March 24, 1964 A. GREEN 3,126,047

MULTIPLE GAS BURNER AND INTERNAL DIVERTER

Original Filed Jan. 27, 1958 2 Sheets-Sheet 1

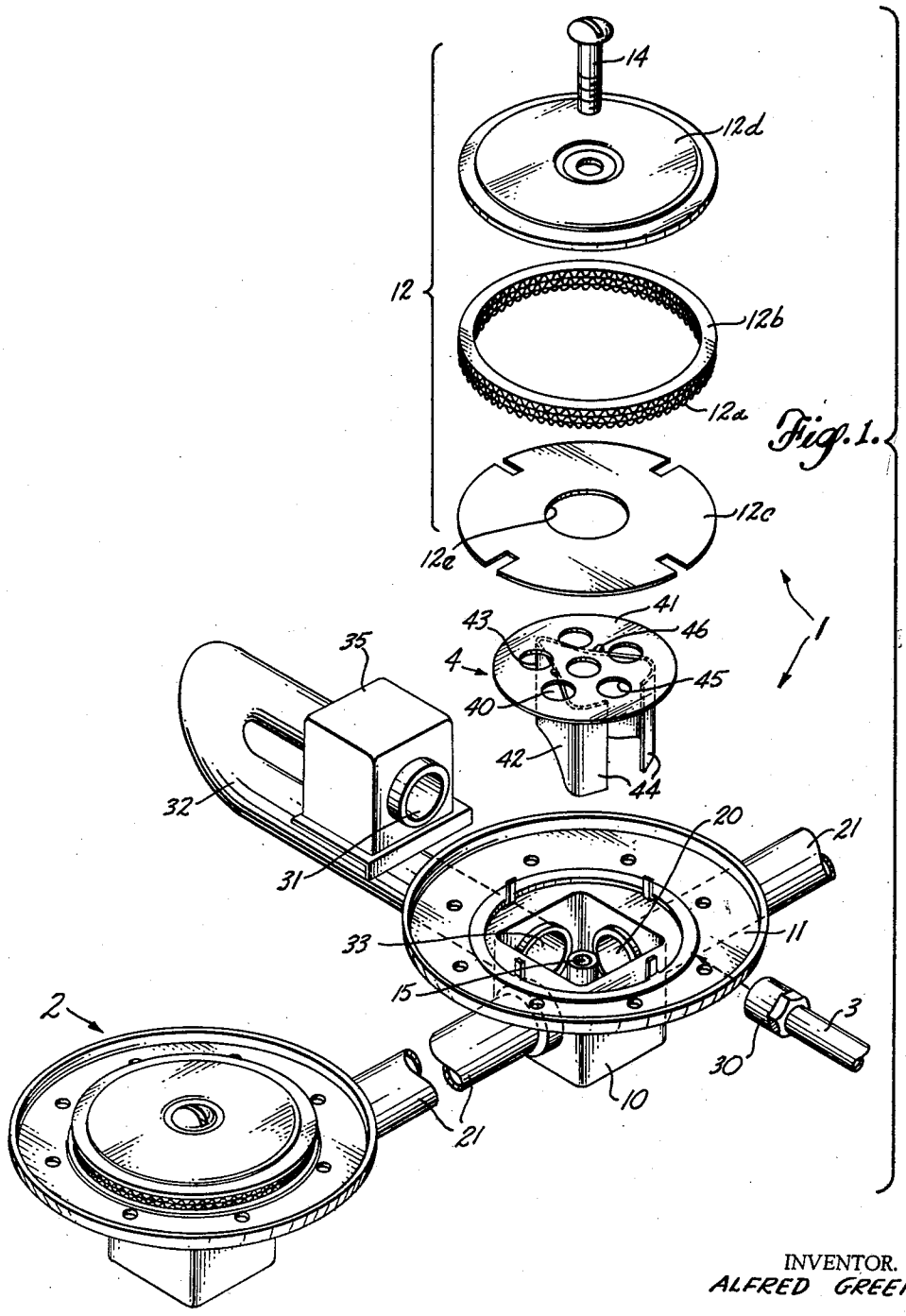

Fig. 1.

