Feb. 21, 1939. J. W. DOW 2,148,192

ENGINE FUEL INJECTOR

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Fig.1.

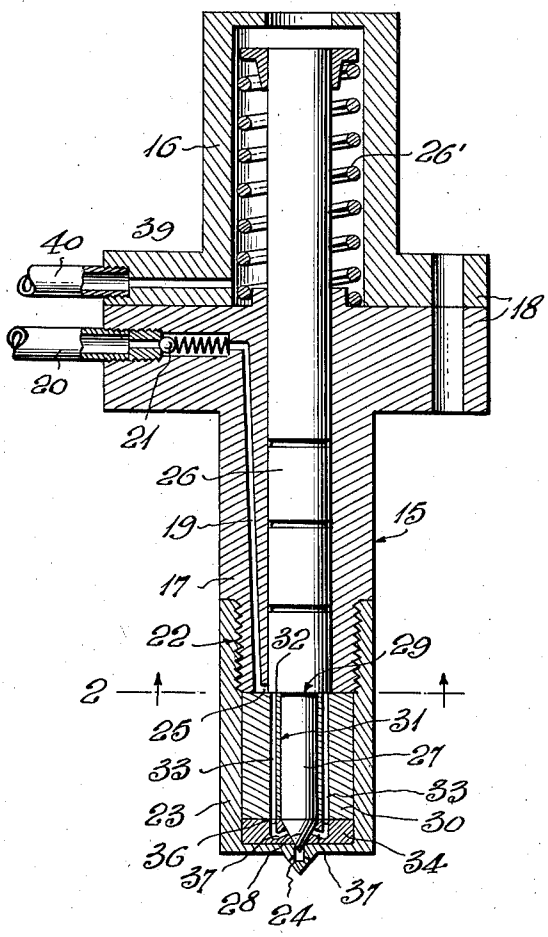


Fig.4.

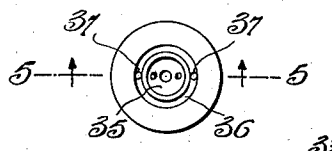


Fig.6.

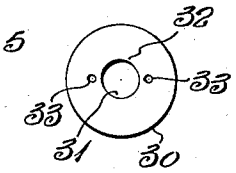


Fig.5.

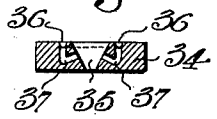


Fig.7.

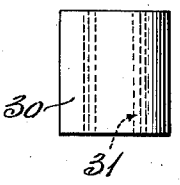


Fig.3.

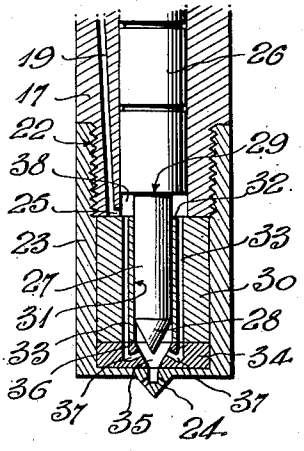
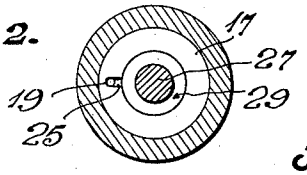


Fig.2.



Inventor

John W. Dow

WITNESS

H. Woodard

By H. B. Wilson & Co Attorneys

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Fig.8.

