Nov. 2, 1943. H. B. LOUGHIN 2,333,188

INDICATING DEVICE

Filed Jan. 2, 1941 2 Sheets-Sheet 1

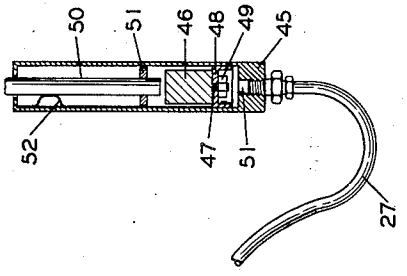


FIG. 5

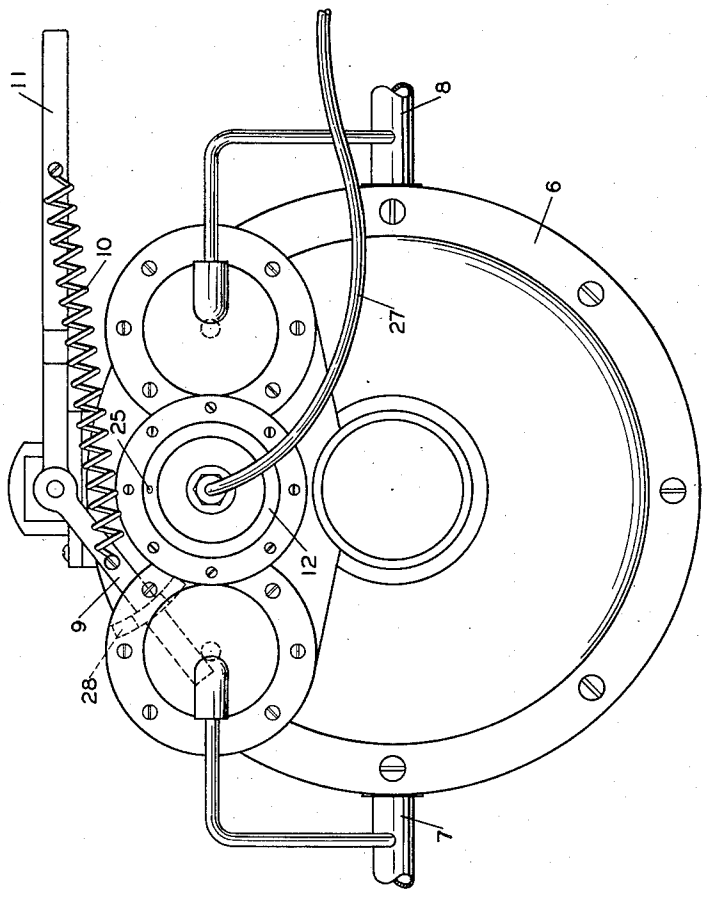


FIG. 1

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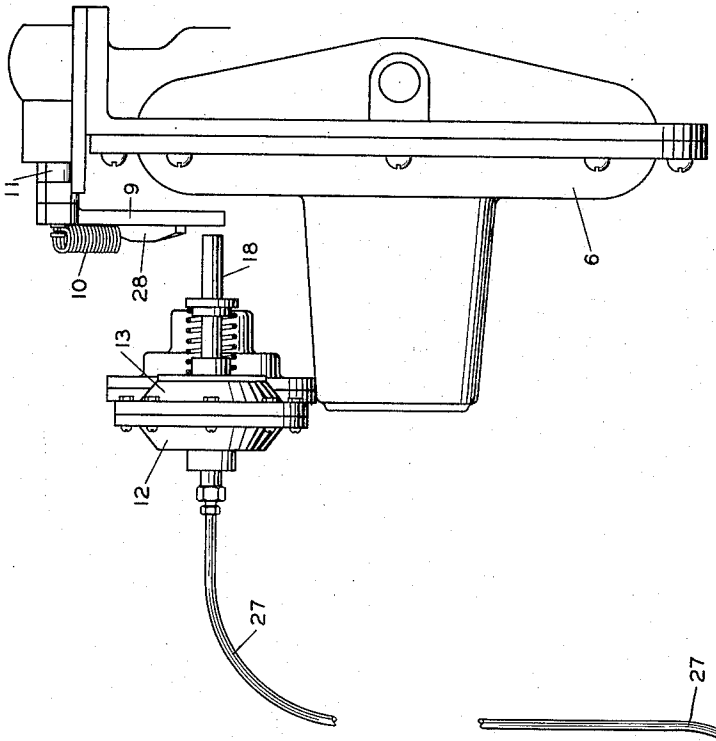


