June 13, 1944. A. D. KRUGLER 2,351,135

PRESSURE REGULATOR

Filed July 10, 1941

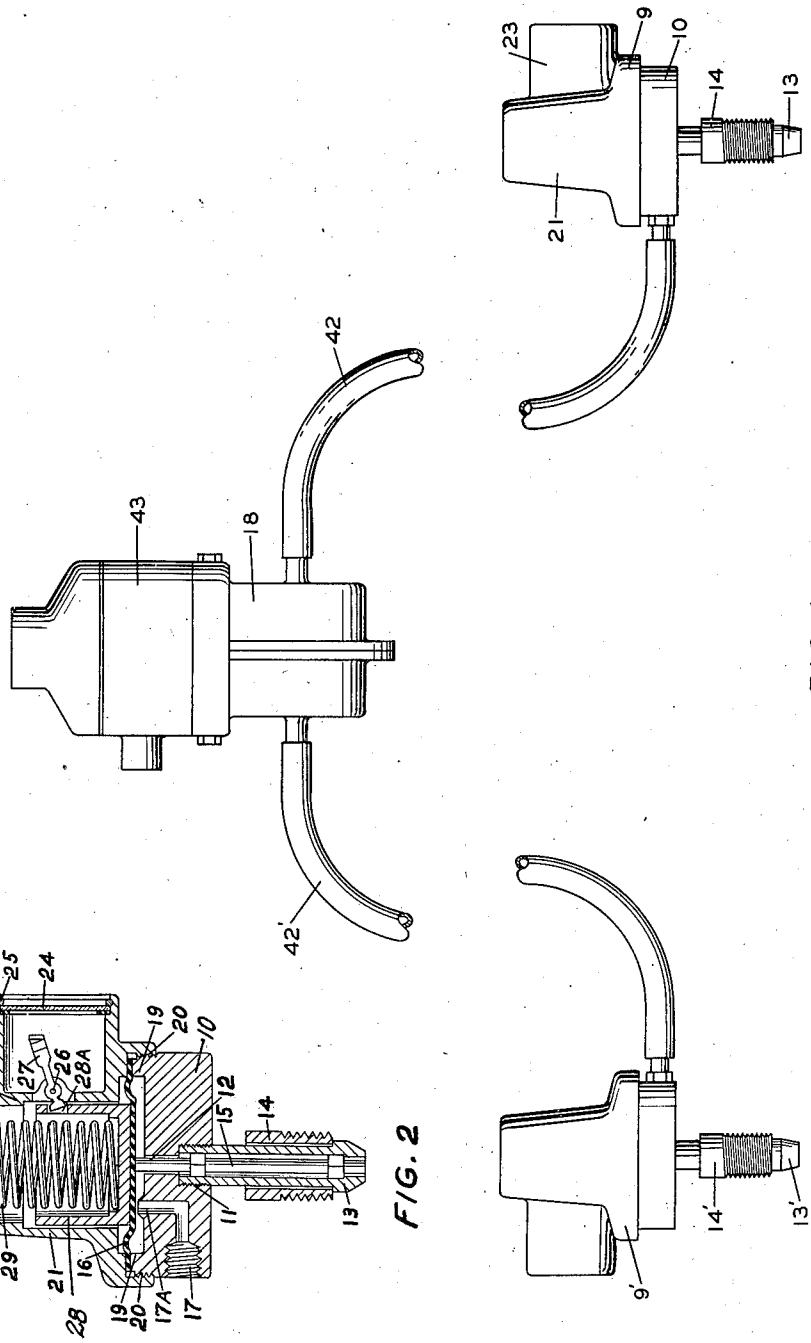

FIG. 1

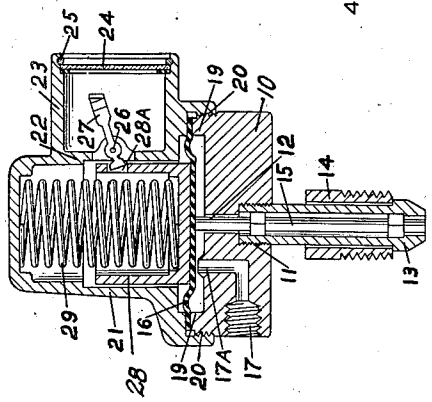

FIG. 2

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Patented June 13, 1944 2,351,135

UNITED STATES PATENT OFFICE

2,351,135

PRESSURE REGULATOR

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Application July 10, 1941, Serial No. 401,849

3 Claims. (Cl. 50—23)

This invention relates to means for controlling and distributing fuel gas to consuming appliances from tanks or portable containers of liquefied hydrocarbon gas or the like. More particularly it relates to an improved self-indicating pressure regulator for an automatic fuel gas system.

