Sept. 23, 1958 G. F. CORLET 2,853,126

STOVES AND LIKE APPARATUS USING LIQUEFIED GAS

Filed July 13, 1956 2 Sheets-Sheet 1

Fig. 1

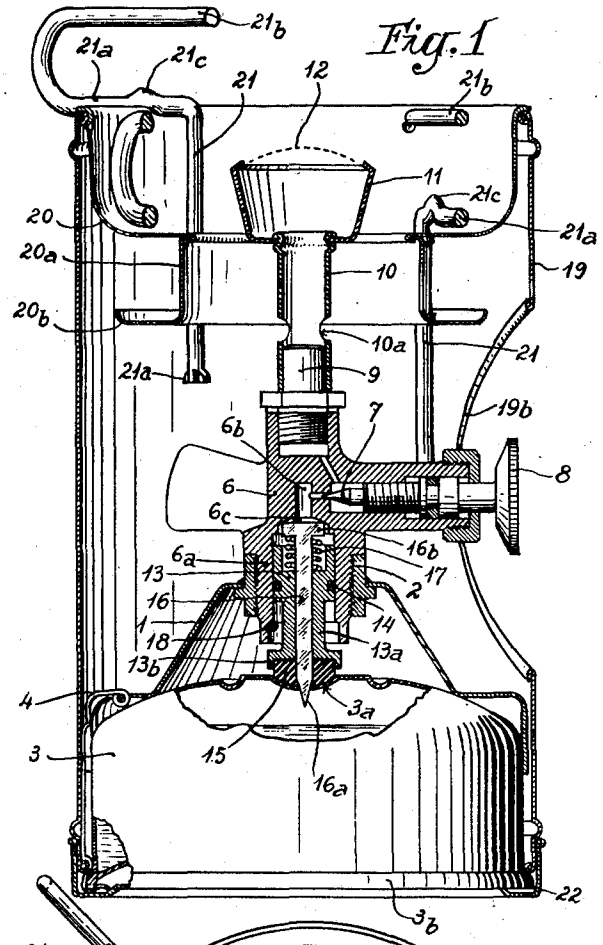
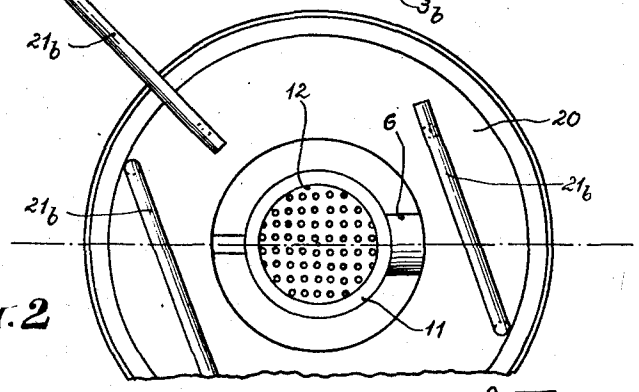


Fig. 2



INVENTOR

Gabriel Felicien Corlet

BY Alexander Sprowell

ATTORNEYS

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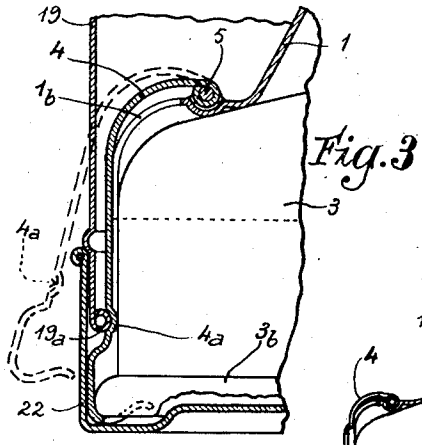

