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DUAL IGNITION FOR 2-CYLINDER ENGINES

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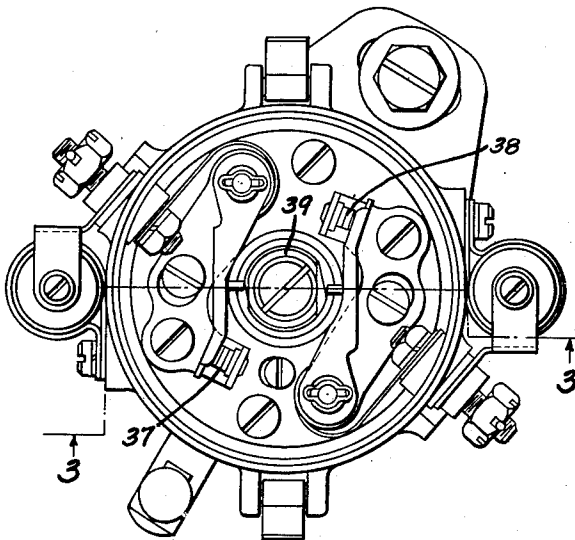


Fig. 1

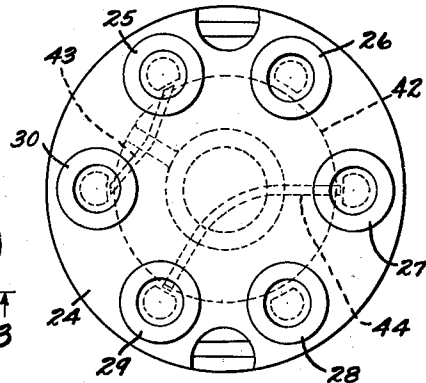


Fig. 2

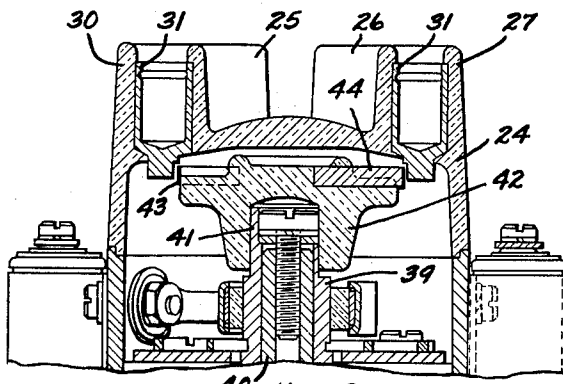


Fig. 3

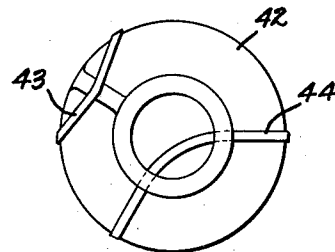


Fig. 4

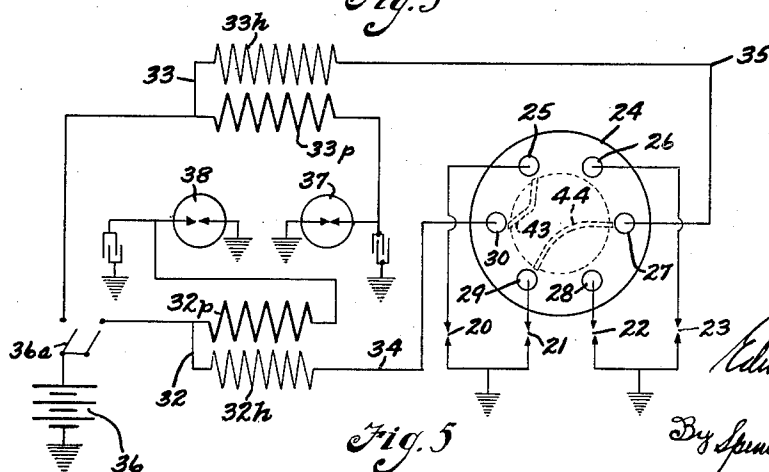


Fig. 5

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DUAL IGNITION FOR 2-CYLINDER ENGINES.

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This invention relates to improvements in devices providing double ignition for a multi-cylinder internal combustion engine.

It is among the objects of the present invention to provide an ignition device, compact and of simple structure and design, which will provide and deliver double sparking impulses to each cylinder of a multi-cylinder combustion engine in recurrent sequence.

Further objects and advantages of the present invention will be apparent from the following description, reference being had to the accompanying drawing wherein a preferred embodiment of one form of the present invention is clearly shown.

