

May 17, 1927.

T. P. NICKELL ET AL.

1,628,902

COMMUTATING MECHANISM FOR IGNITION SYSTEMS AND THE LIKE

Filed June 2, 1922

Fig. 1.

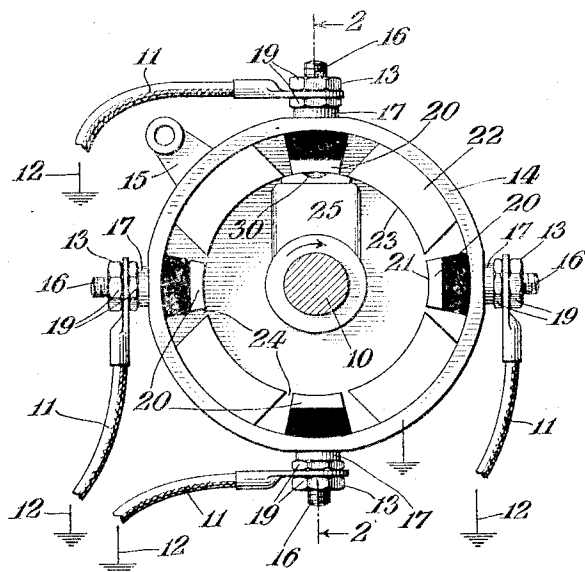
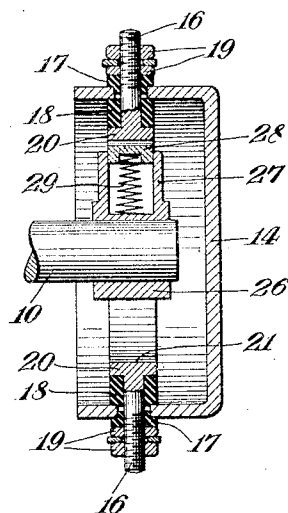


Fig. 2.



Inventors.
Thomas P. Nickell.
William H. Rodefeld
By his Attorney
Robert L. Blair

UNITED STATES PATENT OFFICE.

THOMAS P. NICKELL AND WILLIAM H. RODEFELD, OF RICHMOND, INDIANA; SAID
NICKELL ASSIGNOR TO ROBERT S. BLAIR, OF STAMFORD, CONNECTICUT.

COMMUTATING MECHANISM FOR IGNITION SYSTEMS AND THE LIKE.

Application filed June 2, 1922. Serial No. 565,299.

This invention relates to commutating mechanism and more particularly to mechanism of such nature of ignition systems of internal combustion engines. One of the objects thereof is to provide mechanism of the above nature of simple and durable construction. Another object is to provide mechanism of the above nature of efficient and dependable action. Other objects are to provide mechanism of the above nature which shall be inexpensive and practical in a high degree and adapted to withstand long-continued use at high speed. Other objects will be in part obvious and in part pointed out hereinafter.

The invention accordingly consists in the features of construction, combinations of elements and arrangement of parts which will be exemplified in the structure hereinafter described and the scope of the application of which will be indicated in the following claims.

In the accompanying drawing in which is shown one of various possible embodiments of this invention,

Figure 1 is an end view thereof partially diagrammatic; and

Figure 2 is a sectional elevation taken along the line 2—2 of Figure 1.

Similar reference characters refer to similar parts throughout the views of the drawing.

Referring now to Figure 1 of the drawing, there is shown at 10 a shaft driven in this embodiment from an internal combustion engine at a predetermined rate with respect to that of the engine crank shaft. The several wires 11 correspond to the cylinders of the engine, in this case four in number, and these wires lead through an ignition system of a well known type such as that commonly used in Ford automobiles. As diagrammatically indicated at 12 they ultimately lead to ground.

The wires 11 as shown in the drawing terminate at binding posts 13 mounted about a stationary casing 14. It may here be noted that the term "stationary" is used herein in a broad sense to differentiate from a part which in operation is in movement. The casing 14 although stationary in this sense is adjustable as by means of the arm 15 about the axis of the shaft 10 with respect to which it is concentrically mounted. By this

adjustment the angular relation of the casing with respect to any given position of the shaft 10 may be varied, thus corresponding to a varying hexangular relation with respect to the crank shaft of the engine and cycles of its cylinders.

The binding posts 13 comprising metallic shanks 16 which pass through the walls of the casing are spaced therefrom as by the insulating bushings 17 and sleeves 18. The outer end of the shanks are threaded to accommodate the lock nuts 19 between which the end member of the wires are gripped. At the inner end of the shank 16 is a contact member 20 integral therewith and having an inner surface 21 which is concentric with respect to the shaft 10. The sleeve 18 as shown in Figure 1 of the drawing, fits the contour of the inner wall of the casing and the parts are rigidly held in this position by the inner nut 19 even though the outer nut 19 be loosened or removed in making or breaking connection with the wire.

The casing 14 is provided between each contact 20 with a contact 22 which is electrically and mechanically connected therewith. Thus these contacts 20 and 22 alternate about the casing and the inner surfaces of the contacts 22 as shown at 23 are curved to complete a circle with respect to the curved inner surfaces of the contacts 21 and 22. There is thus provided a substantially continuous metallic raceway of a truly circular form and free from insulation other than that provided by the air at the gaps 24.