Fig. 3

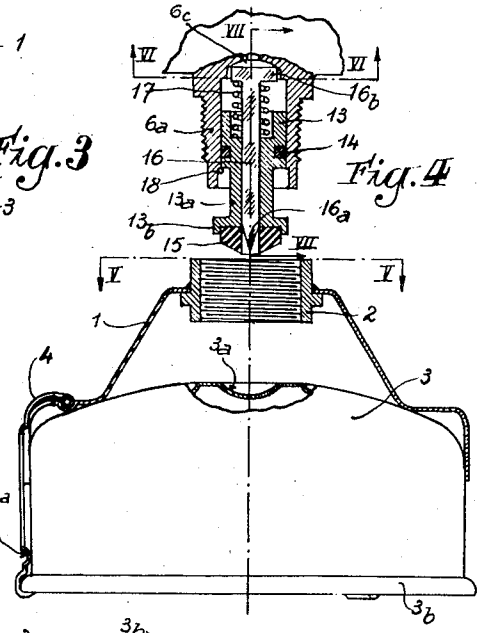

Fig. 4

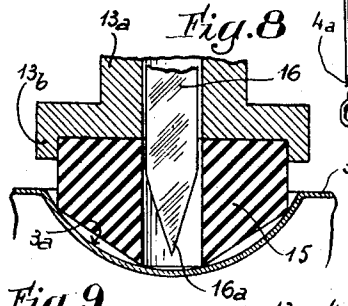

Fig. 8

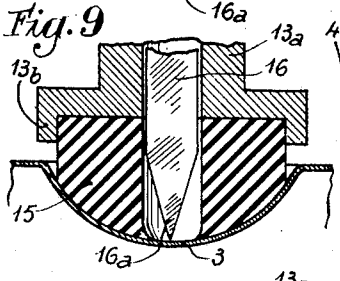

Fig. 9

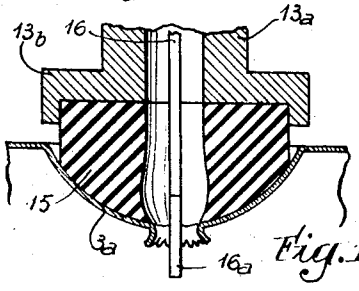

Fig. 10

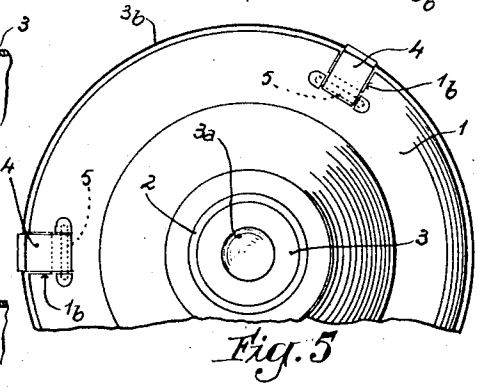

Fig. 5

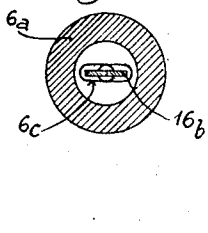

Fig. 6

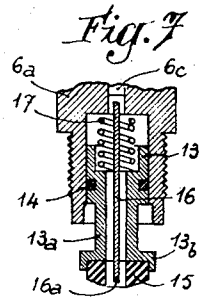

Fig. 7

Gabriel Félicien Corlet INVENTOR

BY Brumbaugh Graves Donohue & Raymond

ATTORNEYS

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STOVES AND LIKE APPARATUS USING LIQUEFIED GAS

Gabriel Felicien Corlet, Pierre-Benite, France, assignor to Société Anonyme "Dessins Etudes Outillage Mecanique, D. E. O. M.," Lyon, France, a French joint-stock company

Application July 13, 1956, Serial No. 597,751

Claims priority, application France October 4, 1955

8 Claims. (Cl. 158—33)

My invention relates to stoves and other apparatus using a combustible gas liquefied under pressure in an easily interchangeable container.

It has been proposed to provide such containers with a lid or plug adapted to be perforated when the container is to be connected with the stove or the like. With such an arrangement means should be provided to prevent the gas from escaping in the outer atmosphere. The container may for instance have a rubber plug which is perforated by means of a hollow needle, or the container may be formed with an internally threaded discharge head adapted to receive the correspondingly threaded gas intake end of the stove, the said head being normally closed by a membrane which is cut or perforated by a hollow punch solid with the said end. These known arrangements complicate the container and substantially increase the cost thereof. It becomes therefore practically impossible to consider the container as a non-refillable can adapted to be rejected after use.

A first object of my invention is to provide a stove or like apparatus using a combustible gas under liquefied form, wherein the gas container will comprise no screw-threaded discharge head, no plug of plastic or like material and will be in the form of a mere inexpensive can.

A further object of my invention is a stove or like gas apparatus comprising a slidable gas intake member provided with an end ring of flexible material adapted to be tightly applied against the wall of the gas container, and an axial perforating needle, movable with respect to the said ring and adapted to be driven through the said wall to form therein an orifice connecting the container with the inner space of the said gas intake member, while means are provided to maintain the said member in gas-tight engagement with the said wall already before the said needle has perforated the latter.

