April 22, 1924. 1,491,743

W. H. BRADFIELD

COMMUTATOR

Filed Sept. 2, 1919

Fig 1.

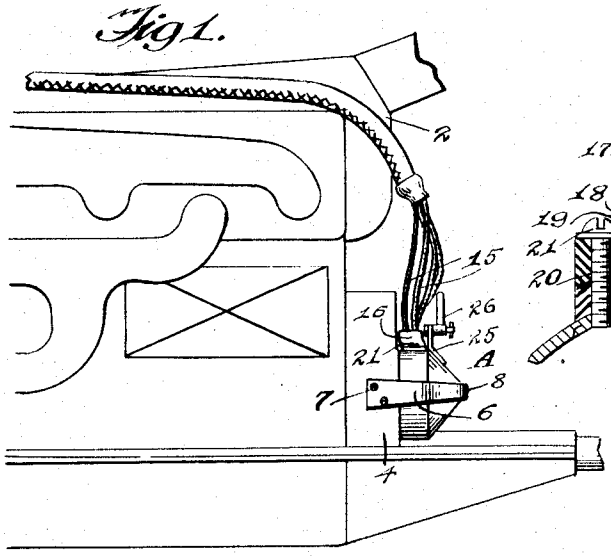


Fig 4.

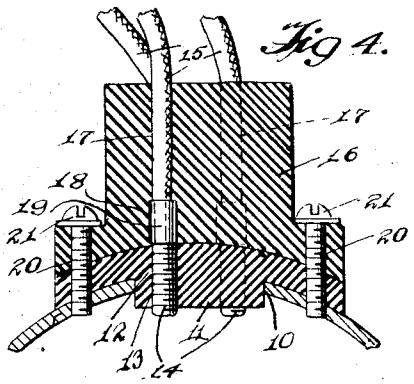


Fig 2.

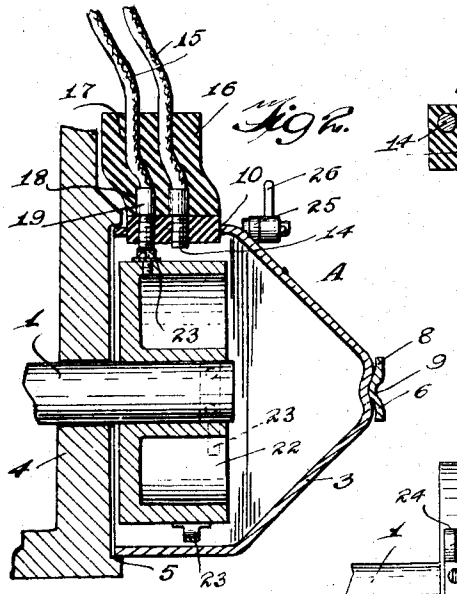


Fig 6.



Fig 3.

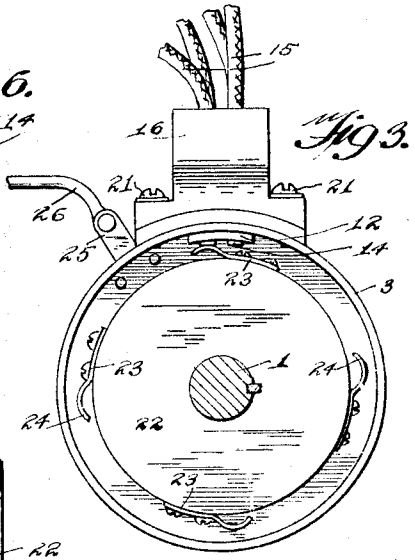
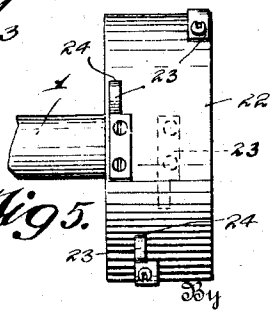


Fig 5.



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UNITED STATES PATENT OFFICE.

WILLIAM H. BRADFIELD, OF COLUMBUS, OHIO.

COMMUTATOR.

Application filed September 2, 1919. Serial No. 320,982.

To all whom it may concern:

Be it known that WILLIAM H. BRADFIELD, a citizen of the United States, residing at Columbus, in the county of Franklin and State of Ohio, has invented certain new and useful Improvements in Commutators, of which the following is a specification.

This invention relates to commutators for internal combustion engines, and the general object of the invention is to improve devices of this character by simplifying the structure of the same and rendering their operation more reliable and positive.

Another object of the invention resides in the provision of a commutator wherein the lead wires connected with the same enter said commutator at a common point, in order that said lead wires may be maintained in such positions as will enable the same to be kept free and clear of oil and like matter surrounding an engine, so that accidental grounding of said wires will be reduced to a minimum.

A further object of the invention resides in the provision of a commutator wherein is embodied a rotatable element having its periphery provided with a plurality of circumferentially spaced and transversely separated contacts which are disposed to successively engage with a plurality of individual terminal members which are located so as to occupy a common position within the housing of the commutator, whereby upon the rotation of said element, the contacts thereof may be brought into engagement with said terminal members to complete the ignition circuits cooperative therewith.

With these and other objects in view, as will appear as the description proceeds, the invention accordingly consists in the novel features of construction, combination of elements and arrangement of parts, hereinafter to be fully described and to have the scope thereof pointed out in the appended claim.

In the accompanying drawing, forming a part of this specification, and in which similar characters of reference denote like and corresponding parts:

Figure 1 is a fragmentary side elevation of an internal combustion engine showing the application of the commutator structure comprising the present invention thereto.

Figure 2 is a vertical longitudinal sectional view taken through the commutator.

Figure 3 is a rear elevation of the commutator.

Figure 4 is an enlarged vertical sectional view of the terminal carrying structure.