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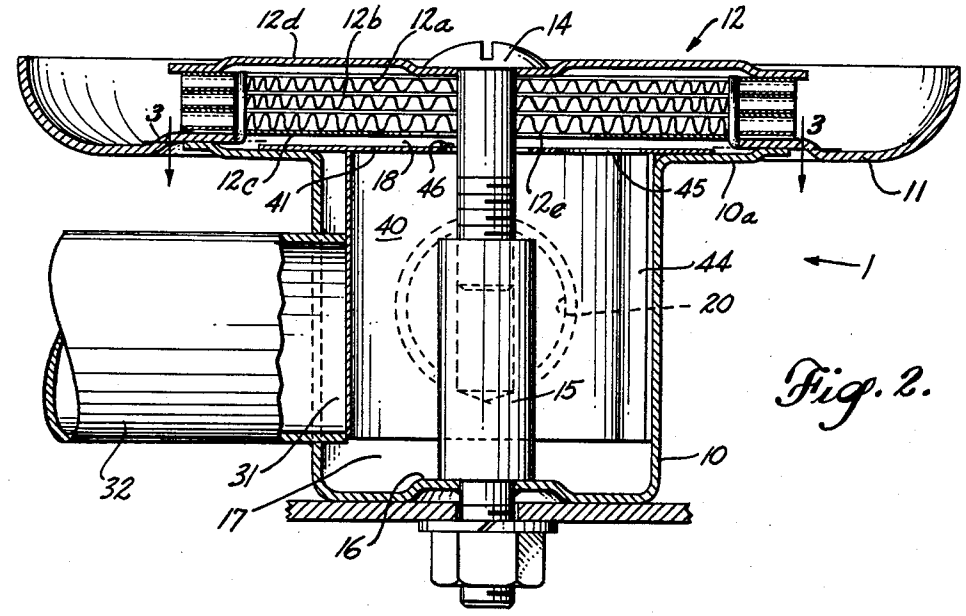

Fig. 2.

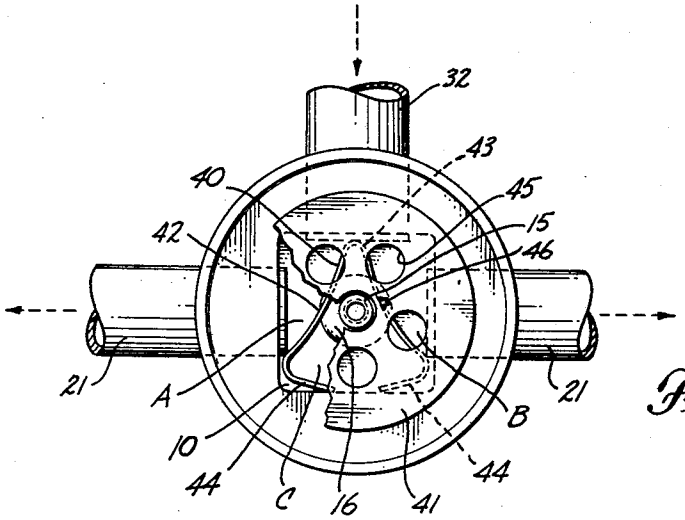

Fig. 3.

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MULTIPLE GAS BURNER AND INTERNAL DIVERTER

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Continuation of application Ser. No. 711,365, Jan. 27, 1958. This application Oct. 24, 1960, Ser. No. 65,559
10 Claims. (Cl. 158—104)

