

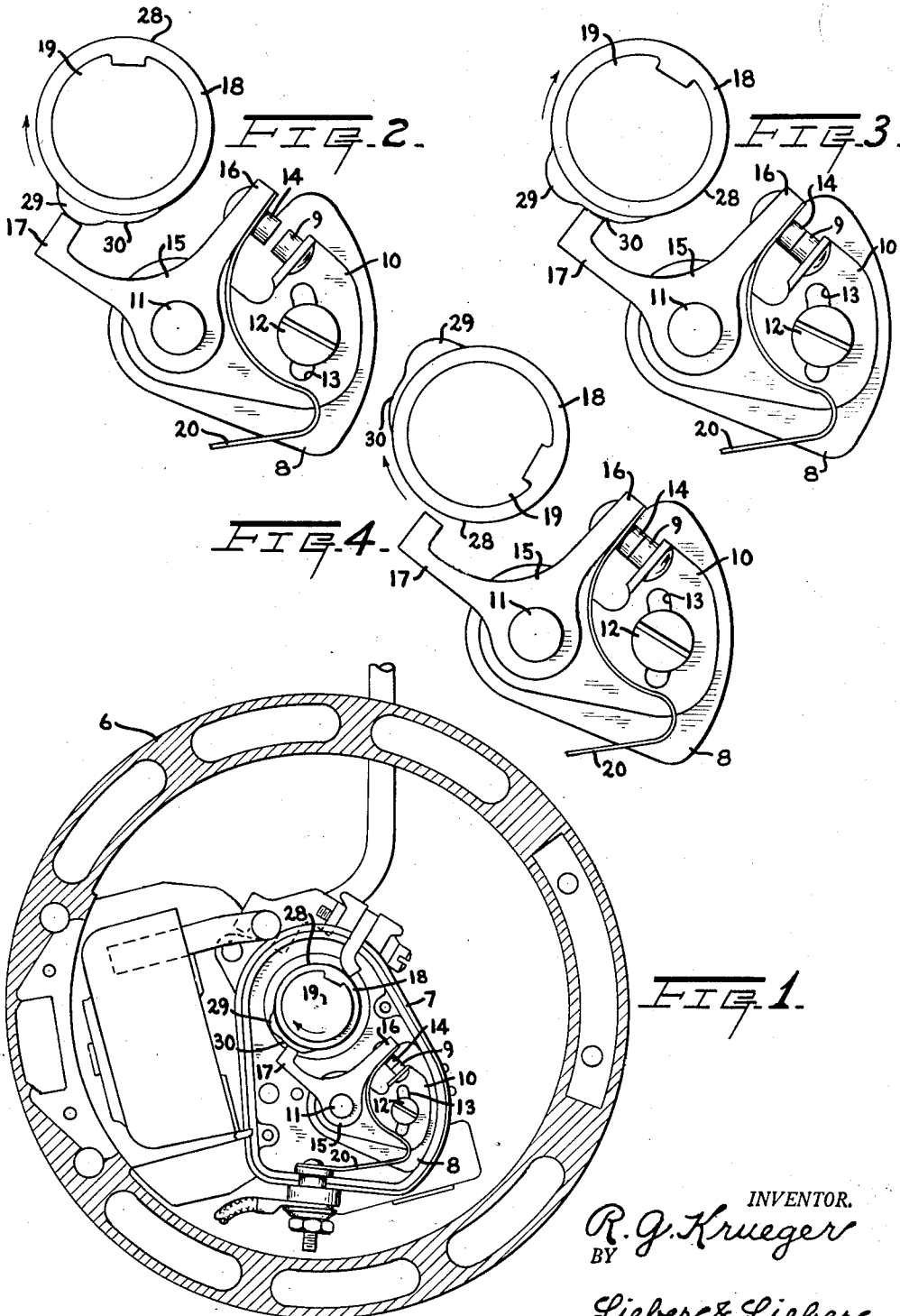
Jan. 21, 1958

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2,820,856

SWITCH CONTACT POSITIONING DEVICE

Filed March 28, 1956



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SWITCH CONTACT POSITIONING DEVICE

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Application March 28, 1956, Serial No. 574,490

5 Claims. (Cl. 200—21)

The present invention relates generally to improvements in the art of fixing the relative positions of switch contacts at predetermined settings, and relates more particularly to the provision of an improved device incorporated directly in a switch actuating member for predetermining the proper relative settings of the switch contacts.

