Feb. 24, 1953

H. L. FUSTON

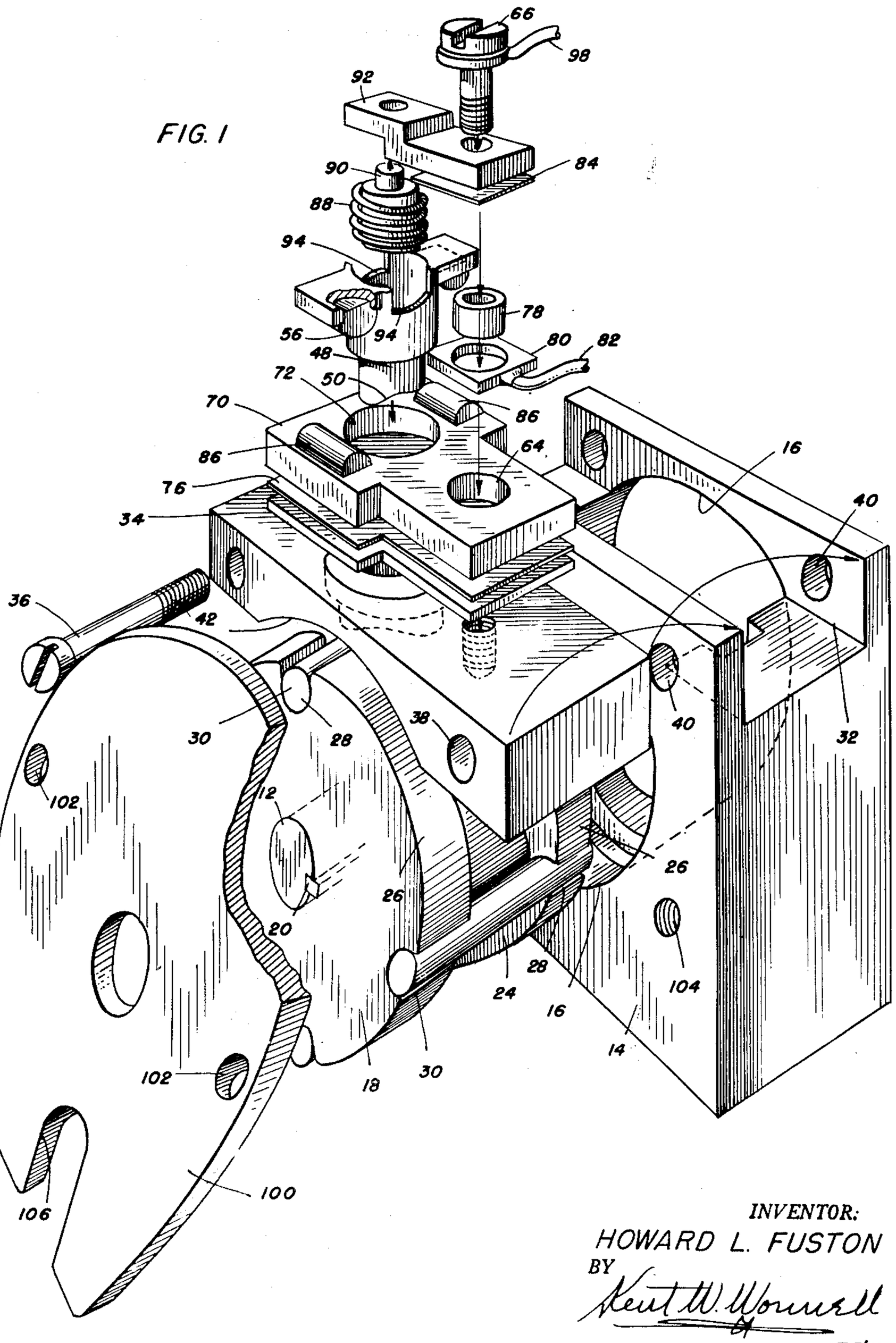
2,629,788

IGNITION BREAKER

Filed Aug. 24, 1950

2 SHEETS—SHEET 1

FIG. 1



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2 SHEETS—SHEET 2

FIG. 2

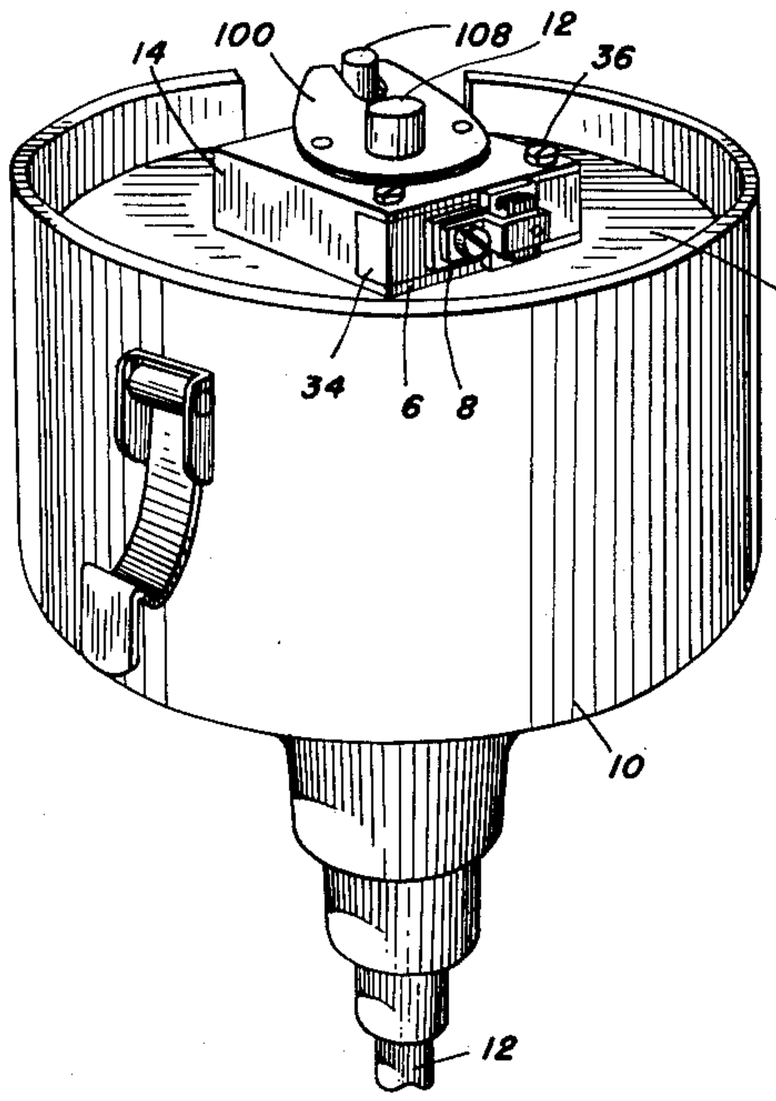


FIG. 5

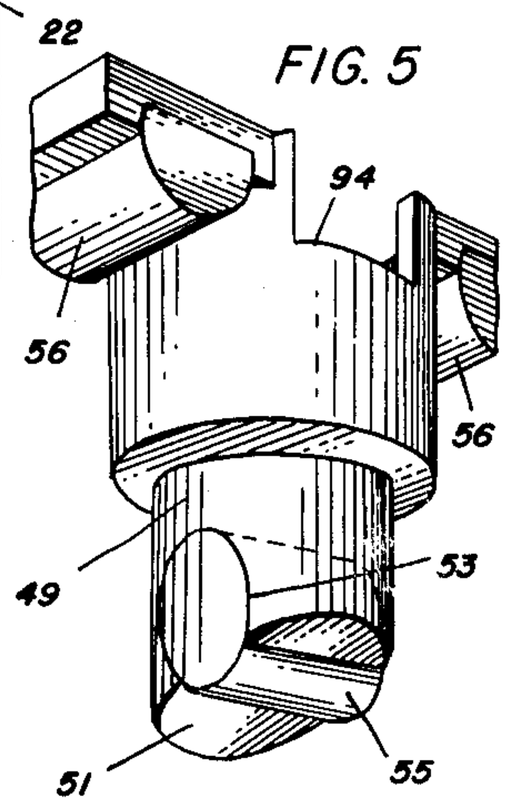
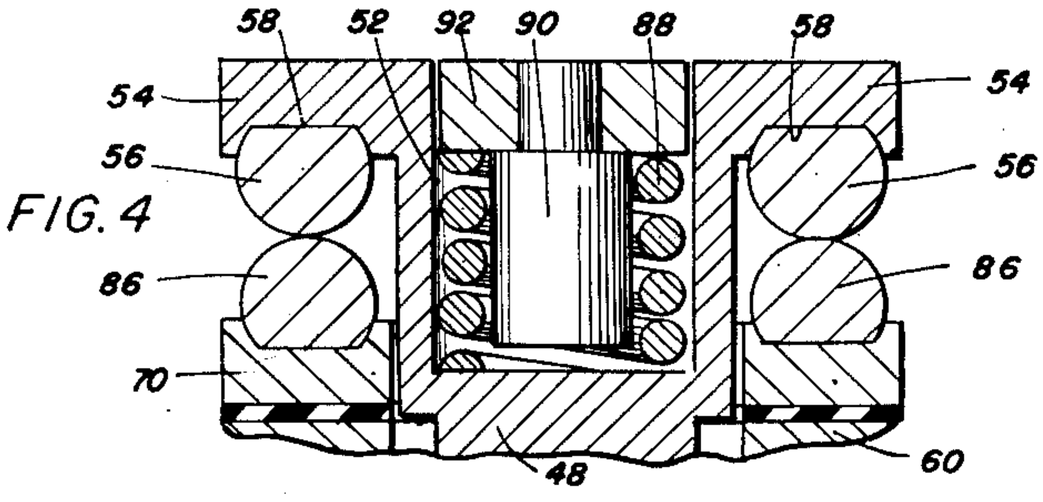


FIG. 3

FIG. 4



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Patented Feb. 24, 1953

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UNITED STATES PATENT OFFICE

2,629,788

IGNITION BREAKER

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Application August 24, 1950, Serial No. 181,239

8 Claims. (Cl. 200—30)

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This invention relates in general to a circuit breaking device and is more particularly described as an ignition breaker for internal combustion engines.

The ordinary type of ignition breaker comprises an oscillating arm which moves radially in a mounting surrounding the cam shaft, the arm being oscillated upon each engagement of a cam which is subject to considerable stress and strain and has a tendency to chatter and to pit or burn the contact points under the severe working conditions to which it is subjected.