Campers, hunters and those who reside in remote places frequently employ multiple-burner gasoline stoves (usually with three burners, although some have but two burners) of a well known type, in which gas is generated from liquid gasoline at a centrally positioned master burner in a generative tube overlying that burner, and is delivered in gaseous form to a distributing chamber immediately beneath and communicating directly and freely with the master burner, and is distributed from that chamber by means of a lateral conduit or conduits to the outlying secondary burner or burners. It has been found in use that the tendency is for the hot gas to rise immediately and so to be supplied over-plentifully to and burned principally at the master burner immediately beneath which it is first delivered, and so the latter will burn with a high flame, whereas the flow to the secondary burners tends to be inadequate, even with their control valves fully opened, and the low flame in these secondary burners may blow out. If this occurs in an enclosed space, as for instance within a tent or cabin, there is a very real danger of asphyxiation and of explosion and fire, arising from the continuing use of the stove. The tendency to blow out is particularly aggravated if it be attempted to turn down the master burner, for that results in disproportionately greater lowering of the flame in the secondary burners. Regardless of blowing out, the uneven distribution of gas to the several burners detracts from the usefulness of the stove, and renders its control difficult. It is the object of the present invention to provide means to insure more equal distribution of the gas to the secondary burners so that, in effect, each individual burner may be regulated between high and low flame without too greatly affecting any other burner. This end is accomplished by a diverter and back pressure generator of special type, installed within the distributing chamber beneath the master burner.

Such stoves as these are relatively inexpensive and must be light in weight for portability. Moreover, since they are used in remote places, any diverter that is to be used must be small, light, reliable and itself easily transportable and replaceable, as well as inexpensive. To provide a diverter having these characteristics is a further object of this invention.

The present invention concerns the stove as a whole, including the master burner and one or more secondary burners, and in particular the distribution chamber and the conduits therefrom to the secondary burner or burners, in combination with a diverter and back pressure generator for installation in the distributing chamber, and the invention concerns further the novel form of such a diverter and back pressure generator per se, for use in a standard stove of the character described. The stove is of known or standard construction, and usually the diverter alone will be sold and installed in a stove already purchased.

The present invention is disclosed in a typical form of execution in the accompanying drawings, wherein FIGURE 1 is an exploded isometric view of a master burner, of the distributing chamber therebeneath, and of the conduit connections to two secondary burners, illustrating the device of the present invention ready for installation.

FIGURE 2 is a vertical sectional view, substantially along the axis of the gas supply tube and inlet port,

illustrating the distributing chamber beneath the master burner with the diverter of this invention installed therein and the master burner thereabove, and FIGURE 3 is a plan view of the same, at the plane indicated at 3—3 in FIGURE 2, with the cap structure of the burner removed, and illustrating primarily the diverter installed within the gas distributing chamber.

The gas generative device in such a stove is part of a master burner **1**, which like the secondary burners **2**, in the stove chosen to exemplify the invention, is composed of a series of stacked and alternating rings **12***a* and **12***b* closed over by a non-perforate cap **12***d*. The rings **12***a* are radially corrugated and the rings **12***b* are planar, thereby defining many radial exits for gas from a centrally located vertical passage for the gas. Each such burner rests upon a dished bottom flange, or shallow cup **11**, and is held in place by a screw **14** passing downwardly through the cap **12***d* and threading within a post **15** beneath the burner, and upstanding within the distributing chamber **10**, which lies beneath the master burner **1**. The gas distributing chamber **10** is formed generally rectangular in plan, with vertical walls that support the cup **11**, and is closed at its bottom. A disk **12***c* open at its center **12***e*, rests within the cup **11** beneath the rings **12***a*, **12***b* to insure exit of gas from the distributing chamber **10** axially upwardly through the central passage within such rings **12***a* and **12***b*, and beneath the cap **12***d*. Its only exit is by way of the circumferential ring of radial exits defined by the rings **12***a*, **12***b*. All the burners are of essentially the same construction and arrangement, except that the distributing chamber beneath the master burner receives all the freshly generated gas, and such as is not burned in the master burner can pass outwardly through the lateral conduit means **21** to the secondary burner or burners. Since, however, there is a directly upward exit for the hot, freshly generated gas from the distributing chamber **10** beneath the master burner, by way of opening **12***e* and so out the master burner, and without the diverter of this invention there is nothing which is effective to create back pressure between the chamber **10** and the master burner, the volume which exits by way of lateral conduits **21** to secondary burners is unlikely to be large, even at best.