A primary object of the invention is to provide an improved switch contact positioning device which is extremely simple, compact and inexpensive in construction and which is moreover adapted to greatly facilitate the proper adjustment of electrical contacts and particularly the correct setting of breaker points in internal combustion engines.

In present ignition systems for internal combustion engines, it is common practice to utilize a cam rotatable with or by the engine crankshaft and adapted to coact with the cam follower arm of a pivotally mounted lever having another arm carrying one of the breaker points or contacts so as to intermittently cause the breaker point carried thereby to be swung into and out of contact with a fixed breaker point upon rotation of the cam. It is customary practice in such arrangements to provide means for constantly resiliently urging the cam follower arm of the lever toward the timing cam, and the rotatable cam is ordinarily provided with a high spot intermittently cooperable with the follower arm to cause the intermittent swinging of the lever about its pivot and resultant intermittent occurrence of a spark at the spark plug. Since it is extremely important for proper operation of the engine to always obtain the correct point opening distance between the breaker points or contacts during the periods when the follower arm coacts with the high spot on the rotating cam, it is always necessary during assembly to carefully adjust or position the normally fixed breaker point or contact to the proper setting relative to the swingable breaker point or contact; and in effecting such adjustments, feeler gages or similar equipment must be utilized, thus resulting in an undesirable time-consuming assembly operation. Furthermore, whether the adjustment in the setting of the breaker points is being effected during assembly or whether the points are being subsequently re-set or re-adjusted as part of a tune-up or repair job, it is a rather delicate task in which the element of human error is definitely present.

It is therefore a more specific object of this invention to provide an improved breaker point or contact actuating mechanism which obviates the above-mentioned difficulties and objections.

Another specific object of the present invention is to provide an improved timing cam for internal combustion engines which is provided with integral means for effecting correct adjustments in point or contact settings without need for utilizing special gages or other tools or equipment.

Another specific object of the invention is to provide an improved contact positioning or setting device which is incorporated directly in the switch actuating member

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and eliminates or at least minimizes the possibility of human error.

Still another specific object of my present invention is to provide a novel and improved timing cam for positively and effectively intermittently opening the switch contacts of an internal combustion engine ignition system to the correct point opening distance, the cam being formed with an integral setting pad or surface for facilitating ready adjustment in the relative positions of the switch contacts without undesirably interfering with the operation of the assemblage.

A further specific object of the present invention is to provide an improved switch actuating and timing cam for the ignition system of an internal combustion engine, the cam being formed with a switch receiving and positioning surface lying in a plane between the high and low cam surfaces and located adjacent to and rearwardly of the high point of the cam.

These and other specific objects and advantages of the invention will become apparent from the following detailed description.

A clear conception of the improvements constituting the present invention and of the mode of applying and of utilizing contact positioning devices embodying the invention in a typical timing system may be had by referring to the drawing accompanying and forming a part of this specification, wherein like reference characters designate the same or similar parts in the several views.

Fig. 1 is a transverse section through a typical timing housing of a single cylinder internal combustion engine and showing the ignition timing mechanism thereof and the improved cam;

Fig. 2 is a somewhat enlarged plan view of the timing mechanism showing the rotatable timing cam in circuit breaking position;

Fig. 3 is a similarly enlarged plan view of the timing mechanism but showing the improved cam rotated to contact setting and adjusting position; and

Fig. 4 is still another enlarged plan view of the same mechanism but with the cam rotated still further to inactive position.

While the improved contact positioning device is particularly shown and described as being embodied in a timing cam having a single high spot and adapted for use in an internal combustion engine of the single cylinder type, the invention may obviously be readily utilized with timing cams having a plurality of high spots and adapted for use in internal combustion engines of more than one cylinder. It is also contemplated that certain specific descriptive terms used herein shall be given the broadest possible interpretation consistent with the disclosure.

