No. 749,994. PATENTED JAN. 19, 1904.

D. E. JOHNSON.

LIQUID FUEL FEEDING SYSTEM.

APPLICATION FILED APR. 11, 1902.

NO MODEL.

Fig. 3.

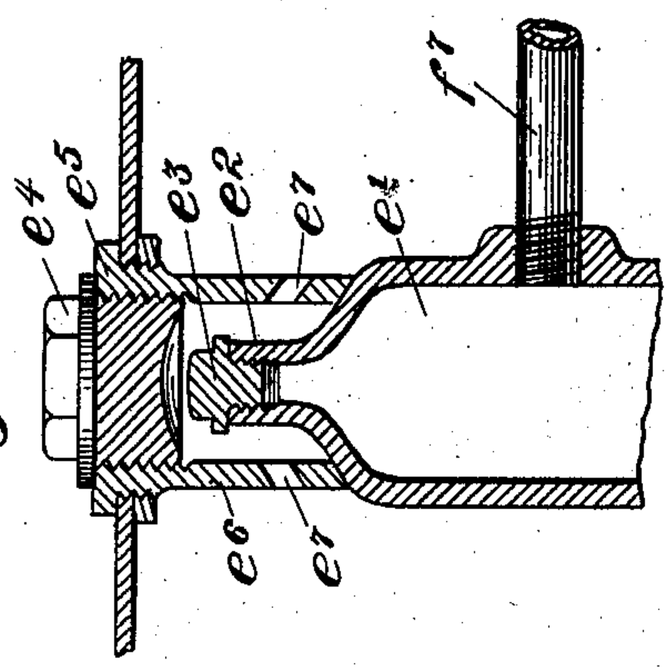


Fig. 1.

