Jan. 27, 1931. A. A. LA POINTE 1,790,547

ELECTROMAGNETIC PUMP

Filed Dec. 10, 1929

Fig. 1.

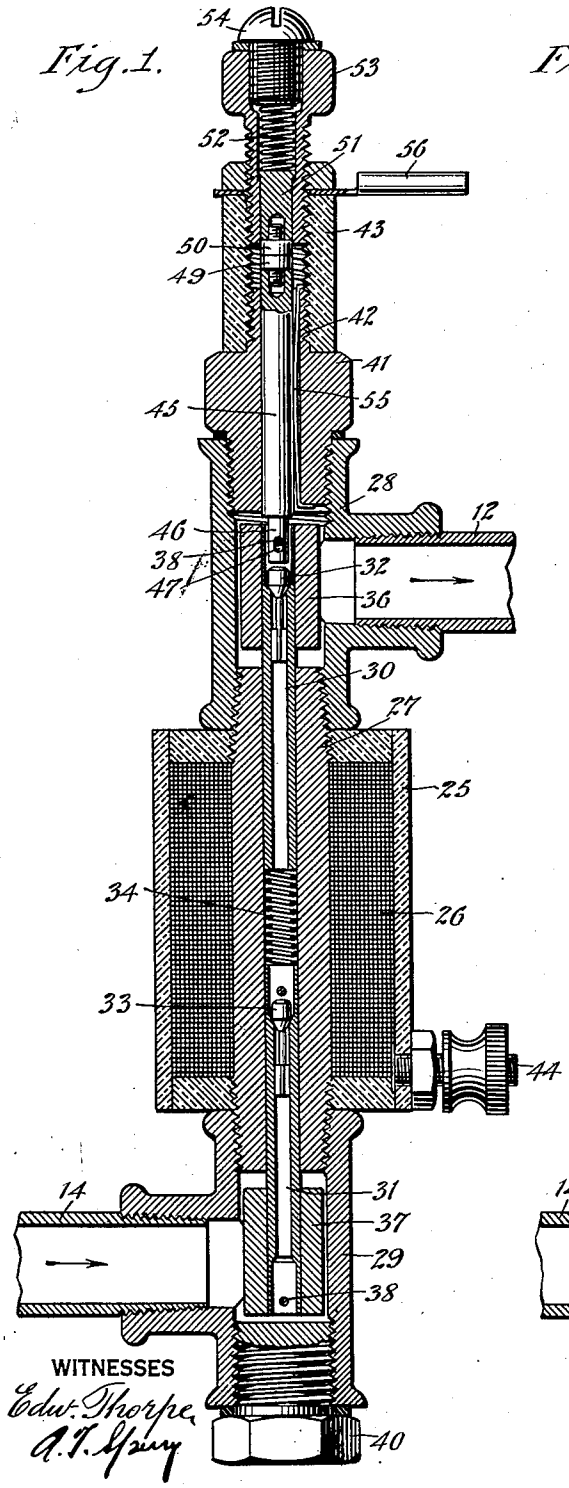
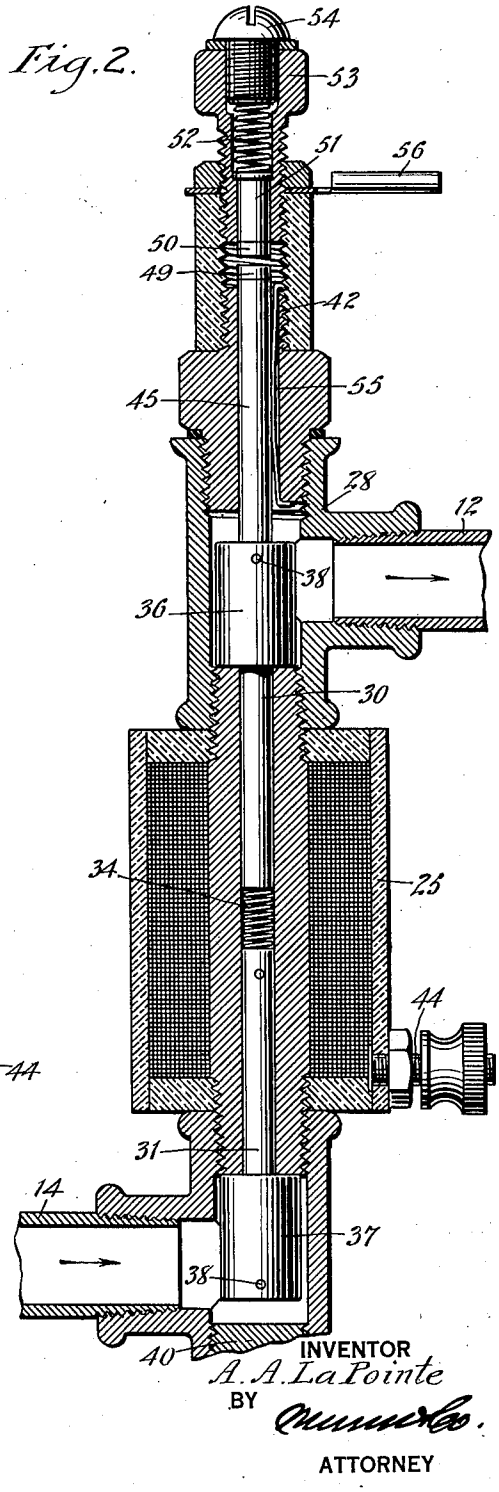