Co-acting with these various contacts is a brush 25 fixed on the shaft 10. This brush comprises a hub 26 with a hollow boss 27 in which is slidably fitted a contact member 28. The member 28 is urged outwardly as by a spiral spring 29 within the boss 27 and seated at its outer end in the inner surface of the contact as shown. The outer surface of the contact 28 is preferably substantially as indicated in Figure 2 of the drawing. In other words, it is curved to fit the circle formed by the surfaces 21 and 23 and is of such a length in a circumferential direction as to bridge the entire space between successive contacts 22. Thus it is in electrical connection with each contact 22 before it has broken electrical connection with the contact 22 which it is leaving. Contact 28 may if desired be provided with

a transverse recess 30 although this is not necessary in so far as the broad features of this invention are concerned.

The casing 14 thus supports a series of contacts which are alternately grounded and live; the latter term indicating a connection with a source of electrical potential.

In the action of the device, as the contact 28 travels about with the rotation of the shaft 10 it passes over a continuous raceway, thus not being subject to vibration and as this raceway is of homogenous material, the chattering due to unequal wear is avoided. As it comes into engagement with the surface 21 of one of the contacts 20, assuming it to travel in the direction indicated by the arrow, it is still in engagement with the preceding contact 22 and accordingly instantly completes the circuit or grounds the corresponding conductor 11. This ground furthermore is maintained uninterruptedly until the rear edge of the contact 28 leaves the forward edge of the contact 20, using the terms with respect to the direction of rotation. This results from the fact that even though contact 28 has left the preceding contact 22, it has before that time made engagement with the following contact 22 and thus uninterruptedly grounds the intermediate contact 20. This action takes place with the various contacts 20 in succession and the engine is thus properly fired. In this action furthermore, it is to be especially noted that there is no grounding through the moving parts or necessity of additional contact mechanism to complete the circuit from the member 20 to ground. There is thus no occasion to ground through a bearing with its high resistance due to oil and its possibility of sparking. Furthermore, ball-bearings may be utilized without fear of high resistance due to their point contact. The single connection, namely that formed between the member 28 and the various members mounted about the casing 14, is of the rubbing type, thus tending to maintain itself in efficient low-resistance condition and is for the reasons above explained, durable and accurate. The air insulation between the contacts is ample and the device is thus not subject to the wearing of insulation with attendant unevenness and formation of insulating powder.

It will thus be seen that there is provided a device of simple and inexpensive construction which is well adapted to meet the hardest conditions of practical use.

As various possible embodiments might be made of the above invention and as various changes might be made in the embodiment above set forth, it is to be understood that all matter herein set forth or shown in the accompanying drawings is to be interpreted as illustrative and not in a limiting sense.

We claim as our invention:—

1. In mechanism of the general nature of that herein described, in combination, a pair of grounded contact members, an interposed live contact member, and a member adapted to pass over the surfaces of said three members and of sufficient length to bridge from one to the other of said grounding members whereby said live member is maintained in electrical connection with ground during the entire time of contact therewith of said last member.

2. In mechanism of the general nature of that herein described, in combination, a pair of grounded members, an interposed live member the active surfaces of all of which lie in the arc of a single circle, and a rotary member the active surface of which conforms to said arc and is of sufficient length to bridge said grounded members.

3. In mechanism of the general nature of that herein described, in combination, a series of metal contact members having their active surfaces arranged in circular form, and a rotary contact member coacting therewith and continuously engaging with a plurality of said first contacts and formed to bridge the space therebetween; the contact members of said series being alternately live and grounded, and said rotary contact member being adapted to bridge adjacent grounded contacts.

4. In mechanism of the general nature of that herein described, in combination, a pair of alternate live and grounded contacts having their inner active surfaces arranged substantially in the arc of a circle and extending entirely about the circle spaced one from another, and a rotary contact member co-acting with said inner surfaces and successively connecting said live members to the contiguous grounded members; said rotary member being of sufficient length in a circumferential direction to bridge successive grounded members and connect them one with another.

5. In mechanism of the general nature of that herein described, in combination, a casing, a plurality of contacts spaced about said casing and insulated therefrom, a plurality of contacts spaced about said casing alternately with respect to said first contacts, said several contacts having their active surfaces lying in a circle, a rotary member mounted within said casing to rotate and successively connect said insulated contacts with the contacts adjacent thereto, and means urging said rotary member outwardly into engagement with the surrounding contacts, said rotary member being of sufficient length in a circumferential direction to bridge successive grounded members and connect them one with another.

6. In mechanism of the general nature of that herein described, in combination, a cas-

ing, a plurality of contacts spaced about said casing and insulated therefrom, a plurality of contacts spaced about said casing alternately with respect to said first contacts, 5 said several contacts having their active surfaces lying in a circle, a rotary member mounted within said casing to rotate and successively connect said insulated contacts with the contacts adjacent thereto, ignition 10 wires leading to said insulated contacts, and a ground connection from the contacts alternated therewith, said rotary member being of sufficient length in a circumferential direction to bridge successive grounded mem- 15 bers and connect them one with another.

7. In mechanism of the general nature of that herein described, in combination, a cas-

ing, a plurality of contacts spaced about said casing and insulated therefrom, a plurality of grounded contacts spaced about said casing 20 alternating with respect to said first contacts, said several contacts having their active surfaces lying in a single circle, and a rotary member mounted within said casing comprising a sliding contact adapted to 25 slide over said active surfaces of said several contacts and being of sufficient circumferential length to bridge successive grounded contacts.

In testimony whereof, we have signed our 30 names to this specification this 23d day of May, 1922.

THOMAS P. NICKELL.
WILLIAM H. RODEFELD.