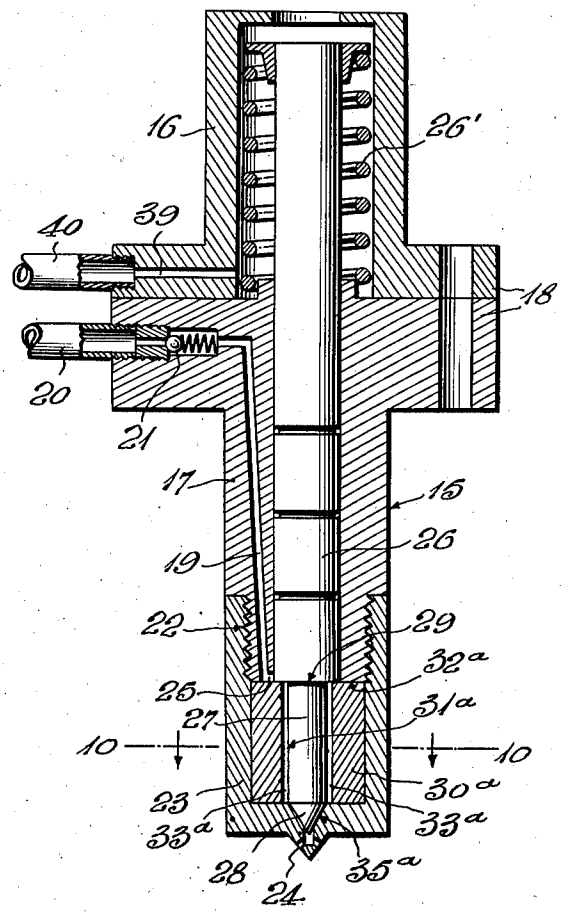


Fig.11.

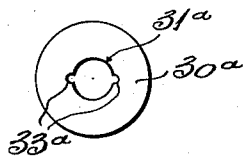


Fig.12.

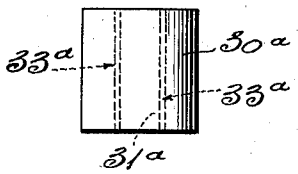


Fig.9.

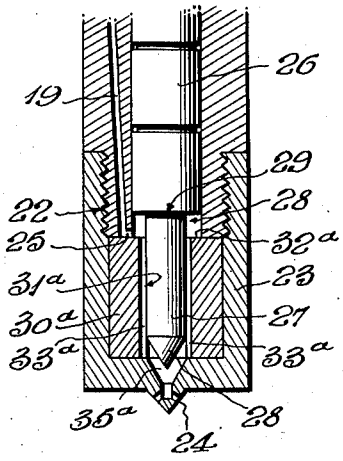
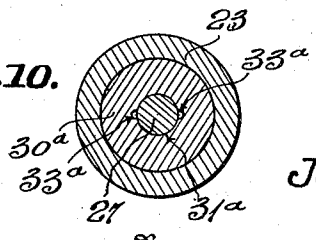


Fig.10.



Inventor

John W. Dow

WITNESS

H. Woodard

By H. B. Williamson

Attorneys

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UNITED STATES PATENT OFFICE

2,148,192

ENGINE FUEL INJECTOR

John W. Dow, Sioux City, Iowa

Application May 27, 1938, Serial No. 210,490

3 Claims. (Cl. 299—107.2)

The invention relates to engine fuel injectors of the general type in which a reciprocatory plunger is operable within a casing and connected with the engine cylinder head for injecting a spray of liquid fuel into the compressed and heated air within the engine cylinder.

The principal object of the invention is to provide a generally simplified construction, yet one which will be highly efficient, may be easily disassembled for cleaning whenever required, and will facilitate replacement of any required parts from time to time.

A further object is to provide an injector in which no fuel lies dormant in the injector tip, to give the engine a clean exhaust, quick cut-off and instant starting at any temperature.

With the foregoing and minor objects in view, the invention resides in the novel subject matter hereinafter described and claimed, description being accomplished by reference to the accompanying drawings.

Fig. 1 is a vertical sectional view through one form of the injector showing the plunger in lowered position.

Fig. 2 is a horizontal sectional view as indicated by line 2—2 of Fig. 1.

Fig. 3 is a detail vertical section showing the plunger in raised position.

Fig. 4 is a top plan view of the ring constituting one element of the injector.

Fig. 5 is a sectional view on line 5—5 of Fig. 4.

