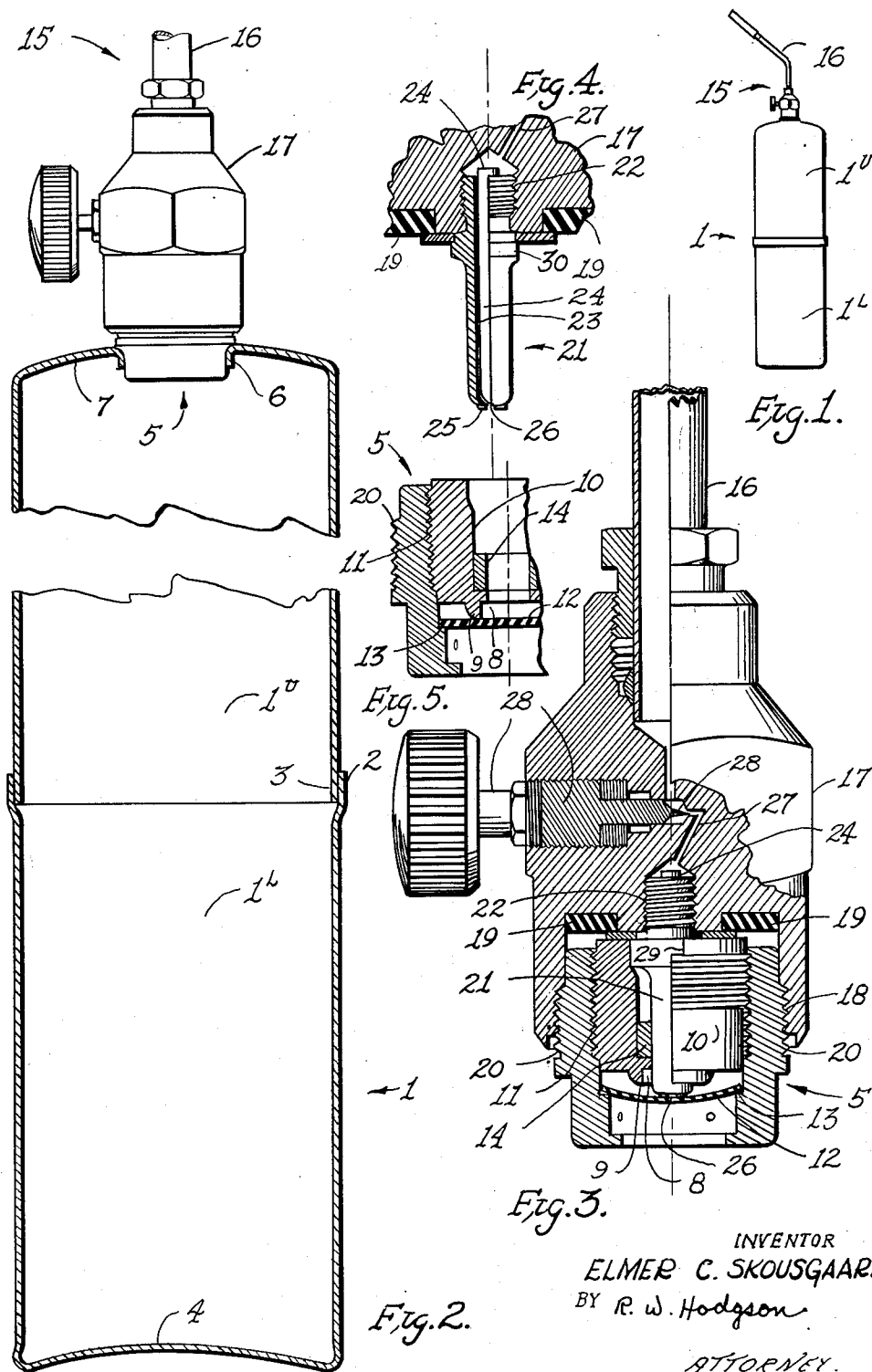


Oct. 1, 1957

E. C. SKOUSGAARD
THROW-AWAY CONTAINER FOR PRESSURIZED, LIQUEFIED
GASES, AND DISCHARGE MEANS THEREFOR
Filed May 12, 1952

2,807,938



INVENTOR
ELMER C. SKOUSGAARD
BY R. W. Hodgson
ATTORNEY.

