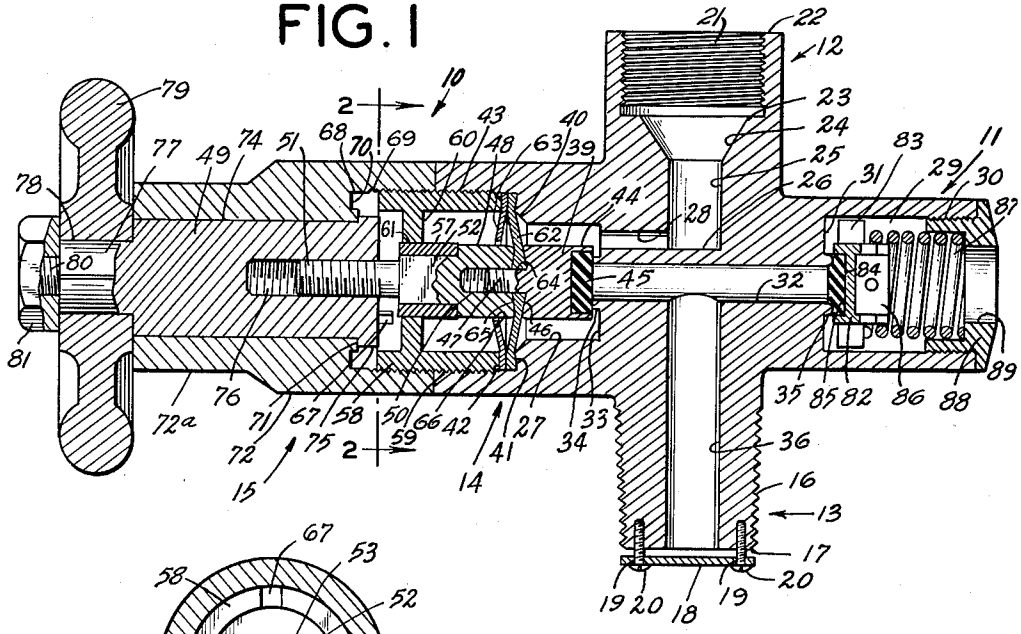
Aug. 7, 1956 G. W. COX 2,757,898

CYLINDER VALVE

Filed March 12, 1951

FIG. 1



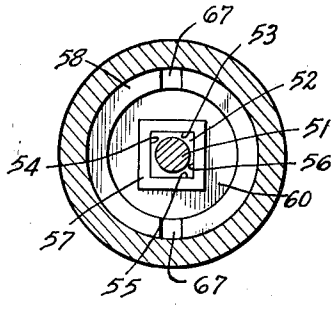


FIG. 2

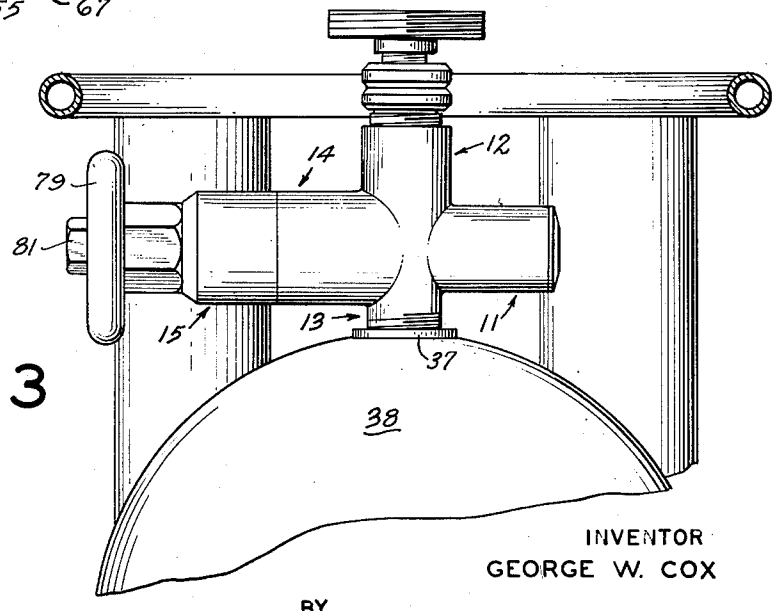


FIG. 3

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CYLINDER VALVE

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2 Claims. (Cl. 251—270)

The present invention relates to valves and more particularly to a valve adapted to be used in connection with liquified petroleum containers.

