

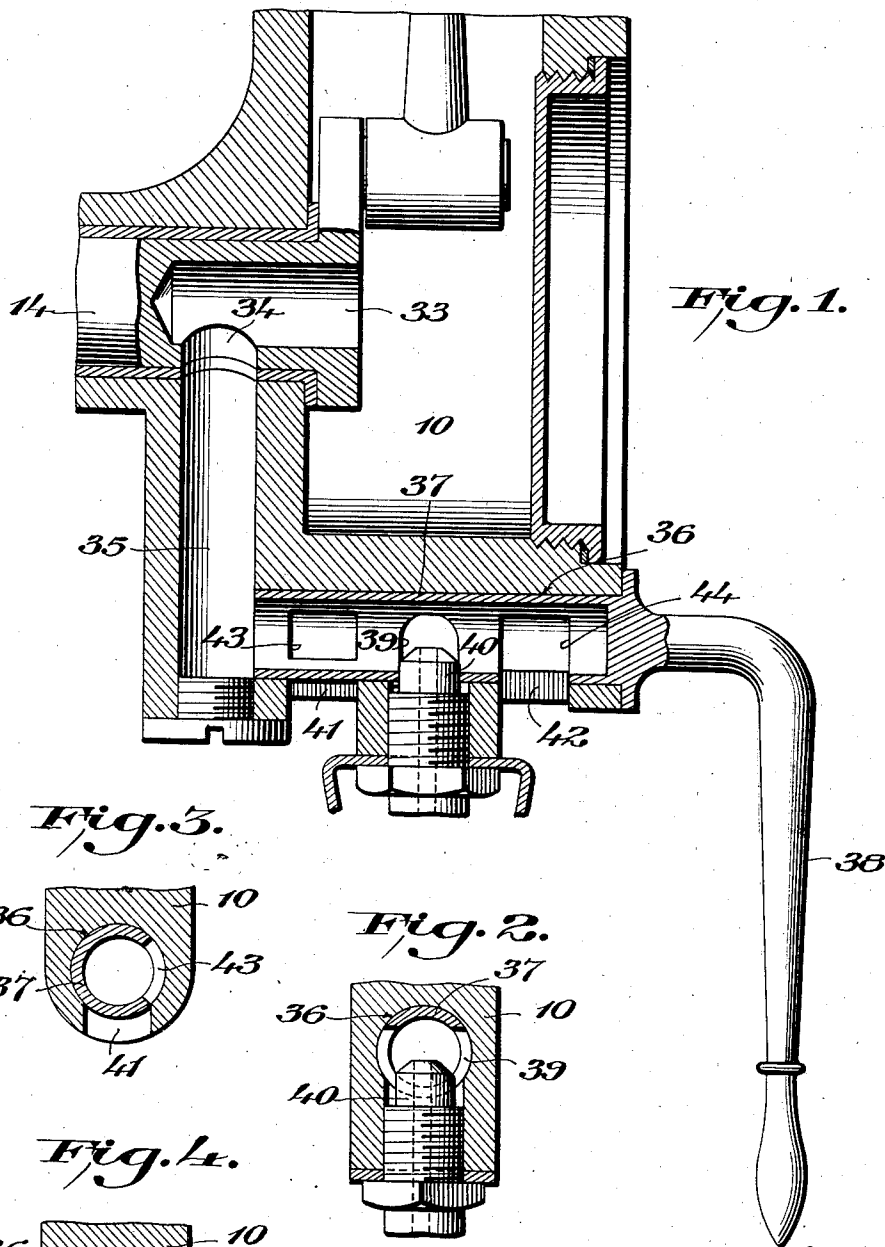
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T. R. ARDEN

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FUEL AND AIR REGULATING MEANS FOR ENGINES

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Inventor

Thomas R. Arden,

By *Volhaupter & Groff*
Attorneys

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FUEL AND AIR REGULATING MEANS FOR
ENGINES

Thomas R. Arden, Danbury, Conn.

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2 Claims. (Cl. 123—119)

This invention relates to means for controlling the admission of fuel and combustion supporting air to internal combustion engines, and has particular reference to means for this purpose as disclosed in my prior application, Serial No. 278,772, filed June 12, 1939, now Patent No. 2,274,644 dated March 3, 1942, of which the present application is a division.

Generally speaking, the object of the present invention is to provide a simple, practical valve means to enable a wide range in regulation of the proportionate amounts of fuel and air to be obtained to facilitate engine starting and high engine operating efficiency at various different speeds.

With the foregoing general object and various other objects in view, which will become more fully apparent as the nature of the invention is better understood, the same consists in a fuel and air admission regulating means embodying the novel features of construction, combination and arrangement of parts as will be hereinafter more fully described, illustrated in the accompanying drawing and defined in the appended claims.

In the accompanying drawing, wherein like characters of reference denote corresponding parts in the different views:

Figure 1 is a central, longitudinal section through a portion of an internal combustion engine equipped with a fuel and air admission regulating means constructed in accordance with one practical embodiment of the invention.

Figure 2 is a central cross section through the structure shown in Fig. 1; and

Figures 3 and 4 are cross sections through the respective air inlet port portions of the regulating means.