1

2,807,938

THROW-AWAY CONTAINER FOR PRESSURIZED, LIQUEFIED GASES, AND DISCHARGE MEANS THEREFOR

Elmer C. Skousgaard, Los Angeles, Calif.

Application May 12, 1952, Serial No. 287,449

10 Claims. (Cl. 62—1)

This application is a continuation-in-part of my co-pending patent application Serial No. 149,538, filed March 14, 1950, now abandoned, and relates generally to an improved container (which may be a throw-away container) for pressurized, liquefied gases (such as butane, propane and the like), and to improved removable discharge means therefor, adapted to effectively and virtually, completely vaporize the liquefied gases passing therethrough. It relates particularly (though not in a limiting sense) to such a container adapted for removable cooperation with a burner to form an improved portable hand torch of the type provided with a hollow enclosed chamber, body or casing, adapted to contain a volatile, inflammable liquid, usually a hydrocarbon such as butane, propane and the like, or various mixtures thereof, which is maintained under pressure within the container, such as to liquefy the gas.

More particularly, the present invention relates to a structure having a container and check valve means, which are arranged for removable engagement with outlet conduit means having engaging fitting means (which may or may not be provided with a burner), check valve actuating means and pressure reducing, flow restricting outlet duct means adapted to virtually completely vaporize discharging gases. The arrangement is such that the combined container and check valve can be of exceedingly simple and cheap construction—to such an extent that it can be thrown away when empty and a new, full (as full as the law and safety factors allow) combined container and check valve can be engaged with respect to the outlet conduit means (and engaging fitting means), check valve actuating means and pressure reducing, flow restricting outlet duct means.

A major disadvantage of most prior art hand torches adapted to contain a volatile inflammable liquid, usually a hydrocarbon such as butane, propane or the like, maintained under liquefying pressure within the container, is the relatively limited capacity for a given size of container or casing. Such a prior art casing (which is usually of cylindrical form and adapted to be normally vertically positioned) is usually slightly less than half full of the inflammable hydrocarbon in liquefied form, and a vertical tube or pipe is usually positioned in the upper half of the cylindrical casing with a very small opening in the lower end thereof immediately above the surface of the pressurized liquefied hydrocarbon contained therein. The arrangement is usually such that the liquefied hydrocarbon never covers the small opening in the lower end of the vertically arranged outlet pipe, irrespective of the position of the casing or torch. Such a prior art device operates as follows: The vapor immediately above the liquefied hydrocarbon in the casing is in communication with the small opening in the vertically arranged outlet pipe, and upon opening a controllable valve in said outlet pipe, the vapor passes outwardly through said outlet pipe and a suitable nozzle at a rate controlled by the degree of opening of the valve in the outlet pipe under the action of the differential pressure head existing between the pres-

2

sure within the hollow body member and ambient atmospheric pressure. If a drop or two of the liquid contained in the hollow body member enters the opening in the lower end of the outlet pipe, this generally results in extinguishing the flame at the nozzle, a highly undesirable result in a torch intended for continuous operation. It can be seen that in the prior art structure just described, the liquid is not in contact with the opening in the lower end of the outlet pipe when the torch is in a normal, vertical position, and even if the torch is turned on one side or the other, the level of the liquid is just below the opening in the bottom of said outlet pipe. However, if the torch is moved rapidly or jostled in any manner, a splashing of the liquid contained therein often occurs and said liquid readily enters the outlet pipe, thus causing the flame in the outlet nozzle to be extinguished.

It can be seen that prior art structures of the type just described are necessarily quite large with respect to the amount of liquid which they contain, and that the operation of such devices is very likely to be interrupted by any rapid moving or jostling of the device. Thus, such prior art torches are not satisfactory for use on a job where a portable unit is required, since in order to provide a torch capable of carrying sufficient inflammable liquid to operate for a full work day, the torch has to be overly large and cumbersome. Furthermore, such torches readily go out during the course of a day's activities, which requires moving the torch about and operating same in different positions.

