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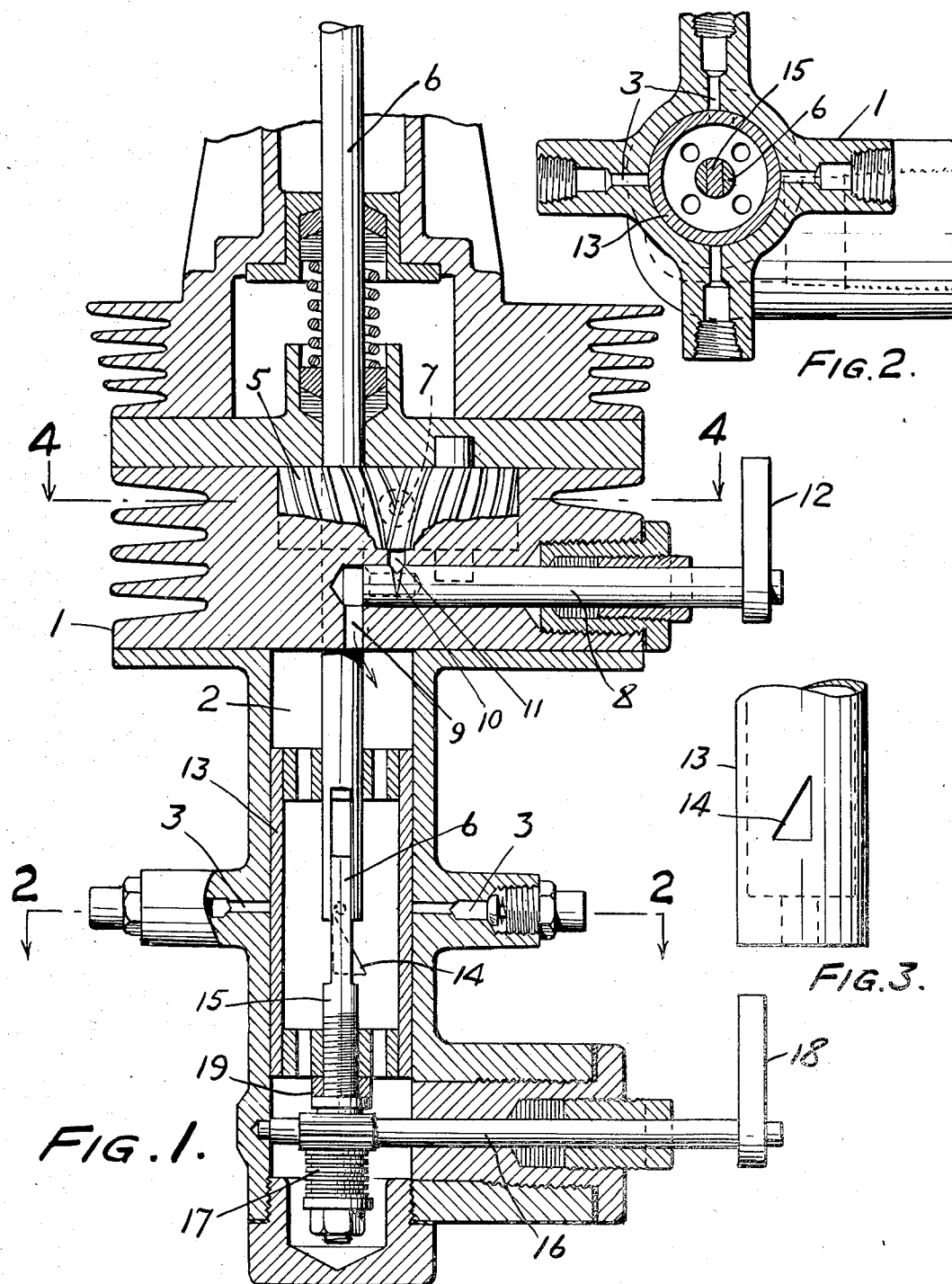
H. O. HEDGES

