

April 7, 1925.

1,532,326

L. B. LENT ET AL
FLUID TRANSFER DEVICE

Filed Sept. 29, 1921

2 Sheets-Sheet 1

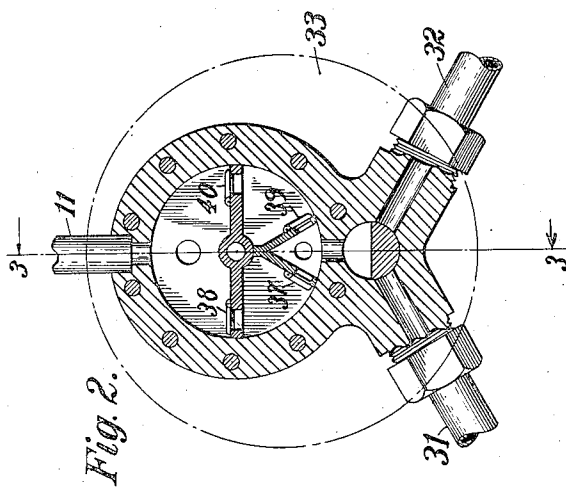


Fig. 2.

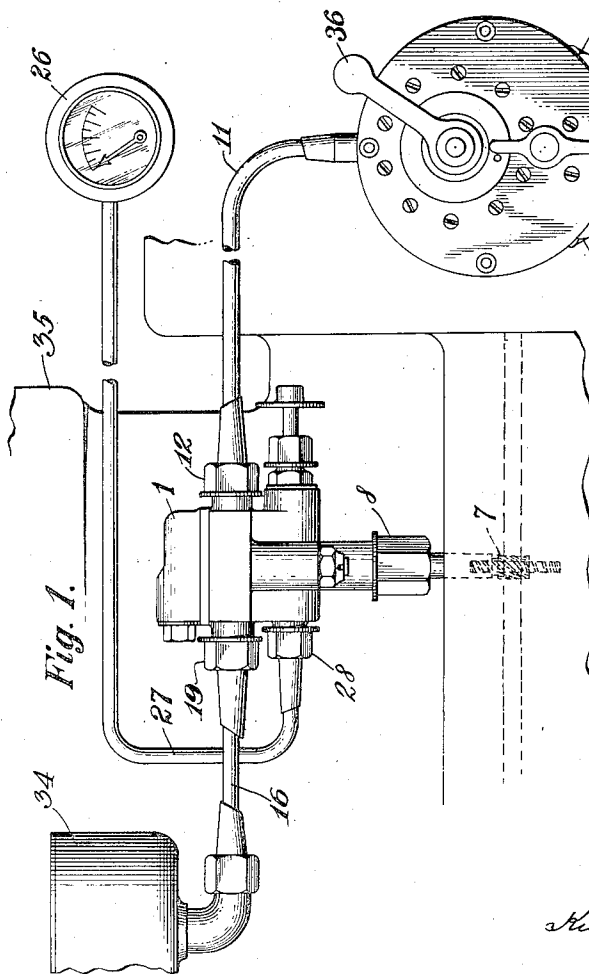


Fig. 1.

