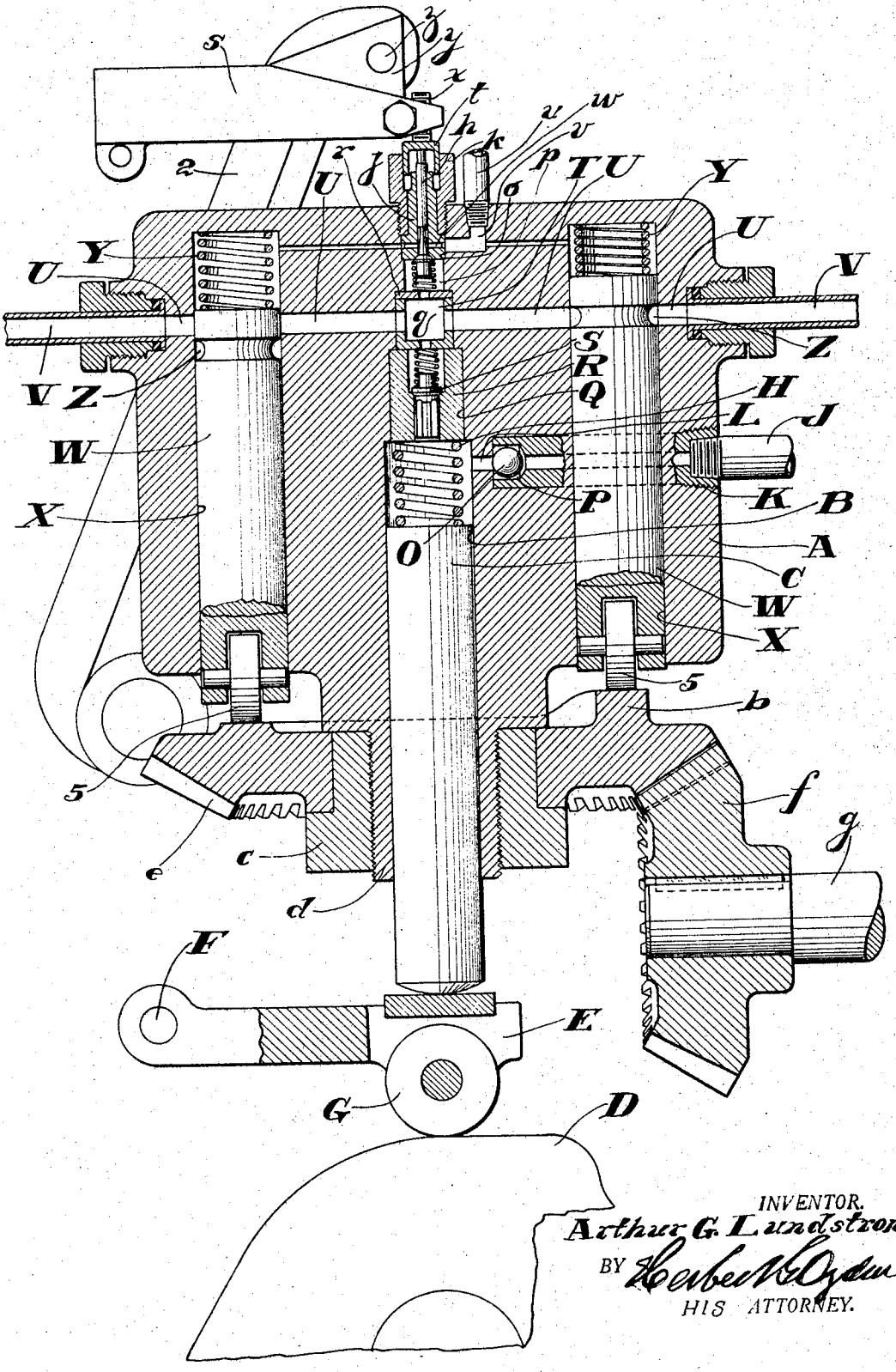
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A. G. LUNDSTROM

FUEL DISTRIBUTOR FOR INTERNAL COMBUSTION ENGINES

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INVENTOR.
Arthur G. Lundstrom
BY Herbert R. Ogden
HIS ATTORNEY.

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ARTHUR G. LUNDSTROM, OF PHILLIPSBURG, NEW JERSEY, ASSIGNOR TO INGERSOLL-RAND COMPANY, OF JERSEY CITY, NEW JERSEY, A CORPORATION OF NEW JERSEY.

FUEL DISTRIBUTOR FOR INTERNAL-COMBUSTION ENGINES.

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This invention relates to internal combustion engines of the solid fuel injection type and has reference more particularly to means for distributing liquid fuel to the spray nozzles of an engine having a plurality of cylinders.

An object of this invention is to enable the liquid fuel to be distributed from a single pump to the various nozzles of a multi-cylinder internal combustion engine.

Other objects and advantages of the invention will be in part obvious and in part pointed out hereinafter.

The drawing illustrates, in vertical section, a fuel pump and distributor constructed in accordance with the practice of the invention.

Referring to the drawings, the fuel pump comprises a pump body A having a pump cylinder B centrally disposed therein. A plunger C is adapted to reciprocate in the cylinder B being actuated from a suitable cam D through the medium of a cam-following lever E pivoted at one end as at F and having an anti-friction roller G riding on the face of the cam D. The suction stroke of the plunger C is effected by means of a coil spring H pressing against the inner end of the plunger C.

