Jan. 17, 1939. M. G. CHANDLER 2,143,937

FUEL FEEDING MEANS FOR INTERNAL COMBUSTION ENGINES

Original Filed Feb. 6, 1936 2 Sheets-Sheet 1

Fig. 1.

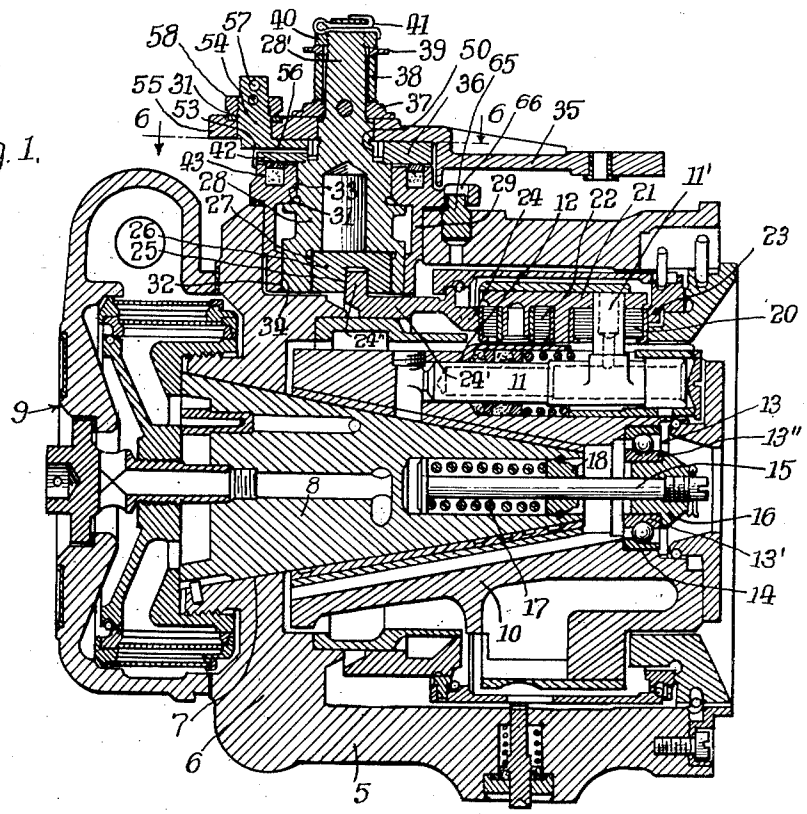
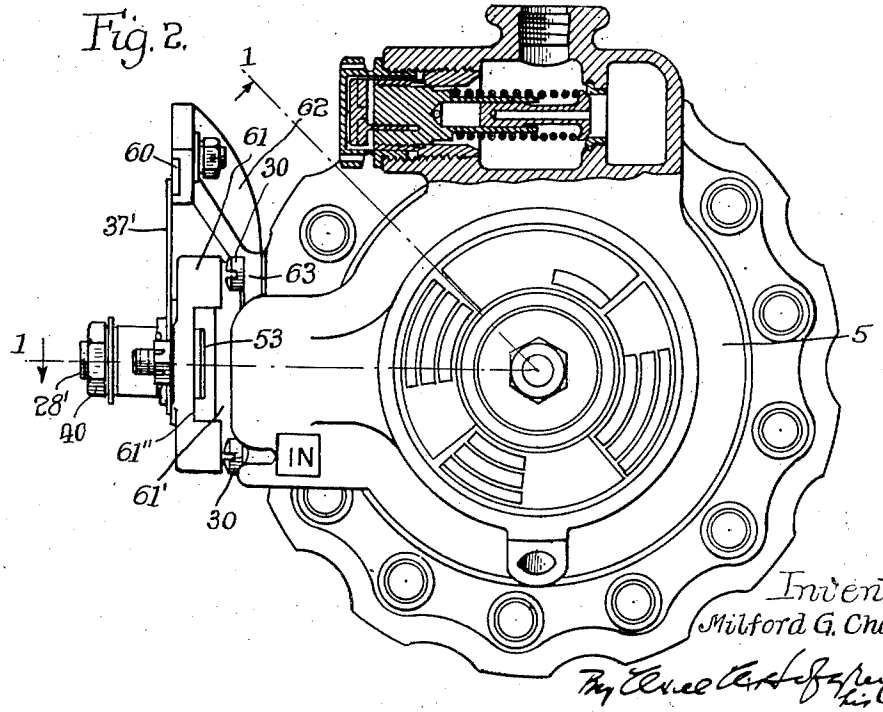


Fig. 2.