2,365,636

ROTARY FUEL INJECTOR

Filed May 2, 1942

2 Sheets-Sheet 1



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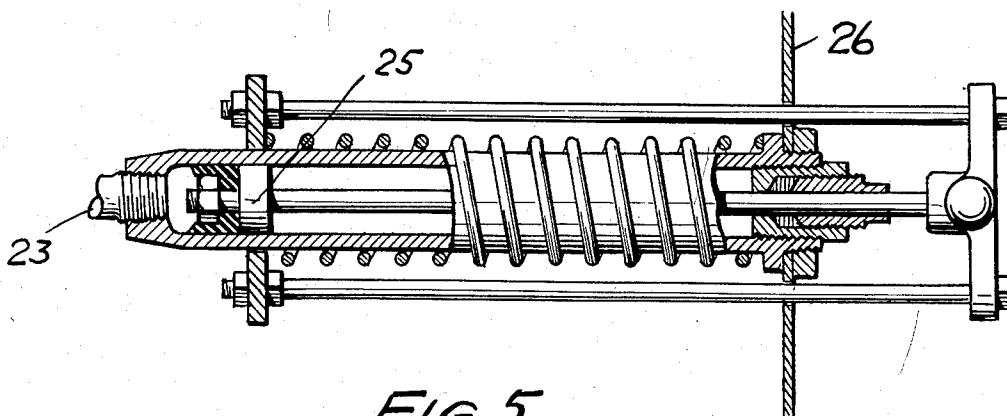
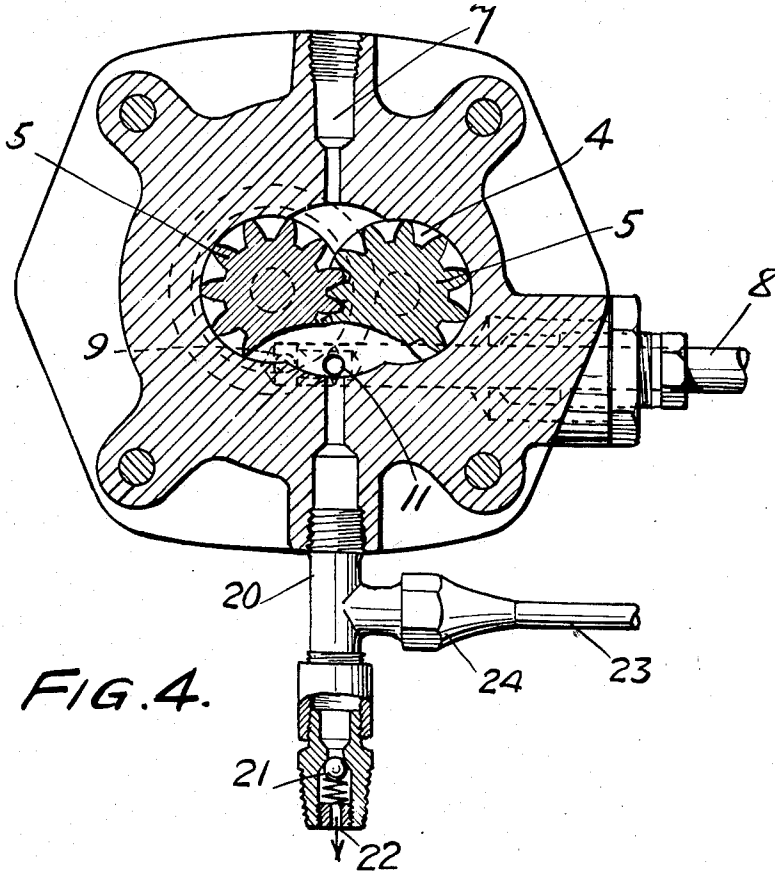
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UNITED STATES PATENT OFFICE

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ROTARY FUEL INJECTOR

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4 Claims. (Cl. 103—2)

The invention relates to fuel injectors of the type used in connection with internal combustion engines, using so-called "solid fuel," commonly meaning gasoline which is injected into the internal combustion engine in the general form of vapor and under considerable pressure of the order of 75 to 100 pounds per square inch.