Furthermore, most such prior art torches have another major disadvantage—the problem of refilling the torch body (or the container associated with the torch) with butane, propane or the like. This is so for several reasons. First, it is unsafe to over-fill a pressure vessel to such an extent as to fail to allow for thermal expansion and various other factors which may affect the device. Also, there are numerous safety regulations which must be complied with in connection with the refilling of pressure vessels with butane, propane and the like. The effect of all of these problems associated with refilling, has been so great as to cause a severe limitation of usage of this type of torch. Furthermore, in certain cases where refilling operations have been improperly conducted, injury and/or damage has occurred.

Generally speaking, the present invention comprises an improved container (which may be a throw-away container) and discharge means for liquefied pressurized gases, and includes a hollow closed casing provided with outlet hole means effectively extending therinto and adapted for removable engagement and disengagement with respect to engaging means (usually threaded engaging fitting means) of an outlet conduit means (which may or may not be provided with a burner). Normally closed check valve means is also effectively positioned in the outlet hole means and is arranged to be forcibly actuated into open position by check valve actuating means carried by the outlet conduit means (or the engaging fitting means), when the engaging means of the outlet conduit means is effectively sealingly engaged with respect to the outlet hole means. Also included, is pressure reducing, flow restricting outlet duct (or orifice) means adapted to effectively communicate the open check valve means and the outlet conduit means—the pressure reducing flow restricting outlet conduit means being such as to virtually completely vaporize discharging gas (or gases).

In one preferred general form of the present invention, the hollow casing may comprise two cylindrical portions (each preferable integrally formed, such as by spinning or the like) mechanically joined together (such as by silver soldering, brazing, welding or the like) at adjacent ends (which are preferably, though not neces-

sarily, of the mating male and female type) to form a cylindrical hollow casing provided with outlet hole means at one end (usually the top end) extending thereinto.

It can be seen from the above general description, that the apparatus of my invention avoids all of the previously mentioned prior art disadvantages, since in the general form of my invention the liquid contained within the hollow body member or casing may be at a much greater height within the hollow body member than in prior art forms. Indeed, it is possible to fill the hollow body member with the pressurized, liquefied gas virtually to capacity, although in the preferred form of my invention, I generally fill the casing somewhat less than full. Thus, a much smaller container (or torch) is required for a given quantity of the liquefied gas. Furthermore, the position of the container or torch is not important.

The torch may be moved rapidly, thus splashing the liquid inside. It may be inverted or turned or twisted and caused to assume almost any position without interrupting the flame at the outlet nozzle. This is a tremendous advantage over prior art structures and is accomplished by reason of the novel pressure reducing, flow restricting means positioned between the interior of the casing and the outlet in the flow path therebetween, thus preventing any drops of the liquid from passing through the outlet conduit to the outlet nozzle and extinguishing the flame.

It will also be understood that the system of the present invention completely overcomes the hereinbefore mentioned prior art problems arising in connection with refilling a torch body (or container associated with a torch) because the detachable throw-away casing (and check valve) of the present invention is of such simple, cheap construction that it can be thrown away when empty—it need never be refilled. Instead, a new casing (and check valve) which has been preloaded at the factory, can be rapidly fastened with respect to the outlet conduit means (and engaging means), check valve actuating means and pressure reducing, flow restricting outlet duct means to form a completely assembled torch. This eliminates any and all problems associated with refilling and makes the torch available for wide-spread commercial use by unskilled personnel.

With the above points in mind, it is an object of this invention to provide an improved container (usually portable) adapted to contain pressurized, liquefied gases, and an improved discharge means therefor.

It is a further object of the present invention to provide an improved container (usually portable) adapted to contain pressurized, liquefied gases, and an improved discharge means therefor, said container being capable of carrying a much larger quantity of liquefied, pressurized gas therein than prior art containers of the same size.

It is a further object of the present invention to provide an improved container (usually portable) adapted to contain pressurized, liquefied gases, and an improved discharge means therefor, including novel pressure reducing, flow restricting means in the outlet flow path of the pressurized gas adapted to virtually, completely vaporize said gas.