FIG. 2

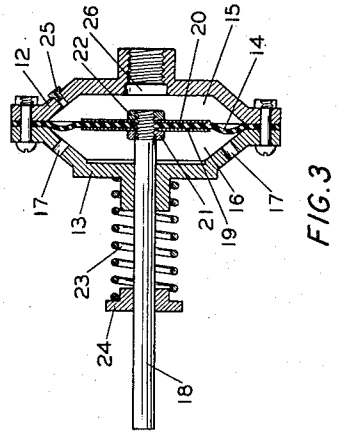


FIG. 3

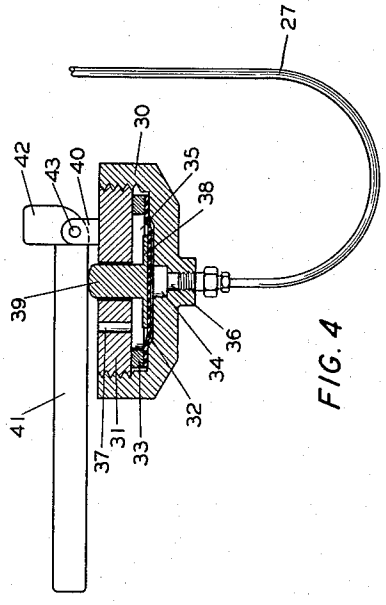


FIG. 4

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2,333,188

UNITED STATES PATENT OFFICE

2,333,188

INDICATING DEVICE

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Application January 2, 1941, Serial No. 372,922

6 Claims. (Cl. 116—114)

This invention relates to equipment for dispensing volatile liquids and liquefied gases for fuel and in particular relates to an indicating device to warn against depletion of the fuel.

Liquefied petroleum gases, including propane, butane, and mixtures of the two, are being marketed extensively for use as fuels in rural and suburban communities in which natural or manufactured gas is not available. In making use of this type fuel for operating gas consuming appliances, such as domestic gas ranges, general practice is to provide the customer with two portable containers and some means of connecting them to a service line through a suitable arrangement of valves and pressure regulators. The usual procedure is to use one of the containers as the active source of gas supply, keeping the other as a reserve source until the first container is exhausted. It is then necessary to cut off the exhausted source and establish connection with the reserve source. Various automatic and semi-automatic devices have been developed by which a change of withdrawal connections is made. Upon the depletion of the active source of gas supply, these devices establish connection between the service line and the reserve source of supply without interruption of the gas supply to the consuming appliances. The reserve source then becomes the active source of supply and remains in service until depleted. During the time this container is in service, it is necessary to replace the depleted container with a filled container. The filled container is then held in reserve until the other container is depleted whereupon it is put into service by a change of withdrawal connections. In systems which make use of such change-over devices, the only attention required by the customer is to replace the depleted container during the period in which the reserve container is being drawn upon.

It is desirable that the supply of gas to the appliances be continuous for the most satisfactory service conditions. While the changeover devices make the change in withdrawal connections without interruption of the gas supply, many do not give any conveniently accessible indication of such change so that there is a possibility of depleting both containers before the customer is aware that the system needs attention. The inconvenience to the customer and the inherent hazards attendant upon the failure of the gas supply make it desirable to provide the systems with an indicator at a convenient location to notify the customer that the changeover has taken place. The customer may then insure continuous gas service by replacing the depleted container.

An object of this invention is to provide a method and apparatus for indicating at a remote point to the consumer of liquefied petroleum gas or similar fuel that the dispensing system requires attention.

Another object of this invention is to provide a method and apparatus for use in connection with a gas dispensing system employing a plurality of containers which serves to give an indication at a remote point that one of the containers has become exhausted.

Other objects and advantages will be apparent from the following detailed description and the accompanying drawings in which like reference numerals designate like parts.

Figure 1 is a front elevation showing one embodiment of the present invention in connection with a changeover mechanism.

Figure 2 is a side elevation of the apparatus of Figure 1.

Figure 3 is a cross sectional view of the actuator operable to actuate the indicator.

Figure 4 is a cross sectional view of one modification of the indicator.

Figure 5 is a cross sectional view of another modification of the indicator.

The present invention provides an indicator for use with a dispensing system whereby the change of withdrawal connections actuates a part of a transmission system which in turn operates a signal to inform the customer that the changeover has taken place. Air is used as the transmission medium and pressure surges are transmitted by this fluid from the actuated part of the transmission system to the signal. For the purpose of illustrating and describing the present invention it is shown in combination with the changeover device disclosed in the Patent 2,047,338 to Rosswell W. Thomas. Certain parts of the changeover as illustrated in the patent are omitted in the present drawings since they are not essential to the operation of applicant's invention and their omission clarifies the instant disclosure.

