Oct. 25, 1932. P. B. COMER 1,884,576

IGNITION SYSTEM

Filed Nov. 1, 1929 2 Sheets-Sheet 1

Fig. 1.

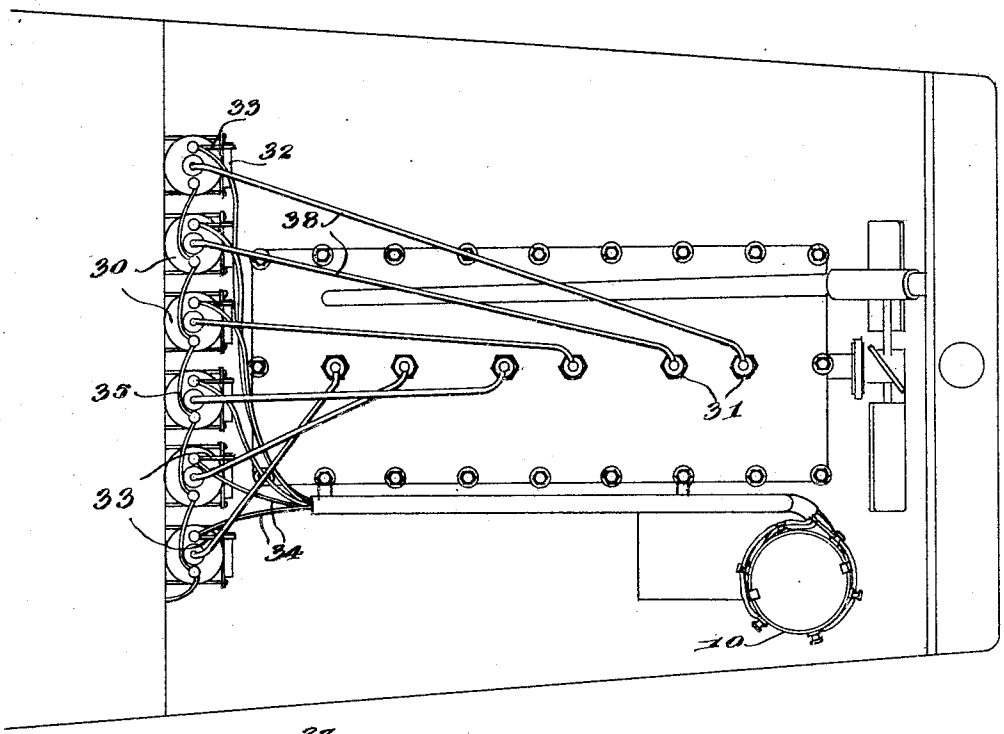
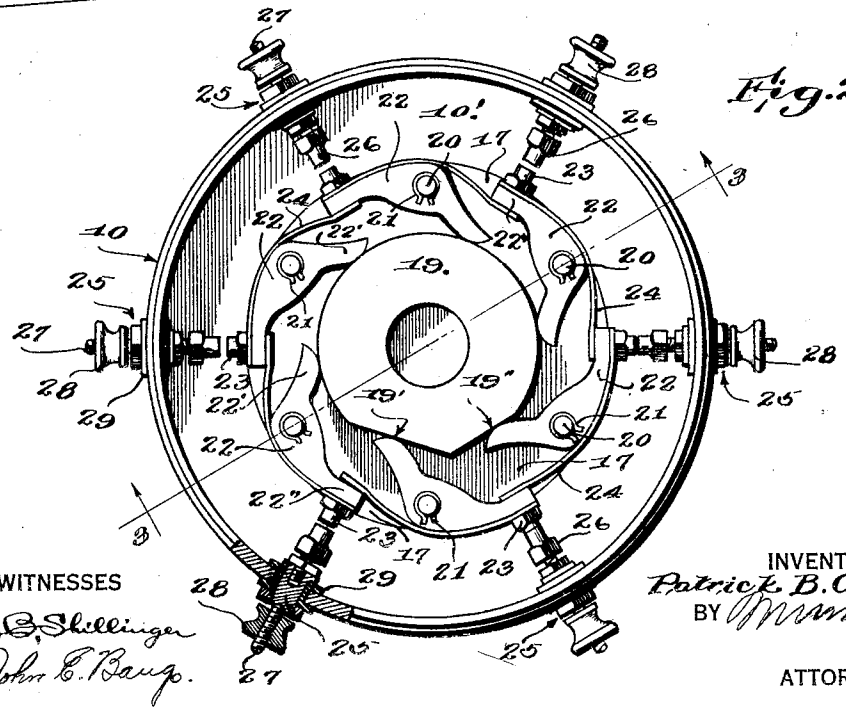


Fig. 2.