Fig. 2.



WITNESSES

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ELECTROMAGNETIC PUMP

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This invention relates to electromagnetic pumps.

It is among the prime objects of the present invention to provide a novel, simple and improved pump adapted for use in a fluid circuit.

A further object of the present invention is to provide an electromagnetic pump of novel and simple design which is adapted to economically operate to cause a flow of liquid.

A further object of the present invention is to provide a novel electromagnetic pump including a pair of oppositely movable rectilinear hollow plungers, which plungers are provided with valves whereby their rectilinear movement will cause a flow of liquid therethrough.

A further object of the present invention is to provide novel pump means for supplying fuel to oil stoves or the like without utilizing the conventional removable fuel tank therefor.

Other objects and features of the present invention include a novel, simple and improved combination and inter-relation of parts whereby an efficient economically operable pump is provided.

Other objects of the present invention will be apparent from a consideration of the following specification when taken in connnection with the accompanying drawings, in which

Fig. 1 is a detailed sectional view of the pump showing the hollow pistons in extended position, and

Fig. 2 is a similar view showing the pistons in contracted position.

Referring more particularly to the drawings, it will be apparent that the pump includes a central magnet coil casing 25, within which magnet windings, illustrated at 26, are provided. The windings 26 are wound about a central tubular core 27, the extremities of which are screw-threaded for securement with the casing 25 and extend from the casing for threaded engagement with upper and lower T-couplings 28 and 29 respectively. The coupling 28 has connected therewith an outlet pipe 12, and the coupling 29 has connected therewith an inlet pipe 14. The windings of the coil 26 are such as to constitute a solenoid for controlling the movement of the tubular pistons, as will be hereinafter described.

Slidably positioned within the core 27 and extending therefrom there is provided upper and lower rectilinearly movable tubular pistons 30 and 31 respectively. The upper end of each piston is recessed to receive therein freely movable valve elements 32 and 33 respectively, the valve elements having enlarged heads adapted to be seated against the bottom of the enlarged recess of the pistons whereby upward flow through the tubes is permitted and whereby the valves will seat themselves to prevent flow of liquid in the opposite direction.

For normally maintaining the pistons in spaced relation and for urging them outwardly from the core 27, an expansion coil spring 34 is provided, the ends of which abut the inner ends of the pistons. The arrangement of the spring 34 together with the winding of the coil 26 is such that upon energization of the coil the pistons will move inwardly toward each other against the tension of the spring 34, and upon deenergization of the coil the pistons will be moved by the spring 34 to their extended position, as shown in Figure 1. This arrangement provides for the opposite rectilinear piston-like movement of the pistons so that upon energization fluid entrapped between the valves 32 and 33 will be forced upwardly past the valve 32 and upon opposite rectilinear movement of the pistons in response to the expansion of the spring 34 new fluid will be brought into the chamber between the pistons by passage by the valve 33.

For causing the pistons 30 and 31 to be moved by the energization of the coil, armature heads 36 and 37 are associated with the extended extremities thereof, the heads being secured to the respective pistons by securing pins 38 which extend therethrough. The armature heads 36 and 37 are centrally bored to receive therethrough the pistons and any equivalent securing means there may be provided, it being understood that the heads may be sweated or otherwise joined to the

pistons. By this construction it will be seen that the core 27 acts as a pole for the magnet, the core and heads being formed of magnetic material, thus insuring proper cooperative movement of the pistons in response to the energization of the coil.

In connection with the heads 37 it will be noted that the heads have a loose fit within the bodies of the T's 28 and 29, thus liquid fuel may readily pass around the heads to enter the extremities of the pistons, which extremities are preferably flush with the ends of the heads, as shown.

The supply pipe 14 leading from a suitable source of fluid supply is associated with the central aperture of the T 29, the lower aperture being suitably closed by a plug 40, the arrangement being such that removal of the plug 40 will facilitate the assembly or repairs of the pump structure. The outlet pipe 12 of the pump is associated with the central aperture of the T 28, the lower aperture being associated with the core 27, as hereinbefore described. The upper aperture of the T 28 is closed by a suitable centrally bored plug 41. The upper end of the plug 41 is provided with extended externally threaded portion 42 which receives thereover an insulated casing 43 and within the casing 43 an automatic circuit impulse controlling unit is provided.