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Fig. 3.

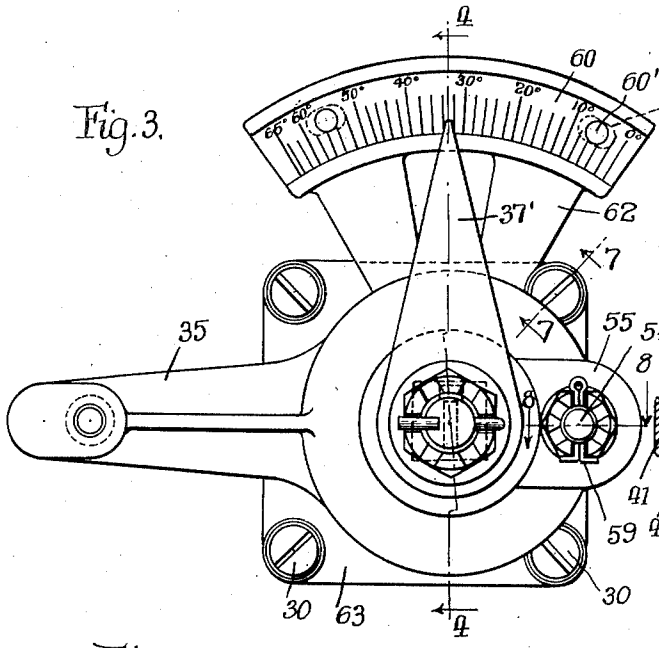


Fig. 4.

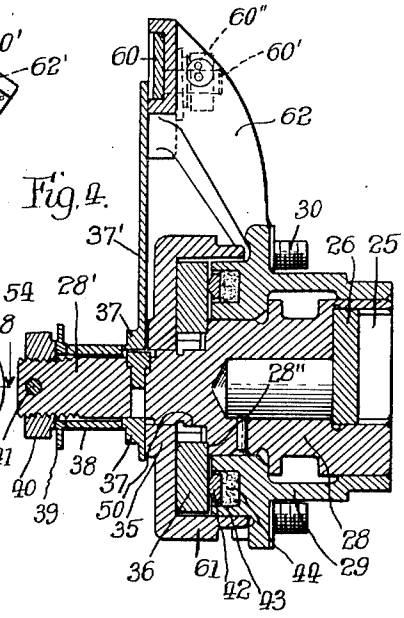


Fig. 5.

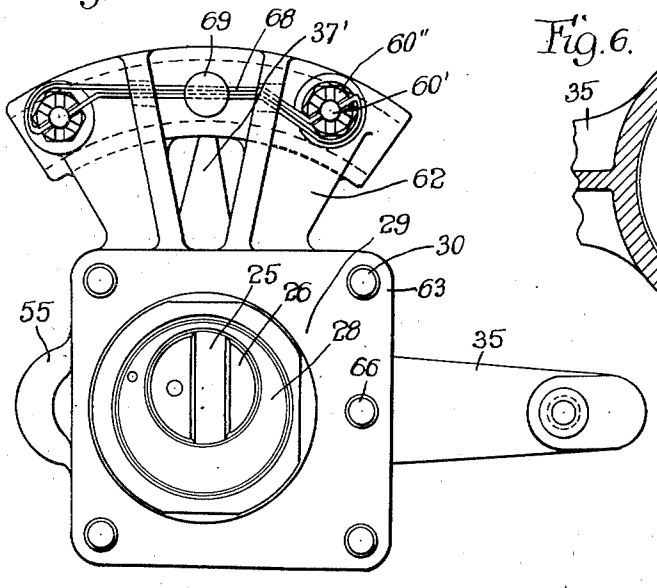


Fig. 6.