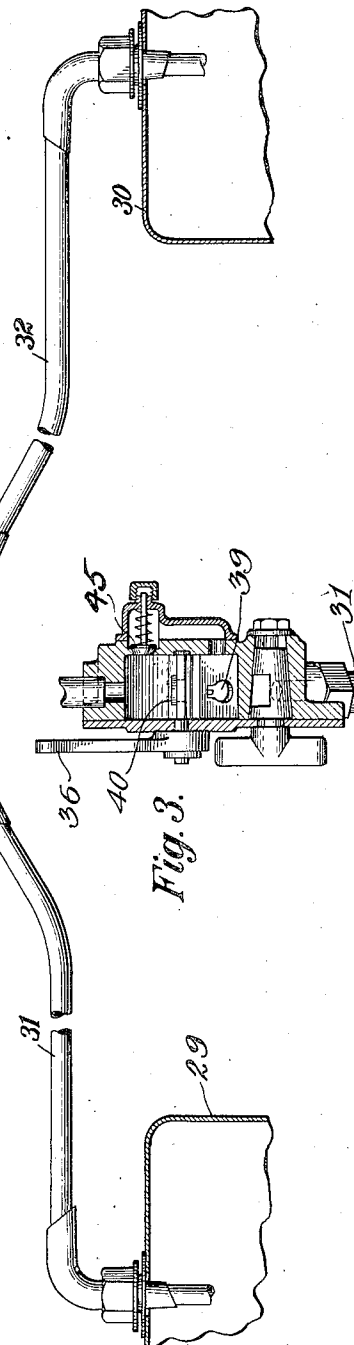


Fig. 3.

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Fig. 5.

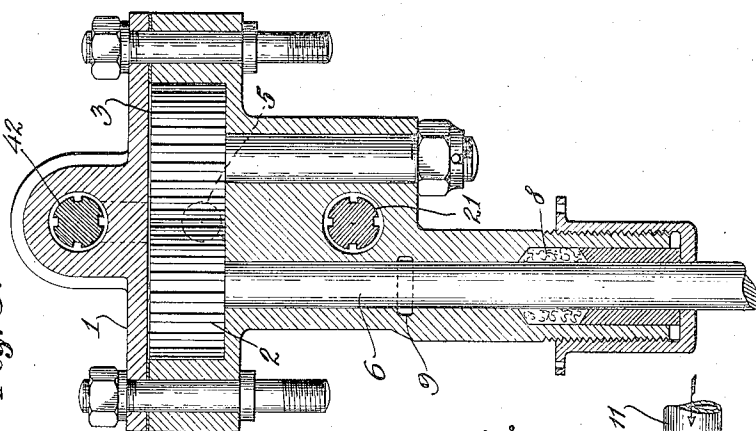


Fig. 6.

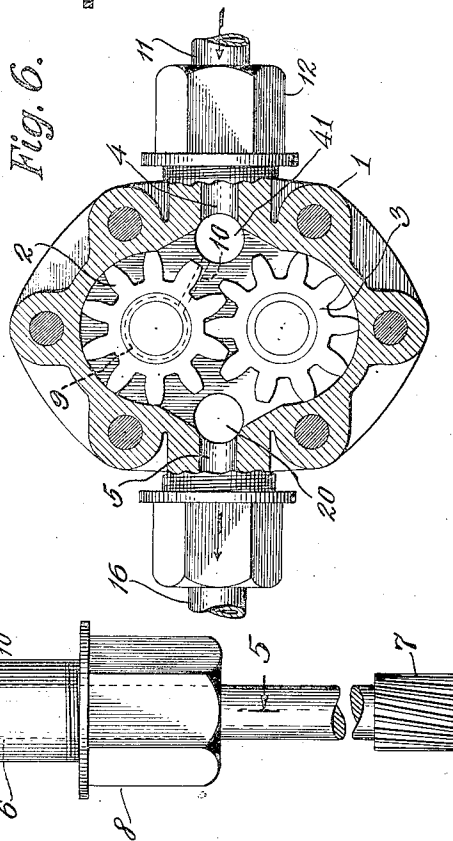
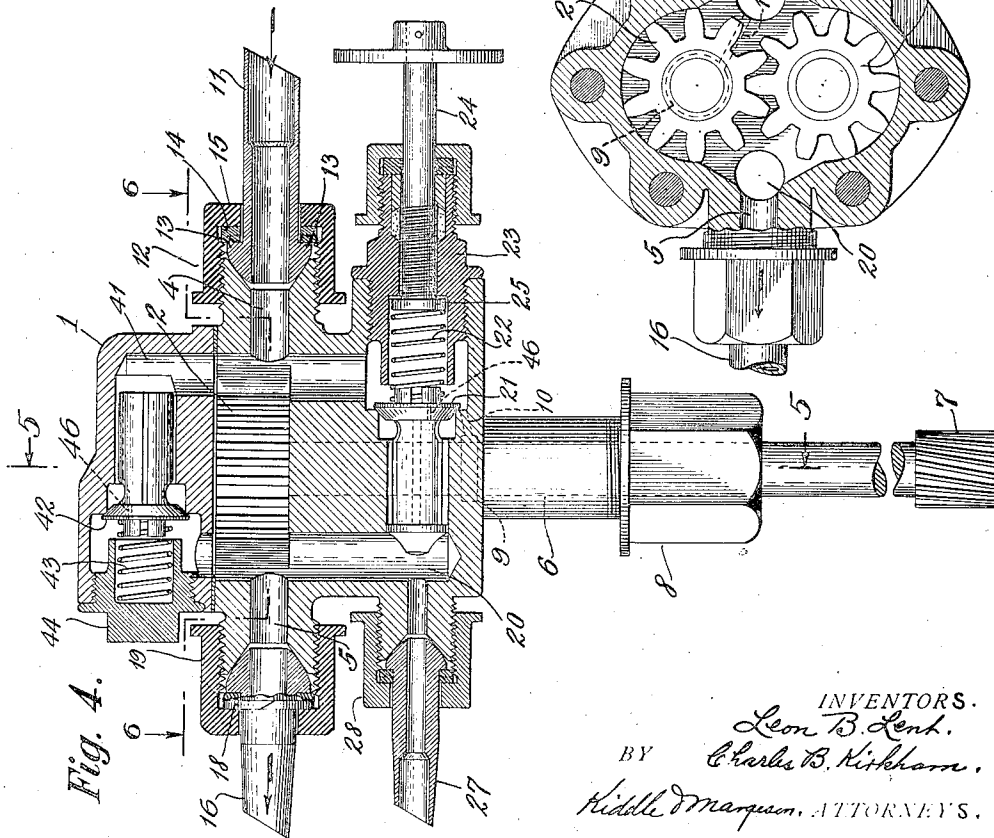