WITNESSES

C. S. Shellinger

John E. Baugh.

INVENTOR

Patrick B. Comer

BY Munn & Co.

ATTORNEY

Oct. 25, 1932. P. B. COMER 1,884,576

IGNITION SYSTEM

Filed Nov. 1, 1929 2 Sheets-Sheet 2

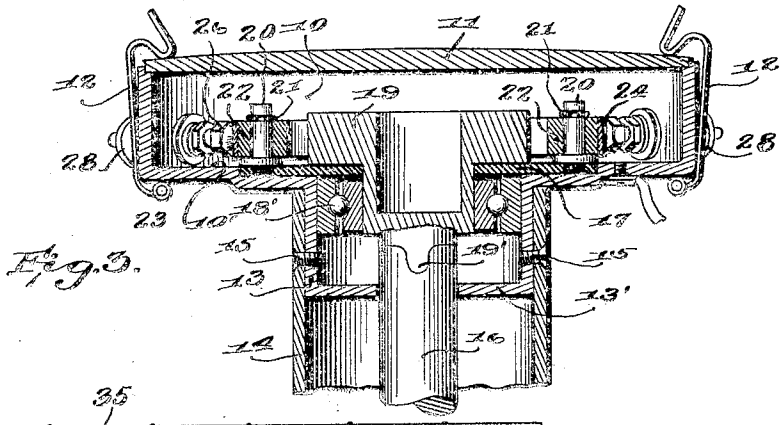


Fig. 3.

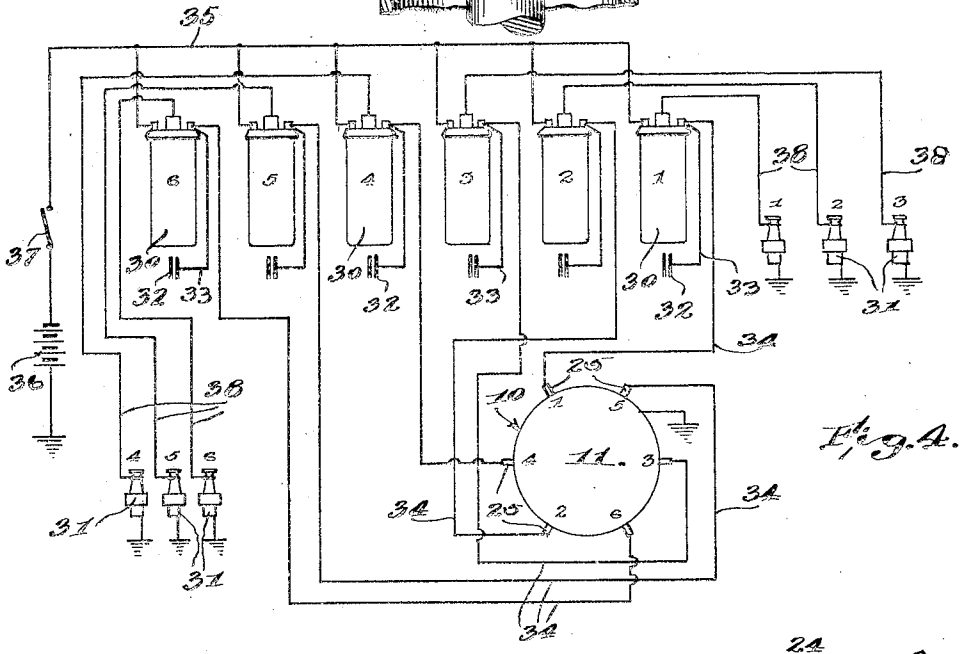


Fig. 4.

