Oct. 23, 1951 A. BRONSTEIN 2,572,105

SELF-BURNISHING CONTACT POINT

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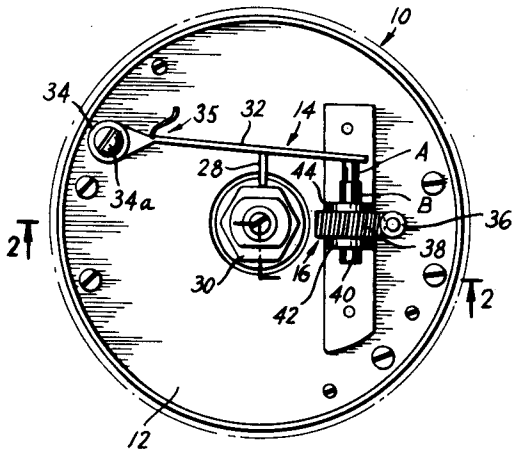


FIG. 1.

FIG. 3.

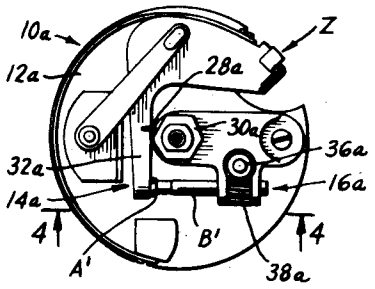
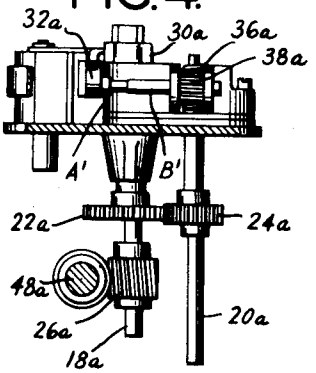


FIG. 4.



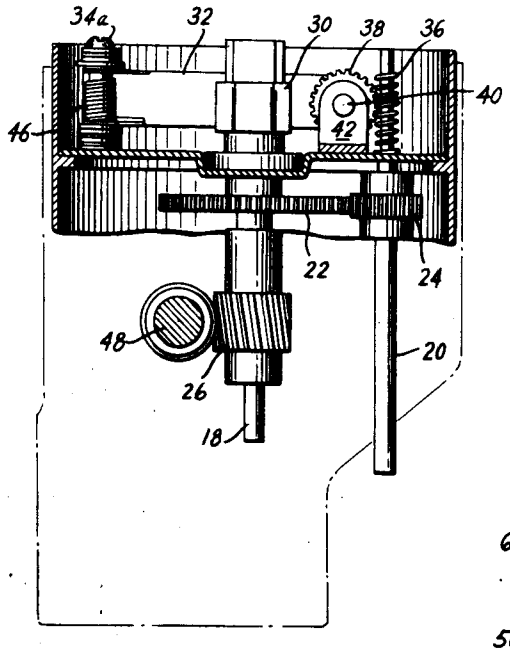


FIG. 2.

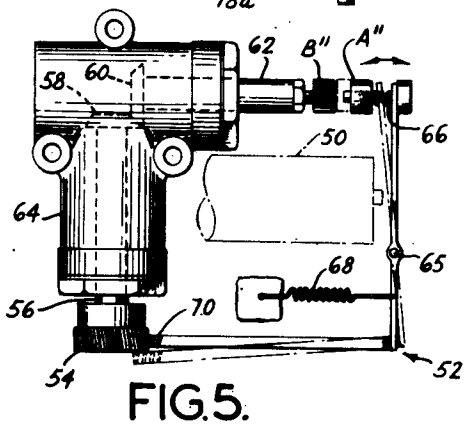


FIG. 5.

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SELF-BURNISHING CONTACT POINT

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2 Claims. (Cl. 200—30)

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This invention relates to self-burnishing electrical contactors.

The automotive and aviation industries employ electrical ignition equipment in association with many of the motors used for propelling the automobile or the airplane. The ignition equipment thus employed, generally requires an electrical circuit breaker for purposes of interrupting an electrical current, which in association with additional electrical equipment, such as an autotransformer or spark coil, furnishes the ignition spark for the combustion of a material within the cylinder of the motor.