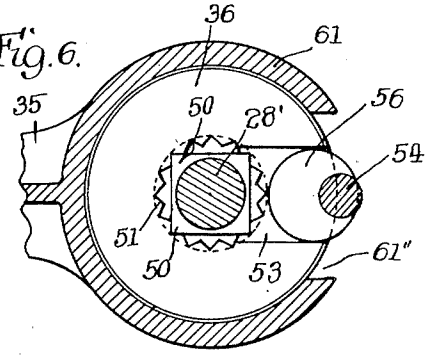


Fig. 7.

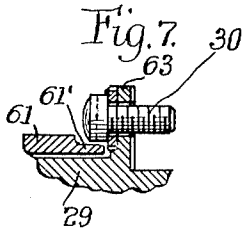
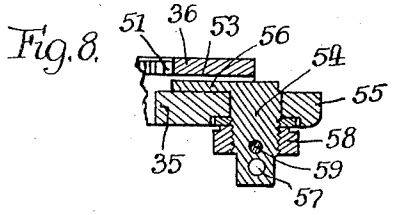


Fig. 8.



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UNITED STATES PATENT OFFICE

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FUEL FEEDING MEANS FOR INTERNAL COMBUSTION ENGINES

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Application February 6, 1936, Serial No. 62,657
Renewed June 23, 1938

12 Claims. (Cl. 74—568)

This invention relates to new and useful improvements in fuel feeding means for internal combustion engines and more particularly to an improvement on the device disclosed in my Patent No. 2,022,653, dated December 3, 1935, and my copending applications Serial Nos. 725,665, 725,666 and 725,667, filed May 14, 1934.

In the devices of said patent and applications there is disclosed a fuel feeding means having a plurality of piston and cylinder devices, the pistons and cylinders being carried on a revolvable rotor. The pistons are reciprocated during rotation of the rotor by means of a pair of relatively stationary annular cams which engage a roller or rollers carried on the piston. For the purpose of adjusting the stroke of the pistons, means is provided for shifting one of the cams toward and from the other. It is an object of this invention to provide a new and improved mechanism for adjusting the movably mounted cam of such a device for the purpose of varying the stroke of the pistons and thereby the output of the fuel feeding means.

Another object of the invention is to provide a new and improved control mechanism for such a fuel feeding means having a control element pivotally mounted on one side of the casing of the device, together with means connecting said element to the adjustable cam operable to move the cam longitudinally of the casing when the control element is pivoted.

Further objects will become readily apparent from the following detailed description taken in connection with the accompanying drawings, wherein:

Fig. 1 is a section along the line 1—1 of Fig. 2.

Fig. 2 is a plan view of a fuel feeding means embodying a preferred form of the invention.

Fig. 3 is a view of the control mechanism looking at the left-hand end of Fig. 2.

Fig. 4 is a section along the line 4—4 of Fig. 3.

Fig. 5 is a view of a portion of the control looking at the right-hand end of Fig. 4.

Fig. 6 is an enlarged fragmentary section along the line 6—6 of Fig. 1.

Fig. 7 is a detail section along the line 7—7 of Fig. 3.

Fig. 8 is a detail section along the line 8—8 of Fig. 3.

Although a preferred form of the invention is shown in the drawings and described hereinafter, it is to be understood that the invention is not to be limited to the particular arrangement shown, it being contemplated that various modifications and alternative constructions may be devised by those skilled in the art without departing from the spirit and scope of the appended claims.