Fig. 6 is an end elevation of the cylindrical block forming another element of the injector.

Fig. 7 is a side elevation of said cylindrical block.

Fig. 8 is a view similar to Fig. 1 but illustrating a more simple construction, the plunger being shown in lowered position.

Fig. 9 is a detail sectional view showing the plunger in raised position.

Fig. 10 is a horizontal section on line 10—10 of Fig. 8.

Fig. 11 is an end elevation of the cylindrical block shown in Figs. 8 to 10.

Fig. 12 is a side elevation of said cylindrical block.

In both forms of construction, a tubular casing 15 is shown formed from upper and lower sections 16 and 17 having abutting flanges 18 jointly forming a body portion to be secured to the engine cylinder head. The lower section 17 is formed with a longitudinal fuel port 19 tapped at its inlet end for connection with a fuel line 20, and provided with an appropriate check valve 21. The lower end portion of this section 17 is threaded at 22 for engagement with a cap 23 having central fuel spray means 24, and the lower extremity of said section 17 is formed with a radial fuel groove 25 communicating with the port 19. In both forms of construction, I have also provided a plunger 26 having a reduced lower end portion 27, the lower extremity 28 of which is conical to constitute a fuel cut-off valve as hereinafter explained. At the juncture of the reduced portion 27 with the major portion of the plunger 26, a downwardly facing shoulder 29 is provided. A suitable spring 26′ is provided exerting an upward force on the plunger 26, and the usual push rod and rocker arm, or similar means is provided for depressing the plunger to inject a spray of fuel into the engine cylinder.

In the form of construction shown in Figs. 1 to 7, a cylindrical block 30 abuts the lower end of the casing section 17 and extends across the open lower side of the fuel groove 25, said block having a central bore 31 which slidably receives the reduced portion 27 of the plunger 26. The portion 32 of the upper end of the block 30 immediately surrounding the bore 31, constitutes an upwardly facing shoulder, and said block is provided with longitudinal fuel ports 33 extending from this shoulder through the lower end of said block. Abutting this lower end of block 30, is a ring 34 having a conical seat 35 which communicates with the fuel spray means 24 and is cooperable with the conical lower end 28 of the plunger 26. The upper side of the ring 34 is provided with an annular groove 36 communicating with the ports 33, and said ring is formed also with acute angular fuel ports 37 which extend from said groove 36 to said seat 35.

The downwardly facing shoulder 29 of the plunger 26 and the upwardly facing shoulder 32 of the block 30, are cooperable in forming a chamber 38 (Fig. 3) which receives fuel from the port 19 upon ascent of the plunger 26, as seen in said view. Upon descent of the plunger 26, this chamber 38 expels the liquid fuel through the ports 33, groove 36, ports 37, seat 35 and spray means 24, into the heated air in the engine cylinders, and when the plunger is fully lowered, the conical plunger end 28 tightly engages said seat 35, sealing the interior of the injector from communication with the engine cylinder during combustion.

The block 30 and ring 34 are both contained in the cap 23 which is threaded at 22 upon the lower end of the casing section 17, and should these parts require cleaning, it will be seen that they may be easily removed. Similarly, new

parts may be quickly and easily substituted whenever advisable.

In the form of construction shown in Figs. 8 to 12, the cap **23** is itself provided with a conical seat **35a** cooperable with the plunger end **28** and communicating with the spray means **24**, and a cylindrical block **30a** is alone confined within said cap, being held by the latter against the lower end of the tubular casing. The side wall of the bore **31a** of the block **30a**, which bore receives the reduced plunger portion **27**, is formed with longitudinal grooves **33a** which extend from the shoulder **32a** to the lower end of the block, the lower ends of said grooves being in communication with the seat **35a**.