It is understood that gas is generated from liquid gasoline or like fuel by means of a generator tube **3** which, in use, overlies the master burner **1** and is heated by the flame from the latter, and the spigot **30** of this generator tube fits within a socket **31** at one side of the master burner, leading to a mixing chamber **35** wherein the gas mixes with air, and whence a gas supply tube **32** leads downwardly and then inwardly and through one wall of the chamber **10**, which has an inlet port **33** in one wall for the gas. Outlet ports **20** are disposed in the walls at points spaced from the inlet port **33**, and lead by way of lateral conduit means **21** to the secondary burner or burners **2**.

As has been stated, any such distribution of the gas is necessarily rather haphazard for the reason that the gas is heated and tends to rise, oversupplying the master burner, and does not readily move laterally through the conduits **21**, for there is no such back-pressure at the master burner as to force appreciable amounts of gas to flow thus laterally. The result is that the gas supply through the conduit means **21** is often inadequate to maintain more than a minimum flame in the secondary burners **2**, while the flame at the master burner **1** is higher than required. It follows that it is not possible to turn down the master burner without the danger of extinguishment of the secondary burners, nor is the flame in the secondary burners sufficiently high for proper regulation, nor sometimes for practical use.

According to the present invention, a diverter and back

pressure generator is employed within the gas distributing chamber 10, and between the inlet to that chamber and the master burner 1, of such shape and so arranged, and so held in place, as to block free exit of gas by way of the master burner, and thus dynamically to effect diversion of the gas in adequate volume to the conduits 21 leading to the secondary burners. Only incidentally, and primarily as a result of back pressure in the passages to the secondary burners, is gas permitted to pass through a restricted passage, as for example around a horizontal edge or edges of the diverter, preferably its lower edge, for access through the center of the cap assembly, at the central opening 12*e*, to the master burner. The supply to the master burner is adequate, but the dynamic flow by reason of the diverter, and the back pressure thus created, forces a higher percentage of gas to the secondary burner.

The diverter and back pressure generator may assume various forms, primarily including an upright wall which diverts gas entering at the inlet port 33 towards the outlet port or ports 20. It is indicated in general by the numeral 4. Preferably it is formed of two parts, namely, a metal ribbon 40 of V-shape, or of modified delta shape, disposed as an upright wall in use, and as a whole defining a generally horizontal plane, and a perforated disk 41 overlying the delta at one edge. The parts should be of heat-resistant material, such as stainless steel, and the ribbon at least should have some resilience.

For use in a three-burner stove the ribbon is formed with an apex 43 which is installed in position to divide the gas stream entering through inlet port 33, and legs 42 extend thence past the respective outlet ports 20 to direct entering gas to these ports 20 and thence to the secondary burners 2. If installed in a two-burner stove division of the entering gas is unnecessary, and the leg of the delta may extend from a point beyond the inlet port to a point beyond the outlet port. Assuming its use in a three-burner stove, as shown, the two legs 42 of the delta-shaped ribbon are curved as viewed in plan, and each extends entirely across the gas distributing chamber to an opposite wall, thereby facilitating dynamic flow to the secondary burners, and dividing the chamber into three subchambers, namely two outer subchambers A and B and an inner subchamber C. The two legs 42 are separate, and their resilient termini 44 bear against the walls of the chambers. They can be squeezed together for installation and then spring outwardly to frictionally engage the chamber walls. This will maintain the diverter in its operative position, and could serve as the entire support of the diverter, although a further support preferably is provided.

It is necessary to insure that some gas entering at inlet port 33 will reach the master burner. Since the legs 42 of the diverter direct the entering gas by way of subchambers A and B towards the outlet ports 20 leading to the secondary burners 2, provision is made for passage of some of the gas to the inner chamber C and thence indirectly to the master burner. This can be done by spacing the ribbon 40 at one or both its edges from adjacent structure; preferably its lower edge only is spaced above the bottom of the distributing chamber 10 to leave a horizontal, somewhat restricted, low-lying passageway 17 between the inner subchamber C and the outer subchambers A and B. The passage 17 is largely out of the flow path of gases that exit at 20, but is the principal communication between the two outer and the inner subchambers. Sufficient gas is expelled by back pressure in the subchambers A and B to supply the needs of the master burner 1 by way of subchamber C. Gas from the inner subchamber C rises into the central aperture of the master burner, and thence exits between rings 12*a* and 12*b*.

