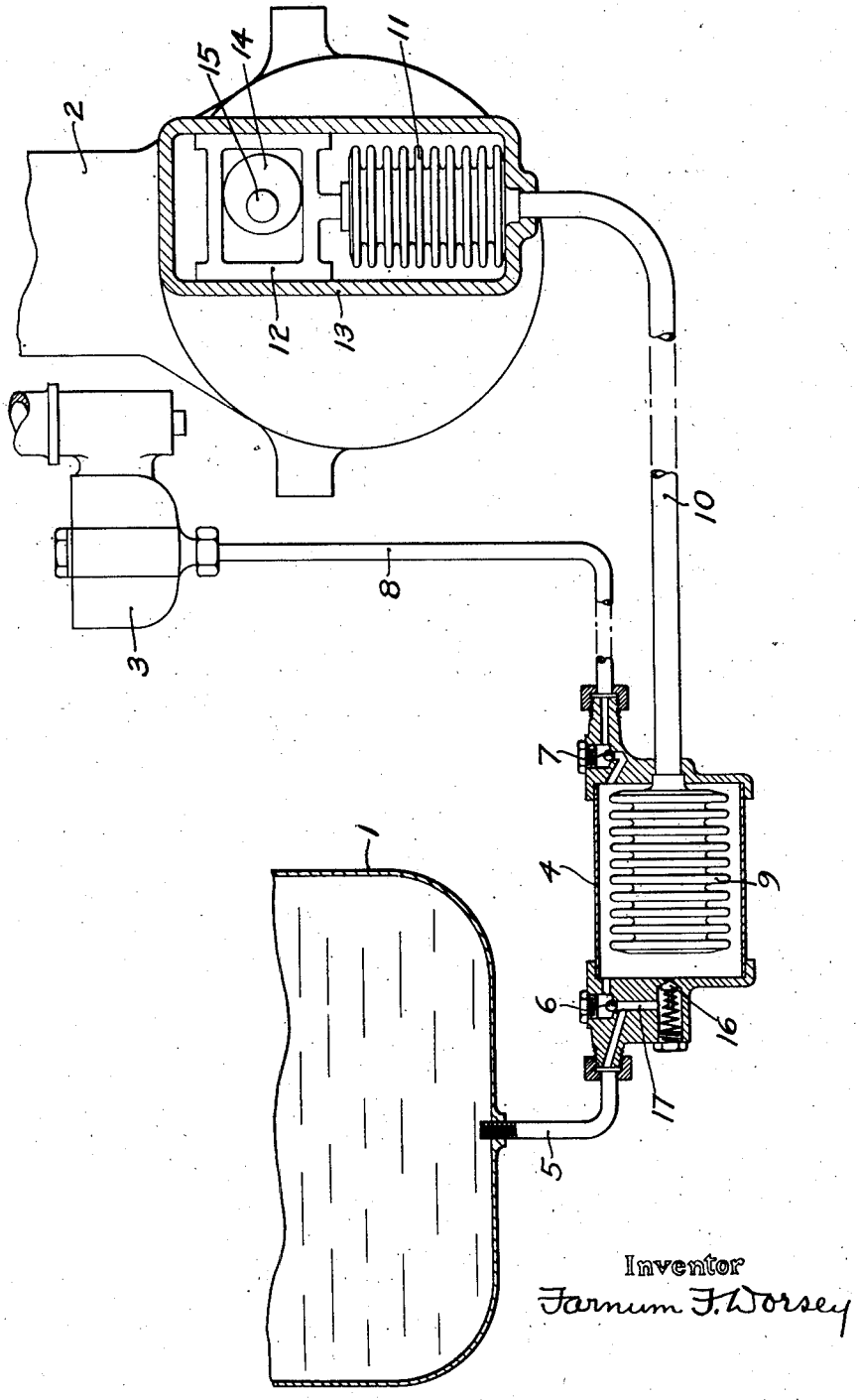
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F. F. DORSEY

FUEL SUPPLY SYSTEM

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Inventor

Farnum F. Dorsey

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FARNUM F. DORSEY, OF ROCHESTER, NEW YORK, ASSIGNOR TO NORTH EAST ELECTRIC COMPANY, OF ROCHESTER, NEW YORK, A CORPORATION OF NEW YORK.

FUEL-SUPPLY SYSTEM.

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This invention relates to a system suitable for supplying fuel to an engine from a tank which is at a location remote from the engine, particularly where the tank is at a lower level than the engine.