Referring to the drawing and particularly Fig. 1 thereof, the typical internal combustion engine timing mechanism shown therein comprises, in general, a flywheel 6, a timer housing 7 having a base plate 8 therein, a normally stationary contact or breaker point 9, means such as a bracket or plate 10 carrying the contact 9 and manually swingable about a pivot shaft 11 for effecting adjustment of the contact 9 to various fixed positions in which the plate 10 may be secured to the base plate 8 by means of a set screw 12 which extends through an arcuate adjusting slot 13 in the plate 10, a movable contact or breaker point 14 cooperable with stationary contact 9, an element shown herein as a bell crank lever 15 swingable about the pivot shaft 11 and having the arm 16 thereof carrying the movable contact 14, a timing cam 18 disposed adjacent to and laterally of the contacts and carried by the rotatable shaft 19 and cooperable with the other arm 17 of the bell crank lever 15 for intermittently retracting or moving the contact 14 away from the contact 9, and means such as a leaf spring 20 having one end secured to the arm 16 of the lever 15 for constantly resiliently urg-

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ing the movable contact 14 toward the fixed contact 9 and the arm 17 toward the cam surface.

Since the components and electrical circuit of internal combustion engine ignition systems of this general type are well known and form no part of this invention, the other parts shown in the drawing have been schematically illustrated and have not been described in detail, it being sufficient to state that an electrical connection is made to the spark plug so that a spark will intermittently occur as the contacts or breaker points 9, 14 are opened.

In accordance with the present invention, the rotatable timing cam 18 is formed with a cylindrical surface 28 provided with a local radially extending lobe or peripheral outwardly projecting portion 29 which intermittently coacts with the arm 17 of the lever 15 to swing the lever about its pivot 11 and raise the contact 14 away from the contact 9. In order that the fixed contact carrying plate 10 may be properly adjusted about its pivot 11 by means of the slot 13 and screw 12 to thereby obtain the correct setting or point opening distance between the contacts 9, 14 during the intervals that the arm 17 is in engagement with the cam projection 29, the cam 18 is formed with a ledge 30 adjoining the portion 29 and extending rearwardly therefrom in an arch parallel to the circular surface 28 and lying radially intermediate the outermost part of the projecting portion 29 and the cylindrical surface 28. This ledge 30 forms a fixed contact adjusting portion which entirely eliminates the need for utilizing feeler gages or other equipment for properly securing the contact 9 in proper position, and when the ledge 30 is properly formed so as to lie in an arc disposed inwardly from the high spot of the projection 29 a distance proportional to that desired for the point opening, it is only necessary to set the arm 17 of the lever 15 against the ledge 30 as shown in Fig. 3 and to then loosen the set screw 12 and swing the plate 10 about its axis 11 until the contacts 9, 14 are closed whereupon the set screw 12 may be firmly tightened and the correct setting has been obtained.

In operation, the fixed contact 9 is first properly adjusted as just described, and as the shaft 19 is rotated by the engine in the direction of the arrows in the several views, the cam 18 is rotated therewith. As the cam 18 is thus rotated the follower arm 17 of the movable contact carrying lever 15 intermittently coacts with the high spot or lobe 29 of the cam thus moving the contact 14 away from the contact 9 against the action of the spring 20 and intermittently breaks the circuit, thus causing a spark to intermittently occur at the spark plug. Obviously, if the engine is of a type having more than one cylinder, a high spot or lobe 29 may be provided for each of the cylinders to thereby intermittently cause the occurrence of a spark in timed sequence at each of the spark plugs.

From the foregoing detailed description it is believed apparent that the present invention contemplates the provision of an extremely simple device by means of which the proper breaker point adjustment may be effected without need for special gages and in an exceptionally rapid and efficient manner; and while a typical timing arrangement has been illustrated, it is believed obvious that the present device may be readily utilized in systems of other types. The ledge 30 of the cam 18 forms an adjusting portion for rapidly determining and positively setting the normally stationary contact 9 in proper position whereby the correct desired contact opening distance between the contacts 9, 14 is obtained during the intervals at which the active portion 29 of the cam coacts with the arm 17 of the movable contact carrying lever 15. Since the lever 30 is positioned rearwardly of the cam surface 29 relative to the direction of rotation of the cam, it does not in any way interfere with the operation of the timing mechanism; and correct adjustments of the breaker points may be rapidly effected both during original assembly of the mechanism as well as at any time sub-

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sequent thereto and whenever re-adjustment in the timing system is required. Since the use of gages is eliminated entirely, the element of human error is also eliminated or greatly minimized since no reliance need be placed in the proper reading of the gages normally required in ordinary timing systems, and the setting can be rapidly accomplished with considerable expediency and saving of time. It is, of course, essential that the cam 18 be carefully formed so that the ledge 30 lies in the proper arch located radially inwardly from the high point of the lobe 29 a distance proportional to that desired for breaker point opening, but once the cam is properly formed and positioned on the shaft 19, a highly advantageous result is obtained.

