

F. CONRAD & T. ABTMEYER.  
 INTERRUPTER.  
 APPLICATION FILED MAY 11, 1914.

1,171,596.

Patented Feb. 15, 1916.

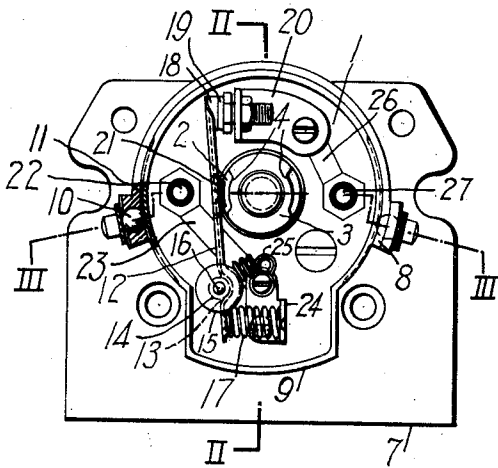


Fig. 1.

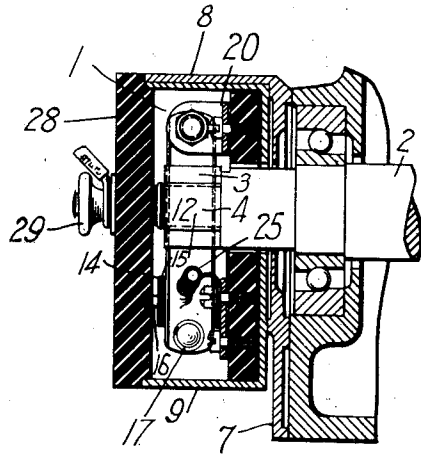


Fig. 2.

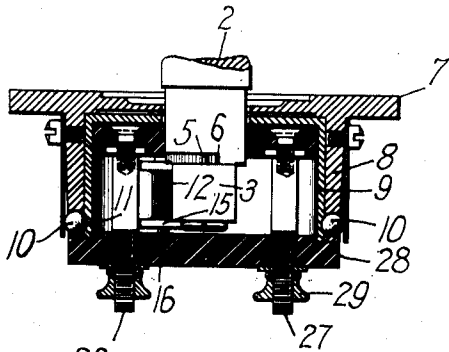


Fig. 3.

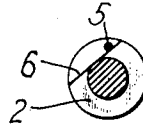


Fig. 4.

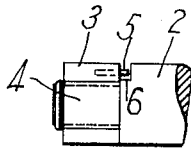


Fig. 5.

WITNESSES:

*R. Lidg.*  
*J. R. Langley*

INVENTORS

*Frank Conrad*  
*& Theodor Abtmeier*  
 BY  
*Walter S. Carr*  
 ATTORNEY

# UNITED STATES PATENT OFFICE.

FRANK CONRAD, OF PITTSBURGH, AND THEODORE ABTMEYER, OF WILKINSBURG,  
PENNSYLVANIA, ASSIGNORS TO WESTINGHOUSE ELECTRIC AND MANUFACTURING  
COMPANY, A CORPORATION OF PENNSYLVANIA.

## INTERRUPTER.

1,171,596.

Specification of Letters Patent.

Patented Feb. 15, 1916.

Application filed May 11, 1914. Serial No. 837,721.

*To all whom it may concern:*

Be it known that we, FRANK CONRAD, a citizen of the United States; and a resident of Pittsburgh, in the county of Allegheny and State of Pennsylvania, and THEODORE ABTMEYER, a citizen of the United States, and a resident of Wilkinsburg, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Interrupters, of which the following is a specification.

Our invention relates to interrupters and particularly to such devices as are employed in connection with the ignition systems of internal combustion engines.

Our invention has for its object to provide an interrupter that is simple in construction and efficient in operation to prevent the back firing of an internal combustion engine with which it may be operatively associated.

It is well known that, in starting a gas engine, back firing will occur if the ignition mechanism is so adjusted that the spark occurs before the pistons reach a dead-center position. It is also well known that, in cranking an internal combustion engine having high compression, it is not always possible to rotate the engine shaft upon the first attempt and, in such cases, it is necessary to allow a partial backward rotation in order that the moving parts may acquire a sufficient inertia to enable the operator to rotate the engine shaft beyond the dead center position. Many serious injuries to the operators of automobiles have occurred under such circumstances through the back firing of the engine. These accidents may occur regardless of the proper adjustment of the ignition mechanism because the backward rotation of the engine mechanism causes the interrupter to open its circuit and cause a spark at such a point in the cycle of the operation of the engine that the resultant explosion causes a forcible backward rotation of the engine shaft. The actuation of the interrupter during backward rotation is caused by the engagement of the rear portions of the usual cam surfaces of the rotatable part of the interrupter, with the lever carrying one of the contact members.

We provide an interrupter in which the rotatable part has a lost-motion connection to its operating shaft. When a partial back-

ward rotation occurs, there is no relative movement between the coacting parts of the interrupter and, therefore, no spark can occur to cause back firing.

The details of our invention will be described in connection with the accompanying drawings in which—

Figure 1 is an end view, partially in elevation and partially in section, of an interrupter constructed in accordance with our invention. Fig. 2 is a sectional view on line II—II of Fig. 1. Fig. 3 is a sectional view on line III—III of Fig. 1. Figs. 4 and 5 are views of details.