The present invention provides for the substitution of a rotary circuit breaker operated by the cam shaft in which a quick break is insured eliminating recoil and providing for a rolling lift contact engagement between the parts instead of a hit and bounce engagement.

An important object of the invention is to provide an ignition point assembly which can be fastened together at the time of manufacture and applied to the end of an ignition breaker shaft or substituted for an ignition breaker assembly as now commonly used.

Further objects of the invention are to provide a lifting and rolling movement of one of the breaker parts which produce an exceedingly fast break and a fast closing of the circuit; to provide cam rollers which fit in end grooves and have an intermediate groove in which the ignition breaker engages the cams so that when any cam roller is past the breaker, it cannot bounce or chatter upon the engaging roller; to produce a rapid break which means less time of arcing between points and a better spark than if a slower break is made; to produce a fast closing of the points which gives more closed time for the circuit and more time for a build-up of a greater spark for the next circuit break; to provide a cam and breaker assembly like a roller bearing having little strain or pressure exerted by the shaft roller projecting into the path of the cam rollers for producing the desired break of the points; to produce a hotter spark by the fast make and break action and thereby producing better combustion resultant upon ignition of fuel in the combustion chamber of an engine and allowing more of the fuel to be exploded or burned in the cylinder of a motor before the exhaust valve opens with resultant of more power developed by the motor without increasing the amount of fuel consumed when ignited by a spark of less intensity; to ignite a less perfect fuel mixture more easily; to provide easier starting of a motor when hot

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or cold; and to increase the fuel efficiency of a motor which does not drop until after the power peak of the motor is reached; and in general, to produce the structure herein shown and described.