It is not desired or intended to limit this invention to the exact details of construction or to the precise mode of use herein shown and described, since various modifications within the scope of the appended claims may occur to persons skilled in the art to which this invention pertains.

I claim:

1. A timing device for the ignition system of an internal combustion engine comprising, a normally stationary contact, means for effecting adjustment of said contact, a movable contact cooperable with said stationary contact, a rotatable member disposed adjacent to said contacts and having a cylindrical surface provided with a local peripheral cam portion and an adjoining fixed contact adjusting portion lying intermediate said cylindrical surface and said cam portion, and an element supporting said movable contact and being successively engageable with said cam portion to intermittently cause said movable contact to be retracted out of engagement with the fixed contact, said element being cooperable with said fixed contact adjusting portion and with said adjusting means to predetermine the correct position of said stationary contact.

2. A timing device for the ignition system of an internal combustion engine comprising, a normally stationary contact, means for effecting adjustment of said contact, a movable contact cooperable with said stationary contact, a rotatable member disposed adjacent to said contacts and having a normal surface interrupted by a local peripheral cam portion and an adjoining intermediate ledge extending rearwardly from said cam portion, and an element supporting said movable contact and being successively engageable with said cam portion to intermittently cause said movable contact to be retracted out of engagement with the fixed contact, said element being cooperable with said ledge and with said adjusting means to predetermine the correct position of adjustment of said stationary contact for obtaining the desired contact opening distance between said movable and stationary contacts during the intervals that said element is in engagement with said cam portion.

3. A timing device for the ignition system of an internal combustion engine comprising, a normally stationary contact, means for effecting adjustment of said contact, a movable contact cooperable with said stationary contact, means for constantly resiliently urging said movable contact toward said fixed contact, a rotatable member disposed adjacent to said contacts and having a cylindrical surface provided with a local peripheral cam portion and an adjoining ledge radially intermediate the outermost part of said cam portion and said cylindrical surface, and an element supporting said movable contact and being successively engageable with said cam portion to intermittently cause said movable contact to be retracted out of engagement with the fixed contact, said element being cooperable with said ledge and with said adjusting means to predetermine the correct position of adjustment of said stationary contact for obtaining the desired contact opening distance between said movable and stationary contacts during the inter-

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vals that said element is in engagement with said cam portion.

4. A timing device for the ignition system of an internal combustion engine comprising, a normally stationary contact, means for effecting adjustment of said contact, a movable contact cooperable with said stationary contact, means for constantly resiliently urging said movable contact toward said fixed contact, a rotatable member disposed adjacent to said contacts and having a cylindrical surface provided with a local peripheral cam portion and an adjoining ledge extending rearwardly therefrom in a plane radially intermediate the outermost part of said cam portion and said cylindrical surface, and an element supporting said movable contact and being successively engageable with said cam portion to intermittently cause said movable contact to be retracted out of engagement with the fixed contact, said element being cooperable with said ledge and with said adjusting means to predetermine the correct position of adjustment of said stationary contact for obtaining the desired amount of contact opening distance between said movable and stationary contacts during the intervals that said element is in engagement with said cam portion.

5. A timing device for the ignition system of an internal combustion engine comprising, a normally stationary contact, means for effecting adjustment of said contact, a movable contact cooperable with said sta-

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tionary contact, means for constantly resiliently urging said movable contact toward said fixed contact, a rotatable timing cam disposed adjacent to said contacts and having a cylindrical surface provided with a local peripheral outwardly projecting portion and an adjoining ledge extending rearwardly therefrom in a plane parallel to said cylindrical surface and radially intermediate the outermost part of said projecting portion and said cylindrical surface, and an element supporting said movable contact and being successively engageable with said projecting portion to intermittently cause said movable contact to be retracted out of engagement with the fixed contact, said element being cooperable with said ledge and with said adjusting means to predetermine the correct position of adjustment of said stationary contact for obtaining the desired contact opening distance between said movable and stationary contacts during the intervals that said element is in engagement with said projecting portion.

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