The shoulder **29** of the plunger **26** coacts with the shoulder **32a** to provide the chamber **38a**. Upon ascent of the plunger, this chamber receives fuel and upon descent of said plunger, said chamber discharges said fuel through the grooves **33a**, seat **35a** and spray means **24**. When the plunger reaches its final lowered position, its conical end **28** tightly seats in the seat **35a**, cutting off communication between the engine and the interior of the injector during combustion.

It will be seen that both forms of construction are simple and inexpensive, may be easily manufactured and installed, easily disassembled and cleaned, and easily repaired. Then too, it is insured that the engine shall have clean exhaust, quick cut-off, and instantaneous starting.

While the exact details above described, may be followed if desired, variations may, of course, be made within the scope of the invention as claimed.

It may be well to add that **39** is merely a fuel drain port leading from the upper casing section **16** to a drain line **40**, for carrying off any fuel which may leak upwardly past the plunger **26**.

I claim:

1. An engine fuel injector comprising an elongated tubular casing having a longitudinal fuel passage, the lower end of said tubular casing being provided with a fuel groove extending from the lower end of said fuel passage to the interior of said tubular casing, a block abutting the lower end of said tubular casing and extending across the open lower side of said fuel groove, said block having a bore axially alined with said tubular casing and of a diameter less than the internal diameter of said casing, whereby a portion of the upper end of said block constitutes an upwardly facing shoulder projecting inwardly from the casing, a cap containing said block and secured to the lower end of said casing, said cap having fuel spray means, fuel conducting means extending from said shoulder to said fuel spray means and including a fuel passage in said block and a conical seat communicating with said fuel spray means, and a plunger slidable in said casing and said bore of said block and having a conical lower end cooperable with said conical seat, said plunger having a downwardly facing shoulder cooperable with said upwardly facing shoulder in forming a chamber which receives fuel from said groove upon ascent of said plunger and discharges said fuel through said fuel conducting means and said fuel spray means upon descent of said plunger.

2. An engine fuel injector comprising a tubular casing, a block abutting the lower end of said tubular casing and having a bore axially alined therewith, the diameter of said bore being less than the internal diameter of said tubular casing, whereby a portion of the upper end of said block constitutes an upwardly facing shoulder projecting inwardly from the casing, said casing being provided with a fuel passage opening into its interior directly over said upwardly facing shoulder, a ring abutting the lower end of said block, the inner edge of said ring being inclined to provide a conical seat, said block and ring being provided with communicating fuel passages extending from said upwardly facing shoulder to said seat, a cap containing said block and ring and secured to said casing, said cap having fuel spray means communicating with said conical seat, and a plunger slidable in said tubular casing and said bore of said block and having a conical lower end cooperable with said conical seat, said plunger having a downwardly facing shoulder cooperable with said upwardly facing shoulder in forming a chamber which receives fuel from said fuel passage of said casing upon ascent of the plunger and discharges fuel through said fuel passages of said block and ring and through said fuel spray means upon descent of said plunger.

3. An engine fuel injector comprising a tubular casing, a block abutting the lower end of said tubular casing and having a bore axially alined therewith, the diameter of said bore being less than the internal diameter of said tubular casing, whereby a portion of the upper end of said block constitutes an upwardly facing shoulder projecting inwardly from said tubular casing, said casing being provided with a fuel passage opening into its interior directly over said upwardly facing shoulder, the wall of said bore of said block being provided with a longitudinal fuel groove extending from said upwardly facing shoulder to the lower end of the block, a cap containing said block and secured to said casing, said cap having a central conical seat communicating directly with the lower end of said fuel groove, said cap being also provided with fuel spray means communicating with said conical seat, and a plunger slidable in said tubular casing and said bore of said block and having a conical lower end cooperable with said conical seat, said plunger having a downwardly facing shoulder cooperable with said upwardly facing shoulder in forming a chamber which receives fuel from said fuel passage of said casing during ascent of said plunger and discharges fuel through said fuel groove, conical seat and fuel spray means upon descent of said plunger.

JOHN W. DOW.