Fig. 4.



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UNITED STATES PATENT OFFICE.

LEON B. LENT, OF NEW YORK, AND CHARLES B. KIRKHAM, OF GARDEN CITY, NEW YORK.

FLUID-TRANSFER DEVICE.

Application filed September 29, 1921. Serial No. 504,128.

To all whom it may concern:

Be it known that we, LEON B. LENT and CHARLES B. KIRKHAM, citizens of the United States, and residents of the borough of Manhattan, city, county, and State of New York, and Garden City, New York, respectively, have made certain new and useful Improvements in Fluid-Transfer Devices, of which the following is a specification.

Our invention relates to an improvement in fluid transfer devices, one object of the invention being the provision of a device which is capable of effecting a transfer of fluid from one point to another at constant delivery pressure regardless of the amount of fluid discharged by the pump which forms a part of our device.

A further object of our invention is the provision of a device of the character indicated wherein the excess fluid discharged by the pump is returned to the intake side thereof by way of a passage in the pump casing.

A still further object of our invention is the provision of a transfer device wherein the delivery pressure may be varied if desired.

In order that we may realize our invention we provide a power-operated gear pump and an auxiliary hand pump of the oscillating type for example, each of these pumps being operable to effect a transfer of the fluid at a constant delivery pressure and independently of each other. Both pumps pass the fluid through the pump casing.

While our apparatus is capable of being substituted for different types of fluid transfer devices now in general use, it is particularly adapted for use in aeroplane work in that it overcomes the troublesome features common to most of the complex systems now in use and also meets the exacting requirements of this class of work.

We might mention at this point that our device is capable of transferring fuel from the fuel tank to the carburetor of the aeroplane engine with certainty which is an essential requirement of any fuel system and particularly fuel system for aeroplanes. By our improved device we are able to positively supply fuel to the carburetor of the engine before the engine is started and afterward an ample supply of fuel is as-

sured under constant pressure and under all possible conditions of engine loading.

Another important feature of our invention is that we have eliminated the many pipe connections and fittings which are now used and have reduced the whole pipe system to an absolute minimum which, of course, reduces the likelihood of trouble due to leaks.

Briefly, our invention comprises a pump casing within which is mounted a gear pump, this casing being provided with a valve-controlled passageway for the return to the intake side of the pump of excess fluid discharged by the pump. The passageway being controlled automatically, the pressure at which the fluid is transferred by the gear pump will at all times be constant.