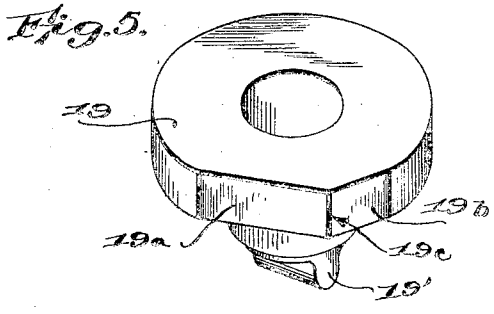


Fig. 5.

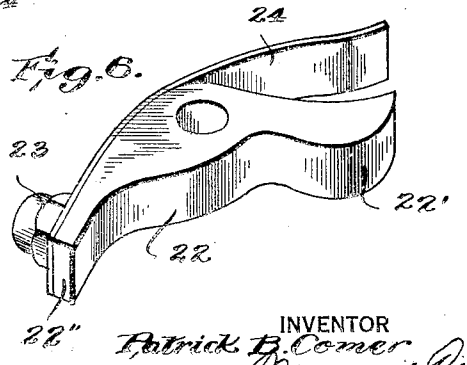


Fig. 6.

WITNESSES

C. B. Shillings

John E. Bangs

INVENTOR

Patrick B. Comer

BY Munn & Co

ATTORNEY

Patented Oct. 25, 1932 1,884,576

UNITED STATES PATENT OFFICE

PATRICK B. COMER, OF GREENSBORO, NORTH CAROLINA

IGNITION SYSTEM

Application filed November 1, 1929. Serial No. 404,147.

This invention appertains to improvements in timing devices for internal combustion engines generally and more partcularly to a type of such devices which is adapted for use with engines employing either single or dual ignition, but, in any case, will necessitate the use of but a single spark plug for each cylinder of an engine.

Another object of the invention is to provide a timer or interrupter as hereinbefore characterized, wherein each spark plug will be connected in circuit with a separate set of breaker points and a separate induction coil and condenser unit and the several independent circuits so constituted commonly connected to the usual source of current supply.

Another object of the invention is to provide an interrupter of the character hereinbefore mentioned, which is arranged to give two successive firing periods in each ignition circuit and wherein one firing period is of greater duration than the other, in order that the breaker points, active at the moment, are given more time on contact and consequently the condenser in circuit with such active points, is given a correspondingly longer time in which to accumulate its current charge whereby a greatly intensified or hotter spark is produced at each plug than would ordinarily be the case.

A further object of the invention lies in the provision of the interrupter as hereinbefore set forth and wherein for ordinary purposes in the operation of an engine equipped with the same one breaker arm of the interrupter is timed to go on contact just as the previously active breaker arms break contact, and, in the use of the combination of a long and short firing period in each circuit, a substantially dual ignition is obtained without the provision of duplicate ignition systems ordinarily employed.

A still further object of the invention is to provide the interrupter as aforesaid and wherein the several breaker arms are arranged in circumferential series about a rotary cam and are resiliently interconnected in a manner that they are equally tensioned about a rotary member or cam and, as a consequence whereof, will uniformly contact the stationary contact points when actuated.

With the foregoing and other equally important objects and advantages in view, the invention resides in the certain new and useful combination, construction and arrangement of parts and circuits as will be hereinafter more fully described, set forth in the appended claims and illustrated in the accompanying drawings, in which:

Figure 1 is a top plan view of a conventional form of automobile engine, showing a practical application of the improved ignition system thereto;

Figure 2 is a top plan view, partly in section, of the current interrupter, but with the cover plate thereof removed;

Figure 3 is a vertical section, taken on the line 3—3 of Figure 2;

Figure 4 is a diagrammatic view of the parts and circuits of a complete six unit ignition system in accordance with the present invention;

Figure 5 is a perspective view of the rotary cam member of the interrupter; and

Figure 6 is a perspective view of one of the several breaker arms or members of the interrupter.

Referring to the drawings, wherein like characters of reference designate corresponding parts throughout the several views thereof, the circuit interrupter, forming a part of the present invention and as illustrated by way of example, is constituted in a housing or shell 10, which is open at its upper end and has its bottom wall 10′ integral with the side wall thereof. The inner side of the open edge portion is shouldered to seat a cover 11 therein, substantially as shown. Suitable fastening means, such as the resilient clips 12, are attached on opposite points on the housing or shell 10 and are arranged to be snapped over adjacent edge portions of the cover 11 to secure the same tightly in position.