It is a further object of this invention to provide a new and improved portable hand torch capable of carrying a much larger quantity of liquid fuel under pressure therein without increasing the overall size of the torch.

It is a further object of this invention to provide a new and improved portable torch which may be operated in virtually any position or during rapid or jostling movements thereof without any interruption in the flame occasioned by drops of the liquid fuel entering the outlet flow path.

It is a further object of this invention to provide a new and improved portable torch provided with pressure reducing, flow restricting means in the outlet flow path for preventing discrete particles of liquid fuel contained

within the torch from passing through the outlet flow path.

It is a further object of the present invention to provide an improved throw-away container or casing (and check valve) of exceedingly simple, cheap construction and adapted for removable engagement with respect to outlet conduit means and check valve actuating means carried thereby and pressure reducing, flow restricting outlet conduit means arranged to communicate the open check valve with the outlet conduit means—also the combination thereof.

Other and allied objects will be apparent to those skilled in the art after a careful perusal, examination and study of the accompanying illustrations, the present specification and the appended claims.

To facilitate understanding, reference will be made to the following drawings, in which:

Fig. 1 is a reduced-size, elevation view of one illustrative embodiment of the present invention in fully assembled relationship.

Fig. 2, is an enlarged, fragmentary, partial, vertical sectional view of the form of the invention illustrated in Fig. 1.

Fig. 3 is a fragmentary, partial, vertical sectional view and shows the check valve held in open position by the check valve actuating means.

Fig. 4, is a fragmentary, partial, vertical sectional view of the check valve actuating pin and pressure reducing, flow restricting outlet duct means.

Fig. 5, is a fragmentary, partial, vertical sectional view similar to a portion of Fig. 3 except that the outlet conduit means and engaging means carried thereby, the check valve actuating means and the pressure reducing, flow restricting outlet duct means have been removed from engagement with respect to the outlet hole means (and the check valve) in the hollow casing thus leaving merely the throw-away casing (not shown) and the closed check valve.

Generally speaking, the present invention comprises a throw-away container and discharge means for liquefied pressurized gases, and includes a hollow closed casing provided with outlet hole means effectively extending thereinto and adapted for removable engagement and disengagement with respect to engaging means of an outlet conduit means (which will be described more fully hereinafter).

In the specific example illustrated, the hollow casing is of longitudinal, cylindrical shape, as indicated generally at 1, and comprises two integral cylindrical portions (preferable, though not necessarily, formed by spinning or the like) indicated at 1U and 1L. The upper end of the lower casing portion 1L, as specifically illustrated, includes an enlarged female receiving portion 2 adapted to receive the mating male portion 3 of the upper casing portion 1U. Said casing end portions 2 and 3 are adapted to be mechanically fastened to form a strong longitudinal hollow casing 1 by any suitable mechanical means, such as silver soldering, brazing, welding or the like. It should also be noted that the lower end of the bottom casing portion 1L is provided with an upwardly domed spun head 4 adapted to provide adequate strength and also a suitable base for resting the torch in an upward position on a flat underlying surface.

In the specific example illustrated, the outlet hole means takes the form of a centrally apertured threaded member, indicated generally at 5, mechanically mounted in an opening defined by the circular member 6 in the top wall 7 of the upper casing portion 1U, and fastened in said position by any suitable means including press-fitting, silver soldering, brazing, welding and various other mechanical means.

Also generally speaking, the outlet hole means is provided with normally closed check valve means effectively positioned in the outlet hole means and arranged to be forcibly actuated into open position when actuated by

5

check valve actuating means (which will be more fully described hereinafter) carried by an outlet conduit means, or engaging means (which will also be more fully described hereinafter).

In the specific example illustrated, the check valve means includes cylindrical valve port means 8 surrounded by downwardly directed seat means 9 carried by a member 10 threadedly engaged within the member 5, as indicated at 11, and includes resiliently deformable, elastomeric seal means 12 normally mechanically held by shoulder 13 (inside of the member 5) in resilient deformable sealing engagement with respect to the seat means 9 whereby the valve port 8 will be effectively closed (this is best shown in Fig. 5). It should also be noted, that in the specific example illustrated, a guide bushing 14 is positioned inside of the member 10 for purposes which will be more fully set forth hereinafter.

