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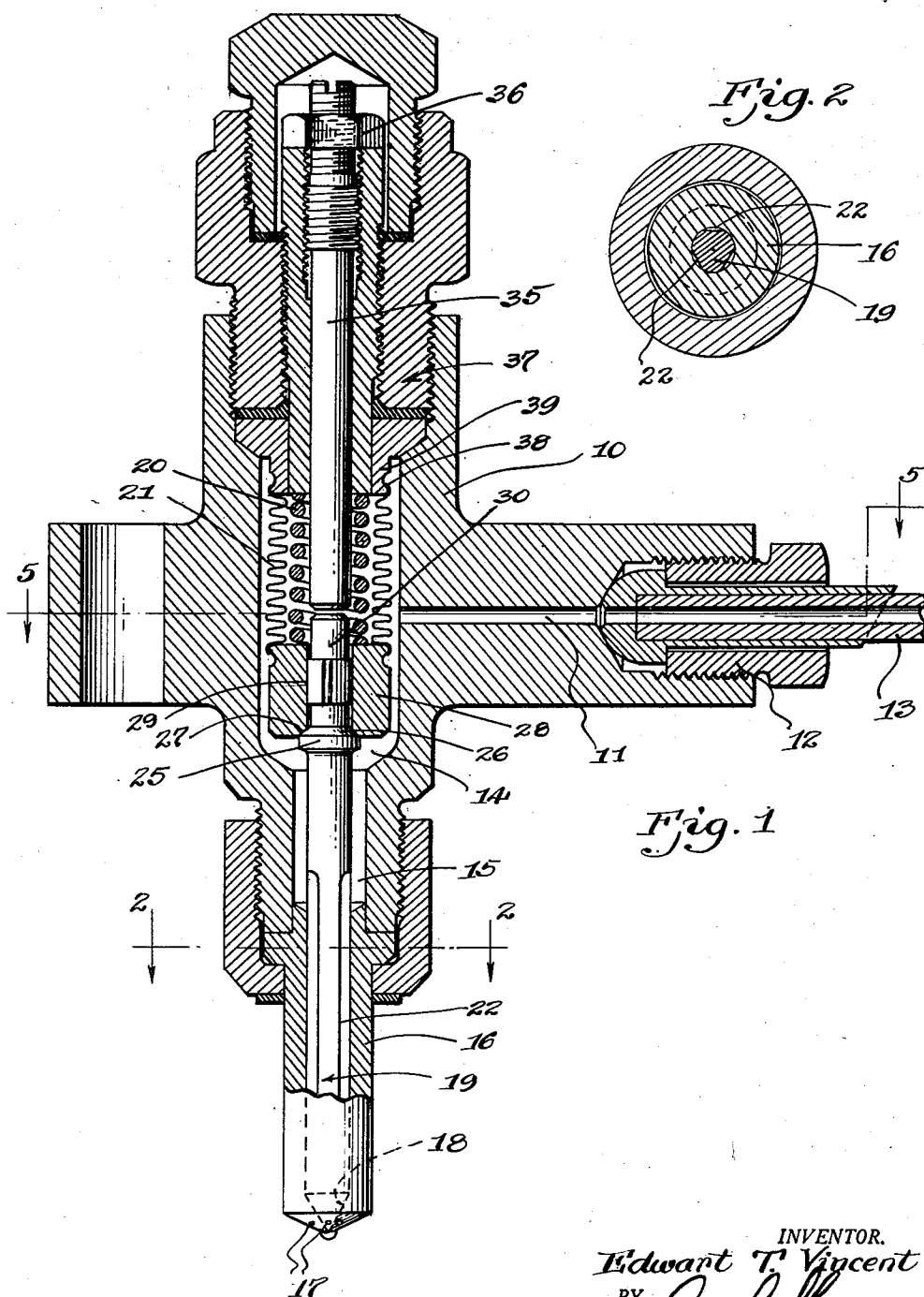
E. T. VINCENT