The bottom wall 10′, of the housing or shell 10 is formed with a central opening from the lower edge of which a cylindrical portion 13 is dependingly supported for snug fitting engagement in the adjacent end of a tubular support 14 and is secured in place therein by means of set screws or the like 15. The lower

end of this portion 13 is inwardly flanged, as at 13′, to form an opening at its center for the journaling therein of the adjacent end of a cam shaft or the like 16 which is housed within the tubular support 14.

Formed in the upper side of the bottom wall 10′, of the housing or shell 10, concentrically about the central opening therein is a depression, in which a metal plate 17, preferably of sheet steel is seated. Mounted within the opening in the bottom wall 10′, immediately below the plate 17, is an anti-friction bearing 18, preferably in the form of an annular ball race, which has its bore disposed in line with the adjacent end of the cam shaft 16 and an opening formed in the center of the plate 17, in order to receive therethrough the reduced hub portion of a cam 19 depending through the opening in the plate. The free end of the hub portion of the cam 19 is provided with means 19′ through the medium of which it will be coupled to the adjacent end of the cam shaft 16.

Rising from the plate 17, adjacent the peripheral edge thereof, are a plurality of equi-distantly spaced pins or studs 20, which have their lower ends secured in place, as by being riveted to the plate, and their upper ends circumferentially grooved to receive resilient clips 21.

Mounted for pivotal movement on each of the pins or studs 20 is a breaker member 22 which is retained in position thereon by the clips 21 aforesaid. These breaker members 22 are preferably of an angular formation, and when operatively arranged, one arm portion 22′ of each is disposed in abutting relation with the peripheral edge of the cam 19, when the other arm portions 22″ will lie substantially parallel to the cam edge. The free end portions of each of the breaker arm portions 22′ are preferably rounded off at the inner side thereof to allow the same to bear uniformly and smoothly against the opposed surface of the cam.

Secured in the outer side of the free end of each of the breaker arm portions 22″ is a breaker point or contact 23, beneath the head portion of which one end of a flat steel spring 24 is engaged. Each of the springs 24 is extended lengthwise over the outer side of the breaker arm portions 22″ and is of a length to have its other end snapped into engagement with the inner side of the free end portion of the arm portion 22″ of an adjacent breaker member 22. Thus with the several springs 24 so arranged, the breaker members 21 will be uniformly tensioned in circumferential alinement about the cam 19 and their inner rounded ends against the peripheral edge thereof.

Mounted in the side wall of the housing or shell 10, in line with each of the breaker contacts 23, is a contact post 25, which has an adjustable contact point 26 at its inner end and directly opposed to each of the adjacent contact points 23 and a screw threaded terminal 27 at its outer end provided with a nut 28 for the attaching thereto of a circuit lead. These posts 25 are seated in insulating bushings 29 mounted in openings in the wall of the housing or shell 10, and are, together with the other parts thereof, the only members of the structure necessary to be insulated.

The cam or interrupter member 19 is generally of cylindrical form but is provided with two breaker gaps in the circle defined by the peripheral edge thereof. As best shown in Figures 2 and 5 these breaker gaps are constituted in an elongated flattened portion 19^a and an adjoining flattened portion 19^b both being formed on the peripheral edge of the member or cam 19. In the clockwise direction of rotation of the member or cam 19, the longer gap portion or surface 19^a will be in advance of the shorter gap portion or surface 19^b, and the member or cam 19 will be preferably timed or set so that the first gap portion or surface 19^a will cause the proper breaker arm 22 to make contact with the adjacent of the posts 25 on time with the beginning of the power stroke of the piston in the cylinder of the engine to be fired at the moment, while the second gap portion or surface 19^b will act to cause the remaking of such contact between the same breaker arm 22 and contact post 25 at an interval through and during the completion of the power stroke of the piston. The momentary break between the sparking periods aforesaid, will obviously be readily accomplished by the high point of the angle formed at the junction point of the gaps or surfaces 19^a and 19^b.

It will be understood that all of the breaker arms 22 and the cooperative parts of the interrupter device will be properly synchronized with the firing order of the cylinders of the particular engine with which it is to be employed, and, after being so installed and timed accidental disturbance of the relationship of the parts, by the very nature of the construction and arrangement involved will be practically impossible.