At the present time there are many workmen who must have some form of a melting furnace on a job away from their workshop. An example of this is the plumber who must have a furnace to melt lead to be used in his work. To carry out this melting operation the plumber takes along a container of liquified petroleum to supply the necessary fuel for the operation. He cannot tell just how much fuel is in the container and to be safe he must take along an additional container. The reason for this is that if he runs out of fuel in one container he must return it to the dealer who originally sold it to him and exchange it for a full container. No other dealer can fill that particular bottle. Conventional valves used in conjunction with liquified petroleum containers require a special type of pump and scales to fill the container. The necessity for this causes increased cost to the consumer.

It is an object of the present invention to overcome these objections by providing a valve which permits one container of liquified petroleum to be bled into an empty container.

Another object of the invention is to furnish an operating mechanism for the valve head which adequately seals the gas within its confining passageway through the valve.

A further object of the invention is to provide an operating mechanism including a non-rising stem and a non-rotating valve head, said stem being connected by a slidably mounted connecting rod to the valve head.

Still further, the present valve contemplates a particular arrangement of passageways in the body thereof, said passageways also being of a diameter sufficiently large to easily accommodate the incoming flow of liquified petroleum from a separate container or a fuel truck.

Also the invention contemplates the arrangement of passageways and tapped outlets so as to provide for convenient operation of the valve mechanism and to furnish a base for a melting furnace to be mounted atop the container.

In the drawing:

Figure 1 is a sectional view of the valve showing its internal mechanism.

Figure 2 is a view taken on line 2—2 of Figure 1.

Figure 3 is an elevation view showing the valve assembled on a liquified petroleum container and showing an adapter mounted thereon.

The valve which I propose to use in carrying out the above mentioned objects has a body shaped somewhat like a cross having horizontal arm portions indicated generally by reference numerals **10** and **11**, and vertical arm portions indicated generally as **12** and **13**. The horizontal arm portions are aligned with each other with arm **10** being somewhat the longer and larger of the two. Vertical arms **12** and **13** are also in alignment with each other and of substantially equal length.

Arm portion **10** is actually constructed in two separable sections, one section **14** being integral with the arms **11**, **12** and **13**, while the other section is a bonnet **15** which is utilized for a purpose to be described as the description proceeds.

Arm **13** is circular in cross section and is provided with conventional pipe threads **16** on the external surface. The threads begin at the free end **17** and taper upwardly and outwardly to the end of the arm adjacent the horizontal portions of the valve.

I provide an excess flow valve at the free end **17** so that in the event the main portion of the valve should be struck and broken off adjacent the top of the container, the valve will shut off the flow of fuel through passage **36**. This excess flow valve includes a disc **18** having a pair of apertures **19** therein, said apertures being adapted to slidably receive studs **20**. In the event the rate of flow of gas out of the container through passage **36** should become greater than a pre-determined amount, disc **18** will be drawn up to shut off the flow.

Arm **12**, the other vertical arm, is also circular in cross section and is fashioned with a concentric tapped bore **21** which extends approximately half the distance from the outer end **22** to the horizontal arms. A shoulder **23** is formed at the inner end of the threads of the tapped bore **21**. A tapered seat **24** is concentrically arranged inwardly of the shoulder and connects the bore with a concentric passage **25**. This passage terminates in an end wall **26**.