The plunger C is adapted to draw fuel oil unmixed with air from a source (not shown) associated with a pipe J connecting at a suitable bushing K with a radially disposed passage L in the pump body communicating directly with the interior of the cylinder B. The flow of fuel oil in the opposite direction is prevented by a valve in this instance shown as a ball valve O seating in an aperture P of the bushing K. The inner end of the cylinder B is counterbored as at Q and provided with a plug R housing a discharge spring-pressed check valve S which controls the flow of fuel oil between a discharge chamber T formed in the plug R and the interior of the cylinder B.

From the discharge chamber T fuel oil is adapted to be conveyed by radially disposed passages U to suitable pipes V leading to the various spray nozzles (not shown) of the cylinders of the engine (not shown). In this illustration only two such pipes V are shown, each pipe being adapted to be connected to the spray nozzles of a separate cylinder. There are as many passages U and pipes V as there are cylinders of the engine. Each of the passages U are controlled by a separate piston valve W adapted to reciprocate in a bore X transverse to the passage U and normally pressed to a closed position by means of a spring Y bearing against the upper end of the piston valves W. Each piston valve W is provided with a circumferential groove Z which is adapted, in the open position of the valve, to register with the passage U.

Actuation and proper timing of the valves W is secured by means of a cam *b* mounted on a removable nut *e* screwed on the boss *d* of the pump body A. The cam *b* is preferably coaxial with the pump plunger C and is provided with bevel gear teeth *e* which are engaged by a bevelled pinion *f* mounted on a countershaft *g*. The shaft *g* and the cam D rotate at a fixed relative rate, that is, the plunger C must reciprocate each time one of the valves W is opened.

The duration of injection is controlled by a by-pass valve *h* mounted in a plug *j* held in place by means of a nut *k* in an aperture *o* in the pump body A. The by-pass valve *h* is normally held closed by means of a spring *p* bearing against the head of the valve and a plate *q* interposed between the plug R and a shoulder *r*. The by-pass valve *q* is adapted to control the flow of fuel oil from the pressure chamber T to a return pipe *u* connected with a passage *v* associated with a bore *w* in the plug *j*. A lever *s* operated in synchronism with the cam D is adapted to actuate the by-pass valve *h* there being a cap *t* interposed between the valve and the contact point *x*. The timing of the depressions of the valve *h* is controlled by a movable fulcrum member *y* pivoted as at *z* on a governor actuated arm 2.

In operation the plunger C is adapted to reciprocate at a rate corresponding to the firing of the engine cylinders (not shown) discharging fuel oil at high pressure into the pressure chamber T and thence into the passages *v*. Simultaneously the valves W are raised to a position permitting the fuel oil to escape through one of the passages *v* at each reciprocation of the pump plunger C, during the injection period of the fuel oil. The valves W are returned to their seats by the springs Y after injection has been terminated by depression of the by-pass valves *h*.

It is understood that as many valves W

will be provided as there are cylinders of the internal combustion engine.

If desired, the valves W may be provided with anti-friction rollers 5 suitably mounted in the ends of the valves and adapted to ride on the cam *b*.

Thus by the above construction are accomplished among others the objects hereinbefore referred to.

I claim:

1. A fuel pump for a multi-cylinder internal combustion engine comprising a pump cylinder and plunger adapted to reciprocate therein, a discharge chamber for said cylinder, a plurality of passages adapted to convey liquid fuel from said cylinder to the spray nozzles of an engine, and a piston valve in each of said passages adapted to control the flow of fuel therein.

2. A fuel pump for a multi-cylinder internal combustion engine comprising a pump cylinder and plunger adapted to reciprocate therein, a discharge chamber for said cylinder, a plurality of passages adapted to convey liquid fuel from said cylinder to the spray nozzles of an engine, a piston valve in each of said passages adapted to control the flow of fuel oil therein, and means to operate said valves successively.

3. A fuel pump for a multi-cylinder internal combustion engine comprising a pump cylinder and plunger therein, a discharge chamber associated with said cylinder, a by-pass valve for relieving pressure in said discharge chamber, passageways adapted to convey fuel oil from said discharge chamber to the spray nozzles of an engine, piston valves adapted to control the flow of fuel oil in said passages, and means to actuate said valves successively.

4. A fuel pump for a multi-cylinder internal combustion engine comprising a pump body having a pump cylinder therein, a plunger adapted to reciprocate in said pump cylinder, a discharge chamber associated with said cylinder, said pump body being provided with radially disposed passages for conveying fuel oil from said discharge chamber to the spray nozzles of an engine, a by-pass valve adapted to relieve pressure in said discharge chamber, and piston valves adapted to reciprocate in said pump body to control the flow of fuel oil in said passages.

5. A fuel pump for a multi-cylinder internal combustion engine comprising a pump body having a pump cylinder therein, a plunger adapted to reciprocate in said pump cylinder, a discharge chamber associated with said cylinder, said pump body being provided with radially disposed passages for conveying fuel oil from said discharge chamber to the spray nozzles of an engine, a by-pass valve adapted to relieve pressure in said discharge chamber, piston valves adapted to reciprocate in said pump body to control the flow of fuel oil in said passages, and a cam journalled on said pump body adapted to actuate said valves.

In testimony whereof I have signed this specification.

ARTHUR G. LUNDSTROM.