Other objects of the invention will appear in the specification and will be apparent from the accompanying drawings in which,

Fig. 1 is an exploded perspective view of a point assembly ignition device in accordance with this invention;

Fig. 2 is a perspective view of a conventional type of ignition breaker holder to which the present invention is applied by substituting the present invention from the ignition breaker now commonly used;

Fig. 3 is a sectional detail of some of the ignition parts shown in Fig. 1;

Fig. 4 is a sectional view taken on the line 4—4 of Fig. 3; and Fig. 5 is a perspective view of a modified form of a point assembly ignition device.

This invention is described as an attachment which may be installed at the end of a cam shaft of the present type of ignition breakers, and of course it may also be incorporated as an original part of the breaker mechanism by similarly fastening it to the cam shaft or any other rotating part operated in timed relation to the engine.

Referring now more particularly to the drawings, a conventional ignition breaker casing 10 has a cam shaft 12 connected thereto and extending upwardly through the casing to the top thereof. This shaft is rotated by an internal combustion engine in timed relation thereto and ordinarily has a single cam at the end of the shaft adapted to engage an ignition breaker or breakers of the single arm type.

In the present invention, a block 14 has a circular opening 16 in which a cam holder 18 is freely rotatable. The cam holder 18 is secured to the cam shaft 12 by a key 20 or in any other suitable manner and the block 14 is fixed against rotation by being secured to a plate 22 relatively fixed in the casing 10 or adjustable therein if the ignition breaker is to be advanced or retarded, in any well known manner.

The cam holder 18 is substantially of the same thickness as the block 14 and has a central peripheral groove 24 forming outer ridges 26 having corresponding spaced slots 28 therein at regular intervals around the periphery usually four, six, or eight depending upon the number of cylinders in the engine to be served thereby. These

slots 28 have circular bottoms and substantially parallel sides for receiving freely therein cam rollers 30 which are preferably of a size to fit within the opening 16 of the block and to be substantially flush with the outer periphery of the side ridges 26.

With this construction, the rollers are held tightly in place, they may be rotated within the cam holder to bring different surfaces of the cam to the outer periphery, and a free space is provided between the outer ridges 26.

At one end of the block 14 is a transverse groove 32 partially intersecting the opening 16 and adapted to receive a bar 34 therein which may be held in connection with the block 14 by bolts 36 inserted through perforations 38 in the bar and through registering perforations 40 at opposite sides of the block 14 and in the sides of the groove 32. These bolts 36 may also be of sufficient length to insert them into the supporting plate 22 for securing the entire point assembly in position.

The inner side of the bar 34 has a transverse arcuate groove 42 which conforms to the curvature of the opening 16 of the block 14 so that it makes a continuous circular receptable with the block 14 for the cam holder 18 and the roller cams 30. In the arcuate portion of the bar 34 is a shouldered bore 44 extending at right angles to the bar at the end of the arcuate portion and parallel to a diametric line extending through the middle of the arcuate portion and the center of the cam holder 18 and the cam shaft 12. In this bore 44 is a correspondingly shouldered bearing sleeve 46 for receiving a plunger 48 having a cam follower 50 at the inner end thereof adapted to extend normally for a partial distance into the groove 24 and in the path of the cam rollers 30. The upper end of the plunger is shouldered outwardly and has a recess 52 and extending from opposite sides of the upper end are projections 54 which carry short segmental circular bars 56 at the inner or under sides thereof, each bar having a flattened portion 58 for securing it to one of the projections 54 by welding or otherwise, and against turning.

The plate 60 has an opening 62 therein through which the plunger passes freely, the opening being of a size to engage the upper end of the bearing sleeve 46 for holding it in place. At the other end of the plate is an opening 64 through which a fastening bolt 66 is inserted into a threaded opening 68 in the bar 34.