Interruption of an electrical circuit containing a reactive component generally results in the production of an electrical arc between the contactors at which the circuit is broken. Special precautions are necessary to minimize the effects of the electrical arc which causes burning and pitting of the contactors, and reduces the effective area of the contactors, generally requiring the early replacement of the contactors. According to one prior art practice, a condenser is used to reduce the burning or pitting due to the arc, but this method is not entirely effective.

It is an object of my invention to form a circuit breaker assembly for ignition equipment wherein burning or pitting of the contactors is eliminated. In general, my invention includes two steps which cooperate to achieve this object. I have found that by rotating one of the contactors in a direction perpendicular to the contactor area during the period when the contactors are making and breaking an electrical circuit including a reactive component, pitting of the contactor is eliminated. Simultaneously, the contactors in operation contact one another when closing the circuit, causing a wiping between the contactors, and resulting in clean contactor surface areas.

In another aspect, I have applied my invention to a breaker system such as is commonly used in magnetos, and have further expanded the same principle to the contactors of electrical relays and the like.

Other objects and advantages of the invention will become apparent from the following description taken in conjunction with the accompanying drawing and it will be apparent to those skilled in the art that many changes in the details of construction and arrangement of the parts described may be made without departing from the spirit and scope of the invention as expressed in the accompanying claims. I therefore, do not wish to be limited to the exact details of construction and arrangement of parts herein set forth, as preferred forms only have been given by way of illustration.

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Referring to the drawing:

Figure 1 is a top view of an electrical ignition circuit breaker utilizing the invention.

Figure 2 is a sectional view along line 2—2 of Figure 1.

Figure 3 is a top view of an electrical magneto circuit breaker utilizing the invention.

Figure 4 is a sectional view along line 4—4 of Figure 3.

Figure 5 is a top view, partly in section, of an electrical relay including contactors utilizing the invention.

Referring in detail to Figures 1 and 2 of the drawing, an electrical ignition circuit breaker device 10, is formed with a base or support 12, for supporting the circuit breaker contactor assemblies 14 and 16, and rotatable shafts 18 and 20. Shafts 18 and 20 have portions extending on both sides of support 12, and are provided with affixed gears 22 and 24 respectively. A further gear 26 is likewise affixed to shaft 18, all said gears being mounted on one side of support 12, although they could likewise be mounted on the other side.

A cam 30 is attached to shaft 18 and a worm gear 36 is attached to shaft 20. Cam 30 is employed to make and break the circuit through the contactor assemblies.

Contactor assembly 14 comprises an arm 32 to which is secured contactor A and a fiber block or tooth 28. Arm 32 is further provided with a non-conductive bearing 34 thru which a shaft 34a passes and secures the contactor assembly to support 12. A wire 35 is connected to arm 32.

Contactor assembly 16 comprises a bearing base assembly containing bearings 42 and 44, a shaft 40 rotatably mounted and extending thru bearings 42 and 44, a gear 38 affixed to shaft 40 and between said bearings, and a contactor B affixed to shaft 40. The assembly is secured to support 12.

The electrical ignition circuit breaker operates in the following manner. A driving torque, such as may be obtained from a gear shaft 48 is applied to gear 26, rotating shaft 18, gear 22, and cam 30. Rotation of gear 22 likewise causes rotation of shaft 20 and gear 36 thru engagement of gear 24. Rotation of cam 30, on which tooth 28 rides under tension of a spring 46, causes the contactor surfaces to make and break completing and interrupting a circuit through contactors A and B, said circuit completion and interruption

being occasioned by the transverse motion of contactor A. Contactor B is simultaneously rotated by means of gear **36** which engages gear **38** rotating the shaft **40** to which contactor B is affixed. In this manner, contact between the contactors is effected and broken during the period whence one contactor is rotated.

For another embodiment of my invention, reference is made to Figures 3 and 4 wherein similar numeral designations are employed for equivalent parts, wherever practical. The electrical magneto circuit breaker **10***a*, is formed with a base or support **12***a* for supporting the breaker contactor assemblies **14***a* and **16***a*, and rotatable shafts **18***a* and **20***a*. Shafts **18***a* and **20***a* have portions extending on both sides of support **12***a*, and are provided with affixed gears **22***a* and **24***a* respectively. A further gear **26***a* is likewise attached to shaft **18***a*.