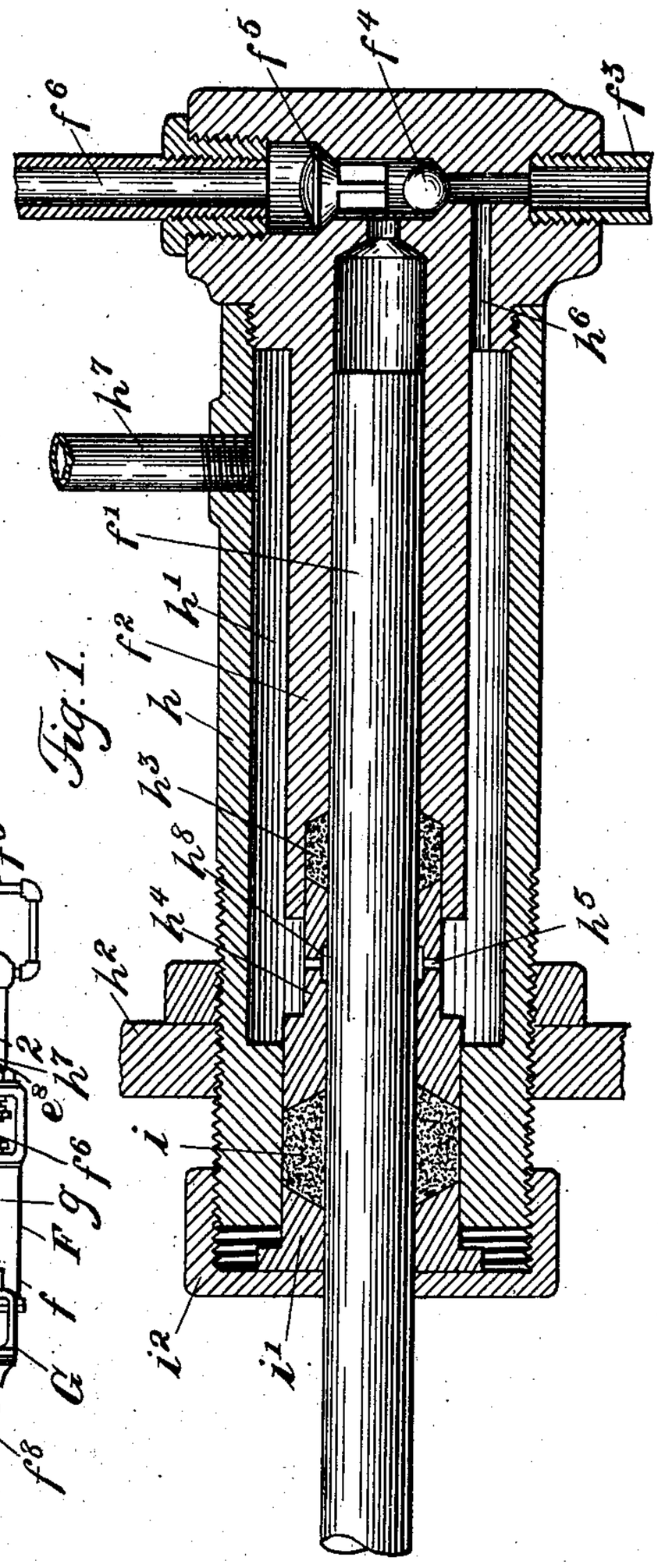
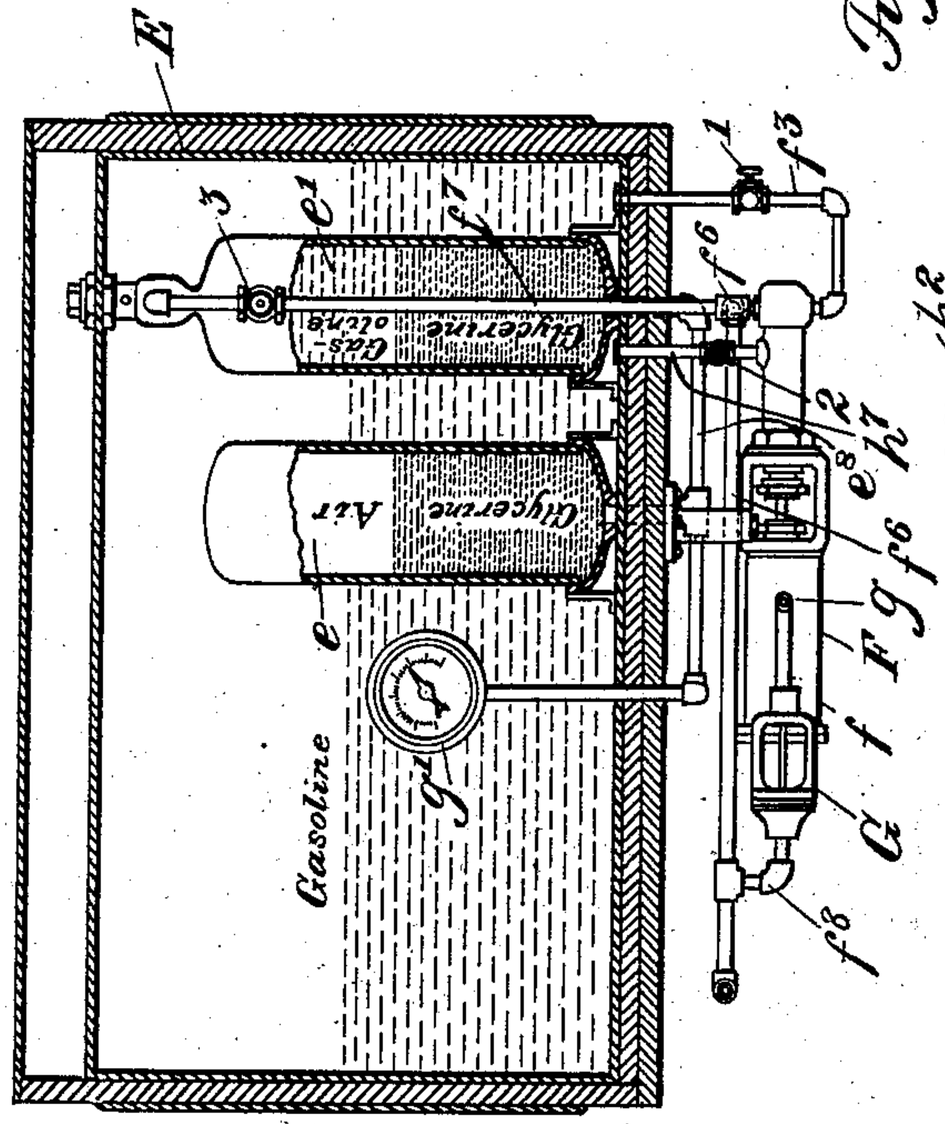


Fig. 2.



Witnesses

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No. 749,994. Patented January 19, 1904.

UNITED STATES PATENT OFFICE.

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LIQUID-FUEL-FEEDING SYSTEM.

SPECIFICATION forming part of Letters Patent No. 749,994, dated January 19, 1904.

Application filed April 11, 1902. Serial No. 102,431. (No model.)