On top of the plate 60 is a similarly shaped plate 70 having an opening 72 through which the plunger extends and having a larger opening 74 surrounding the bolt 66.

Between the plates 60 and 70 is an insulating strip 76 having openings through which the plunger and the bolt 66 are inserted and in the opening 74 of the upper plate is an insulating shell 78 surrounding the bolt and extending above the plate 70. A contact ring 80 surrounds the upper projecting end of the insulating shell 78 and lies in contact with the upper surface of the plate 70 with a conductor lead or connection 82 extending therefrom to provide an electrical connection. On top of the ring 80 is an insulating washer 84 which insulates the plate 70 both at the top and the bottom from engagement with other parts of the unit assembly.

At the other end of the plate 70 and on opposite sides of the opening 72 therethrough are contact bars 86 segmental in shape and partially seated within the bar as shown in Fig. 4 and

secured thereto by welding or in any other suitable manner, the outer curved surfaces being substantially in alignment with the contact bars 56 carried by the plunger 48 so that they are adapted to make a line contact when brought together.

In the recess 52 at the outer end of the plunger 48 is a partially compressed coil spring 88 centered therein by a core plug 90 secured in one end of an attaching clip 92 which is seated in opposite grooves 94 in the walls of the plunger formed by the recess 52, the other end of the clip 92 comprising an offset portion having a hole 94 through which the fastening bolt 66 also extends. A contact ring 96 surrounds the bolt 66 at its outer end between the head thereof and the clip 92 and has an attached circuit forming connection 98 extending therefrom.

When the bolt 66 is tightened in place, the clip 92 is forced downwardly against the spring 88, causing the shouldered portion of the plunger to be seated upon the bearing sleeve 46. In this position, the cam follower 50 projects beyond the outer periphery of the cam holder 18 into the groove 24 thereof and into the path of the cam rollers 24 thereof. The cam follower 50 has a rounded engaging portion substantially at its center which is cut away rearwardly from further engagement with the bearing rollers so that after the rollers engage the cam, a quick return of the cam will not permit it to again engage the roller which is passing, but the cam follower 50 will again enter into the groove 24 in position to engage the next roller cam when it moves into engaging position.

Extending over the top of the block and maintaining the holder 18 in position therein is a cover plate 100 having openings 102 through which fastening screws are inserted into threaded openings 104 in the block 14. This plate preferably projects at one side thereof with a notch 106 in the projection, the notch being engageable by a projection 108 of the spark advance mechanism so that the entire contact point assembly can be advanced or retarded relative to its position on the shaft 12 and relative to the engine cylinders to which the ignition device is connected for advancing and retarding the engine spark in a well known manner.

The installation of this new point assembly requires no skilled labor or any technical machine to check the timing of the distributor and makes it possible to quickly replace the points at a cost lower than normally charged to replace the points now used, plus greater labor costs for installing the points and for timing the distributor or the magneto.

When the point assembly is fastened together at the time of manufacture and the projection of the shaft roller is measured, if the distance is not such as to cause proper opening of the points when the cam roller passes under and lifts the breaker plunger, then gap spacers of desired thickness may be inserted between the plates 60 and 70. The present unit is fastened to the plate 22 by two bolts so that by removing them and taking off the old assembly, a new point assembly is effected.

In the operation of this unit, the plate 70 and its contact bars 86 together with the contact ring 80 are insulated from the remaining parts of the assembly except through contact with the movable contact bars 56 carried by the plunger so that upon separation thereof by the lifting and rolling action of the cam makes an exceedingly fast

break of the circuit and a fast reclosing of the circuit without any danger of reengagement or chattering between the cam rollers **30** and the cam follower **50**. A fast break means less time of arcing between the points and a better spark than if the slower break is made. The fast closing of the points gives more time that the circuit is closed and more time for closing a condenser circuit to build up a greater spark for the next break of the circuit.