In the drawing:

Fig. 1 is a plan view of the ignition device with the distributor head and rotor removed;

Fig. 2 is a top view of the distributor head, the rotor being shown in dotted lines;

Fig. 3 is a fragmentary sectional view taken along the line 3—3 of Fig. 1;

Fig. 4 is a detail plan view of the rotor; and

Fig. 5 is a diagrammatic view showing the electrical connections of the device.

The ignition device illustrated in the present drawing is adapted to provide double ignition for a two cylinder two cycle internal combustion engine.

Referring particularly to the Fig. 5, the numerals 20 and 21 designate a pair of spark plugs adapted to be inserted in one cylinder, while numerals 22 and 23 designate a pair of spark plugs for the other cylinder of the engine. The distributor head 24 is provided with six terminal posts 25, 26, 27, 28, 29 and 30 arranged in a circular row and equally spaced. The Fig. 3 illustrates the terminal post 30 and 27 in section, each terminal post being hollow and containing a recessed conductor 31 adapted to receive a wire conductor, the inner end of the recessed conductors extending into the interior of the distributor head and forming terminals also arranged in a circular row. In Fig. 5 spark plugs 20, 21, 22 and 23 are connected with terminal posts 25, 29, 28 and 26 respectively. The posts 30 and 27 provide connectors for ignition coils 32 and 33 respectively, the secondary windings 32^b and 33^b being directly connected with their respective ter-

minals by means of wires 34 and 35 respectively. The primary windings 32^p and 33^p of the coils 32 and 33 respectively are adapted to be connected by means of a switch 36^a, with a source of current shown in the form of a storage battery 36. Each primary winding is provided with a circuit interrupter designated by the numerals 37 and 38. These circuit interrupters 37 and 38, shown in the Fig. 1, are adapted to be operated by means of an engine driven cam 39 located within the housing of the ignition device. This cam is mounted upon a shaft driven by the engine and designated by the numeral 40, said cam having a portion 41 extending beyond the end of the shaft upon which is secured the rotor or distributing member 42. The distributing member is illustrated in the Fig. 4 as including two angularly arranged conducting bars 43 and 44 adapted to provide bridging connections between pairs of terminal posts in recurrent sequence.

In the wiring diagram Fig. 5 with the distributor rotor in the position shown, simultaneous interruption of the current flowing through both the ignition coils, will cause sparking impulses from both coils to be directed over different paths. The impulse from coil winding 33^b will be directed over the wire 35 to the coil terminal 27 thence across the conductor 44 to the spark plug terminal 29 thence through the spark plug 21 to ground. At the same time a sparking impulse from the winding 32^b will be directed through wire 34 to coil terminal 30 thence through the conductor bar 43 to plug terminal 25 across plug 20 to ground. After this cylinder is fired the cam 39 of the ignition unit will rotate 180° before another sparking impulse is provided, at which time the rotor will have moved 180° thereby connecting terminals 27 and 28 by the bridging conductor bar 43 and terminals 26 and 30 by the bridging conductor bar 44, thus coil 33 will deliver a sparking impulse to the plug 22 while coil 32 will deliver a sparking impulse to plug 23.

It will of course be understood that an ignition unit of this type may be constructed for delivering a double sparking impulse to each cylinder of multi-cylinder engines including 4, 6 or more cylinders.

In determining the arrangement of the

distributor head and the rotor for engines including different numbers of cylinders, the following formulas may be used:

Distributor head specifications.

C designates the number of engine cylinders.

P designates the terminal posts on head.

S designates the spacing of the said posts in degrees.

K designates the spacing in degrees between the terminals having the coils connected thereto.

$P = 3 \text{ times } C.$

$$S = \frac{360}{P}$$

$$K = \frac{360}{C}$$

Rotor specifications.

With conductors as marked 43 and 44.

D designates the spread of 43 in degrees.

E designates the spread of 44 in degrees.

G designates the distance of degrees between the closer ends of 43 and 44.

N designates the distance in degrees between the more remote ends of 43 and 44.

F designates the firing interval in degrees of distributor cam revolutions.

$$D = S$$

$$E = 2S$$

$$G = S$$

$$N = 360 \text{ minus sum of } D, E \text{ and } G.$$

$$F = \frac{360}{C}$$

By the above figures if an ignition circuit for a 6-cylinder engine is to be provided, the number of terminals on the distributor will be 3×6 or 18. The spacing in degrees of the terminals on the distributor head will be $\frac{360}{18}$ which is 20. The terminals to which

coils are to be connected will be $\frac{360}{6} = 60$, designating the distance in degrees between said coil terminals. The rotor for this device will have the bar 43 with a spread of 20° which is equal to the spacing of the posts, while the bar 44 has a spread equal to twice the spacing of the posts, or in this case 40° . Their adjacent ends will be 20° while their more remote ends will be spaced substantially 280° or 360 minus the sum of the spacings of four posts. The firing intervals of the engine in degrees of the cam shaft rotation of the distributor will be at 60° .