A bore **27** is concentrically arranged in section **14** and communicates with passage **25** by means of a horizontal passage **28**. It will be noted that the passage **28** is positioned adjacent the upper portion of bore **27** and the lower end wall **26** of passage **25**.

The horizontal arm **11** has a concentric bore **29** fashioned therein with the outer portion thereof tapped to provide internal thread **30**. Bore **29** is terminated at its inner end by the wall **31**. Bores **27** and **29** are in axial alignment and communicate with each other through passage **32**, the latter passage also being in axial alignment with bores **27** and **29**.

Bore **27** terminates at its inner end in the wall **33**. Annular rims **34** and **35** are formed in walls **33** and **31**, respectively, at each end of passage **32**. A passage **36** is concentrically arranged in arm **13**, and extends from end **17** to passage **32** for communication therewith.

Arm **13** is adapted to be received by the tapper bore **37** in the upper end of the liquified gas container **38**. The gas from the container is adapted to flow outwardly through passage **36**, through passage **32** to bore **27**, through passage **28** and **25** and out through any convenient adapter positioned in the tapped bore **21** to the furnace or other device which is to use the gas.

A valve head **39** and its operating mechanism are positioned in sections **14** and **15** of the horizontal arm **10**, said head being mounted to rest adjacent seat **34** to close one end of passage **32**. Therefore, this will prevent the flow of gas from the container to the furnace or other device using the gas.

The internal structure of section **14** of the valve body has previously been described as having a bore **27** internally thereof which terminates at the inner end in a wall **33**. The outer end of the bore **27** terminates at the inner edge of an annular chamfered surface **40**, the latter being undercut to form an annular groove or shoulder **41**. A concentric bore **42** is formed in the outer portion of section **14**, extending inwardly to annular groove **41**. The outer portion of bore **42** is tapped to form internal threads **43**.

Valve head **39** is fashioned with an annular peripheral flange **44** at one end thereof within which a disc insert **45** is furnished, the latter being adapted to abut the an-

nular seat 34. The other end of the valve head is undercut to form an annular groove 46. A threaded extension 47 is concentrically arranged to project longitudinally from the said other end of the head adjacent the aforementioned groove 46.

An elongated connecting rod 48 is positioned concentrically in sections 14 and 15 to interconnect the valve head 39 with the valve stem 49. One end of rod 48 is circular in cross section and has a tapped bore 50 fashioned concentrically therein adapted to receive threaded extension 47. The other end portion of the rod is constructed in the form of a threaded extension 51. Intermediate these end portions is formed a mid-section 52 which is rectangular in transverse cross-section providing surfaces 53, 54, 55 and 56, each of the surfaces being normal to adjacent surfaces. A box sleeve 57 has an inner surface complementary to the aforementioned surfaces on mid-section 52 and is removably mounted thereon. The outer surfaces of the box sleeve are parallel to the inner surfaces. A cylindrical sleeve 58 is formed with external threads 59 which are adapted to be threadingly received in the tapped portion 43 of bore 42. Adjacent one end of said sleeve is arranged a wall 60 which has a centrally arranged rectangular aperture 61 complementary with the outer surfaces of box sleeve 57. Thus the out of round shape of the mating surfaces of the box sleeve, wall 60 and rod 48 prevent rotation of rod 48. Rod 48 and sleeve 57 can move longitudinally in sleeve 58, however.

