May 22, 1962 C. T. BREITENSTEIN 3,035,617

FUEL TRANSFER ADAPTER WITH DUAL VALVE ACTUATOR

Filed Jan. 9, 1957

FIG. 1

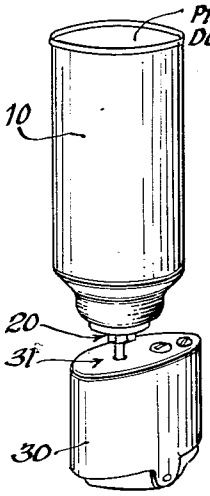


FIG. 2

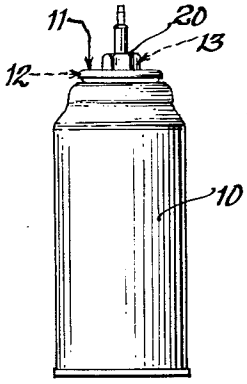


FIG. 3

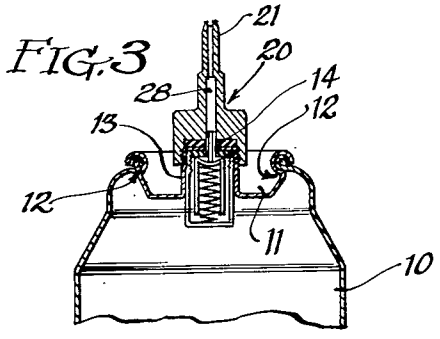
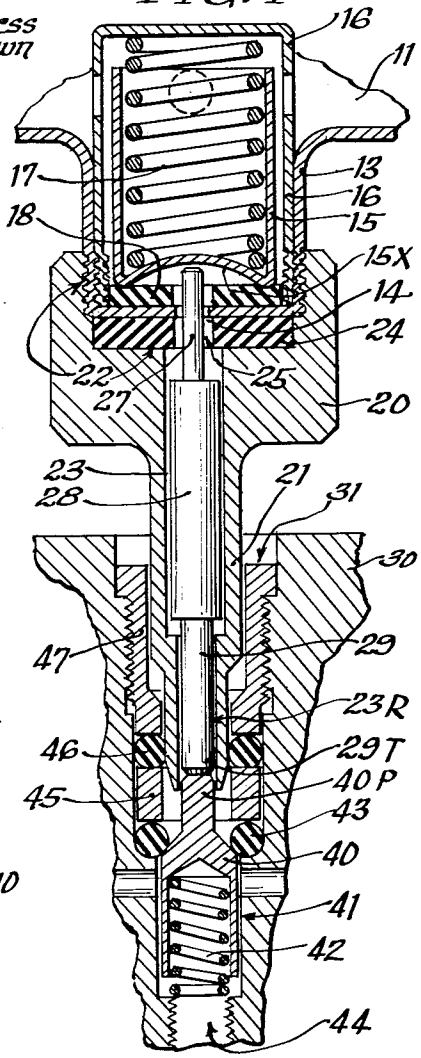
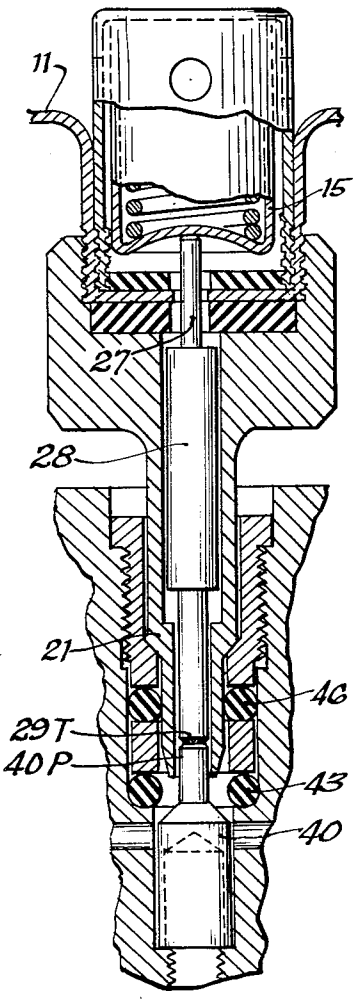


FIG. 4



Inserted

FIG. 5



Depressed

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FUEL TRANSFER ADAPTER WITH DUAL VALVE ACTUATOR

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This disclosure provides as its principal object a simple transfer adapter and valve actuator for use with valved canisters of liquified petroleum gas such as butane, whereby pocket-size cigarette lighters and like devices may be conveniently refueled from a bulk supply.

The device is characterized by great simplicity in construction, operation, and cost of manufacture, and by certain safety features, all of which will appear more fully as the following description proceeds in view of the annexed drawing in which:

FIG. 1 is a perspective illustration of a fueling operation;

FIG. 2 is an elevational view of a fuel canister with fueling valve applied;

FIG. 3 is a fragmentary sectional detail through the valve mechanisms on a canister;

FIG. 4 is an enlarged sectional fragment of the fueling valves on the canister and a pocket lighter in starting position;

FIG. 5 is a view the same as that of FIG. 4 but with the valves open.

Liquified petroleum gas such as butane is sold in small canisters **10**, such as depicted in FIG. 2, which are constructed to hold safely at basic pressures of about 80 lbs./in., and they are commonly fitted with what may be termed the aerosol type of built-in valve means, one form of which is shown in FIG. 3, the construction and operation of which, while known in the art, must be set forth to understand the novel transfer valve means disclosed herein.

The known aerosol valve consists of a cap portion **11** expanded into a seal, as at **12**, with the top rim of the can.

