

(No Model.)

W. E. EASTMAN.  
LIQUID FUEL FEEDING APPARATUS.

No. 387,056.

Patented July 31, 1888.

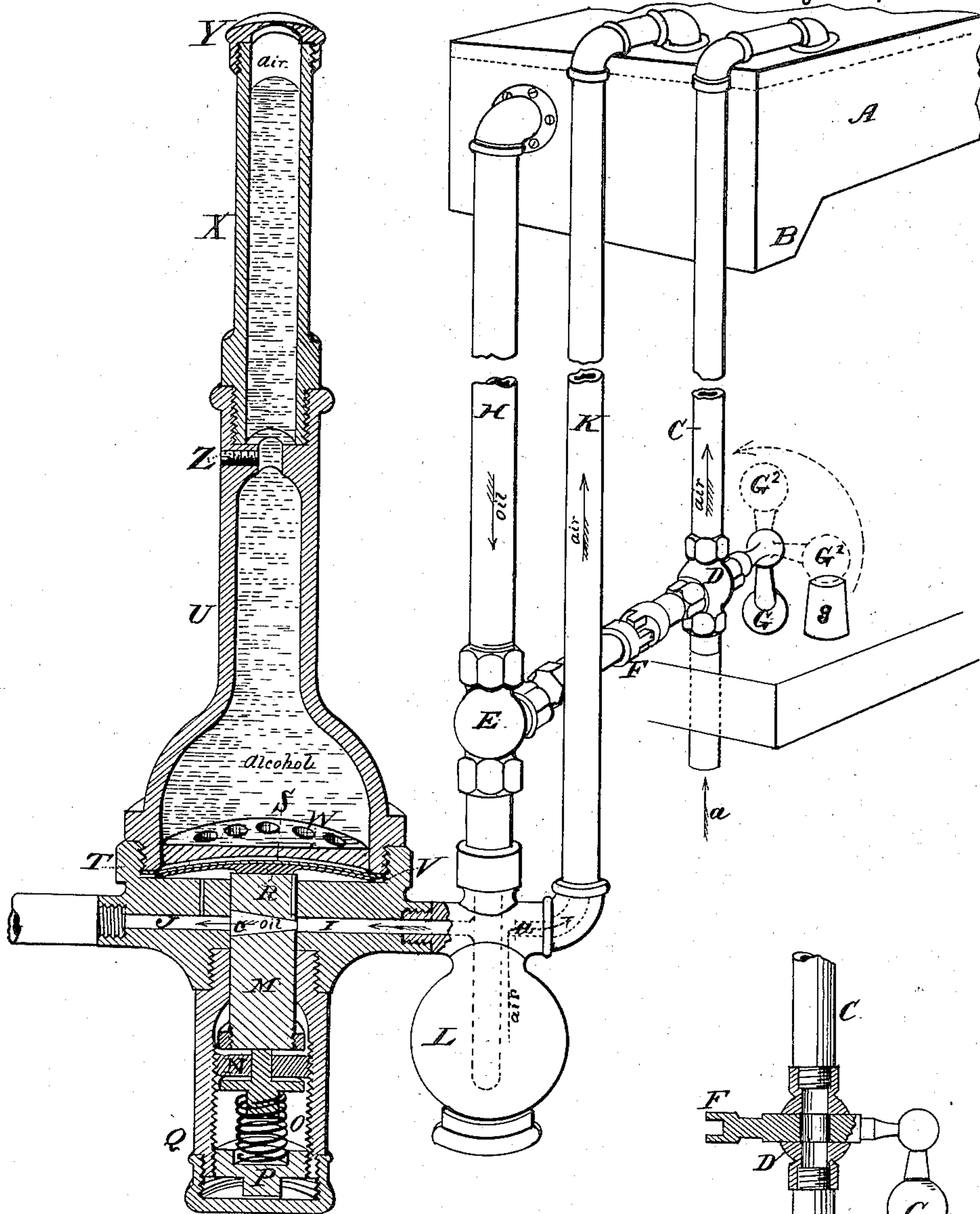


Fig. 1.

Fig. 2.

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# UNITED STATES PATENT OFFICE.

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## LIQUID-FUEL-FEEDING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 387,056, dated July 31, 1888.

Application filed April 18, 1887. Serial No. 235,264. (No model.)