Also generally speaking, outlet conduit means may be included and may be provided with engaging fitting means selectively sealingly engageable or disengageable with respect to the outlet hole means.

In the specific example illustrated, a portion of the outlet conduit means is indicated generally at 15 and comprises an outlet tube 16 and a hollow engaging fitting 17 provided with engaging interior threads 18 and a rubber or elastomeric seal 19. It will be noted that the interior threads 18 are adapted to be manually threadedly engaged with respect to exterior threads 20 of the member 5 in a manner whereby the upper annular edge of the member 5 will sealingly abut the seal 19 so as to place the hollow vertical bore in the member 5 in sealed communication with respect to the hollow interior of the fitting member 17.

Also generally speaking, check valve actuating means may be carried by the engaging fitting means for forcible actuating cooperation with respect to the check valve whereby to forcibly open same when the engaging fitting means is effectively sealingly engaged with respect to the outlet hole means.

In the specific example illustrated, the check valve actuating means takes the form of a pin, indicated generally at 21, threadedly engageable, as indicated at 22, within the engaging and/or fitting member 17 so as to be downwardly directed and virtually concentric with respect thereto. The pin 21 is provided with a central bore hole 23 carrying therein a rod 24 of slightly smaller dimensions so as to effectively form an annular, pressure reducing, flow restricting duct in the space defined by the bore hole 23 and the rod 24 positioned therein. This may be of exceedingly size—so small as to comprise capillary flow means, in certain cases. The lower open end of the bore hole 23 is provided with centrally apertured, annularly shaped, restricting means indicated at 25.

As best shown in Fig. 3, the check valve actuating pin 21 extends downwardly into forcible unseating contact with respect to the upper surface of the resilient, deformable, elastomeric seal means 12 when the threaded means 18 and 20 are in fully engaged, sealed relationship. This allows pressurized gases to flow upwardly past the shoulder 13 and past the outer periphery of the deformed seal means 12 (which becomes resiliently displaced upwardly because of the upward pressure of the liquefied gas) and then through lateral ingress slot means 26 in the tip of the actuating pin 21 into the pressure reducing, flow restricting flow duct 23 and thence upwardly into a duct 27 in the engaging fitting 17, which may be provided manually controllable valve means, such as a needle valve 28, for effectively controlling the outflow of gas through the outlet conduit tube 16. It will be understood that as soon as the engaging fitting 17 is unscrewed from the member 5, the actuating pin 21 will move upwardly and allow the elastomeric seal 12 to resiliently engage the seat means 9 to effectively close the port 8 and thus shut off any outflow of gas. This is best shown in Fig. 5.

6

It should also be understood that the pressure reducing, flow restricting duct means 23 acts to effectively vaporize all discharging gas in a very effective manner so as to prevent the escape of any unvaporized liquefied gaseous particles.

It should also be noted that the annular upper wall of the member 10 may be provided with a transverse slot 29 therein to facilitate the threaded insertion of the member 10 into the interior of the member 5 at the factory so as to properly position the associated parts with respect to the seal means 12.

The base of the check valve actuating pin 21 may also be provided with a flat portion, such as is indicated at 30, to facilitate the threaded insertion of the threaded base of the pin 21 into the assembled position shown.

Numerous modifications and variations of the present invention will occur to those skilled in the art after a careful study hereof. All such properly within the spirit and scope of the present invention are intended to be included and comprehended as fully as if specifically described, illustrated and claimed herein.

For example, it should be noted that the pressure reducing, flow restricting outlet duct means may constitute capillary flow means and may cause the flow therethrough to bear a linear relation to the differential pressure causing the flow rather than to be proportional to the square root of the differential pressure causing the flow, as is true of prior art containers and torches. This adds to the advantage of such a system, because it makes it possible to control (by controllable valve means) the rate of flow, within a wide range and without undue pressure drop variation across the pressure reducing means such as would be the case in ordinary turbulent flow. The arrangement just described can be modified within wide limits.