It is to be noted that the plate 17 is so positioned in the depression of the bottom wall 10′ of the housing or shell 10 that the pins or studs 20 carried thereby are centered in the spaces between adjacent contact posts 25, and, by reason of such arrangement, the breaker arms 22 may be reversed, end for end, on the pins or studs 22 in order to adapt the same for proper contacting relation with the posts 25, if the drive of the cam or interruper 19 should of necessity be in a counter-clockwise direction.

In the make up of the device, it is also to be noted that the housing or shell 10 may be formed of either aluminum, cast-iron or bronze; the cam or interrupter member 19

of either steel, brass or bronze; the breaker arms 22 preferably of steel; and the contact points 23 and 26 of tungsten steel.

In effecting the installation of the improved ignition system on the engine and with the circuit interrupter mounted in position adjacent thereto and the cam 19 operatively coupled to the driven shaft 16, induction coils 30, corresponding in number to the number of spark plugs 31 employed by the engine and the contact posts 25 carried by the interrupter, will be conveniently mounted adjacent to the engine, as for instance, on the outer side of the dash of an automobile beneath the hood enclosing the engine. Cooperative with each induction coil 30 is a condenser 32 which will have one side of the same grounded and its other side connected by a conductor 33 to one terminal of the associated induction coil.

With the circuit interrupter 10 and the induction coil and condenser units thus installed, each of the terminals 27, of the contact points 25 of the circuit interrupter, will be connected by a lead 34 to one of the primary terminals of a corresponding induction coil 30 and commonly so with the conductor 33 leading from the associated condenser 32, while the housing or shell 10 will, of course, be grounded. The other primary terminals of the induction coils 30 will be commonly connected by a conductor 35 to one side of a current source 36 which will have its other side grounded. An ignition control switch 37 will be interposed in the conductor 35 in the usual manner. Each of the spark plugs 31 will likewise be connected by a conductor 38 to one of the secondary terminals of a corresponding induction coil 30 and the other terminals of the latter grounded. It is understood that the spark plugs 31 will be connected in the proper numerical order or sequence of the firing of the cylinders of a particular engine to the induction coil and condenser units and contact posts 25 of the interrupter corresponding thereto, both of the latter having the same numerical designation, as shown in Figure 4.

In the operation of the ignition system thus provided, the greater length of the first fire gap or surface 19^a on the cam or interrupter member 19, gives to the system a slow motion effect by prolonging the period the current feed to the condensers 32 before contact is momentarily broken between the breaker arm, contact point 23 and the post contact point 26 active at a given time and the occurrence of the second spark during the interval of the passing of the second fire gap or surface 19^b.

It is to be especially noted that the second current from the coil 30 is not in any way shifted or distributed but is passed directly to the spark plugs 31, and, as a result of this, the system is unaffected by water or moisture, thereby making it entirely dependable for all outdoor work; the circuit interrupter, in the present instance, being entirely encased and otherwise water or moisture proof.

Without further description, it is thought that the features and advantages of the invention will be readily apparent to those skilled in the art, and it will of course be understood that changes in the form, proportion and minor details of construction may be resorted to, without departing from the spirit of the invention or its scope as claimed.

I claim:

1. In an ignition system of the character described, a circuit controller comprising a movable member, a plurality of stationary contact points arranged at one side of said member and said stationary contact points, a plurality of movable contacts arranged in circular series about said member and movable to contact the latter, engaging means between said member and said movable contacts, and a tensioning means carried by each of said movable contacts and arranged for effective cooperation with an adjacent of such contacts to hold the same normally inoperative, said member being formed to successively actuate each of said movable contacts to engage its corresponding stationary contact, a plurality of times at each firing cycle.

2. In an ignition system of the character described, a circuit controller comprising a circular rotary member, a plurality of stationary contact points spaced from and arranged in circular series about said member, a corresponding number of pivoted members substantially bellcrank in form having one arm engaged with the edge of said rotary member, a contact point carried by the other arm of each of said members and movable into engagement with said stationary contact points, said rotary member being formed with adjacent flattened edge portions whereby to cause said movable contacts to successively complete a plurality of circuits with a corresponding stationary contact point, and spring means attached to each of said pivoted members and cooperative with adjacent of the latter to normally tension the same uniformly against the edge of said rotary member.

PATRICK B. COMER.