An object of this invention is to provide an automatic system, suitable for use with portable containers of a self-service unit, which will not require any attention from the customer other than to replace the exhausted containers.

Another object of the invention is to provide means for automatically changing from one source of supply to another when the one in use is exhausted.

Another object is to provide a combined means for regulating the pressure of the fuel in the system and indicating which container has become exhausted as well as indicating which one is still supplying the system.

Still other objects and advantages of this invention will be apparent to those skilled in the art from the following detailed description in conjunction with the accompanying drawing, forming a part of this specification, and in which:

Figure 1 is a general schematic view showing the sequence of units; and

Figure 2 is a vertical section through one of the self indicating high pressure regulators.

Referring now more particularly to Figure 1, it will be seen that the high pressure regulators, illustrated generally by the numerals 9—9', are adapted to be connected to containers, not shown, of fuel gas. By means of the regulators 9—9', the pressure of the fuel gas is reduced to some suitable pressure, such as ten to fifteen pounds per square inch, at which pressure it is delivered by flexible conduits 42—42' to an automatic change-over device 18, and thence through a second-stage regulator 43 to a service line at some lower pressure, as ten or twelve inches water column. The changeover valve 18, of any known design, automatically changes the withdrawal to the alternate source when the initial source becomes exhausted.

Since applicant's first stage regulators 9—9' are similar in design, and operation only one will be described in detail for the sake of brevity. The first stage regulator 9 comprises a body member 10, Figure 2, having a central bore 11 extending part way through and terminating in a smaller bore 12 which extends through the remainder of the body member. Bore 11 is internally threaded to engage the upper end of a hollow nipple 13. Sleeve 14 surrounding the nipple is externally threaded and adapted to engage in a tap plug or closure member of a fuel container, making a pressure tight engagement therewith between the regulator and the container. Slidably mounted within the nipple is a pushpin 15 adapted to unseat a valve in the container, allowing the gas to flow through the interior of the nipple. A stem on the upper end of push-pin 15 extends through bore 12 and contacts the under side of diaphragm 16. This connection between the container and regulator is not further shown or described being well known in the art and one type being generally described in the U. S. Patent No. 2,172,311, issued to R. W. Thomas, September 5, 1939.

Passage 17 has its outer end internally threaded to receive a connecting pipe or hose 42 from one side of the control valve, indicated generally by the numeral 18, Figure 1, and extends through body member 10 terminating in its upper interior face with a raised outlet portion 17A.

An annular shoulder 19 projects from the upper end of the body member and is externally threaded as at 20, to engage threads on the lower end of the hollow housing member 21. This housing is constructed with an interior wall 22 integral therewith and with a circular projecting member 23 extending therefrom. A glass window 24 closes the end of this member, being fitted into an annular groove, and held in place by a sealing ring 25 or any other suitable means. In this way an inspection port is provided for a purpose hereinafter described.

Extending through interior wall 22 and pivotally mounted thereon at 26 is an indicating arm 27 adapted to be raised and lowered through contact with the walls of rectangular slot 28A of spring cup 28. This cup is of smaller diameter than the interior of housing member 21 and slidably mounted within so as to engage the shorter end of arm 27. A coil spring 29 is fitted within this cup and extends to the top of housing 21 as shown in Figure 2. The lower end of cup 28 rests upon the upper side of diaphragm 16. This diaphragm is of rubber, or any other suitable material, and is interposed between body member 10 and housing 21, being clamped in place on the annular shoulder 19 when the threads on the lower end of the housing engage the threads on the upper end of the body member, as at 20.

In operation it will be seen that this first stage, or high pressure regulator functions as an ordinary pressure regulator and has the addi-

tional novel feature of an integral indicator registering fluctuations of pressure. Thus fuel gas admitted from the container or other source of supply flows through the interior of nipple 13, up through bore 12 into the interior space beneath diaphragm 16. Movement of diaphragm 16 is thus controlled by the pressure of the gas on its lower side and by the force exerted by spring 29 in cup 28 on its upper side, which force acts through pushpin 15 to operate the container closure or valve. Thus the pressure delivered by the regulators 9—9' is controlled and maintained substantially constant in a manner well known in the art. When pressure under the diaphragm fails, the diaphragm drops down and seals on raised outlet portion 17A, so that the regulator 9 may be disconnected from the empty tank without any back-flow leakage from the other (still connected). This movement of the diaphragm is transmitted to cup 28 and in turn to arm 27. Thus it will be seen that as long as gas under pressure is flowing through the regulator, arm 27 will so indicate. When the source connected to regulator 9 is exhausted, spring 29 will force the diaphragm down to its lowest position, and arm 27 will be raised to so indicate. The position of arm 27 is always visible to the consumer through window 24, then with suitable marking on window 24, it will be apparent from the position of the arm whether or not the supply connected to regulator 9 is exhausted. In this way the supplies connected to regulators 9—9' may be checked.