To all whom it may concern:

Be it known that I, DANIEL E. JOHNSON, a citizen of the United States, residing at Hartford, in the county of Hartford and State of Connecticut, have invented an Improvement in Liquid-Fuel-Feeding Systems, of which the following description, in connection with the accompanying drawings, is a specification, like characters on the drawings representing like parts.

This invention relates to fuel systems of the type wherein a liquid fuel, such as gasolene or kerosene, is employed.

The aim of my invention is to provide a novel and improved means for forcing the liquid fuel from the supply-tank to the burner or point where it is used without the necessity for maintaining the entire supply of fuel under pressure.

My invention will be best understood after a description of a system illustrating one embodiment thereof.

In the drawings, Figure 1 is an enlarged sectional view through the pumping end of the fuel-pump; Fig. 2, a sectional detail of the fuel-supply reservoir or tank and showing the arrangement of means for feeding the fuel therefrom; and Fig. 3 is a sectional detail showing the filling-opening, Fig. 2, and closures therefor.

The fuel-supply tank or reservoir E may have any desired relation to the pumping and fuel consuming device or devices in the system and may have any shape or size required by the particular function which it may be called upon to fulfil.

Referring to Fig. 2, I have arranged within the supply reservoir or tank E a plurality of chambers e e', shown as contained in separate cylinders standing upon end and supported upon the bottom of the reservoir. One of these cylinders, as e', (see Fig. 3,) has a contracted neck e^2, which receives the screw-plug e^3, removal of which permits the said cylinder e to be filled when necessary. The filling-opening for the reservoir E is shown as closed by a cap e^4, threaded into a bushing e^5, having a depending tubular extension e^6, which meets and rests upon the upper end of the cylinder e'. This tubular extension is perforated laterally, as at e^7, so that upon removal of the plug e^4 gasolene or other liquid fuel poured into the filling-opening within said bushing will escape through said perforations e^7 and enter and fill the reservoir E. The feeding device, here shown as a pump, is typified at F, the same, as shown, comprising a steam-cylinder f, supplied with steam from any suitable source, the piston in said steam-cylinder carrying at its opposite end a plunger f', Fig. 1, which works within a pump-cylinder f^2. The pump takes its supply through the inlet or supply pipe f^3, leading from the bottom of the reservoir E, Fig. 2, said supply being controlled by a suitable inlet-valve, shown as a ball-valve, Fig. 1. The discharge from said pump under the control of a suitable discharge-valve f^5 passes through a discharge-pipe f^6, Figs. 1 and 2, and along to the fuel-consuming device. (Not shown.) Referring to Fig. 2, the discharge-pipe f^6 has a branch f^7, which leads upward to the top of the cylinder e' within the reservoir E and has its end turned inward and entering the top of said cylinder, as best shown in Figs. 2 and 3. Before the apparatus is started a quantity of glycerin or other insulating liquid is poured into the cylinder e', thus trapping a quantity of air in the cylinder e and in the pipe e^8, connecting the two cylinders. Now as the pump F operates gasolene is drawn from the bottom of the reservoir E through the supply-pipe f^3 and is forced by said pump outward and along the delivery-pipe f^6 under a pressure depending upon the difference between the capacity of the pump and the amount of gasolene permitted to flow to the fuel-consuming device, this excess of pump capacity of course creating a pressure at the delivery side of the pump. This pressure is communicated through the branch f^7 to the interior of the cylinder e' and acts upon the glycerin therein, forcing the latter into the other cylinder e and compressing the air therein. Consequently this air acts as a cushion to absorb or take up the impulses of the pump or sudden fluctuations in pressure at the delivery side of the pump and also when compressed under the normal pressure main-

tained at the delivery side of the pump stores up sufficient pressure to feed the gasolene from the top of the cylinder e' and in the branch pipe f^7 and delivery-pipe f^6 to the fuel-consuming device for a considerable period of time when the pump is not running.

The delivery-pipe f^6 has a branch f^8, Fig. 2, which leads to a suitable, preferably diaphragm, regulator G, which controls in usual manner the supply of steam through the pipe g, leading from the generator to the steam-cylinder of the pump F. Thus when the pressure in the delivery-pipe f^6 reaches a predetermined point necessary for the best working of the burner such pressure acting through this diaphragm-regulator will cut off the supply of steam from the said pump and cause the operation of the latter to cease until such time as the liquid-pressure becomes reduced sufficiently to again start the pump for restoration of the pressure.