It will be seen that in this device it is necessary to have the same number of coil terminals as there are engine cylinders and that each coil terminal has one of a pair of plug terminals located on either side thereof. In the 4 and 6-cylinder ignition units two coils may be used to provide the spark-

ing impulses. Each coil is connected with coil terminals 180° apart in the 4-cylinder device, while in the 6-cylinder device one coil is connected with three terminals 120° apart.

Proper timing of the ignition unit in relation to the engine firing may be obtained by the rotation of said unit in its mounting element on the engine until a proper location obtains. The interruptions are so arranged that the two plugs carrying a pair in a cylinder may be fired simultaneously or in proper succession.

While the form of embodiment of the present invention as herein disclosed constitutes a preferred form, it is to be understood that other forms might be adopted, all coming within the scope of the claims which follow.

What is claimed is as follows:

1. An ignition device comprising in combination, a distributor head having a plurality of terminal posts arranged in a circular row; and a rotatable member having separate conductors each providing a bridging connection between certain pairs of terminal posts in recurrent sequence.

2. An ignition device comprising in combination, a distributor head having a plurality of terminal posts arranged in a circular row; and a rotatable member having conductors one of which provides a bridging connection between two adjacent terminal posts while the other connects two of the alternate terminal posts, both in recurrent sequence.

3. An ignition device comprising in combination, a member supporting a plurality of terminal posts arranged in a circular row, certain ones of which are each connected to an ignition coil, and each one of the remaining terminal posts connected to a spark plug; and a rotatable member having conductors concurrently providing a bridging connection between each ignition coil terminal post and a spark plug terminal post in recurrent sequence.

4. An ignition device for concurrently directing sparking impulses to pairs of spark plugs, comprising in combination, a distributor head having a plurality of terminal posts arranged in a circular row, certain of which provide separate terminals for ignition coils, the terminal post on each side of each ignition coil terminal providing a connection for each one of the same pair of spark plugs; and a rotatable member having conductors adapted in recurrent sequence, concurrently to connect one ignition coil terminal post with its adjacent spark plug terminal post and its other adjacent spark plug terminal post with the other ignition coil terminal post.

5. An ignition device for a two cylinder

engine each cylinder of which has two spark plugs to be simultaneously fired, comprising in combination, a distributor head having six terminal posts, equally spaced and arranged in a circular row, two diametrically opposite terminal posts providing separate terminals for two ignition coils, the remaining terminal posts providing connectors for the spark plugs, each pair of spark plugs being connected respectively to two terminal posts having an ignition coil terminal therebetween; and a rotor comprising an insulating body carrying two conductors providing bridging connections between the two ignition coil terminal posts and the terminal posts of a pair of contacts in recurrent sequence.

6. An ignition device for a multi-cylinder engine each cylinder of which is provided with two spark plugs adapted to be fired simultaneously comprising in combination, a distributor head having three times as many terminal posts as the number of engine cylinders, said posts being arranged in a circular row and spaced equally, and a rotatable member having angularly arranged conductor bars providing bridging connections for the terminal posts, the one conductor bar bridging between two adjacent terminal posts, the other between two posts spaced by one intervening post, adjacent ends of said conductor bars being spaced apart a distance equal to the spacing of the posts.

7. An ignition device for an engine having C cylinders and two spark plugs per cylinder fired for each cylinder explosion comprising, a distributor head having 3C terminal posts equally spaced in a circular row, certain of said posts providing terminal

connections for ignition coils, the spacing in degrees of said coil posts being $\frac{360}{C}$, the other post being connected to spark plugs, the plug posts for each pair of spark plugs of any one cylinder being located one on each side of a coil post; and a rotor having separate conductors for conducting sparking impulses from coil posts connected with separate coils to the various pairs of spark plug posts in recurrent sequence.

8. An ignition device for a multi-cylinder engine each cylinder of which is provided with a pair of spark plugs to be fired simultaneously, comprising in combination, a distributor head having three times as many terminal posts as there are engine cylinders, arranged in a circular row, a number of said posts equal to the number of engine cylinders providing connectors for ignition coils, the angular spacing of said connectors being determined by dividing 360 by the number of cylinders, thus providing a spark plug terminal on each side of a coil terminal; means for bridgingly connecting one coil terminal with a spark plug terminal on its one side and another coil terminal with the spark plug terminal on the other side of the first mentioned coil terminal, said means comprising an insulating body having two angularly arranged conductor bars one bridging two adjacent terminals the other two terminals having an intermediate terminal, the bars having their two adjacent ends separated a distance equal to the distance between distributor head terminals.

In testimony whereof I hereto affix my signature.

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