As illustrated in the drawings, a fuel feeding means is illustrated comprising a tubular casing 5 having a head end 6 provided with a conical seat 7 in which a conical valve element or cone 8 is mounted. The valve element is secured in position by means of a strainer structure or cap 9. A rotor 10 is revolvably mounted upon the cone 8 and carries a plurality of pistons 11 reciprocably mounted in cylinders 12 formed in the rotor. The rotor is held on the cone 8 by means including a ball bearing 13 the outer race 13' of which fits in a recess 14 in the rotor and the inner race 13'' of which is secured to the cone 8 by means of a stud 15 and nut 16 secured to one end of the stud. The other end of the stud is preferably headed and a coil spring 17 is positioned intermediate the head on the stud and a collar 18 suitably secured to the cone 8. The detailed construction of these portions of the fuel feeding means are more particularly described and claimed in said patent and copending applications.

The pistons 11 are provided with driving projections 11' which carry rollers 20 and engage shoes 21 which carry additional rollers 22, the rollers 20 being arranged to follow one stationary annular cam 23, whereas the rollers 22 follow along a second annular cam 24. These cams are mounted on the casing 5 and are held against rotational movement, the cam 23 being fixed against longitudinal movement also, whereas the cam 24 is adjustable longitudinally of the casing for the purpose of varying the stroke of the pistons 11. The contours of the cams and the construction of the roller and shoe mechanism are all fully disclosed in said pending applications, and it is to the means for adjusting the cam 24 longitudinally of the casing 5 that the present invention is particularly directed.

As illustrated herein, the cam 24 has a tubular portion 24' and a lug 24'' projecting radially from one side of the tubular portion. The lug 24'' fits in an electric slot 25 in a circular disk 26 which is rotatably mounted in an eccentric recess 27 formed in a rotary control member 28. The member 28 is rotatably mounted on and extends into a bushing 29 which is secured to the casing 5 by means of a plurality of bolts 30 (Fig. 2) and forms spaced bearing surfaces at 31 and 32 engaging corresponding cylindrical surfaces 33 and 34 on the member 28. One end 28' of the mem-

ber 28 projects outwardly from the bushing 29 and carries a control element 35.

As illustrated herein, the projecting end 28' of the member 28 is of reduced diameter and in addition to the control element 35 carries a bearing plate 36 positioned against the control element 35, a collar portion 37 of an indicating pointer 37', bushing 38, a member 39 and a nut 40, a suitable cotter pin 41 serving to hold the nut 40 against rotation. The bearing plate 36 along its inner edge is clamped against a shoulder 28'' (Fig. 4) on the member 28 and has its lower surface in operative engagement with an annular sealing ring 42, which ring is positioned in an annular recess 43 in the bushing 29 and is urged into sealing engagement with the plate 36 by means of suitable packing material 44.

In order to facilitate locating the control element 35 on the member 28 so that it may extend radially therefrom, in any one of a plurality of directions, the portion 28' of the member 28 is preferably formed with a square portion 50 (Figs. 1, 4 and 6) which fits into a sixteen-toothed recess 51 formed in the plate 36 so that the plate 36 may be located in any one of sixteen different angular positions with respect to the member 28. Since the control element 35 in turn is secured to the bearing plate 36, the control element may thus be adjusted angularly with the plate 36. Furthermore, means is herein provided for adjusting the control element 35 angularly with respect to the plate 36 to obtain a more accurate adjustment. In the preferred form of the invention illustrated, the plate 36 is provided with a radial recess 53 (Figs. 1, 2, 6 and 8) and a pin 54 carried on an extension 55 of the control element 35 has at its lower end an eccentric and circular disk portion 56 which fits into the recess 53. The pin 54 may be rotated by inserting a suitable rod in a diametric hole 57 in the upper portion of the pin (the skirt 61 of the control element 35 being recessed at 61'' to provide clearance), the pin when rotated causing the eccentric portion 56 to move the control element 35 angularly with respect to the plate 36. After making the minute adjustment thus obtainable, a nut 58 on the pin 54 may be tightened and secured in its tightened position by means of a cotter pin 59.

In order to provide a visual indication of the location of the control cam 24, an arcuate scale 60 is suitably mounted on an extension 62 of the bushing 29, the end of the pointer 37' extending over said scale. The scale preferably has threaded pins 60' extending through arcuate slots 62' in the extension 62 to receive nuts 60'' so that upon adjusting the scale and tightening the nuts the adjustment may be sealed by a wire 68 (Fig. 5) and seal 69, the wire passing through suitable cotter pin holes in the pins and nuts.