While I prefer to use the diaphragm for starting and stopping the supply-pump, yet obviously the well-known equivalent of this arrangement maybe employed—viz., a continuously-operating pump with the diaphragm-regulator controlling a by-pass which regulates the effective delivery of the pump. Such equivalent being so well known it is unnecessary here to illustrate the same, the object being to prevent continued delivery of the pump with the attendant increase of pressure when the pressure upon the gasolene has already reached the highest limit.

A pressure-gage g', Fig. 2, is in communication with the delivery side of the pump herein by connection with the pipe e^8, connecting the bottoms of the two cylinders $e\ e'$ to indicate visually the pressure carried.

Thus my improved system provides a reservoir of fuel which is free from pressure, the fuel being pumped therefrom to the fuel-consuming device under any desired pressure determinable by adjustment of the diaphragm-regulator G, such pressure being elastic by reason of the air-cushion in the cylinder e, which takes up the impulses of the pump and furnishes a stored pressure sufficient to feed the liquid fuel during considerable periods of inaction of the pump. By insulating the air from the gasolene by interposition of the glycerin I eliminate all danger of the air to absorb or take up the gasolene, and thus lose its effectiveness, as is the case where the gasolene is permitted to come into direct contact with the air. By arranging the cylinders $e\ e'$ in the reservoir E any leakage mixes with the main body of fuel in the reservoir, hence does not appear at the exterior. Furthermore, said cylinders, which carry considerable pressure, may be more safely carried in the reservoir E than in an exposed position. In systems of this general type great difficulty has heretofore been experienced in providing a pump which will pump gasolene for any length of time without objectionable or excessive leakage. Recognizing the practical impossibility of providing a tight gasolene-pump I have herein provided for operating the pump, even in the presence of considerable leakage, without such leakage appearing at the exterior of the pump, and I accomplish this by the following construction, reference being had to Fig. 1.

Surrounding the pump barrel or cylinder f^2 I arrange a jacket or sleeve h, separated from the cylinder f^2, to leave a leakage-chamber h. The sleeve h may conveniently be screwed upon the base of the cylinder f^2, and at its opposite end may be threaded, as shown, to enter and be held by the yoke h^2 of the pump F.

The pump-cylinder f^2 is provided with a usual packing h^3 between it and the plunger f', the gland h^4 of said packing being perforated at h^5 to permit any leakage around the packing to escape into the leakage-chamber h', from which it may escape through the outlet h^6 at the right, Fig. 4, into the supply-pipe f^3 of the pump, thus to mingle with the supply of the pump. In other words, the pump draws not only from the reservoir E through the pipe f^3, but also from the leakage-chamber h', thus taking care of whatever leakage may take place.

The leakage-chamber h' is vented through a pipe h^7, Figs. 1 and 2, which leads upward to the reservoir E, which it enters at the bottom, so that any air which may become locked in the leakage-chamber may escape through this vent h^7, said vent also permitting any heated gasolene to rise to the reservoir, and, thus maintaining a circulation through the leakage-chamber, keep the pump always cool. The circulation may be in an opposite direction should the pump draw from the leakage-chamber. Ordinarily, however, the pump will draw through the natural supply of its pipe rather than from the leakage-chamber against the heat-impelled circulation therethrough referred to. This vent may in case of clogging of the inlet-pipe f^3 also constitute a source of supply from the reservoir to the leakage-chamber, thus permitting the pump to draw from said leakage-chamber.

To insure free escape of all leakage around the plunger f' into the leakage-chamber, the gland h^4 is provided with an annular recess h^8, into which the openings h^5 enter.

The contents of the leakage-chamber h' being free from pressure, there is little tendency of the same to escape around the plunger f'; but to effectually guard against any escape I have provided an additional packing i between the end of the sleeve h and the said plunger, such packing being compressed between the end of the gland h^4 of the inner packing and a second exterior gland i', the latter being confined in position by a cap-nut i^2 on the end of

the said sleeve. Thus there are provided two packings for the plunger f', one of the glands being common to both packings, and experience has shown that there is no appreciable leakage from the cylinder in this arrangement.

The pump supply-pipe f^3 is shown provided with a hand-valve 1, by which it may be closed when necessary, and the vent-pipe h^7 is provided with a similar hand-valve 2. The branch f^7, leading to the top of the cylinder e', is likewise provided with a hand-valve 3, which latter extends through to the interior of the reservoir E for convenience in operation.

My invention is not limited to the particular embodiment thereof here shown and described, but may be varied within the spirit and scope of the invention.