Furthermore it should be understood that the outlet hole means, and the means for engaging it with respect to engaging means carried by an outlet conduit means can be substantially modified, as can the outlet conduit and its engaging fitting means.

The structure of the check valve means and/or the check valve actuating means can be modified substantially, as can the arrangement of the pressure reducing, flow restricting outlet duct means, which need not necessarily be carried by the check valve actuating means.

The structure of the casing can be in sections suitably fastened together, as illustrated, or, if desired, can be of integral construction.

The check valve elastomeric seal means may (or may not) also comprise a thermally fusible protective plug and, if desired, may be made of a non-communicating cellular type of elastomeric material so as to prevent leakage therethrough and so as to facilitate the deformable sealing and unsealing action thereof, and is preferably made of a material highly resistant to attack by hydrocarbons.

Various types of controllable valve means may be used and may be positioned at various locations in the outlet flow path.

If desired, a suitable safety valve, or the like, may be connected between the interior of the casing and ambient atmosphere for preventing the differential pressure head from ever exceeding a predetermined safe maximum value.

It should also be noted that the check valve means of the present invention and the portions of this application pertaining thereto are a continuation-in-part of my co-pending patent application, Serial No. 197,703, filed November 27, 1950, now abandoned.

The exact compositions, configurations, relative positionings, and cooperative relationships between the various component parts of the present invention are not critical and can be modified substantially with the spirit hereof.

The embodiments of the present invention specifically

described, illustrated and claimed herein are exemplary only, and are not intended to limit the scope of the present invention, which is to be interpreted in the light of the prior art and the appended claims only, with due consideration for the doctrine of equivalents.

What is claimed is:

1. An improved container and discharge means for liquefied pressurized gases, comprising: a hollow closed casing provided with outlet hole means extending thereinto; check valve means effectively positioned in the outlet hole means and including outlet valve port means provided with surrounding seat means on the inlet side thereof, resiliently deformable elastomeric seal means, means mounting said seal means in resilient deformable sealing engagement with respect to the seat means in a manner whereby force in excess of a predetermined value acting upon said seal means in a direction from the outlet side of said port means toward the inlet side thereof will resiliently deformably unseat said seal means and effectively open the outlet valve port means, and whereby differential pressure acting across said seal means in the other direction will positively and forcibly seat said seal means across the outlet valve port means in sealing engagement with the seat means; outlet conduit means provided with engaging fitting means selectively removably sealingly engageable and disengageable for corresponding communication and non-communication with respect to the outlet hole means; check valve actuating means carried by the engaging fitting means for extension into the outlet hole means and for forcible unseating cooperation with respect to the elastomeric seal means when the engaging fitting means is effectively sealingly engaged for communication with respect to the outlet hole means; vaporizing means comprising capillary flow, pressure reducing, flow restricting outlet duct means effectively communicating the interior of the engaging fitting means and the outlet conduit means whereby to provide effective communication between the valve port means and the outlet conduit means when the seal means is forcibly unseated by the check valve actuating means; said capillary flow, pressure reducing, flow restricting outlet duct means being arranged to virtually completely vaporize discharging gases; and manually controllable valve means in cooperative relationship with respect to the outlet duct means whereby outflow therethrough can be controlled.

2. Apparatus of the character defined in claim 1 wherein the hollow closed casing comprises two longitudinal, cylindrical portions, one of which has an enlarged female receiving end and the other of which has a smaller male insertion end, mechanically joined together to form a longitudinal, cylindrical closed hollow casing provided with outlet hole means at one end extending thereinto.