One side of the coil 25 is adapted for electrical connection with one of the conductors 16 by a suitable binding post 44. The opposite side of the coil is grounded to the core 27, the circuit being completed therefrom through the T 28 and plug 41 to a reciprocating plunger 45. The plunger 45 includes a reduced lower extremity 46 having an elongated aperture 47, which aperture receives therethrough the securing cross pin 38, the arrangement being such that restricted relative movement between the plunger 45 and the piston 30 is provided. The upper end of the plunger 45 has secured therein for movement therewith, a contact head 49, the upper face of which is adapted for periodic contact with a similar contact element 50, which is carried for movement with a slidable support 51. The support 51 is mounted within an externally threaded closure cap 52, within which an expansion spring 53 is provided for normally urging the support 51 downwardly. The tension of the spring 53 is adapted to be controlled by screw 54, the inner end of which abuts the upper end of the spring 53. The impulse controlling assembly is completed by the provision of a laterally extending flat leaf spring 55 which lies within the plug 41, its inner face lying against the plunger 45, whereby frictional contact is produced therebetween, thus preventing rectilinear movement of the plunger 45 except in response to the movement of the piston 30.

From the foregoing it will readily be seen that upon the contracting movement of the pistons 30 and 31 the plunger 45 will be caused to move downwardly after a predetermined free movement of the piston 30 the downward movement of the plunger 45 carries with it the contact element 49, which is thus moved away from the contact element 50, it being noted that the upper end of the support 51 flares outwardly for abutting relation with an inner shoulder on the cap 52. The cap 52 is associated with the opposite conductor 16 through a suitable surrounding electrical connector 56. The separation of the contacts 49 and 50 will be seen to break the circuit to the coil 25 and thus deenergize the coil. Deenergization of the coil permits the spring 34 to move outwardly the pistons 30 and 31, whereby upward movement of the pistons 30 will after a predetermined free movement, move upwardly the plunger 45, thus again establishing electrical contact between the contacts 49 and 50, and causing re-energization of the coil 25.

From the foregoing it will readily be seen that the present invention provides a novel, simple and improved electromagnetic pump which is adapted for various types of use. The invention further provides for a specific use of the pump in connection with an improved supply system for oil burning stoves or their equivalent.

In connection with the present invention it will be understood that only one form of the invention is herein shown and only one system for use of the pump is disclosed. It will be understood, however, that the invention is subject to numerous changes and modifications and the full use of equivalents may be resorted to without departing from the spirit and scope of the invention as outlined in the appended claims.

I claim:

1. An electromagnetic pump including a tubular core having electromagnetic windings associated therewith and a pair of movable tubular pistons within said core.

2. An electromagnetic pump including a tubular core having electromagnetic windings associated therewith, a pair of movable tubular pistons within said core and resilient means for normally urging said pistons in opposite extended position from said core.

3. An electromagnetic pump including a tubular core having electromagnetic windings associated therewith, a pair of movable tubular pistons within said core and resilient means for normally urging said pistons in opposite extended position from said core, said pistons including armature heads at their extremities, said heads being adapted to be attracted by energization of the core to inwardly move said pistons toward each other and against the tension of said spring.

4. An electromagnetic pump including a tubular core having electromagnetic wind-

ings associated therewith, a pair of movable tubular pistons within said core, and resilient means for normally urging said pistons in opposite extended position from said core, said pistons including valves adapted to prevent the passage of fluid therethrough in one direction.

5. An electromagnetic pump including a tubular core having electromagnetic windings associated therewith, a pair of movable tubular pistons within said core, resilient means for normally urging said pistons in opposite extended position from said core and impulse controlling means associated with one of said pistons.

6. An electromagnetic pump including a tubular core having electromagnetic windings associated therewith, a pair of movable tubular pistons within said core and resilient means for normally urging said pistons in opposite extended position from said core, said means including a contact having lost motion connection with said pistons and a fixed contact adapted to control the energization of said windings.

7. An electromagnetic pump including a casing, a tubular core within said casing, electrical windings around said core and within said casing, a pair of tubular rectilinearly movable pistons within said core and extending therefrom, said pistons including armature heads associated with the extremities of said pistons for attraction by the extremities of said core upon energization of said windings, resilient means within said core between the inner extremities of said pistons adapted to normally urge said pistons outwardly from said core, valves carried by said pistons adapted to permit upward movement of fluid therethrough and to prevent movement of fluid in the opposite direction, and circuit controlling means associated with one of said pistons for controlling the impulsive energization of said windings.

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