2,391,808

FUEL ATOMIZER

Filed Aug. 19, 1942

2 Sheets-Sheet 1



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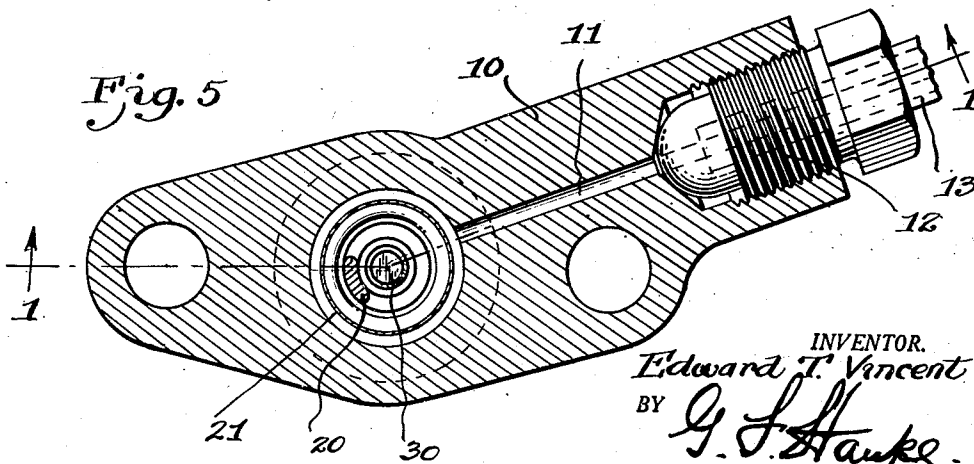
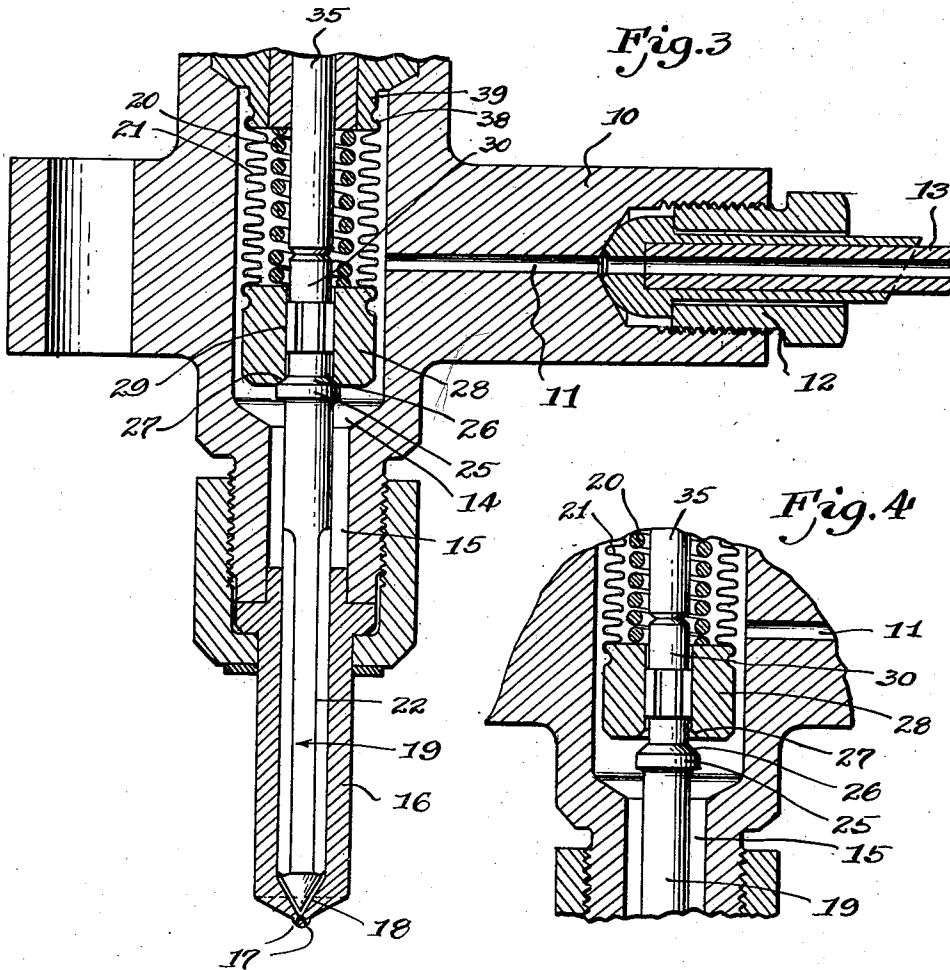
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UNITED STATES PATENT OFFICE

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FUEL ATOMIZER

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Mich., a corporation of Virginia

Application August 19, 1942, Serial No. 455,392

3 Claims. (Cl. 299-107.6)

My invention relates to fuel atomizers and more particularly to an improved leakless fuel atomizer structure.

It is an object of my present invention to provide an atomizer, of the type having a freely floating valve opened by injection pressure and having yielding means urging said valve on its seat, with means to prevent leakage or loss of fuel from the atomizer, said means preferably including a bellows chamber having at all times substantially a constant pressure differential between the chamber interiorly of the bellows and the chamber exteriorly of said bellows into which fuel under pressure is introduced from the usual fuel injection pump.

Fig. 1 is a vertical sectional view through an atomizer embodying the improved feature of my invention and taken substantially from the line 1-1 of Fig. 5.

Fig. 2 is a detail sectional view taken on the line 2-2 of Fig. 1.

Fig. 3 is a fragmentary sectional view of the atomizer showing the valve lifted off the discharge jet valve seat.

Fig. 4 is a fragmentary detail sectional view showing the valve between the bellows interior and the fuel chamber unseated on said discharge jet valve, and

Fig. 5 is a detail sectional view taken substantially on the line 5-5 of Fig. 1.