3. An improved container and discharge means for liquefied pressurized gases, comprising: a longitudinal virtually cylindrical hollow closed casing provided with outlet hole means at the top thereof extending downwardly thereinto; check valve means effectively positioned in the outlet hole means and including virtually cylindrical outlet valve port means provided with surrounding virtually cylindrical seat means on the lower side thereof; resiliently deformable elastomeric seal means, means mounting said seal means immediately below and in resilient deformable sealing engagement with respect to the seat means in a manner whereby downward force in excess of the predetermined value acting upon said seal means will resiliently deformably unseat said seal means and effectively open the outlet valve port means, and whereby differential pressure acting upwardly across said seal means will positively and forcibly seat said seal means across the outlet valve port means in sealing engagement with the seat means; outlet conduit means provided with threaded engaging fitting means selectively removably sealingly engageable and disengageable for corresponding communication and non-communication with respect to the outlet hole means; check valve actuating pin means

carried by the engaging fitting means for downward extension into the outlet hole means for forcible downward unseating cooperation with respect to the elastomeric seal means when the engaging fitting means is effectively sealingly engaged for communication with respect to the outlet hole means; and vaporizing means comprising pressure reducing, flow restricting outlet duct means effectively extending through the interior of the actuating pin means from the actuating end of the actuating pin means to the outlet conduit means whereby to provide effective communication between the valve port means and the outlet conduit means when the seal means is forcibly unseated by the check valve actuating pin means; said pressure reducing, flow restricting outlet duct means being arranged to virtually completely vaporize discharging gases; and manually controllable valve means in cooperative relationship with respect to the outlet duct means whereby outflow therethrough can be controlled.

4. Apparatus of the character defined in claim 3 wherein the lower end of the check valve actuating pin means is provided with ingress means communicating the exterior of said pin means with the duct means therein.

5. Apparatus of the character defined in claim 4, wherein the duct means in the check valve actuating pin means comprises hole means carrying therein slightly smaller rod means whereby to effectively provide pressure reducing, flow restricting, outlet duct means.

6. Apparatus of the character defined in claim 5, wherein the elastomeric seal means comprises a thermally fusible protective plug.

7. Apparatus of the character defined in claim 6, wherein the seal means comprises a non-communicating cellular type of elastomeric material to facilitate deformability of the seal means and to minimize leakage through the seal means.

8. Apparatus of the character defined in claim 7, wherein the seal means comprises an elastomeric material of a type resistant to attack by hydrocarbons.

9. An improved throw-away container and discharge means for liquefied pressurized gases, adapted for removable sealing engagement and disengagement with respect to outlet conduit means provided with engaging fitting means and provided with check valve actuating means, and provided with pressure reducing, flow restricting, outlet duct means effectively communicating the interior of the engaging fitting means and the outlet conduit means, comprising: a hollow closed casing provided with outlet hole means effectively extending thereinto and adapted for removable engagement and disengagement with respect to the engaging fitting means of an outlet conduit means; check valve means effectively positioned in the outlet hole means and including outlet valve port means provided with surrounding seat means on the inlet side thereof, resiliently deformable elastomeric seal means and means mounting said seal means in resilient deformable sealing engagement with respect to the seat means in a manner whereby force in excess of predetermined value acting upon said seal means in a direction from the outlet side of said port means toward the inlet side thereof will resiliently deformably unseat said seal means and effectively open the outlet valve port means and whereby differential pressure acting across said seal means in the other direction will positively and forcibly seat said seal means across the outlet valve port means in sealing engagement with the seat means; said seal means being cooperable to be forcibly actuated into an unseated position with respect to the valve port means when check valve actuating means of an outlet conduit means is extended into the outlet hole means for forceable unseating cooperation with respect to the elastomeric seal means when the engaging fitting means of the outlet conduit means is effectively sealingly engaged for communication with respect to the outlet hole means, whereby outlet duct means connecting the interior of the engaging fitting means and the outlet conduit means will effectively com-

municate the open valve port means and the outlet conduit means.

10. Apparatus of the character defined in claim 9, wherein the hollow closed casing comprises two cylindrical portions mechanically joined together at adjacent ends to form a cylindrical closed hollow casing provided with outlet hole means at one end extending thereinto.

References Cited in the file of this patent

UNITED STATES PATENTS

1,929,511	Milkey -----	Oct. 10, 1933
2,172,310	Thomas -----	Sept. 5, 1939
2,271,917	Evleth -----	Feb. 3, 1942
2,562,680	Paquin -----	July 31, 1951
2,689,768	Falligant -----	Sept. 21, 1954