With reference to Figure 1 of the drawings, the numeral 6 designates the housing of the pressure regulator in the aforesaid patent to Thomas. The conduits 7 and 8 afford communication between the pressure regulator 6 and the sources of gas supply, not shown in the drawings, as described in the said patent. In the aforesaid Thomas patent a power operated lever movable through an arc of 90° shifts the valves

and makes the change in withdrawal connections. Power is supplied to the lever by a contraction coil spring attached at one end to the lever and at the other end to an arm which is movable through an arc of substantially 180°. In the accompanying drawings, the lever 9, the spring 10 and the arm 11 are shown. When the lever 9 is in the position shown in Figure 1, withdrawal is made through the conduit 7 from a source of supply. Upon depletion of the fuel in the supply source connected to conduit 7, the lever 9 swings through an arc of substantially 90° cutting off conduit 7 and establishing withdrawal connections with conduit 8. The movement of the lever is utilized to actuate the indicator and give a visible signal to the customer showing that one of the supply sources is depleted and that the system needs attention.

The indicator signal is preferably placed near the fuel consuming appliances where it may be readily observed by the customer. Since the appliances may be at a considerable distance from the source of fuel supply, it is necessary to provide a transmission system to transmit a signal from the changeover mechanism to the indicator signal. This transmission system comprises an actuator mounted on the changeover, a conductor, and an indicator. The actuator housing comprising two sections 12 and 13 is mounted on the pressure regulator 6. A flexible diaphragm 14 divides the housing into two compartments, namely a fluid compartment 15 and an atmospheric compartment 16. The atmospheric compartment is vented to the atmosphere through the vents 17 in the housing. A power shaft 18 extends through the housing member 13 and atmospheric compartment 16. The shaft is threaded on the inner end which extends through the diaphragm and is attached thereto by backing plates 19 and 20 secured by the clamping nuts 21 and 22. A coil spring 23 surrounding the shaft 18 externally of the actuator housing abuts against the housing member 13 at one end and against a spring retainer 24, attached to shaft 18, at the other. The fluid compartment 15 is in communication with the atmosphere through a small orifice spud 25. The outlet 26 from the fluid compartment is connected to a conductor 27 through which fluid from the actuator may pass to the indicator. Attached to the lever 9 of the changeover device is a cam 28 so positioned that the cam surface contacts the end of the power shaft 18 when the lever 9 moves from one operating position to the other.

When the changeover of withdrawal connections takes place, the lever 9 moves through an arc of approximately 90°. This causes the surface of the cam 28 to move the power shaft 18 in a longitudinal direction compressing the spring 23 and moving the diaphragm 14 thereby displacing fluid in the fluid compartment 15 of the actuator. The fluid used in the embodiments of the invention described herein is atmospheric air but the invention is not to be limited to the use of this fluid. The area of the opening in the orifice spud 25 is so small relative to the volume of air displaced by movement of the power rod and diaphragm that only a small amount of air escapes through the orifice to the atmosphere. Displacement of the air in the fluid chamber 15 causes a momentary increase in pressure in the fluid chamber and expulsion of the air through the outlet 26. The air expelled from the fluid chamber through the outlet 26 and the pressure surge accompanying its expulsion are transmitted to the indicator through the conduit 27.

Two embodiments of the indicator are shown in the accompanying drawings. Referring first to the indicator modification of Figure 4, the numeral 30 designates the body of the indicator which is internally threaded to receive the cover 31. A flexible diaphragm 32, held in place by the clamping ring 33, separates the cover from the housing thereby forming chambers 34 and 35. The chamber 34 on the under side of the diaphragm 32 is provided with an inlet 36 to which is attached the conductor or conduit 27. The chamber 35 above the diaphragm is vented to the atmosphere through the port 37 in the cover 31. A diaphragm backing plate 38 having a projection 39 formed thereon rests on the upper side of the diaphragm in the chamber 35. The projection 39 extends upwardly through the cover 31. Attached to the top of the cover 31 is a yoke 40. An indicator rod or signal comprising a semaphore 41 and attached counterweight 42, is hinged to the yoke 40 by the pin 43 which extends through the yoke and counterweight.