The perforating needle is preferably of non-circular cross-section in the per se known manner, and means are provided to lower this needle and to rotate it about its own axis when the gas intake head has been applied against the container wall, whereby the said needle will make therein a circular hole corresponding to the circumference circumscribed about the cross-section of the needle.

In order to improve tightness between the end ring of flexible material and the container wall, there is advantageously formed in the said wall a cup-shaped depression adapted to receive the said ring, which is correspondingly shaped in axial section, whereby inflation of the ring under the action of the gas under pressure will cause a more intimate contact between the outer periphery of the ring and the inner periphery of the depression. The face or side of the container on which the said depression is formed is preferably bulged to obtain an increased mechanical resistance against the axial pressure exerted on the said face or side by the ring of flexible material.

In a preferred embodiment of my invention the apparatus comprises a support in which the liquefied-gas container may be secured by appropriate means, which

support is provided with an internally threaded sleeve adapted to receive the end portion of a gas intake head, the said end portion slidably enclosing a spring pressed tubular gas intake member the outer end of which carries the ring of flexible material, while the perforating needle, disposed co-axially to the said member, is solid with the aforesaid end portion whereby it rotates on itself and moves downwardly when the said end portion is screwed into the sleeve of the said support. When the gas intake head is screwed into the sleeve of the support, the end ring of flexible material is first pressed into tight engagement with the container wall under the action of the urging spring, then the perforating needle comes into contact with the said wall and drills therein a hole through which gas may flow from the container into the gas intake head.

In the annexed drawings:

Fig. 1 is a general vertical section of a portable stove according to my invention.

Fig. 2 is the corresponding plan view thereof.

Fig. 3 is a fragmental enlarged sectional view showing the details of an elastic clip adapted to retain the container in the support.

Fig. 4 is a partial vertical section showing the gas intake head disposed above the sleeve of the support to be engaged thereinto.

Figs. 5 to 7 are sections taken along lines V—V, VI—VI and VII—VII of Fig. 4.

Figs. 8 to 10 are large scale detail sections illustrating three successive steps during the screwing down of the tail portion of the gas intake head into the sleeve of the support of the gas container.

The apparatus illustrated comprises a support **1** in the form of an inverted cup having a frusto-conical bottom. The central portion or smaller base of the said bottom carries an internally screw-threaded sleeve **2** which is for instance welded in a hole provided therein. This support **1** is adapted to receive a container **3** filled with liquefied gas under pressure, for instance butane gas, the said container being in the form of a cylindrical can of reduced height with the upper end bulging upwardly. In the central portion of this upper end there is provided a spherical depression **3***a*. This container **3** is made of relatively thin sheet metal, its lower end being seamed and/or soldered. It comprises no particular gas discharge member such as a plastic plug, a threaded head with a ball valve or a membrane, etc. It is engaged upwardly into the support **1** and it is secured thereon by pivoted spring clips **4**. Each clip **4** is formed of a band of spring metal, as for instance steel, one end of which is rolled on a small pin **5** (Figs. 3 and 5) fixed to the support **1**, while its other end is bent in the form of a hook adapted to engage elastically the lower edge **3***b* of the container **3**. This band is besides appropriately shaped to follow the contour of the side of the container **3**. The support **1** is slotted in front of each clip **4** in order that the latter may freely come into contact with the side of the container **3**.

The apparatus illustrated further comprises a gas intake head **6** provided with an end or tail portion **6***a* adapted to be screwed into the sleeve **2**. This body **6** carries a needle valve **7** actuated by an outer knob **8** to close a passage between the inner blind bore of the end portion or tail **6***a* and an upper bore co-axial to the said tail **6***a* and adapted to receive the conventional gas outlet nozzle **9** of the gas burner of the stove, the said nozzle carrying a sleeve **10** provided with air inlet holes **10***a* and topped by a cup **11** with a perforated cover **12**.

The end portion or tail **6***a* forms a cylinder for a tubular piston-like member **13** provided with a sealing ring

14. This member 13 is in one with a downwardly extending tubular rod 13*a* which terminates in an inverted cup 13*b* in which there is mounted a ring 15 made of a flexible material such as natural or synthetic rubber or like substance. As shown in Fig. 8 this ring 15 projects substantially below the edge of the said cup 13*b* and its lower annular face is frusto-conical, its dimensions being such that it may enter the above described depression 3*a*.