The principal object of the present invention is to provide comparatively simple, compact and efficient apparatus for distributing gasoline or the like unmixed with air and designated "solid fuel" under pressure to the cylinders of internal combustion engines in such a way that means are provided for controlling and independently adjusting the rate of flow, the duration of flow, and the time of introduction in respect to the piston stroke.

Another object of the invention is to properly, efficiently and accurately inject fuel to the cylinders of an internal combustion engine.

Other objects of the invention will appear from the following description at the end of which the invention will be claimed.

Generally stated, the invention comprises, a casing having therein a distributing cylinder provided in its curved wall with a row of ports to the engine combustion chambers and having therein a pump chamber and rotary engine-driven pump elements and equipped with valved communication to the distributing cylinder for regulating the rate of feed, an open-ended balanced sleeve valve rotatably and endwise movably mounted in the cylinder and provided in its curved wall with a slot of generally right angle triangular open area variously alignable with the row of ports to adjust the time and duration of feed or flow, telescopic connections between the sleeve and a rotary element of the pump, means for endwise adjusting the sleeve, and means for setting the sleeve angularly in respect to the telescopic connection to adjust the time of feed in respect to the engine stroke together with a pressure regulator, a fuel return connection, and a primer.

The invention also comprises the improvements to be presently described and finally claimed.

In the following description, reference will be made to the accompanying drawings forming part thereof and in which:

Fig. 1 is a vertical sectional view of a rotary fuel injector embodying features of the invention;

Fig. 2 is a sectional view taken on the line 2—2 of Fig. 1 with parts omitted;

Fig. 3 is a detailed view of the sleeve valve;

Fig. 4 is a sectional view taken on the line 4—4 of Fig. 1 with parts omitted; and

Fig. 5 is a view partly in section and partly in elevation of a primer.

Referring to the drawings, 1 generally is a casing. Within the casing there is a distributing cylinder 2. The cylinder 2 is provided in its curved wall with a row of ports 3 fitted with suitable outwardly opening check-valves in respect to the engine combustion chambers (not shown because too well understood to require illustration or description). The casing 1 is also provided with a pump chamber 4 (Fig. 4) and in the pump chamber are arranged the rotary engine-driven pump elements 5. 6 is an engine-driven shaft and it serves to rotate the pump elements. 7 is the inlet to the pump chamber. There is valve communication from the pump chamber 4 to the distributing cylinder 2. 8 is a rotatably mounted spindle extending into the casing and its inner end is tubular and communicates with a passage 9 leading to the interior of the cylinder 2. The wall of the tubular part of the spindle is provided with a slot 10 of V-shaped open area which is aligned with a passage 11 communicating with the pump chamber. 12 indicates a crank-arm by means of which the rate of flow from the pump chamber to the cylinder is adjusted. By turning the spindle 8, the V-shaped opening 10 is variously positioned in respect to the passage 11, which, therefore, is more or less closed according to the angular position of the V-slot in respect to it. 13 is an open-ended balanced sleeve valve rotatably and endwise movably mounted in the cylinder 2. The sleeve valve is provided in its curved wall (Fig. 3) with a generally right angle triangular open area or slot 14 co-operating with the row of ports and its function is to adjust the time and duration of feed. The lower end of the spindle 6 is secured to the sleeve valve 13 and serves to rotate it. The telescopic extension 15 of the spindle 6 is arranged to rotate with and is movable endwise in respect to it (see Fig. 2). 16 is a spindle extending into the casing and it is provided with a toothed wheel which meshes with circularly disposed teeth 17 on the end of the extension 15 so that the valve 13 can be moved upward and downward and adjusted by means of a crank-arm 18 on the end of the spindle 16. Bearing in mind that the sleeve valve is rotating in respect to the ports 3, it is evident that the effective area of the slot 14 depends upon its level in respect to the ports so that, by moving the valve sleeve axially, the duration of flow to the

ports can be adjusted. The construction and arrangement of parts is such that, by loosening the nut 19, the sleeve valve can be angularly adjusted in respect to the spindle 6 and this adjustment advances or retards the passage of the slot 14 past the ports 3 and in respect to the stroke of the engine which drives the spindle 6; otherwise stated, the time in the stroke at which the fuel is fed is adjustable.