It is of course necessary to prevent the gas from leaking through the valve operating mechanism while gas is flowing from the container to the furnace. This is taken care of by the use of flexible diaphragm or sealing element 62 and a protective washer 63. The diaphragm is fashioned with an aperture 64 centrally thereof which is adapted to be received by the inner portion of extension 47. The inner and outer peripheries of the disk have tapering sides so that the inner and outer edges are thicker than the intermediate portion. The end of rod 48 which is furnished with tapped bore 50 tapers inwardly as illustrated by numeral 65 from the outer edge thereof so as to be complementary with the inner peripheral edge of the diaphragm. Therefore, when rod 48 and the valve head are moved generally toward each other the inner periphery of the diaphragm is fixedly secured between surfaces 46 and 65. One side of the outer periphery portion of the diaphragm is adapted to fit complementary with annular groove 41. Protective washer 63 is also furnished with a central aperture, said aperture being illustrated by the numeral 66 and is adapted to receive one end portion of rod 48. It will be noted that the inner portions of the diaphragm and washer are spaced apart and that they converge at their outer ends. In this manner there is less chance for leakage. One end of sleeve 58 is adapted to abut the outer periphery of washer 63 so as to force it and the adjacent edge of diaphragm 62 against annular groove 41. Sleeve 58 is furnished at its other end with a pair of aligned slots 67 arranged so as to permit removal of the sleeve with an appropriate tool.

Section 15 of arm 10 comprises a sleeve 72 furnished at one of its ends with a bore 68 which is tapped over a major part of its length to provide threads 69. At the inner end of the bore an annular groove 70 is formed leaving an annular shoulder 71. The other end of sleeve 72 is fashioned into an octagonal head 72*a* so as to permit an appropriate wrench to be used in securing the sleeve 72 to cylindrical sleeve 58. The former sleeve has a concentrically arranged aperture 74 which is adapted to journal valve stem 49. It will be noted that the stem is of the non-rising type, being provided with a peripheral flange 75 at one end thereof which is adapted to abut the annular shoulder 71. Connecting rod 48 is secured to the stem by threadingly receiving extension 51 of the rod in tapped bore 76, the latter being formed in the stem. A hexagonal head 77 is fashioned on the other end portion of stem 49 which is adapted to be received within an aperture 78 in hand operating wheel 79, said aperture being complementary with the hexagonal head 77 in order to prevent relative movement therebetween. A threaded extension 80 projects from the head and is adapted to be threadingly received by a nut 81 to fixedly mount the hand wheel on head 77.

The operation of the valve mechanism is quite simple. When it is desired to permit gas to flow from the container to a furnace the hand wheel is rotated in a counterclockwise direction. This, of course, rotates stem 49 and causes extension 51 to extend further into tapped bore 76. Rod 48 is prevented from rotation by the box sleeve 57; that is, the sleeve cannot rotate since it is complementary with aperture 61 in wall 60 on the fixedly mounted sleeve 58. Also, the inner surface of box sleeve 57 receives the mid-section 52 of the rod which is complementary therewith. Therefore, rod 48 can only move longitudinally. This movement causes valve head 39 to move longitudinally, thereby removing disc 45 from seat 34.

The general order of assembly of the valve mechanism, assuming that all of the removable parts are taken from section 14, is to first place the diaphragm on extension 47 and insert extension 47 in tapped bore 50. After tightening the two parts together the diaphragm will be fixedly secured thereto. Protective washer 63 is received by the free end of rod 48 and is placed adjacent the diaphragm. This much of the mechanism is then placed in body section 14 with the outer peripheral edge of diaphragm 62 fitting in annular groove 41. Next, cylindrical sleeve 58 is positioned in bore 42 until it abuts washer 63. Slots 67 are utilized to tightly secure said sleeve in said bore. It will be noted that without the box sleeve in position the mid-section 52 is permitted to rotate in aperture 61.

After the above operations are carried out box sleeve 57 is placed on mid-section 52, thereby preventing rotational movement of said rod. Stem 49 is then mounted on extension 51. The stem 49 is slidably and rotatably received in sleeve 72, threads 69 and 59 cooperating to fix sleeves 72 and 58 together. Lastly, handwheel 79 is secured to the stem by nut 81.