Where a fuel-pump is located adjacent the engine, in an arrangement of the kind in question, difficulty is encountered owing to the fact that the pump will not always start into operation without priming, and owing also to the fact that a volatile fuel, such as gasolene, may release a sufficient volume of vapor to interfere with the pumping operation. In accordance with the present invention the pump, or the fuel-impelling member thereof, is located adjacent the fuel-tank, and preferably at such a low level as to be always primed by fuel flowing by gravity from the tank. This location of the fuel-impeller involves the use of a remote power-connection with the engine; and a feature of the invention resides in a novel and simple device for this purpose, by which friction, wear and lost motion are avoided.

Other features of the invention will be noted in connection with the following description of the illustrated embodiment thereof.

The accompanying drawing is an elevation, partly in section, showing a fuel-supply system in accordance with the invention.

The invention is illustrated in a form adapted for use in an automobile, in which the fuel-tank 1 is located at the rear of the vehicle, at a low level, while the engine 2 is located at a higher level at the front end of the vehicle.

The specific means for introducing the fuel into the engine are not involved in the invention, but are illustrated as comprising an ordinary carbureter 3.

The pump characteristic of the invention is shown as having a cylindrical chamber 4, connected with the bottom of the fuel-tank by a short pipe 5. The fuel-inlet is controlled by a check-valve 6, and the outlet by a check-valve 7, and the fuel is discharged through a pipe or conduit 8 connecting the pump with the carbureter.

The movable member or impeller of the pump has, in the illustrated structure, the form of a corrugated diaphragm 9 of the bellows type, made of thin sheet-metal and capable of expanding and contracting longitudinally to a substantial extent. This impeller is enclosed in the pump-chamber, and is connected, through a pipe or conduit 10, with a similar diaphragm 11 located adjacent any part of the mechanism of the vehicle from which power may be conveniently derived. Preferably, however, the power is derived directly from the engine, in order that the fuel-pump may be operated while the vehicle is stationary. The diaphragm 11 is attached to a yoke 12 which slides in the casing 13 enclosing the diaphragm, and the yoke is actuated by an eccentric 14 driven by a shaft 15. This shaft may be driven in any convenient way from the mechanism of the engine.

The two diaphragms and the pipe 10 constitute a hermetically closed system, which is filled with some liquid that is stable under the ordinary extremes of atmospheric temperature. Glycerine is a suitable liquid for this purpose. Consequently, when the fluid-impeller or diaphragm 11 is alternately expanded and contracted by the eccentric mechanism, the fluid flows alternately from and to the fuel-impeller 9, causing the latter to contract and expand, and thus to draw fuel into the pump-chamber and then expel it through the fuel-pipe 8.

The pump is preferably arranged to provide a surplus of fuel beyond that required by the engine, and a spring-pressed escape-valve 16 is used to permit the excess to return, through a by-passage 17, to the pipe 5 and the tank. Where the carbureter 3 is of the ordinary float-feed type, the escape-valve may be adjusted to maintain a pressure in the system equivalent to a slight gravity-head at the carbureter.

Since the pump-chamber is located at the bottom of the fuel-tank, it will always be full of fuel so long as any remains. Its valves are therefore always liquid-sealed and practically certain to operate, and the pump is free from the difficulties encountered where it is attempted to raise gasolene or similar volatile liquids by pumping at the upper end of a conduit.

The inventor is aware that it has previously been proposed to actuate a remote fuel-pump by the alternations of pressure in an engine-cylinder, communicated to the pump-diaphragm through a conduit. Such arrangement has proven impracticable, how-

ever, owing to the fact that the conduit becomes clogged with products of combustion, and to the further fact that the gaseous medium with which the conduit is filled, being elastic and compressible, does not readily transmit pressure impulses, at high speed, through a long and slender pipe. By using an actuator independent of the cylinder and piston of the engine, and a transmitting fluid which, being a liquid, is substantially incompressible, the present inventor has avoided the difficulties just described.

It will be understood that the drawing is partly diagrammatic in character, and that the invention is not limited to the details of construction of the illustrated embodiment, but may be embodied in various forms within the scope of the following claim.

The invention claimed is:

In a fuel-supply system, the combination, with an engine, a fuel-tank remote from the engine, and a fuel-feeding device adjacent the engine and higher than the fuel-tank, of a pump-chamber located adjacent and lower than the fuel-tank and communicating therewith; an elastically expansible impeller in the pump-chamber; an elastically expansible impeller adjacent the engine; means, actuated directly from the mechanism of the engine, for expanding and compressing the latter impeller; a fluid-conduit connecting the two impellers, and constituting, therewith, a hermetically sealed chamber; substantially incompressible liquid filling said chamber; a fuel-conduit extending from the pump-chamber to the fuel-feeding device; and valves controlling the flow of fuel through said conduit.

FARNUM F. DORSEY.