April 12, 1932. R. L. KENT 1,853,767

LIQUID PUMP

Filed Aug. 8, 1930

Fig.1.

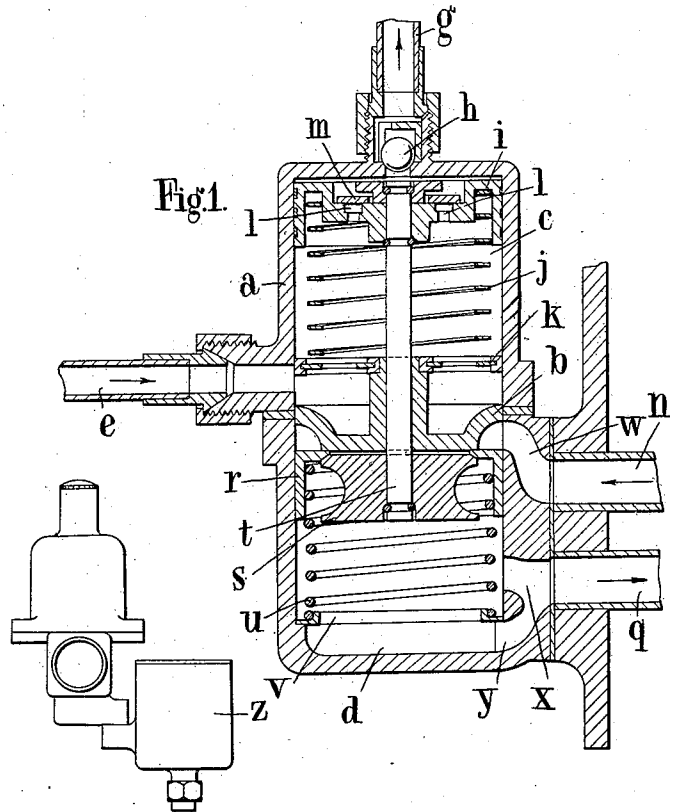
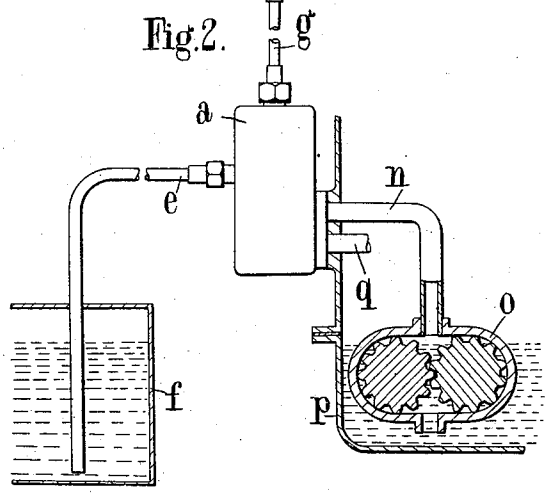


Fig.2.



R. L. Kent
INVENTOR

By. Marks & Clark
ATTYS.

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UNITED STATES PATENT OFFICE

RAYMOND LESLIE KENT, OF LOWER PENN, ENGLAND, ASSIGNOR OF ONE-THIRD TO MORRIS INDUSTRIES LIMITED, OF OXFORD, ENGLAND, AND ONE-THIRD TO THOMAS CARLYLE SKINNER, OF BIRMINGHAM, ENGLAND

LIQUID PUMP

Application filed August 8, 1930, Serial No. 473,974, and in Great Britain December 24, 1929.

This invention has for its object to provide an improved fuel pump for internal combustion engines employing petrol or other like fuel, the pump being used for supplying fuel automatically from a main tank to the carbureter float chamber or other small container.

The invention comprises a pair of pistons arranged in separate cylindrical chambers, one of the pistons being arranged to act on the petrol or other liquid fuel, and the other to be operated in one direction by oil supplied by the lubricating oil pump, a spring or springs acting on one or each of the pistons, and a valve in the operating piston whereby the oil pressure acting on one of its surfaces can be intermittently neutralized.

In the accompanying drawings, Figure 1 illustrates in section a petrol or like fuel pump constructed in accordance with this invention.

Figure 2 shows diagrammatically the pump illustrated in Figure 1, in combination with a lubricating oil pump, and fuel tank and carbureter.