*To all whom it may concern:*

Be it known that I, WILLIAM E. EASTMAN, a citizen of the United States, residing at Boston, in the county of Suffolk and State of Massachusetts, have invented certain new and useful Improvements in Liquid-Fuel-Feeding Apparatus, of which the following, taken in connection with the accompanying drawings, is a specification.

The object of my present invention is to produce a cut-off valve, plug-cock, and an automatically-regulated feed-governor operating in conjunction, which in their entirety I designate as a "liquid-fuel-feeding apparatus," designed to regulate the supply of liquid fuel from the reservoir to the stove, as adapted to my heretofore-patented method of heating steam rail-cars for the transportation of produce.

The improvements herein combined especially refer to the construction embodied in a previous application filed March 14, 1888, and numbered 230,905. Therein two vehicles are introduced, to make operative certain parts appertaining to that method.

The purpose of my present improvement is to simplify and perfect that invention, rendering it more effective by the introduction of but one liquid and the addition of a cut-off valve and plug-cock, thus lessening the expense of its production. I attain these desiderata through the principles involved and the construction shown in the illustration comprising a part of this specification, wherein—

Figure 1 exhibits a longitudinal vertical section in perspective of one-half of my improved apparatus with its connecting-pipes and reservoir in elevation. Fig. 2 is a side elevation in section of the plug-cock and its connections.

Specific references by letters occur throughout the drawings, referring to which—

A designates the oil-reservoir situated beneath a car, the depth of one end being increased, as at B, to receive any sedimentary deposit, which, if suspended, would interfere with the efficiency of the drawing-off pipe H. The several pipes may be further protected at their terminals within said reservoir by net-

ted coverings (not herein illustrated) across their orifices, if desirable.

The operation of the reservoir and its connecting-pipes, together with the operation of the clutch mechanism, is as follows, viz: In the manipulation of the plug-cock, cut-off valve, and several pipes establishing communication from the oil-reservoir suspended from the car-bottom to the place of consumption, it is necessary to expedite the flow of oil therefrom through the admission of air in proper volume to displace the contents of said reservoir, which otherwise is hermetically sealed, for reasons which presently appear.

To facilitate the simultaneous actuation of said cock and valve at a proper moment, an intercommunication is achieved through a clutch so loosely connected that only the second movement of the (plug-cock) ball-lever bar insures the admission of air to the reservoir and expulsion of oil therefrom at one and the same moment.

Referring to the illustration, C designates the air-duct, which is controlled by the plug-cock D and additionally actuates the cut-off valve E through the instrumentality of the lever-clutch F. In the manipulation of said cock by the attendant, the ball-lever bar G lying upon its rest *g* in the dotted position indicated at *G'*, air is excluded from the duct C and the oil is suspended in its passage through the outflow-pipe H. Moving said lever to the vertical position at *G*<sup>2</sup> admits the air from the direction of the arrow *a* to the reservoir, (this being its position while replenishing the same,) with the oil still suspended in its movement. The final rotation of said lever-bar places it in the depressed position shown at *G*, actuating said clutch and permitting the oil to flow freely through its channels I and J in the direction of arrows to the place of its ignition and consumption, the air meanwhile having free admission through the vent-tube C to the reservoir, which is hermetically sealed to protect its contents from humid and frigid conditions of the atmosphere or evaporation during extreme heat.

K is also an air-vent duct, permitting the escape of air should any accumulate or exist



in the sediment-chamber L, which receives the oil previous to its passage through the valve M, and is further intended to retain any residue of foreign matter, which, if existing, may be removed at intervals through the orifice at the bottom, which is closed by a screw-cap, as illustrated.

Q designates a cylindrical internally-threaded casing, the bottom of which is also closed by a screw-cap, and which is "tapped" or threaded into the bottom of the bed-piece T, or, if preferred, may be cast integrally with the same. This casing contains and supports the accessories actuating the valve M upwardly, said accessories consisting, first, of a receiving-nut, P, threaded within the bottom of said cylinder; second, the follower and resisting spring O, seated within said nut, and, third, the check-nut N, gaging the downward movement of said valve, which is properly splined to prevent its rotation, and provided with a transverse conical through oil-passage, c, located opposite the horizontal channels I J in the bed-piece T.