As illustrated most clearly in Figs. 2, 4 and 7, the control element 35 is provided with a skirt portion 61 which surrounds the plate 36 and the adjacent end of the bushing 29 so as to form a guard for the bearing. This skirt portion is preferably reduced in thickness at 61' (Fig. 7) so as to provide clearance for screws 30 which extend through the corners of a rectangular flange 63 on the bushing 29 to secure the control to the casing 5 of the fuel feeding means. To locate the bushing 29 on the casing 5 a pin 65 (Fig. 1) may be anchored in the casing 5 and project into a suitable recess 66 in the bushing flange 63.

Not only does the invention provide a simple and accurate means for adjusting the cam 24 for varying the stroke of the fuel feeding means, the means for adjusting the control element angularly with respect to the member 28 also serving to facilitate installation of the fuel feeding means on an engine and the connection of the control element to other control devices. In this manner the idling position of the control element 35 may be accurately determined. The connection between the bearing plate 36 and the member 28 provides for an approximate adjustment of the control element 35, after which an accurate adjustment thereof may be obtained by the adjusting pin 54.

I claim as my invention:

1. In a fuel feeding means for internal combustion engines having an element adjustable rectilinearly for varying the quantity of fuel discharged, a control mechanism comprising a bushing having longitudinally spaced annular bearing surfaces, a shaft rotatably mounted in said bushing and having portions engaging said bearing surfaces and an eccentrically located circular recess in one end thereof, a circular member rotatably positioned in said recess and having an eccentric slot for operatively engaging a portion of said element, a bearing plate secured to said shaft adjacent the outer end of said bushing, a sealing ring mounted on said bushing for engaging said plate, a control arm mounted on said shaft, and means for securing said control arm to said shaft in various angularly adjusted positions.

2. In a fuel feeding means for internal combustion engines having an element adjustable rectilinearly for varying the quantity of fuel discharged, a control mechanism comprising a supporting bushing, a shaft rotatably mounted in said bushing and having an eccentrically located circular recess in one end thereof, a circular member in said recess having an eccentric slot for operatively engaging a portion of said element, a bearing plate secured to said shaft adjacent the outer end of said bushing, a sealing ring mounted on said bushing for engaging said plate, a control arm mounted on said shaft, and means for securing said control arm to said shaft in various angularly adjusted positions.

3. In a fuel feeding means for internal combustion engines having an element adjustable rectilinearly for varying the quantity of fuel discharged, a control mechanism comprising a support, a shaft rotatably mounted on said support having an eccentrically located circular recess in one end thereof, a member positioned in said recess having an eccentric slot for operatively engaging a portion of said element, a control arm mounted on said shaft, and means for securing said control arm to said shaft in various angularly adjusted positions.

4. In a fuel feeding means for internal combustion engines having an element bodily adjustable rectilinearly for varying the quantity of fuel discharged, a control mechanism comprising a support, a first member rotatably mounted on said support, and a second member eccentrically positioned on said first member for rotation relative thereto and having eccentric means operatively engaging a portion of said element to shift the same bodily upon rotation of said first member.

5. In a fuel feeding means for internal combustion engines having an element adjustable rectilinearly for varying the quantity of fuel discharged, a control mechanism comprising a bushing having longitudinally spaced annular bearing

surfaces, a shaft rotatably mounted in said bushing and having portions engaging said bearing surfaces and an eccentrically located circular recess in one end thereof, a circular member rotatably positioned in said recess and having an eccentric slot for operatively engaging a portion of said element, a bearing plate adapted to be secured to said shaft in any one of a plurality of angularly spaced positions, a control arm carried on said bearing plate and adjustable angularly with respect thereto, and means for adjusting said control arm with respect to said plate comprising opposed radially extending shoulders on said plate, a pin rotatably mounted eccentrically on said control arm and having an eccentric circular portion engaging said shoulders, and means for securing said pin in its adjusted position.