A cam **30***a* is attached to shaft **18***a*, and a worm gear **36***a* is attached to shaft **20***a*.

Contactor assembly **14***a* comprises an arm **32***a* to which is secured contactor A' and a block or tooth of insulating material **28***a*. Arm **32***a* is fastened to support **12***a* and insulated therefrom at point Z.

Contactor assembly **16***a* comprises a bearing assembly including bearings **42***a* and **44***a*, a shaft **40***a* rotatably mounted within said bearings **42***a* and **44***a*, and a contactor B'.

Operation of the electrical magneto circuit breaker is similar to that of the electrical ignition circuit breaker. Although shafts **18** and **20**, and **18***a* and **20***a* are shown geared to one another through gears **22** and **24**, and **22***a* and **24***a*, respectively, said gears could be replaced by separate driving means for the individual shafts.

My invention is also applicable to electromagnetic relays or switches, and I am including herein a description of an electromagnetic relay utilizing my invention.

Referring in detail to Figure 5, a relay comprising an electromagnetic **50** and a pair of contactors A'' and B'' in association with an armature **52** for opening and closing the switch formed by the contactors A'' and B'' and a rotating means for rotating contactor B'' form an embodiment of an electromagnetic relay employing my invention. In detail, the rotating means may comprise a gear **54**, a shaft **56** and a bevel gear **58** coupled to a second bevel gear **60** connected to a shaft **62**, to which is fastened contactor B''. The rotating means is shown mounted in a casing **64**.

In detail, the electromagnetic relay operates as follows; when coil or electromagnet **50** is energized from a source (not shown), armature **52**, which is pivoted at point **65** is drawn to the electromagnet, bringing contactors A'' and B'' into contact. Contactor A'' is tensioned against contator B'' by means of a spring **66**. Upon release of the energizing source, armature **52** is drawn away from the electromagnet by means of tensioning spring **68**, simultaneously causing rack gear **70** to engage gear **54**, rotating contactor B''. It is to be noted that spring **66** releases the tensioning force against contactor A'' slowly, permitting rotation of contactor B'' to commence before the contactor surfaces are disengaged.

Having thus disclosed several devices embodying my invention, I desire to reiterate that the embodiments are for purposes of illustration, and I desire that the appended claims be interpreted in the light and scope of my invention.

What is claimed is:

1. An ignition system including a support; a first shaft rotatably mounted on said support; ignition current means including a circuit breaker; said circuit breaker including a first contactor and a second contactor; a polygonal shaped member affixed to said shaft and adapted to move said first contactor into and out of contact with said second contactor; a bearing assembly, said bearing assembly including a pair of bearings, a second shaft, having said second contactor secured at one extremity thereof, supported through said bearings and a gear secured to said shaft and between said bearings, a third shaft rotatably mounted on said support and parallel to said first shaft, a worm gear secured to one extremity of said third shaft and adapted to engage and rotate the gear secured to said second shaft, and gearing means between said first and third shafts adapted to rotate said second contactor as said first contactor is moved in and out of contact with said second contactor.

2. An ignition system including a support, a first shaft rotatably mounted through said support, a polygonal member secured to said first shaft, a circuit breaker comprising a first contactor assembly and a second contactor assembly, said first contactor assembly including a first contactor adapted to be moved laterally by said polygonal member, and said second contactor assembly including a bearing assembly, said bearing assembly including a pair of bearings, a second shaft adapted to ride said bearings, a gear secured to said second shaft and between said bearings, and a second contactor secured to an extremity of said second shaft and adapted to come into and out of contact with said first contactor, a third shaft rotatably mounted through said support and parallel to said first shaft, a worm gear secured to one extremity of said third shaft and adapted to engage and rotate the gear secured to said second shaft, and gearing means of a predetermined ratio between said first and third shafts adapted to rotate said second contactor as said first contactor is moved in and out of contact with said second contactor.

ALBERT BRONSTEIN.

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