In series with the main transfer device or pump is a manually operated auxiliary pump provided with a relief valve whereby the pressure at which the hand-operated auxiliary pump may deliver fluid is automatically regulated. The two pumps are operable independently of each other and the auxiliary pump is only used for priming purposes, or in an emergency.

We have illustrated an embodiment of our invention in the accompanying drawings, it being understood, however, that the apparatus shown is illustrative rather than definitive.

Fig. 1 is a more or less diagrammatic view showing a system embodying our invention whereby fuel or other liquid may be transferred from a supply tank or other source to the carburetor of a gas engine for example;

Fig. 2 is a section taken through the hand-operated auxiliary pump shown in elevation in Fig. 1;

Fig. 3 is a section taken substantially on the line 3—3 of Fig. 2 looking in the direction of the arrows;

Fig. 4 is a sectional elevational view of the power-operated transfer device;

Fig. 5 is a section on the line 5—5 of Fig. 4; and

Fig. 6 is a section taken on the line 6—6 of Fig. 4.

Referring to the drawings in detail,—1 designates a pump casing within which is mounted a gear pump comprising the pump gears 2 and 3 respectively. Gear

pumps are well known but we might add that in our apparatus as illustrated fluid is taken into the pump at 4 and discharged at 5 and hereafter we will refer to 4 as the intake side of the pump and 5 as the discharge side thereof.

The pump gear 2 is mounted upon a power-driven shaft 6 which when the device is employed as a device for supplying fuel to an internal combustion engine may be and preferably is driven by the engine to which it is supplying fuel. The drive from the engine may be through a gear 7 mounted upon the drive shaft 6.

As will be seen from Fig. 5 the shaft 6 passes into the pump casing through the usual stuffing box. In addition to this stuffing box we provide additional means for preventing leakage of the fuel being transferred past the drive shaft, this means comprising a pocket 9 in the casting or pump casing 1 through which passes the drive shaft and a passageway 10 leading therefrom to the intake side of the pump. By this arrangement any fluid attempting to pass the drive shaft will be trapped in the pocket 9 and be sucked from thence into the pump.

The fluid being transferred is taken into the pump casing through the pipe 11, this pipe being attached to the pump casing by a lock washer union designated 12. From Fig. 4 it will be seen that this union comprises a lock washer 14 and a nut 15, the end of the pipe 11 being provided with an annular shoulder 13 and the lock washer 14 being interposed between this shoulder and the nut. When the nut 15 is set up it will be seen that a good tight locked union is obtained between the pipe 11 and the pump casing 1. It may be here mentioned that this locked connection or union is very important when the present device is employed in aeroplane work inasmuch as it effectually prevents leakage at this connection due to vibration of the machine. As the fluid is drawn through the pipe 11 it passes through the gear pump in the usual way and is discharged from the casing through a discharge pipe 16. This pipe also is connected to the pump casing by a lock union comprising the lock washer 18 and nut 19.

As heretofore noted, it is the purpose of this invention to effect delivery of the fluid being transferred at a constant pressure and to this end, therefore, a valve-controlled return passageway 20 has been provided in the pump casing 1, this passageway connecting the discharge side of the pump to the intake side thereof. A spring loaded check-valve 21 is provided in this passageway, the valve being held seated by a spring 22. While this ensures delivery at constant pressure and permits of the return of excess fluid to the intake side of the pump, yet it

may be desirable to vary this delivery pressure and to this end we provide a screw-threaded plug 23 screwed into the casting constituting the casing 1 and a stem 24 screw-threaded into the plug 23, the inner end of this stem being provided with a head 25 adapted to engage the spring 22. By turning the stem 24 one way or the other the tension on the spring 22 may be varied to vary the pressure at which the fluid will be delivered.

In addition to the parts so far described a pressure gauge 26 has been provided connected to the pump casing by a pipe 27 locked to the casing as indicated at 28 by a locked union. 29 and 30 designate two tanks from which the fuel or other liquid to be transferred is taken, these tanks being connected by pipes 31 and 32 to an auxiliary or hand-operated pump 33 connected in series with the gear pump through the pipe 11. This auxiliary pump is provided for priming purposes primarily and in case of emergency.