Referring more particularly to Fig. 4, 20 is a connection which communicates with the pump chamber on the pressure side and it is provided with a pressure regulator 21 and a fuel return 22. The pressure regulator comprises a spring-pressed check-valve in the form of a ball and an appropriate seat with which it co-operates. The connection 20 is provided with a branch 23 that is connected with a primer. In this branch 23 there is the fitting 24. The primer includes a spring-pressed piston 25 and its cylinder which is connected with the connection 23 and with a fixed support 26. The operation of the primer may be described as follows: In starting the engine the handle of the plunger 25 shown at the right in Figure 5 is pulled toward the right. This fills the cylinder to the left in Figure 5 with fluid by way of a branch connection to a reservoir not shown and it also compresses the spring. Upon commencing to start the engine the handle is released and the spring forces the plunger toward the left forcing the fluid from the cylinder past the check valve 24 to the distribution cylinder 2, thus an initial charge is injected to a cylinder which thereafter operates in the usual manner.

From the foregoing description, it is evident that the V-shaped slot 10 provides for adjusting the rate of flow of fuel, the triangular opening 14 provides for adjusting the time and duration of flow, and the angular adjustment 19 for the sleeve valve provides for adjusting the time of feed in respect to the engine stroke.

It will be obvious to those skilled in the art that modifications may be made in details of construction and in matters of mere form without departing from the spirit of the invention.

I claim:

1. A rotary injector for "solid" fuel comprising, in combination, a casing having therein a distributing cylinder provided in its curved wall with a row of ports and having therein a pump chamber and rotary driven pump elements and equipped with valved communication to the distributing cylinder including a tubular valve element having in its curved wall a slot of V-shaped

open area positionable to regulate the rate of flow, an open-ended balanced sleeve valve rotatably and endwise movably mounted in the cylinder and provided in its curved wall with a slot of generally right angle triangular open area variously alignable with the row of ports to adjust the time and duration of flow, endwise slidable connections between the sleeve and a rotary element of the pump, means for endwise adjusting the sleeve, and means for setting the sleeve angularly in respect to the endwise slidable connections to adjust the time of feed.

2. A rotary fuel injector for a "solid" fuel comprising, in combination, a casing having therein a distributing cylinder provided in its curved wall with a row of ports and having therein a pump chamber and rotating driven pump elements and equipped with valve communication to the distributing cylinder, a sleeve valve rotatably and endwise movably mounted in the cylinder and provided in its curved wall with a slot of irregular open area variously alignable with the row of ports to adjust the time and duration of feed, connections between the sleeve and a rotary element of the pump, means for endwise adjusting the sleeve, and means for setting the sleeve angularly.

3. In a rotary fuel injector for "solid" fuel, the combination of, a casing having therein a distributing cylinder provided in its curved wall with a row of ports, means for supplying "solid" fuel under pressure and at regulated rate of flow to the cylinder, a sleeve valve rotatably and endwise movably mounted in the cylinder and provided in its curved wall with a slot of generally irregular open area variously alignable with the row of ports to adjust the time duration of flow, means for rotating the valve, and means for adjusting the valve endwise.

4. In a rotary fuel injector of the type specified the combination of a casing having therein a cylinder provided with ports, a pump mechanism delivering to the cylinder, a sleeve valve in the cylinder provided in its curved wall with an opening cooperating with the ports, a fuel return connection from the pressure side of the pump, a relief valve communicating with the pressure side of the pump and connected to the source of fuel supply, and a primer including a spring pressed piston and having a connection with the return connection and thence to the discharge side of the pump.

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