Referring to the drawings, an interrupter 1 comprises a rotatable portion which includes a shaft 2 and a disk 3 having oppositely disposed cam faces 4. The cam faces 4 are so arranged as to produce a quick movement of the coacting part to open and close the circuit which is controlled thereby. Since the cam faces 4 are of symmetrical form, the cam 3 may be employed equally as well for either direction of rotation. The disk 3 is rotatably mounted on a reduced portion of the shaft 2 but its movement relatively to the shaft is limited by a pin 5 carried by the disk 3 and a shoulder portion 6 on the shaft 2. The interrupter comprises, also, a stationary part which includes a supporting plate 7 having a curved flange portion 8. The supporting plate 7 may be attached to any suitable mechanism as, for example, to the end plate of a dynamo-electric machine having an armature shaft corresponding to the shaft 2. A member 9, of substantially cup-shape, is mounted within the flange portion 8 and is yieldingly retained therein by a pair of spring-pressed balls 10 which engage a coacting groove 11 in the member 9. A lever 12 has an intermediate curved portion 13 which bears upon an insulating bushing 14 having circular flanges 15 to form a bobbin or spool-like member. The bushing 14 is rotatably mounted upon a pin 16 which thus forms a pivotal support for the lever 12.

A spring 17 bears upon one end of the lever 12 to normally effect the engagement of the contact member 18 carried by the lever at its opposite end with a stationary contact member 19 that is adjustably mounted upon a conducting member 20. The lever 12 is provided at an intermediate

portion with a block 21 of fiber, or other suitable material, to coact with the cam surfaces 4 of the disk 3. The electrical circuit through the interrupter extends from a terminal screw 22 through a conducting plate 23, a member 24, in parallel through the spring 17 and a shunt conductor 25, lever 12, contact members 18 and 19, member 20 and a conducting plate 26 to a second terminal 27. A cover plate 28 of insulating material is held in position by the thumb nuts 29 on the terminal screws 22 and 27. The various parts forming the circuit above traced are supported by and insulated from the cup shaped member 9.

If, in starting an internal combustion engine having an ignition mechanism which comprises an interrupter constructed in accordance with our invention, the engine shaft be allowed to rotate backwardly, the cam 3 will remain stationary for a sufficient portion of the engine cycle to prevent actuation of the lever 12. When forward rotation is imparted to the engine shaft, the cam 3 is rotated to separate the contact members 18 and 19 and thereby cause an ignition spark at the proper instant to cause forward rotation. In the operation of the interrupter, the time of the spark may be controlled by adjusting the position of the member 9 relatively to the stationary plate 7. This adjustment may be accomplished in any suitable or well known manner. The member 9 may be removed from the supporting plate 7 for inspection and repair of the mechanism contained therein by simply pulling it outwardly with sufficient force to remove the balls 10 from the groove 11.

We claim as our invention:

1. In an interrupter, the combination with a pair of relatively movable contact pieces, of means comprising a member having a cam surface for actuating one of said contact pieces, an axially extending pin connected to said member and a rotatable member having a plurality of shoulder portions coacting with said pin to form a lost-motion connection to the cam member.

2. In an interrupter, the combination with a rotatable shaft having shoulder portions, and a cam mounted thereon and having a pin for engaging said shoulder portions to form a lost-motion connection thereto, of a pair of relatively movable contact members, and a lever carrying one of said contact members and coacting with said cam.

3. In an interrupter, the combination with a rotatable member having shoulder portions and a cam mounted thereon and having a projection for coacting with said shoulder portions to form a lost-motion connection thereto, of an adjustable member, a pair of relatively movable contact members

mounted on said adjustable member, a lever carrying one of said contact members and coacting with said cam.

4. In an interrupter, the combination with a rotatable member having shoulder portions, and a cam mounted thereon and having a pin for engaging said shoulder portions to form a lost-motion connection thereto, said cam being provided with a pair of oppositely disposed recessed portions, of a pair of relatively movable contact members, and means actuated by said cam for separating said contact members.

5. In an interrupter, the combination with a rotatable member, and a cam mounted thereon, of a lever coacting with said cam, and a pivotal support for said lever comprising a pin and an insulating bushing on said pin.

6. In an interrupter, the combination with a rotatable member, and a cam mounted thereon, of a lever coacting with said cam and provided with an intermediate curved portion, a pin for pivotally supporting said lever at said curved portion, and an insulating bushing on said pin.

7. In an interrupter, the combination with a pair of relatively movable contact members, a lever carrying one of said members and having a curved intermediate portion, a stationary pin, a flanged bushing on said pin for coacting with said curved portion, and means for actuating said lever.

8. In an interrupter, the combination with a pair of coacting contact members, a lever carrying one of said members, said lever having the form of a channel in cross section and being provided with a curved intermediate portion, a rotatably supported flanged bushing for supporting said lever at the curved portion, a spring bearing upon one end of said lever, and means for actuating said lever.

9. In an interrupter, the combination with a pair of relatively movable contact pieces, and a supporting member therefor, of means comprising a cam member for actuating one of said contact pieces, a rotatable shaft having a lost-motion connection to one of said members and means comprising a pin and a plurality of shoulder portions for forming said lost-motion connection.

In testimony whereof, we have hereunto subscribed our names this 27th day of April, 1914.

FRANK CONRAD.  
THEODORE ABTMEYER.

Witnesses as to Conrad:

W. L. WRIGHT,  
B. B. HINES.

Witnesses as to Abtmeyer:

B. B. HINES,  
J. R. BACKOFEN.