Referring to the drawings, a cylinder *a* is divided by a partition *b* into two chambers *c*, *d*. The chamber *c* is connected by a pipe *e* to the main fuel supply tank *f*, and by a pipe *g* (which is controlled by a non-return valve *h*) to the carbureter float chamber *z* or other small container to be supplied with fuel. Also the chamber *c* contains a pump piston *i* which can be moved in one direction by a spring *j*. The spring is carried at one end on a perforated support *k*. Apertures *l* in the piston allow the liquid to flow through the piston, and these apertures are controlled by a valve ring *m*.

The other chamber *d* is connected by a pipe *n* with the pump *o* by which lubricating oil is supplied to the various parts of the engine. The return flow of oil from the chamber *d* to the oil tank *p* or to any other part of the lubricating system is effected through the pipe *q*. Within the chamber *d* is arranged an annular piston *r* with which co-operates a valve *s* connected by a rod *t* with the fuel pump piston *i*. The piston *r* is acted on by a spring *u* supported on a ring *v*. The pipe *n* communicates with the upper side of the piston *r* through a passage *w*, and the pipe *q* communicates with the under side of the piston *r* through a pair of adjacent passages *x*, *y*.

Starting with the mechanism in the position shown in the drawings, lubricating oil from the pump *o* acts on the upper side of the piston *r* and valve *s* and moves them together in the downward direction against the action of the spring *u*. By this movement of parts, the piston *i* is caused to descend against the action of the spring *j*, and petrol or the like is caused to flow to the upper side of the piston *i* through the valve *m*. When the piston *r* reaches the ring *v* its movement is arrested, and thereupon the pressure acting on the upper side of the valve *s* causes the valve to continue its motion sufficiently to allow oil to flow past the valve from the upper to the lower side of the piston. In this position the passage *x* is closed by the piston *r*, but the passage *y* is open, and consequently oil can flow through the piston from the pipe *n* to the pipe *q*. Since the oil pressure acting on the two sides of the piston *r* is now nearly balanced, the piston can return under the action of its spring *u*. Until the piston *r* has uncovered the port *x* little or no movement is received by the valve *s* and the piston *i*, owing to the obstruction of the aperture of the ring *v* by the lower part of the valve *s*, but after the port *x* has been uncovered the valve *s* and piston *i* are freed to move upwards under the action of the spring *j*, following the movement of the piston *r*, and a quantity of liquid fuel is displaced from the chamber *c* through the valve *b* to the pipe *g*. When the piston *r* reaches the upper end of its movement, the valve *s* closes the aperture in the said piston, and the cycle of operations is then repeated.

When the pressure of liquid in the pipe *g* exceeds that of the spring *j*, due to the fact that no further liquid can pass into the container *z* supplied by the pump, the action of the mechanism ceases, but the action is automatically resumed when the liquid can again flow freely into the pipe *g*.

By this invention the automatic supply of

liquid fuel from the main tank to the carbureter or the like is maintained in an effective manner, and the means employed ensure the necessary reliability. When the engine stops, the lubricating oil pump *o* also stops, and no further fuel is supplied until after the engine has been re-started.

Whilst, in the drawings, I have shown the chamber *d* connected directly to the oil pump *o*, it will be understood that the connection may be made to any convenient part of the lubricating oil supply system of the engine.

Having thus described my invention what I claim as new and desire to secure by Letters Patent is:—

1. In fluid operated fuel pumps for internal combustion engines, the combination of a cylindrical pump chamber, a cylindrical operating chamber coaxial with the pump chamber, a piston in the pump chamber, a non-return valve on the said piston, an annular piston in the operating chamber, a valve disc co-operating with the said annular piston, a rod connecting the pump piston with the valve disc in the operating chamber, a spring in each chamber acting on the piston in that chamber, inlet and outlet passages for each chamber, a spring supporting ring in the operating chamber, and outlet ports common to the outlet passage and opening into the operating chamber at opposite sides of the said ring, substantially as described.

2. In fluid operated fuel pumps for internal combustion engines, the combination of a cylindrical pump chamber, a cylindrical operating chamber coaxial with the pump chamber, a piston in the pump chamber, a non-return valve on the said piston, a piston in the operating chamber, a valve co-operating with the operating piston, a rod connecting the pump piston with the valve of the operating piston, a spring in each chamber acting on the piston in that chamber, and inlet and outlet passages for each chamber, substantially as described.

In testimony whereof I have signed my name to this specification.

RAYMOND LESLIE KENT.