The fitting of the cam rollers in the grooves of the cam holder, the cam cover having a slip fit within the block **14**, and the outer exposed edges of the roller being even with an outer periphery of the cam holder, makes this assembly like a roller bearing and little strain or pressure is exerted by the cam follower **50** projecting into the path of the cam rollers for the desired breaking of the points which makes it unnecessary to provide much lubrication as excessive wear is avoided.

The fast make and break action gives a hot spark, ignites fuel in the combustion chamber more quickly and allows more fuel to be exploded in the cylinder of an engine before the exhaust valve opens, thereby resulting in more power being developed by the engine without increasing the amount of fuel consumed when ignited by a spark of less intensity.

As the roller cams move past the breaker cam follower **50**, it is impossible to produce a bouncing action, since the cam **50** is firmly seated by its spring **88** and the cam itself is seated in the groove **24** of the holder. This produces a perfected continuous closed circuit from the time of the return of the cam follower **50** until the next cam roller is reached. This intense spark will also ignite a less perfect fuel mixture to make for easier starting of an engine when it is cold or hot. Also with an intense spark, the motor efficiency is made up to the power peak and the full efficiency of the engine does not drop until after the power peak of the engine is reached. It is also noted that the greatest efficiency of fuel consumption is at the same speed of the motor as when the power peak of the engine is reached. These features operate to make any internal combustion engine perform more satisfactorily than with the conventional types of ignition which are now commonly used.

As shown in Figs. 1 and 3, the plunger **48** has an integral curved or rounded cam follower **50** at the inner end which is adapted to extend for a partial distance into the peripheral groove **24** of the cam holder **18**, but as shown by Fig. 5, a plunger **49** has a flat or straight extremity **51** at the inner end extending at an angle transversely of the plunger, and intersecting this plain surface is a circular recess **53** extending across the recess and having a circular cam follower **55** inserted and secured firmly therein so that a portion of the cam projects beyond the flat extremity **51** providing a rounded cam surface for engagement with the cam rollers **30** and adapted to extend for a partial distance into the groove **24**. The action of this cam assembly is substantially the same as that shown in Figs. 1 and 3 and the plunger is mounted and operated in the same manner.

While preferred forms of the invention have been described in some detail, they should be regarded by way of illustrations and examples rather than restrictions or limitations thereof, as many changes in the construction, combination and arrangement of the parts may be made

without departing from the spirit and scope of the invention.

I claim:

1. In an ignition breaker, a cylindrical holder having a peripheral circular groove and transverse peripheral slots extending across the groove, cam rollers seated in the slots, a block having a circular opening in which the cam holder and the rollers are inserted and by which the rollers are retained in their slots, and an ignition cam follower having means for supporting it in the block, a portion of the cam follower extending into the peripheral groove of the holder and adapted to engage the rollers as the holder is rotated in the block.

2. In an ignition breaker, a supporting block having a circular opening therethrough, a circular holder rotatable in the opening of the block, the holder having a peripheral groove and opposite transverse slots in the edges, cam rollers seated in the slots and retained in the holder when it is inserted in the opening of the block, means for rotating the holder relatively to the block, a breaker cam follower having means for mounting it in the block to project into the groove of the holder and into the path of the rollers as the holder is rotated, contact means carried by the cam follower, fixed contact means carried by the block and relative to which the cam contact means are movable, and means tending to press the cam contact means into engagement with the fixed contact means.

3. In an ignition breaker, a supporting block having a circular opening with a groove intersecting the opening at one side, a holder fitting rotatably in the circular opening having a peripheral groove with transverse slots, cam rollers inserted in the slots across the grooves and retained in the slots when the holder is inserted in the opening of the block, a perforated bar extending in the groove of the block, a breaker cam follower insertable through the perforation of the block into the groove of the holder and in the path of the rollers, fixed contact means supported by the bar, means for insulating the bar from the contact means, contact means carried by the breaker cam follower and adapted to make engagement with the fixed contact means, a spring tending to press the cam follower into the groove of the carrier, a fastening plate to limit the movement of the cam follower outwardly from the bar, and electrical connections leading from the plate and the bar in a circuit which is broken when the fixed contact means and the cam follower contact means are separated.

