arm,

a fixed spring support carried by the plate adjacent the post and at the same side of the arm the contacts are located, and a tension spring having one end attached to the switch arm and the other end attached to said fixed support for yieldingly drawing the switch arm into circuit closing position and for maintaining the same seated in the groove.

5. In a circuit breaker, a mounting plate stamped from bendable metal and having a flat attaching surface and two spaced upstanding lugs substantially perpendicular to the plane of the attaching surface, a stationary contact carried by one of said lugs, a post fixed to the supporting surface adjacent the other of said lugs, and having a longitudinal groove on its side facing the stationary contact, a switch arm having one end seated in said groove to be pivotally mounted enabling its outer free end to swing toward and from the stationary contact, and a tension spring having one end attached to said other lug adjacent the post and its opposite end engaging the medial portion of the switch arm to yieldingly draw the switch arm toward the stationary contact and toward the post.

6. In a circuit breaker, a stationary contact, a post having a longitudinal groove facing the stationary contact, a switch arm having one end fulcrumed in said groove and its opposite end engageable with the stationary contact, a spring connected to the arm to apply spring force acting on the arm in a direction toward the post and stationary contact so as to yieldingly maintain the arm engaged with the post and the stationary contact, and means for holding the arm against edgewise movement with respect to the post to preclude disalignment of its outer free end with the stationary contact.

7. In a circuit breaker, a switch arm, a post having a longitudinal channel to receive one end of the switch arm and provide a pivotal mounting therefor, a fixed support adjacent to the post, a tension spring having one end hooked to the fixed support and its other end attached to the medial portion of the switch arm to yieldingly draw the arm toward the post and tending at all times to swing the arm in one direction on its pivotal mounting, and means on the switch arm engageable with the adjacent coils of the spring for holding the spring centrally with respect to the switch arm and for preventing chattering of the arm.

8. In a circuit breaker, a pivoted switch arm, a tension spring having one end attached to the arm to yieldingly urge the same in one direction, said spring pulling on the arm in a line forming an acute angle to the arm and having its hook which engages the arm so proportioned as to dispose the end coil of the spring in contacting relationship to the switch arm whereby the spring and arm are held against relative displacement and whereby vibrations and chattering on the part of the switch arm are damped out.

9. In a circuit breaker of the character described, a pivoted switch arm having two spaced holes medially of its length, and a coiled tension spring for yieldingly urging the arm in one direction having an attaching loop passing through one of said holes and applying its force on a line forming an angle sufficiently acute with respect to the switch arm as to dispose its adjacent end coil in the other opening and thereby hold the spring against rocking.

10. In a circuit breaker, a pivotally mounted switch arm stamped from sheet metal and having a hole located medially of its ends, a tension spring to yieldingly urge the arm in one direction having an attaching loop passing through said hole, and means at the edge of said hole which is engaged by the spring loop to re-inforce said edge.

11. In a circuit breaker, a stamped metal switch arm having a hole medial of its ends, a tension spring to yieldingly urge the arm in one direction having a loop passing through said hole, and a double thickness wall portion at the edge of said opening engaged by the spring loop, said double thickness wall portion being formed by bending back the metal cut out from the arm to form the opening.

12. In a circuit breaker, a one piece stamped metal mounting bracket having a flat attaching plate and an upstanding lug substantially perpendicular to the plane of the plate, a stationary contact carried by said lug, a post projecting perpendicularly up from the plate at a distance from the stationary contact and having a longitudinal groove facing the stationary contact, a switch arm having a wide base at one end thereof engageable in said groove to pivotally mount the arm with its outer end portion engageable with the stationary contact, spring means for yieldingly urging the switch arm about its pivotal mounting in a direction toward the stationary contact, and said plate having notches weakening its portion between the stationary contact and the post to enable twisting of the plate to dispose the post and stationary contact in exactly parallel planes in the event such adjustment is required.

PERRY E. MACK.