My improved atomizer comprises a casing 10 having a fuel inlet 11 connected by means of a suitable union or coupling 12 with a fuel line 13 connected with a source of intermittent fuel pressure supply. This casing is provided with a fuel inlet 14, and an outlet 15 to which is secured a fuel jet fixture 16 having fuel atomizing jet openings 17 and a valve seat 18. A freely floating valve 19 is supported in said jet fixture 16 and seats on said valve seat 18 to close the discharge jet openings 17, this valve being urged on its seat by reason of the compression spring 20 and the expansible spring bellows 21. The valve 19 is cut away as at 22 along its lower portion to provide a longitudinal passageway for fuel to flow through the jet fixture 16 to the jets 17 when the valve is unseated. Said valve is provided with an enlarged portion 25 near its upper end having a bevelled upper face 26 seated on the valve seat 27 carried by a sleeve 28 secured to said expansible spring bellows 21.

This sleeve 28 is provided with a bore 29 for supporting the upper end portion 30 of the valve, said valve being conveniently slotted or grooved to permit free flow of fuel under pressure into the

interior of the bellows when the sleeve 28 is unseated with respect to the bevelled valve seat 26.

An adjustable stop pin 35 is maintained in a predetermined adjustment by means of the nut 36, and any suitable oil tight union structure 37 is provided to seal the chamber 14 and support said stop 35. The bellows 21 is preferably secured as at 38 to the reduced extension 29 of the union structure 37.

The operation of the present atomizer structure can be best explained if we assume that the engine has been idle and the pressure in chamber 14 is very low. When the engine is started, the pressure of the fuel supplied to chamber 14 becomes sufficient to overcome the resistance of spring 20 and bellows 21. The bellows is compressed and the sleeve 28 together with valve 19 are urged upwardly, said valve opening inwardly and unseating and opening the discharge jet 17. The inwardly opening movement of the valve is arrested when same abuts the stop 35 and thus the pressure in chamber 14 will continue to compress or collapse said bellows 21, thereby unseating the sleeve 28 with respect to the valve seat 26-27 permitting the fuel pressure to flow into the interior of the bellows until the differential pressure between chamber 14 and the interior of the bellows reaches a predetermined amount as, for example, 200 pounds, the pressure inside the bellows together with the pressure of the compression spring and spring pressure of the bellows itself cause the sleeve 28 to seat on the valve thus maintaining a minimum pressure differential during the operation of said atomizer. If at any time the pressure differential increases the sleeve 28 will unseat on the valve 19 until the pressure differential reaches this predetermined amount.

This construction permits of a hydraulic pressure operated injection valve which is free of all leakage past moving parts, thus controlling to a higher degree the equality of fuel flow to the various cylinders of a multi-cylinder engine and at the same time it permits the use of a light flexible bellows as the pressure differential is relatively slight, and as a result there is no destructive collapsing the bellows.

It will be apparent to those skilled in the art to which my invention pertains, that various modifications and changes may be made therein without departing from the spirit of my invention or from the scope of the appended claims.

I claim:

1. A fuel atomizer structure comprising a casing provided with a fuel chamber having a fuel

inlet and a discharge jet, a freely floating inwardly opening valve operatively associated with said discharge jet, said valve having a stem extending into said fuel chamber, a sleeve having a valve seat and a bore through which said valve stem extends, said valve stem having an enlarged portion seating on the sleeve valve seat, an expansible bellows connected to said sleeve and a wall of said chamber, a spring of predetermined spring tension engaging the sleeve and positioned to urge the valve on its seat to close the discharge jet, said sleeve being operable under pressure in said chamber to unseat with respect to said valve stem and permit fuel under pressure to enter the interior of the bellows and to thereby maintain a slight differential fuel pressure between the interior and exterior of said bellows.

2. A fuel atomizer valve structure comprising a casing provided with a fuel chamber having a fuel inlet and discharge jet, a freely floating inwardly opening valve operatively associated with said discharge jet, said valve having a stem extending into said fuel chamber, a sleeve having a valve seat and a bore through which said valve stem extends, said valve stem having an enlarged portion seating on the sleeve valve seat, an expansible bellows connected to said sleeve and a wall of said chamber, a spring of predetermined spring tension engaging the sleeve and positioned to urge the valve on its seat to close the discharge jet, and an adjustable stop which limits the opening movement of the discharge valve, said bellows defining a chamber housing said spring and

communicating with the fuel chamber only when said sleeve valve is unseated, said sleeve valve seated on the enlarged portion of said valve stem to close off said two chambers from each other during normal operating conditions to eliminate leakage of fuel from said atomizer and also operable to maintain a predetermined constant pressure differential between said two chambers.

3. A fuel atomizer valve structure comprising a casing provided with a fuel chamber having a fuel inlet and a discharge jet, a freely floating inwardly opening valve operatively associated with said discharge jet, said valve having a stem extending into said fuel chamber, a sleeve having a valve seat and a bore through which said valve stem extends, said valve stem having an enlarged portion seating on the sleeve valve seat, an expansible bellows connected to said sleeve and a wall of said chamber, a spring of predetermined spring tension engaging the sleeve and positioned to urge the valve on its seat to close the discharge jet, said bellows defining a chamber contained substantially within said fuel chamber and communicating therewith only when said sleeve valve is unseated, said valves operable during normal operation to open said discharge jet and operable when subjected to excess pressures in said fuel chamber to unseat said sleeve valve and thereby permit the introduction of a predetermined amount of fuel under pressure to the bellows chamber in order to re-establish the constant pressure differential between said chambers.

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