Standing from the center of the top closure is a threaded nipple **13** having a central escape orifice **14** in the top wall thereof, these parts being seen (upside down) to large scale in FIG. 4.

A cup-shaped valve member **15** is housed in a similarly-shaped cage **16** fitted into the aerosol valve and including a spring **17** normally closing the dished end **15X** of the valve member or poppet against a resilient sealing gasket **18**.

In order to release any pressurized contents from a canister valve such as described, it is necessary to depress the valve member or cup **15** far enough to permit the gas to escape around the dished end **15X** through the gasket orifice and the cap orifice at **14**. Such a condition is shown.

The novel transfer adapter is indicated generally at **20** in FIGS. 2 and 3 and consists of the cap nipple **20**, shown in FIG. 4, having at one end a long injection stem **21** adapted to fit into the fueling port **31** in a pocket lighter **30** (FIG. 1 also), and at its other end an internally threaded bore **22** which screws tightly down upon the canister nipple **13**.

Secured either by snap-fit or cement in the bore **22** is a resilient washer gasket **24** having a central gas passage **25** of certain size which is smaller than the main bore **23** in the stem.

Slidable in the main stem bore **23** is a valve actuating or releasing pin means consisting of a median plunger portion **28** with reduced end pins **27** and **29**, the former

of which is the release pin and enters the canister nipple to engage the dished end **15X** of the aerosol valve, while the other and larger end pin **29** is the trigger pin and enters (along with stem **21**) the fueling port **31** of the lighter, as in FIGS. 4 and 5.

A safety feature provides for a length of the trigger pin **29** (FIG. 4) which is shorter by about 1/32-inch than the appertaining reduced portions **23R** of the stem bore, so that the outer triggering end **29T** of the releasing pin is recessed in the stem bore and is not readily accessible for accidental or other manual release, for instance in the idle condition of the canister as seen in FIG. 2. Since the butane gas is inflammable and explosive, it is important to discourage heedless release by children and others.

While some types of pocket gas lighter are provided with an internal piercing spike (not shown) for breaking and entering a metal bomb seal on a small single-charge refill bomb, variations in construction and size of such spikes on different makes of lighter can make it uncertain whether a particular brand of lighter will accept and actuate the new transfer valve actuator.

Accordingly, there is provided for a cooperative lighter to be fueled by the new adapter a special valve actuator within such lighter, as illustrated in FIG. 4.

The valve actuator consists of a hollow plunger **40** inverted in a bore **41** in the lighter fuel passage and forced by a spring **42** against a seal such as an O-ring **43** to close off the lighter fuel chamber passage **44** normally.

A metal collar **45** spaces the inner O-ring seal **43** from an outer O-ring seal **46**, and both rings and the collar are retained in the well **31** by a threaded insert **47** which is bored to receive the transfer stem **21**.

The operation of the transfer device is illustrated in two stages in FIGS. 4 and 5, FIG. 4 showing the condition of FIG. 1 upon insertion of the transfer stem into the lighter, and FIG. 5 illustrating the depressed condition of the canister **10** upon the lighter **30** by the operator, which forces the valve plunger means **40** in the lighter to open away from seal **43** thus opening the passage into the fuel chamber.

At the same time, the reduced probing pin portion **40P** of the actuator plunger in the lighter enters the stem of the transfer nozzle to engage and depress the recessed trigger end **29T** of the transfer valve pin, thereby displacing the latter inwardly to push the aerosol valve cup or poppet **15** to unseat the latter and open the aerosol valve, as in FIG. 5, a slight clearance around all pins and plungers being wholly adequate to permit the thin gas and/or the liquified gas to enter the lighter. Best results are obtained by permitting the fuel to enter the lighter as a liquid, and therefore the fueling canister is inverted, as in FIG. 1.

During the fueling operation the upper O-ring **46** seals with the outer portion of the stem **21**, and since the transfer adapter nipple **20** is sealed in its seat on the can nipple by washer gasket **24**, the fuel, whether gas or liquid, is confined to the intended course.

I claim:

A transfer, valve-actuating, adapter stem for use in fueling cigarette lighters having a charging port with pin-operated valve located interiorly thereof, from pressurized fuel canisters having a nipple with concealed valve therein, said adapter comprising: a body having a coupling part with a coupling bore adapted to engage said canister nipple and an elongated nozzle extending from said body with a second bore communicating from said coupling bore through the tip of the coupling nozzle, the bore being of greater diameter than the second bore, the second bore being narrower than the coupling bore in a median portion of the nozzle beginning at its conjunction with the coupling bore and extending a distance into the nozzle and reducing to a still further narrowed portion extending

through the outer tip end of the nozzle; a trigger pin situated in said second bore and having a widened median portion of lesser length and diameter than the median portion of the second bore and having a first narrowed end portion extending from one end of said trigger pin median portion and terminating within the second bore inwardly of the tip of the nozzle so as to be guarded therein, and said trigger pin further having an opposite inner end portion narrower than its median portion and extending substantially into said coupling bore portion; and a coupling seal secured in said coupling bore against the terminus of said median portion of the second bore and having a fuel passage therethrough substantially greater in diameter than the inner end of the trigger pin but of lesser diameter than the median portion of the trigger pin to retain the latter in the adapter while permitting free longitudinal shifting thereof and passage of fuel around the inner end of the pin through the remaining extent of said second bore, said trigger pin being adapted to actuate the respective valve means of a lighter and canister as aforesaid to which the adapter is coupled on pressing the nozzle into the lighter port far enough to engage the valve pin thereof with the first end of the trigger pin to cause the inner end of the trigger pin to engage and actuate the canister valve.

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