In the axial bore of the tubular rod 13*a* there is slidably disposed a flat needle 16 having a sharp lower point 16*a* and a transverse T-shaped upper head 16*b* which is engaged with a substantial clearance into a corresponding depression 6*c* (Figs. 1, 4, 6 and 7) provided in the upper end of the axial blind bore of the end portion or tail 6*a*. The bottom of this depression 6*c* is not flat, but conical, and the passage 6*d* which connects the said blind bore with the chamber of the needle-valve 7 opens in the center of this conical bottom. A coil spring 17 is interposed between the head 16*b* and the tubular member 13 to maintain the said head 16*b* in the depression 6*c* and to urge member 13 against a transverse pin 18 laterally carried by the end portion 6*a* in the lower part thereof. At this position (Figs. 4 and 8) of the parts, which corresponds to lowermost position of the member 13 and consequently of the ring 15 of flexible material, the point 16*a* of the perforating needle 16 is disposed slightly above the lower end of the said ring 15, i. e. inside with respect to the latter.

The stove further comprises an open-ended cylindrical outer casing the lower end of which is slidably engaged on the support 1 after the container 3 has been disposed therein. As shown in Fig. 3 this casing 19 has a beaded lower edge 19*a* which protrudes inwardly, the said beaded edge being adapted to fit into corresponding depressions 4*a* formed on the clips 4. The casing 19 has a wide lateral opening 19*b* (Fig. 1) which permits access to the actuating knob 8. The upper end of the said casing 19 is closed by a cup-shaped cover 20 having an outwardly folded upper edge which rests on the upper edge of the casing. The bottom of this cover 20 has a central aperture and it is solid with a cylindrical downward extension 20*a* the lower edge of which is flanged as indicated at 20*b*. Three vertical rods 21 are passed through appropriate holes provided in the flanged edge 20*b* and in the remaining annular portion of the bottom of the cup-shaped cover 20, the upper part of each one of these rods 21 being first bent at 90°, then at 180° in order to determine two horizontal portions 21*a* and 21*b* disposed one above the other. The lower portion 21*a* comprises a depression 21*c* adapted to rest on the edge of the cup-shaped cover 20 as indicated on the left-hand side of Fig. 1, whereby the rod under consideration is retained at such a position that the upper horizontal portion 21*b* thereof may form a support for the dishes, saucepans and like kitchen articles to be disposed on the stove. When the stove is to be folded, each rod 21 is raised and rotated through an appropriate angle, whereby its upper horizontal portions 21*a* and 21*b* may thereafter be lowered into the cup-shaped cover 20. In Figs. 1 and 2 one rod 21 is illustrated at the operative position while the two other rods are shown at the folded position. The lower ends of the rods 21 are flattened as indicated at 21*d* to prevent their becoming disengaged from the flanged edge 20*b*.

The stove also comprises a cover 22 (Figs. 1 and 3) which may be disposed on any one of the ends of the casing 19.

The operation is as follows:

The user has at his disposal a number of containers 3 filled with liquefied gas and tightly closed. These containers are preferably in the form of small cans or "cartridges." When it is desired to use the stove, the outer casing 19 is first removed and the support 1 is unscrewed from the end portion or tail 6*a*. A container 3 is then disposed in the support and it is secured thereto by the spring clips 4. There is thus obtained the assembly illustrated in Fig. 4.

The end portion or tail 6*a* is then screwed down into the upper sleeve 2 of the support 1. The end cup 13*b* is thus lowered towards the central depression 3*a* of the container 3 and the ring 15 of flexible material is thereby engaged into the said depression, as indicated in Fig. 8. As soon as the ring 15 becomes pressed against the wall of the depression 3*a*, it is frictionally retained thereby and prevented from rotating. As the screwing down of the tail 6*a* is continued, the spring 17 is compressed and the lower end of the flexible ring 15 fits tightly into the depression 3*a*, as indicated in Fig. 9. But at the same time the perforating needle 16 rotates together with the gas intake head 6 owing to its own head 16*b* being retained in engagement with the depression 6*c* under the action of the spring 17, the said needle also moving downwardly with respect to the sleeve 2 into which the end portion 6*a* is being screwed, and the point 16*a* of the needle comes into contact with the central part or bottom of the depression 3*a* and drills a hole in the wall of the latter, as clearly shown in Figs. 9 and 10, the diameter of this hole corresponding to the largest transverse dimension of the needle. The gas under pressure, may thus flow freely through the axial bore of the tubular rod 13*a* into the upper part of the bore of the end portion or tail 6*a*. It thus reaches the gas passage 6*d*, the lower end of which is free owing to the conical shape of the bottom of the depression 6*c*. The needle valve 7 being closed, the gas cannot flow towards the burner 9, 10, 11. On the other side the gas cannot leak outwardly since the sealing ring 14 of the gas-intake member 13 is perfectly tight and since the flexible ring 15 is tightly applied against the periphery of the depression 3*a* of the gas container.