A relief valve is mounted in bore 29 in body section 11. This valve includes a valve head 82 with radiating arms 83 extending therefrom. A seat 84 is fashioned in the head to receive disc 85 which is adapted to close passage 32 by abutment with the annular shoulder 35. The valve head has a sleeve-like extension 86 which is adapted to receive one end of coil spring 87. This spring is held in place by a threaded cap 88 adapted to be received by internal threads 30. The cap is furnished with an aperture 89. When the pressure in the container increases beyond a predetermined amount, to wit, the loading of spring 87, valve head 82 is moved longitudinally of bore 29 permitting the gas to enter said bore and pass out through aperture 89.

It will be seen that I have constructed a valve which accomplishes all the objects set forth. The arrangement of passages permits the gas to flow from the bottle to a tapped bore on the upper end of the valve, which, by an adapter, permits the gas to be fed directly to a melting furnace mounted on the valve. Adequate protection is provided by the valve so that it is safe under varying conditions of temperature. Protection is obtained by the excess flow valve in the event the main valve is sheared off the container. The main passages are sufficiently large in diameter, being approximately five-sixteenths of an inch in diameter compared to the one-eighth diameter passages in conventional valves. These and other advantages inherent in the apparatus furnish an all around valve for obtaining the liquified petroleum from its container.

I claim:

1. A valve comprising a body having passageways for fluid flow and means providing a first bore in communication with said passageways, a valve head movable in said body to close at least one of said passageways from said bore, means forming a second bore and a shoulder at one end thereof adjacent said first bore, a flexible sealing element having inner and outer peripheral edges, a connecting rod slidingly received in said bore, means connecting the rod and said valve head, and means connecting the inner edge of said sealing element to said connecting rod, said connecting rod being movable to move said valve head and means for holding the outer edge of said sealing element in sealed contact with said shoulder and for confining said rod to straight line movement comprising a unitary sleeve connected to said body, said sleeve being rotatable to urge said outer edge of said sealing element against said shoulder, but being normally fixed in position and urging said outer edge against said shoulder, said sleeve having a wall, said wall having an opening, said rod being received within said opening and being spaced therefrom for rotation of said sleeve with respect to said rod, means for preventing rotation of said rod within said opening when said sleeve is normally fixed in position comprising a second sleeve removably mounted on said rod and contacting said unitary sleeve, said second sleeve being slidable longitudinally of said rod out of contact with said unitary sleeve, said unitary sleeve being rotatable with respect to said rod when said second sleeve is out of said contact, said second sleeve being normally engaged with said unitary sleeve and said rod, said second sleeve having a shape mating with said unitary sleeve and said rod for preventing relative rotation of said rod and said unitary sleeve, said second sleeve preventing rotation of said rod with respect to said unitary sleeve when so normally engaged, said second sleeve being slidable with respect to said unitary sleeve when normally engaged with said unitary sleeve and said rod for translational movement of said rod in said second bore.

2. A valve comprising a body having a passageway for fluid flow and means for closing said passageway comprising a valve head and a seat cooperable therewith, a bore, said valve head being movable in said bore, a second bore forming a shoulder with said first bore, a sealing diaphragm seated on said shoulder and connected to said valve head, said valve head being slidable axially in said second bore and means for firmly seating said diaphragm against said shoulder and for confining said valve head to straight line movement comprising a unitary sleeve connected to said body, said sleeve being rotatable to urge said diaphragm against said shoulder, but being normally fixed in position and urging said diaphragm against said shoulder, said sleeve having a wall, said wall having an opening slidably receiving a rod connected to said valve head, said opening having an out of round configuration, said rod being received in said opening but being spaced from said opening sufficient for rotation within said opening, a second sleeve removably mounted on said rod and rotatably fixed with respect to said rod, said second sleeve having an outer surface formed complementary to and in contact with said out of round configuration in the first mentioned opening and being slidable longitudinally of said unitary sleeve and said rod, said second sleeve normally preventing rotation of said rod with respect to said unitary sleeve, said second sleeve and said rod being slidable longitudinally of said second bore within said unitary sleeve.

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