Figure 5 is a side elevation of the rotatable contact carrying element, and

Figure 6 is a detailed horizontal sectional view taken through the terminal members and showing their relative locations.

Referring more particularly to the details of the invention, the latter consists of a commutator structure A, which is adapted to be associated with the cam shaft 1 of an internal combustion engine 2, in substantially the ordinary manner. Preferably, the structure A consists of a housing or casing 3 which is of substantially cup shaped formation and hence is provided with an open rear face, which is adapted to be positioned over the end of the shaft 1 which projects beyond the case 4 of the engine 2. To secure the housing in place, the rim of the latter is adapted to rest within an annular depression 5 formed in the case 4 and is retained in this position by means of a resilient bracket 6, which is mounted rigidly as at 7 upon the case 4 and is provided with a laterally extending resilient arm 8, said arm being provided with a depression 9 which is disposed so as to engage with a similar depression formed in the apex of the housing 3. Thus, when the housing is applied, said arm 8 will press against the conical end thereof so that the rim of the housing will be firmly retained within the depression 5. However, this construction is such as to permit said housing to be readily removed from its position surrounding the projecting end of the cam shaft when desired, thus rendering interior parts easily accessible.

In the present form of the invention, the housing 3 has its upper portion formed with a slot 10, in which is fitted the reduced end 11 of an insulating block 12. This block is formed with threaded bores 13, which pass vertically therethrough and are arranged to receive similarly threaded terminal members 14, said members being arranged in a relatively staggered manner clearly shown in Figure 6. In order to unite the terminal members for electrical connection with the lead wires 15, use is made of a cap block 16, which, in turn, is formed with vertical bores 17 disposed for registration with the bores 13 formed in the base block 12. The bores 17, however, are provided with enlarged

lower portions 18, in which are seated the enlarged terminals 19 of the lead wires 15. The cap block 16 is further formed with openings 20, which are arranged to register with similar openings formed in the base block 12 and in the rim of the housing 3. Screws or their equivalents 21 are arranged to pass through these lateral openings and are threaded into said housing so that the blocks 12 and 16 may be rigidly connected in a clamped manner upon the exterior of the housing 3 and to the top of the latter. Manifestly, when the blocks are securely joined, the terminals 19 of said lead wires will be brought into firm frictional contact with the terminal members 14, thus establishing electrical communication therebetween. The wires 15 lead, in the ordinary manner, to the coil structure, not shown, of the engine which, in turn, is also connected with the spark plugs of said engine in the usual manner which form the ignition circuits of the engine 2.

In order to complete these circuits at proper periods of engine operation, the cam shaft 1 has its protruding end equipped with a rotatable element 22. This element may be in the form of a wheel and by being keyed or otherwise connected with the cam shaft, said element will rotate in unison with said shaft. Provided upon the periphery of the element 22 are a plurality of resilient contacts 23 which correspond to the number of sparking devices employed upon the engine 2. These contacts are provided with resilient hook shaped portions 24 which when the element 22 is rotated will contact with individual terminal members 14. It will be observed that the contacts 23 occupy equally spaced circumferential positions upon the periphery of the element 22 and are further spaced longitudinally upon said element so that the contacts will each engage with the terminal member situated in the same plane therewith. This manner of situating the contacts will cause an independent closing or breaking of the spark plug circuits and will prevent undue engagement between wrong contacts and terminal members.

Thus, upon the rotation of the cam shaft 1, the element 22 will be revolved so that the contacts 23 thereof will be successively brought into engagement with the ends of the terminal members 14 and in this manner will ground the circuits of which the lead wires 15 form a part. It will of course be understood that the spark plugs are also grounded upon the engine frame so that by grounding the current conducted by the lead wires 15, the various circuits will be completed. To advance or retard the opening or closing of said circuits, the housing 3 is provided with a fixed bracket 25, with which is connected a suitable actuating device 26 leading to the spark control of the engine. By operating the latter, said housing will be caused to rotate axially and in this manner the positions of the terminal members may be shifted relatively to the contacts 23, whereby the making or breaking of the circuits governed thereby may be accordingly retarded or advanced.

In view of the foregoing description, it will be manifest that there is provided a commutator of an exceptionally simple yet efficient nature, and one wherein the liability of accident to the working parts thereof is reduced to the minimum. It is obvious that if the contacts should lose their resiliency or become otherwise defective, such members may be quickly removed from the element 22 and may be either renewed or repaired without any undue expense or labor. Furthermore, the present invention confines the lead wires to the top of the housing through the provision of the blocks 12 and 16, said wires enter the commutator at the central point. This structure is in contrast to the conventional form of commutator wherein the wires enter the housing at radially spaced positions entirely around said housing. This old structure is open to the objection of allowing the lead wires to become oil soaked which has the effect of short circuiting said wires by interfering with their insulation. In the present structure, the wires are held entirely out of contact with the oily products of the engine, and hence, their operation is rendered reliable for long periods of use.

I claim:

In a commutator for internal combustion engines, a wheel arranged for rotation in connection with a timed engine driven shaft, a plurality of resilient contacts arranged upon the circumference of said wheel, said contacts being distributed transversely of the circumference of said wheel to be each located in different vertical planes of rotation and spaced equidistantly upon the circumference of said wheel, an open ended housing covering said wheel and having a slot in the wall thereof, an insulating block mounted upon said housing and having an extension fitting in the slot, vertically disposed stationary contacts arranged within said block and extension for co-operation with the movable contacts of said wheel, said stationary contacts occupying relatively staggered positions for individual registration with said movable contacts, and a second insulating block engaged with the first block and having lead terminals carried thereby adapted to bear against the ends of the stationary contacts.

In testimony whereof I affix my signature.

WILLIAM H. BRADFIELD.