The semaphore of the signal is normally in the position shown in Figure 4, or horizontal, during the time fuel is being withdrawn from a container. When the active container is emptied and the changeover takes place, the semaphore is raised to an upright position by the action of the actuator and indicator. The fluid expelled from the fluid compartment of the actuator and the accompanying pressure surge are transmitted to the chamber 34 of the indicator through the conduit 27. Fluid entering the chamber 34 through the inlet 36 from the conduit 27 acts on the under side of the diaphragm 32 pushing it upward. The action of the diaphragm against the backing plate 38 pushes the projection 39 through the cover 34 which in turn raises the semaphore 41 from its horizontal position. Inclination of the semaphore from the horizontal shifts the position of the counterweight relative to the hinge pin 43 and the counterweight then acts to swing the semaphore to an upright position. This indicates to the customer that the changeover has taken place and that the system needs attention. When the empty fuel container has been replaced the semaphore is manually reset to the horizontal position.

Another embodiment of the indicator in which the fluid and pressure surge from the actuator is directed against a piston which operates a signal, is shown in Figure 5. This embodiment comprises a cylinder 45 having reciprocally mounted therein the piston 46 integral with which is an externally threaded pin 47. A leather cup 48 is carried by the pin 47 and held in place by the internally threaded tap 49. The leather cup 48 serves to prevent leakage past the piston 46. The signal 50 rests on the piston 46 in the position shown in Figure 5 as long as the system needs no attention. The signal extends through an opening in the top of the cylinder 45 and has an attached guide 51 near its lower end to hold the signal in a vertical position.

When the changeover takes place, the pressure surge and fluid from the actuator are transmitted to the indicator through the conduit 27 and enter the cylinder 45 through the inlet 51. Fluid entering the cylinder acts against the leather cup 48 and piston 46 forcing them upwardly. The signal 50 is pushed upwardly by the piston and extended into view above the cylinder. The signal is held in the extended position by the action of the spring 52 attached to the cylinder 45 and bear-

ing against the signal 50. The friction between the spring and the signal is sufficient to retain the signal until it is manually reset.

Any air lost by leakage past the cup and piston of the indicator shown in Figure 5 is made up by atmospheric air which may enter the actuator through the orifice spud 25. The orifice spud 25 also serves to allow any air in excess of that needed to operate the signal to escape from the actuator housing. This insures freedom of interference with the changeover mechanism. Thus, if the condition should arise where the spring 10 is not strong enough to pull the cam 28 past the power shaft 18, compressed air will escape through the orifice, allowing the power shaft and actuator diaphragm to move to a position which will allow the cam 28 to pass. Since the fluid chamber of the actuator is open to the atmosphere through the orifie spud, the indicator mechanism is not effected by temperature changes.

The present invention provides a safe, dependable and efficient transmission system and indicator for use with liquefied gas dispensing equipment. While the apparatus shown and described herein is taken in connection with one particular type change-over, it will be obvious to one skilled in the art that it may be used with other changeover devices in which the changeover of withdrawal connections is accompanied by mechanical motion.

I claim:

1. In dispensing equipment in which a changeover device for changing withdrawal connections is employed, an indicating device comprising an actuator momentarily operable by the changeover device, an indicator to permanently register the occurrence of a changeover, and means for transmitting motion from the actuator to the indicator.

2. In a dispensing system having a changeover device for changing withdrawal connections, an indicating device comprising an actuator momentarily operable by the changeover device for producing fluid pressure surges, an indicator responsive to the fluid pressure surges to permanently register the occurrence of a changeover and a conduit for conducting the pressure surges from said actuator to said device.

3. In dispensing equipment having a changeover device for changing withdrawal connections, an indicating device comprising an indicator to permanently register the occurrence of a changeover and means momentarily mechanically operable by the changeover device to actuate said indicator.

4. In a dispensing system employing a changeover device for selective withdrawal from a plurality of sources including a changeover lever, indicator means comprising a cam on the changeover lever, a pneumatic impulse generator momentarily operated by the cam, and signal means responsive to the impulse so generated.

5. In a device for signaling the actuation of a changeover mechanism including a changeover lever, a cam on said lever, a pneumatic impulse generator and an indicator, said indicator including a semaphore to permanently register the occurrence of a changeover and means sensitive to an impulse from said generator by movement of said cam to operate the semaphore.

6. In a device for signaling the actuation of a changeover mechanism including a changeover lever, a pneumatic impulse generator and an indicator actuated by impulses from the generator to permanently register the occurrence of a changeover, said generator including a case, a chamber formed therein, means operably connected to the changeover lever and adapted to momentarily displace a fluid within the chamber, and a discharge conduit communicating from the chamber to said indicator.

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