It should be remarked that the gas pressure in the ring 15 of flexible material tends to dilate the latter, as shown in Fig. 10, whereby the said ring is more strongly applied against the wall of the depression 3*a*, which enhances the tightness.

The outer casing 19 is then engaged on the support 1 and the cover 22 is disposed on the lower end of the said casing. The rods 21 are thereafter brought to their raised or operative position.

When the stove is to be folded the rods 21 are returned to their lowered position within the cup-shaped cover 20. The cover 22 is removed from the lower end of the outer casing 19 and disposed onto the upper end thereof.

It will be appreciated that in the stove described the gas container or cartridge 3 comprises no particular gas discharge member and is therefore an inexpensive can which may be rejected after use. Also ring 15 is pressed in tight engagement with the perforatable wall 3*a* before the latter is punctured, whereby any gas leakage is avoided during the screwing down operation.

I claim:

1. In a portable stove or like apparatus using a combustible gas under liquefied form, a sealed gas container having a perforatable wall; a support formed with an open-ended screw-threaded sleeve, said support being adapted to receive said container with said perforatable wall in front of one end of said sleeve; means to retain said container within said support; a gas-intake head formed with a tubular screw-threaded tail portion adapted to be screwed into said sleeve; a tubular gas-intake member slidably and rotatably movable in said tubular tail portion in gas-tight engagement therewith; spring means urging said tubular gas-intake member outwardly with respect to said tubular tail portion; a ring of a flexible sealing material at the outer end of said tubular gas-intake member to be pressed by said spring means against said perforatable wall when said tubular tail portion is screwed into said sleeve; and a perforating needle carried by said gas-intake head coaxially to said tubular gas-in-

take member to perforate said perforatable wall, said perforating needle being so disposed within said gas-intake head that it does not engage said perforatable wall before said ring has been tightly applied against same.

2. In a portable stove or like apparatus as claimed in claim 1, said perforatable wall being formed with a depression adapted to receive said ring.

3. In a portable stove or like apparatus as claimed in claim 1, said perforatable wall being formed with a depression adapted to receive said ring and the outer end of said ring being substantially frusto-conical to fit into said depression.

4. In a portable stove or like apparatus as claimed in claim 1, said container being in the form of a cylindrical can having a bulged upper end, the top of said bulged end being adapted to form said perforatable wall.

5. In a portable stove or like apparatus as claimed in claim 1, said tubular tail portion having a blind bore, said perforating needle having a T-shaped head and said spring means being interposed between said T-shaped head and said tubular gas-intake member to maintain said T-shaped head against the bottom of said blind bore.

6. In a portable stove or like apparatus as claimed in claim 1, an abutment carried by said tubular tail portion to limit the outward stroke of said tubular gas-intake member within said tubular tail portion under the action of said spring means, the outermost position of said tubular gas-intake member being such that said needle terminates short of the outer end of said ring.

7. In a portable stove or like apparatus a sealed gas container having a perforatable wall; a gas-intake head adapted to receive gas from said container after perforation of said perforatable wall, said gas-intake head being formed with an outwardly opening bore; a tubular gas-intake member slidably and rotatably movable in the bore of said gas-intake head; spring means urging said gas-intake member outwardly with respect to said gas-intake head; a ring of a flexible sealing material at the outer end of said tubular gas-intake member; means to force said gas-intake head towards said perforatable wall against the action of said spring means to cause said ring to be pressed against said wall in gas-tight engagement therewith; and a perforating needle carried by said gas-intake head coaxially to said gas-intake member to perforate said perforatable wall when said gas-intake head is forced towards said container, said needle being so disposed within said head that it does not engage said perforatable wall before said ring has been tightly applied against same.

8. In a portable stove or like apparatus as claimed in claim 7, means to limit the outward stroke of said tubular gas-intake member under the action of said spring means, the outermost position of said tubular gas-intake member being such that said needle terminates short of the outer end of said ring.

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