4. In an ignition breaker, a supporting block having a circular hole therethrough, a circular holder rotatable in the hole of the block, the holder having a peripheral groove forming outer ridges having corresponding slots extending transversely of the edge of the holder, cam rollers seated in the slots and retained in the holder by the block when the holder is inserted in the hole of the block, means for rotating the holder relatively to the block, a breaker cam follower having means for mounting it in the block to project into the groove of the holder and into the path of the rollers as the holder is rotated, cooperating contact means carried by the cam follower and the block, means for insulating the contact means of the cam follower from the contact means of the block, and resilient means engaging the cam follower tending to hold it in the peripheral groove of the holder in the path of the cam

rollers and to hold the insulated contact means in engagement with each other.

5. In an ignition breaker, a supporting block having a circular opening therethrough and a transverse groove at one side partially intersecting the opening, a bar seated in the groove having a portion thereof conforming to the curvature of the opening of the block, a circular holder rotatable in the opening of the block, the holder having a peripheral groove forming outer ribs having corresponding transverse slots therein at regular intervals around the periphery, cam rollers seated in the slots and retained in the holder when it is inserted in the opening of the block, the bar having an opening therethrough and a breaker cam follower mounted therein to project into the groove of the holder and into the path of the rollers as the holder is rotated, spring means tending to press the cam follower into the groove of the holder, the cam follower having opposite outer segmental bar contacts, an insulated plate supported by the bar having a perforation through which the cam follower is also movable, a pair of segmental bar contacts carried by the plate in positions to engage the bar contacts of the cam follower when it is pressed inwardly by its spring, and fastening means for securing the plate and bar together and extending over the outer end of the cam follower for engaging the spring means and tending to hold the cam follower contacts in engagement with the fixed contacts of the plate.

6. In an ignition breaker, a supporting block having a circular opening therethrough, a circular holder rotatable in the opening of the block, the holder having transverse slots in the edges, cam rollers seated in the slots and retained in the holder when it is inserted in the opening of the block, a breaker cam follower having means for mounting it in the block to project into the path of the rollers, contact means carried by the cam follower, insulated fixed contacts carried by the block and located in the path of the breaker cam follower contacts, spring means tending to hold the breaker cam follower and fixed contacts in engagement which is separated when the cam follower is engaged by the rollers, means for rotating the circular holder in the block, means for mounting the block in relatively fixed position for receiving the holder, and a means attached to the outer side of the block to extend over the holder and providing an engageable

portion extending beyond the block for relatively moving the block to relatively advance or retard the timing of the ignition breaker.

7. In an ignition breaker, a circular holder having transverse slots in the edges, cam rollers seated in the slots, a supporting block having a circular opening therethrough in which the holder is rotatable and for retaining the cam rollers in the slots, a breaker cam follower having means for mounting it in the block to project into the path of the rollers as the holder is rotated, an insulated plate carried by the block, the plate and the cam follower having corresponding bar contacts circular in cross section to provide a line engagement when they are together, spring means carried by the supporting block and engaging the cam follower tending to hold the contacts together except when the cam follower is engaged by the rollers, a plate secured to the block and extending over the holder for retaining it in the block, the plate having a slotted portion projecting from the block to provide means for engaging and moving the block relatively to the holder to advance and retard the separation of the breaker contacts.

8. In an ignition breaker, a block having a circular opening therethrough, a circular holder rotatable in the opening of the block, the holder having a peripheral groove forming outer ridges and having corresponding transverse slots therein, cam rollers seated in the slots and retained in the holder when it is inserted in the opening of the block, a breaker cam follower having means for mounting it in the block to project into the groove of the holder and into the path of the rollers as the holder is rotated, means for mounting the supporting block in a relatively fixed position with respect to the holder, the block having means projecting therefrom for adjusting it circularly with respect to the holder for advancing and retarding the engagements of the breaker cam follower.

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