Referring to the drawing in detail, 10 designates a portion of the crank case of an internal combustion engine, 14 designates the crank shaft of the engine journaled in the front wall of said crank case, 33 designates a longitudinal bore in the crank shaft 14 opening through the inner end of said crank shaft into said crank case, 34 designates a lateral port in said crank shaft to provide communication at predetermined times between the bore 33 and a fuel and air supply duct 35 in the front wall of the crank case, and 36 designates an elongated, cylindrical valve chamber in the bottom portion of the crank case 10 communicating at one end with the duct 35.

In the valve chamber 36 is rotatably mounted a hollow, cylindrical valve 37 which closely fits said chamber and which is open at its end adjacent the duct 35 to afford communication be-

tween the interior thereof and said duct. At its other end said valve is closed and provided with a suitable handle 39 for use in manually, rotatably adjusting the same. In said valve, medially thereof, is a circumferentially extending slot 39 in which is disposed the inner end of a fuel nozzle 40 which is threaded into an opening in the wall defining the chamber 36 and which may be connected with any suitable source of fuel supply. The valve thus is held in said chamber by said nozzle 40, the latter serving at the same time, as an abutment engageable by the walls defining the ends of the slot 39 to limit rotative adjustments of the valve.

In the wall defining the chamber 36 are two air inlet ports 41 and 42, while in the side wall of the valve 37 are two air inlet ports 43 and 44 for cooperation, respectively, with the ports 41 and 42. The ports 41, 43 are disposed inwardly with respect to the nozzle 40; that is to say, between said nozzle and the duct 35. On the other hand, the ports 42, 44 are disposed outwardly with respect to the nozzle 40; that is to say, to the side of said nozzle remote from the duct 35.

In the present instance the valve 37 is rotatable through an angle of approximately 180° and the ports 41, 43 and 42, 44 are of such circumferential lengths that when said valve is at its limit of rotation in one direction both ports 41 and 42 are closed, while when said valve is at its limit of rotation in the other direction both ports 43 and 44 are alined with the ports 41 and 42, respectively, and air is free to enter the valve through both pairs of ports. The port 44 is longer than the port 43 and is disposed so that it begins to uncover the port 42 immediately upon rotation of the valve from its first mentioned position toward its second mentioned position and thereafter maintains said port 42 open during such rotation of the valve. On the other hand, the shorter-length port 43 is disposed relative to the port 42 to begin to open the port 41 only after the port 42 has been fully opened by rotation of the valve 37 from its first mentioned position toward its second mentioned position. Because of this arrangement, initial rotation of the valve from its first mentioned position toward its second mentioned position results in opening of the port 42 and maintenance of the port 41 closed. Air then is drawn only through the ports 42, 44, and since air drawn through these ports is required to flow over the fuel nozzle 40 in order to reach the duct 35, an effective mixing of fuel and air results. If a rich mixture is desired the valve 37 is rotated to aline greater or lesser areas of

the ports 42, 44, depending upon the mixture richness desired. In any event, the valve is not rotated so far as they align, or partly align, the ports 41, 43. On the other hand, if a lean mixture is desired the valve is further rotated to align the ports 41, 43 to a greater or lesser extent, depending upon the mixture leanness desired. Air entering the valve through the ports 41, 43 does not flow over the nozzle 40 and, therefore, as lean a mixture as desired may be obtained.

Preferably the valve chamber 36 is disposed at the bottom of the crank case 10, as shown, although it may be disposed elsewhere if desired. In any event, the described arrangement affords a simple, practical means especially suited for miniature engine use to enable a wide range of fuel and air mixing regulation.

The engine partially illustrated is of the two-stroke-cycle type in which the fuel and air is admitted to the crank case 10 under the control of the valve means comprised by the port 34 in the crank shaft 14 in cooperation with the bore 33 in said crank shaft and the duct 35 in the crank case, and from the crank case 10 is delivered to the combustion chamber of the engine in any well known or desired manner. It is to be understood, however, that the present fuel and air admission regulating means is not restricted to use with two-stroke-cycle engines and is not necessarily embodied in or associated with an engine in the manner specifically illustrated in the drawing but, on the contrary, may be used on four-or-more-stroke-cycle engines and may be operatively associated with any given engine in any suitable manner other than the specific manner illustrated in the drawing. Furthermore, it is to be understood that the regulating means itself is not necessarily of the specific

form shown, but may be embodied in various other specifically different forms within the spirit and scope of the invention as defined in the appended claims.

I claim:

1. In an internal combustion engine, a crank case having therein a valve-accommodating bore and a fuel supply duct for the engine leading from said bore, a hollow cylindrical valve open at one end and closed at its other end and rotatably mounted in said bore and having its interior in communication through the open end with said duct, said valve having a circumferentially extending slot, and a fuel nozzle carried by said crank case and extending into said slot, thereby holding said valve against longitudinal movement in said bore, said crankcase and valve having air admission ports disposed, longitudinally with respect to said valve, at opposite sides of said nozzle, respectively, for cooperation by rotation of said valve to regulate admission of air into said valve.

2. In an internal combustion engine a crank case having therein a valve-accommodating bore and a fuel supply duct for the engine leading from said bore, a hollow cylindrical valve open at one end and closed at its other end and rotatably mounted in said bore and having its interior in communication through its open end with said duct, and a nozzle disposed to supply fuel into said valve at a point intermediate its ends, said crank case and valve having cooperating pairs of air inlet ports disposed, longitudinally with respect to said valve, at opposite sides of said nozzle, respectively, to regulate supply of air and fuel to the interior of said valve responsive to rotatable adjustment of said valve.

THOMAS R. ARDEN.