6. In a fuel feeding means for internal combustion engines having an element adjustable rectilinearly for varying the quantity of fuel discharged, a control mechanism comprising a support, a shaft rotatably mounted in said support and having an eccentrically located circular recess in one end thereof, a circular member rotatably positioned in said recess and having an eccentric slot for operatively engaging a portion of said element, a plate adapted to be secured to said shaft in any one of a plurality of angularly spaced positions, a control arm carried on said plate and adjustable angularly with respect thereto, and means for adjusting said control arm with respect to said plate comprising a radially extending recess in said plate.

7. In a fuel feeding means for internal combustion engines having an element adjustable for varying the quantity of fuel discharged, a control mechanism comprising a support, a shaft rotatably mounted in said support and having an eccentrically located circular recess in one end thereof, a circular member rotatably positioned in said recess and having an eccentric slot for operatively engaging a portion of said element, a plate adapted to be secured to said shaft in any one of a plurality of angularly spaced positions, a control arm carried on said plate and adjustable angularly with respect thereto, and means for adjusting said control arm with respect to said plate comprising a radially extending recess in said plate and a pin rotatably mounted eccentrically on said control arm and having an eccentric circular portion engaging in said recess.

8. In a fuel feeding means for internal combustion engines having an element adjustable for varying the quantity of fuel discharged, a control mechanism comprising a rotatably mounted shaft, means forming an operative connection between said shaft and said element, a member adapted to be secured to said shaft in any one of a plurality of angularly spaced positions, a control arm carried on said member and adjustable angularly with respect thereto, and means for adjusting said control arm with respect to said member comprising opposed shoulders on said member and a pin rotatably mounted eccentrically on said control arm and having an eccentric portion engaging said shoulders.

9. In a fuel feeding means for internal combustion engines having an element adjustable rectilinearly for varying the quantity of fuel discharged, a control mechanism comprising a support, a shaft rotatably mounted on said support having an eccentrically located recess in one end thereof, a member positioned in said recess having means for operatively engaging a portion of said element to shift the same rectilinearly upon rotation of said shaft, and a control arm mounted on said shaft.

10. In a fuel feeding means for internal combustion engines having an element adjustable rectilinearly for varying the quantity of fuel discharged, a control mechanism comprising a support, a shaft rotatably mounted on said support, a member eccentrically positioned on said shaft for rotation relative thereto and having means for operatively engaging a portion of said element, a control arm mounted on said shaft, and means for securing said control arm to said shaft in various angularly adjusted positions comprising means having a radially extending recess rotatable with said shaft, and a pin rotatably mounted eccentrically on said control arm and having an eccentric portion engaging in said recess.

11. In a fuel feeding means for internal combustion engines having an element adjustable for varying the quantity of fuel discharged, a control mechanism comprising a rotatably mounted shaft, means forming an operative connection between said shaft and said element, a member adapted to be secured to said shaft in any one of a plurality of angularly spaced positions for obtaining a rough adjustment between the shaft and the member, a control arm carried on said member, and means for adjusting said control arm angularly with respect to said member to obtain a fine adjustment between said control arm and said shaft.

12. In a fuel feeding means for internal combustion engines having an element adjustable for varying the quantity of fuel discharged, a control mechanism comprising a rotatably mounted shaft, means forming an operative connection between said shaft and said element, a control arm adjustable angularly with respect to said shaft, and means for adjusting said control arm with respect to said shaft comprising opposed shoulders rotatable with said shaft, and a pin rotatably mounted eccentrically on said control arm and having an eccentric portion disposed between said shoulders.

MILFORD G. CHANDLER.

4

CERTIFICATE OF CORRECTION.

Patent No. 2,143,937. January 17, 1939.

MILFORD G. CHANDLER.

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction as follows: Page 1, second column, line 47, for the word "electric" read eccentric; and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 6th day of June, A. D. 1939

Henry Van Arsdale

(Seal) Acting Commissioner of Patents.