The loose diaphragm R rests above said valve, the central portion thereof being increased to a suitable thickness, that it may be protected from injury through its abrasion with the valve-top, the propulsion of the valve downward being effected by the expansion of the alcohol influenced by any change of temperature, and its consequent pressure (through the foraminous bridge W) upon the resilient diaphragm S and loose diaphragm R, consecutively. The valve M, thus receiving motion intermittently through said diaphragms, automatically controls the flow of oleose fuel to the burner, that the requisite amount of warmth may be maintained, increasing as the temperature falls and decreasing as the temperature rises.

Threaded into the bed-piece T, through which the oil flows, and which forms the chamber wherein the diaphragms R and S are situated, is the chambered receptacle U, containing alcohol to the exclusion of any other liquid vehicle, the expansive properties of which under heat I have proved by exhaustive experiments to fulfill all the requirements of my invention, heretofore obtained through the addition of mercury as an auxiliary expansive power.

To protect the resilient diaphragm S, (which in my present invention I solder or otherwise permanently attach to the annular shoulder V,) a transverse perforated bridge, W, preferably constructed integral with the said receptacle U and concaved upon the plane contiguous to the diaphragm, lies sufficiently above the same to limit its upper movement and to protect it from injury by the valve M in its propulsion upward. For convenience of construction I form connection at any point in the length of the chamber U, to which I affix an extended receptacle, X, which may or may not be of corresponding diameter, and

which particularly subserves the purpose of an expansive air-chamber, being screw-capped, as at Y, for the admission of the liquid contents, with a sufficient space above the latter that the air therein inclosed may form an elastic cushion to meet the maximum expansion of the contents without injury to said diaphragms.

Z designates a screw-plug for the liberation of the surplus spirits over and above what is required to produce the necessary pressure and consequent action upon said diaphragms to actuate the valve M and control the flow of liquid fuel to the stove. The latter is not herein illustrated, but clearly exhibited in my former Letters Patent, No. 247,028, September, 1881, No. 248,924, November, 1881, No. 269,189, December, 1882, and No. 253,521, February, 1882.

I am aware that several features of my invention herein described were before set forth and claimed in my previous application filed March 14, 1887. I therefore do not herewith claim such features, broadly; but

What I do claim, and desire to secure by Letters Patent, is—

1. In a liquid-fuel-feeding apparatus, the combination, with the receptacle U, provided with a foraminous base or bridge, W, and an expansive chamber, X, threaded into the top thereof, the bed-piece T, provided with oil-ducts J I, the diaphragms S R, the perforated valve M, underlying said diaphragms, and the follower O, of a hermetic tank, A, provided with a deposit-chamber, B, at the bottom of one end thereof, air-pipes C K, for admission of air above the contents of said tank, and outlet-pipe H, provided with the cut-off valve E, for transmitting oil to the burner, substantially as described.

2. In a liquid-fuel-feeding apparatus, the combination, with a bed-piece, T, provided with transverse oil-ducts J I, the diaphragms R S, seated within said bed-piece, the valve-case Q, thereto attached, provided with accessories embracing a nut, P, spring-follower O, and check-nut N, the valve M, thereby actuated, and provided with the oil-passage c, of a receptacle, U, for the reception of alcohol, provided with a foraminous concaved bridge, W, at its bottom and a screw-plug, Z, at its top, admitting to the interior, substantially as illustrated, and for the purpose described.

3. In a liquid-fuel-feeding apparatus, the expansion-chamber X, the receptacle U, thereto united, to contain alcohol, the diaphragms R and S, adapted to receive the pressure of said alcohol, the hermetic tank A, the accessory pipes C K, conveying air thereto, the oil-pipe H, leading therefrom, the cock D, provided with an operative lever-bar, G, the loose clutch F, and the cut-off valve E, constructed and adapted to operate in combination with a bed-piece, T, provided with oil-passages, and a residuum-chamber, L, the valve-case Q, thereto attached, the spring-fol-

lower O, therein contained, and the valve M, having a reciprocating motion to control the variable flow of liquid fuel to the burner, substantially in the manner and for the purpose  
5 set forth.

In testimony whereof I have signed my name to this specification, in the presence of two sub-

scribing witnesses, on this 14th day of April, A. D. 1887.

WILLIAM E. EASTMAN.

Witnesses:

LYMAN SPALDING,  
FANNIE P. BARTLETT.