I claim—

1. A liquid-supply system comprising a liquid-supply reservoir and a delivery-pump supplied therefrom provided with a leakage-chamber to receive leakage from the pump and having communication with the pump-supply through a plurality of separate passages.

2. A liquid-fuel-supply system for motor-vehicles comprising a fuel-supply reservoir and a delivery-pump supplied therefrom, and provided with a leakage-chamber in circulatory communication with said reservoir.

3. A pump of the class described comprising a pump-cylinder with its pump-chamber, a pump-operating member extending through said cylinder, inlet and discharge passages for said pump-cylinder, said pump having also a leakage-chamber to receive leakage therefrom, said chamber being in communication with a space adjacent said pump-operating member packed against the compression-pressure of the pump and also against the atmosphere.

4. A liquid-fuel-supply system for motor-vehicles provided with a delivery-pump having a pump-cylinder, a plunger reciprocable therein, a leakage-chamber surrounding said pump-cylinder, and separate packings between the pump-plunger and pump-cylinder and between the pump-plunger and leakage-chamber wall, said separate packings having a common intervening gland.

5. A liquid-fuel-supply system for motor-vehicles provided with a delivery-pump having a pump-cylinder, a plunger reciprocable therein, a leakage-chamber surrounding said pump-cylinder, and separate packings between the pump-plunger and pump-cylinder and between the pump-plunger and leakage-chamber wall, said separate packings having a common perforated gland to permit leakage from the innermost packing to escape into said leakage-chamber.

6. The within-described pump for motor-vehicle fuel-supply systems and the like, the same containing a pump-cylinder and its plunger, inlet and discharge passages for said pump-cylinder, and a leakage-chamber surrounding said pump-cylinder and in communication with said cylinder-inlet.

7. A pump of the class described comprising a pump-cylinder and its pump-chamber, a pump-operating member extending through said cylinder, inlet and discharge passages for said pump-cylinder, said pump having also a leakage-chamber to receive leakage from said pump in communication with a space adjacent said pump-operating member packed against the compression-pressure of said chamber and also against the atmosphere, and means to withdraw the leakage from said chamber.

8. A pump of the class described comprising a pump-cylinder with its pump-chamber, a pump-operating member extending through said cylinder, inlet and discharge passages for said pump-cylinder, a plurality of separate packings encircling said pump-operating member, and a leakage-chamber communicating with a space intermediate said packings and also in connection with the inlet-passage of the pump to receive the leakage from said pump.

9. A liquid-fuel-supply system comprising a supply-reservoir and a delivery-pump, an inlet-passage connecting the same with the supply-reservoir and a leakage-chamber for said pump in communication with the inlet-passage of said pump and having separate communication with said reservoir.

10. A liquid-supply system comprising a liquid-supply reservoir and a delivery-pump supplied therefrom, the latter having its pump-cylinder and inlet and outlet passages, and a chamber surrounding said pump-cylinder communicating with said inlet-passage and said reservoir.

11. A liquid-fuel-supply system comprising a reservoir and a pump having a pump-cylinder, a plunger, inlet and discharge passages, and a leakage-chamber surrounding said pump-cylinder and in communication with said cylinder-inlet and said reservoir.

12. A pump of the class described comprising a cylinder, inlet and discharge passages, a plunger, packing between said cylinder and plunger, an outer cylindrical sleeve surrounding said pump-cylinder but leaving an annular space between said pump-cylinder and said sleeve, and a second packing between said cylindrical sleeve and said plunger, said plunger being exposed to said annular space intermediate said first and second packings.

13. A pump of the class described comprising a cylinder, inlet and discharges passages, a plunger, packing between said cylinder and plunger, an outer cylindrical sleeve surrounding said pump-cylinder but leaving an annular space between said pump-cylinder and said sleeve communicating with said inlet-passage, and a second packing between said cylindrical

sleeve and said plunger, said plunger being exposed to said annular space intermediate said first and second packings.

14. A liquid-fuel-supply system comprising a reservoir, a pump, inlet and outlet passages therefor, a leakage-chamber to receive the leakage from said pump in communication with said inlet-passage, a communicating passage between said reservoir and said leakage-chamber, and a valve for said passage.

15. A pump of the class described comprising a cylinder, inlet and discharge passages, a plunger, an outer cylindrical sleeve surrounding said cylinder but leaving an annular space between said cylinder and said sleeve adapted to receive the leakage from said pump, and packing between said cylindrical sleeve and said plunger.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

DANIEL E. JOHNSON.

Witnesses:
ELIZABETH HEYWOOD,
E. H. STOCKER.