While applicant has described a specific embodiment, it is to be understood that the form of this invention, herewith shown and described, is a preferred example only and that various modifications may be made therein without materially departing from the spirit of the invention as defined by the appended claims.

Having thus described my invention, I claim:

1. For use in a liquefied petroleum gas dispensing system which includes a tank of gas under pressure having a thrust-operated outlet valve serving as a closure therefor, an improved regulator-indicator comprising in combination a body, a diaphragm separating said body into two compartments, the diaphragm having a central portion mounted for movement axially of the diaphragm, an inlet and an outlet formed in the walls of one of said compartments whereby the gas under pressure urges the diaphragm in one direction, said inlet establishing pressure-tight communication with the interior of said tank, a thrust member slidably mounted in said inlet operable by said central portion of said diaphragm to control said tank outlet valve, a hollow cup-shaped member slidably mounted in the other of said compartments and having a slot in the side wall thereof and operatively engaged with said diaphragm, the body of the cup-shaped member forming a wall of the slot a chosen distance from the portion engaged with the diaphragm, a regulator spring received within said cup whereby the spring urges the diaphragm against said gas under pressure, a semaphore arm pivotally mounted within the housing having one end extending into said slot and engaged by the wall thereof as the cup-shaped member is moved in one direction whereby pivoting movement of the semaphore arm occurs upon said movement of said cup-shaped member and an inspection port opposite the other end of said arm to indicate visually the position of the semaphore arm, and thereby the known related position of the diaphragm.

2. For use in a liquefied petroleum dispensing system which includes a tank of gas under pressure having a thrust operated outlet valve serving as a closure therefor, an improved regulator-indicator comprising in combination a body, a diaphragm separating said body into two compartments, the diaphragm having a central portion mounted for movement axially of the diaphragm, and inlet and an outlet formed in the walls of one of said compartments whereby the gas under pressure urges the diaphragm in one direction, said inlet establishing pressure-tight communication with the interior of said tank, a thrust member slidably mounted in said inlet operable by said central portion of said diaphragm to control said tank outlet valve, a hollow cup-shaped member slidably mounted in the other of said compartments and having a slot in the side wall thereof and operatively engaged with said diaphragm, the body of the cup-shaped member forming a wall of the slot a chosen distance from the portion engaged with the diaphragm, a regulator spring received within said cup whereby the spring urges the diaphragm against said gas under pressure, a semaphore arm pivotally mounted within the housing having one end extending into said slot and engaged by the wall thereof as the cup-shaped member is moved in one direction whereby pivoting movement of the semaphore arm occurs upon said movement of said cup-shaped member, said body having an integral lateral extension and an inspection port at the end of said extension to indicate visually the position of the semaphore arm, and thereby the known related position of the diaphragm.

3. For use in a liquefied petroleum gas dispensing system which includes a tank of gas under pressure having a thrust-operated outlet valve serving as a closure therefor, an improved regulator-indicator comprising in combination a body, a diaphragm separating said body into two compartments, the diaphragm having a central portion mounted for movement axially of the diaphragm, an inlet and an outlet formed in the walls of one of said compartments whereby the gas under pressure urges the diaphragm in one direction, said inlet establishing pressure-tight communication with the interior of said tank, a thrust member slidably mounted in said inlet operable by said central portion of said diaphragm to control said tank outlet valve, a hollow cup-shaped member slidably mounted in the other of said compartments and having a closed slot in the side wall thereof and operatively engaged with said diaphragm, the body of the cup-shaped member forming a wall of the slot a chosen distance from the portion engaged with the diaphragm, a regulator spring received within said cup whereby the spring urges the diaphragm against said gas under pressure, a semaphore arm pivotally mounted within the housing having one end extending into said slot and engaged by the wall thereof as the cup-shaped member is moved in one direction whereby pivoting movement of the semaphore arm occurs upon said movement of said cup-shaped member and an inspection port opposite the other end of said arm to indicate visually the position of the semaphore arm, and thereby the known related position of the diaphragm.

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