The hand pump is a simple device operated by a handle 36 which may be oscillated or rocked to alternately effect a transfer of fluid through check-valves 37, 38 and 39, 40, the fluid then passing through the pipe 11 and into the pump casing 1. From thence the fluid passes around the gear pump by way of a passage 41 controlled by a check-valve 42 loaded by a spring 43 held in the casing by a screw-threaded plug 44. The passage 41, it will be seen from Fig. 4, places the intake pipe 11 and discharge pipe 16 into communication with each other, all fluid passing through this passage having to flow past the spring loaded check-valve 42. From thence the fluid passes to the carbureter 34 of the engine 35.

In order that too much pressure may not be imposed upon the pressure gauge 26 due to operation of the auxiliary pump a spring-loaded pressure relief valve 45 has been provided on the back of the pump for shunting the fuel from the discharge to the intake side of the pump.

The valves 21 and 42 have been provided with bleeder passages 46 which are merely a series of small holes in the valves. These bleeders are provided for the purpose of freeing the system of air when fuel such as gasoline is being transferred. Of course these bleeder passages do not in any way prevent delivery of fluid by the device at constant pressure.

It will be seen from the foregoing that initially if necessary the hand-operated pump may be operated to effect a sufficient transfer of fuel from the tanks 29 and 39 to start the engine and that thereafter the fuel will be transferred by the gear pump. It will be seen also that the gear pump and the auxiliary pump are connected in

series, each pump being capable of effecting a transfer of fluid from the tanks 29 and 39 through the pump casing 1 and of delivering fluid at substantially constant pressure. Of course by placing these two pumps in series the number of pipe connections is reduced which is a valuable feature in aeroplane work.

It will be seen also that in starting, the auxiliary pump is used to force fuel to the carbureter and incidentally prime the power pump. After the engine starts, however, the power-driven gear pump furnishes the fuel continuously, the pressure being automatically governed or controlled. The auxiliary pump at that time becomes a part of the suction line. However, should the power pump fail for any reason the auxiliary pump may be used continuously to furnish fuel to the carbureter.

It will be seen also that our improved apparatus fulfills all the requirements of a fluid transfer device and of a transfer device for use in connection with aeroplanes. The number of pipe connections and the amount of piping required are reduced to a minimum. In normal operation there is no pressure on any part of the system except the line running from the discharge of the power pump to the carbureter and to the pressure gauge and these lines we have properly protected from leakage.

It will be seen also that the operation of our apparatus should be equally good and reliable, no matter what the relative elevations and locations may be of the fuel tanks, parts of the system and engine. This enables us to locate the tanks and other parts of the apparatus where found most convenient.

While we have described and illustrated a specific embodiment of our invention it is to be understood that various changes may be

made in the details thereof within the purview of our invention.

What is claimed as new is:

1. In a device for transferring fluid, the combination of a casing, a pump within the casing for effecting a transfer of fluid through the casing, said casing being provided with a passageway through which fluid may be transferred through the casing independently of the action of said pump.

2. In a device for transferring fluid, the combination of a casing, a pump within the casing for effecting a transfer of fluid through the casing, said casing being provided with a passageway through which fluid may be transferred through the casing independently of the action of said pump, and a valve in said passageway permitting flow of fluid therethrough in one direction only.

3. In a device for transferring fluid, the combination of a casing, a power driven gear pump within the casing for effecting a transfer of fluid through the casing at constant delivery pressure, said casing being provided with a passage for returning excess fluid discharged from the pump to the inlet side thereof, a spring loaded valve controlling said passage, means for regulating said valve to vary the pressure at which fluid is delivered by said gear pump, an auxiliary pump for transferring fluid independently of said gear pump through a second passage in said casing, a valve controlling said second passage, said gear pump and auxiliary pump being independently operable and connected in series whereby fluid transferred by the auxiliary pump passes through the gear pump.

This specification signed this 13th day of September, 1921.

LEON B. LENT.
CHARLES B. KIRKHAM.