To assist in attaining such back pressure the ribbon is preferably affixed to a disk 41, the latter being of a size to overlie the distributing chamber 10 and to rest upon the flange 10*a*. Being affixed to the disk with its upper edge in close contact therewith, there is no space across

the upper edge of the ribbon for passage of gas from outer subchambers A and B to inner subchamber C, yet such a passage might be provided to supplement or supplant the lower passage 17. Some leakage directly from subchambers A and B to the burner's central aperture may be desirable, and if so the disk 41 is apertured as shown at 45, above the outer subchambers, as well as above the inner subchamber.

The disk is affixed to the ribbon at 46, intermediate the ends of the legs of the delta. The termini 44 are left free, so that by their resilience they may frictionally engage the walls of the distributing chamber, and so that they may be sprung inwardly for installation, as already described.

The spacing of the ribbon's lower edge above the bottom of the gas distributing chamber might be achieved otherwise than by its suspension from the disk 41. For example, its lower edge might rest upon the boss 16 which stands up centrally of the bottom, and in such case the disk 41 need not be affixed to nor support the ribbon. It is preferred, however, that the diverter and back pressure generator be one unit, for ease of handling, hence the construction shown and described is preferred.

When the stove is operating, with gas generated at the master burner 1 and delivered at inlet port 33 to the gas distributing chamber 10, the dynamic movement of such gas is guided by the curved walls 42 to the outlet ports 20 although some of the gas escapes through the passage 17 or equivalent passages, and through apertures 45 if these are provided, into the central aperture of the master burner 1, and thence exits around the burner's periphery, in far smaller volume than if the diverter were absent. The diverter and back pressure generator equalizes the gas volume delivered to the several burners. Each secondary burner is readily and individually controlled by its own throttle valve (not shown), and the total gas supply and hence the supply to the master burner is regulated by the main supply valve (also not shown). Tests have shown that each burner, with all operating simultaneously, can be adjusted to boil a like quantity of water in the same length of time. No burner is starved.

The device is small in size and of light weight, and relatively inexpensive. A person going into a remote area and depending upon such a stove can readily carry several such devices. They will last for considerable periods of time, since they are not directly exposed to the heat of the flame, but should one need replacement it is a simple matter to replace it by simply removing the screw 14 and the cap and burner assembly and installing a new diverter 4, the only tool required being a screw driver for the screw 14. Once installed, the diverter is securely held in operative position, and cannot be lost nor displaced.

This application is a continuation of my application Serial No. 711,365, filed January 27, 1958, now abandoned.

I claim as my invention:

1. In combination with a gas burning device including casing means defining a gas distributing chamber having a top opening to supply a first burner means, and said casing means having spaced gas inlet and outlet ports formed in its side walls, a second burner means connected for supply to said outlet port, gas diverter means inserted within the gas distributing chamber and including a ribbon of metal disposed in an upright plane and having a leg extending substantially entirely across the chamber and from the top opening downwardly, from a location adjacent the mouth of the inlet port to a location on the opposite side of the outlet port from said inlet port, said ribbon leg being so spaced from the adjacent portions of the chamber side wall between said locations as to divide the chamber into two subchambers at least one of which communicates with the top opening and the other of which interconnects the inlet and outlet ports to divert gas therebetween and to the second burner means, and

means overlying said top opening for creating back pressure in the subchambers.

2. The combination according to claim 1 wherein the casing means also is formed to define a second outlet port in the side wall of the chamber, a third burner means connected for supply to said second outlet port, and the metal ribbon having an additional leg extending from the inlet port to the opposite side of the second outlet port from the inlet port, and said second leg being spaced from the chamber's wall to define an additional subchamber interconnecting the inlet port and the second outlet port.

3. The combination according to claim 1 wherein the metal ribbon is mounted in spaced relation to the bottom of the chamber so as to define a passage beneath it through which the subchambers can communicate.

4. The combination according to claim 3 wherein the means for creating back pressure in the subchambers includes a perforated disk mounted in the top opening and having the metal ribbon depending therefrom.

5. The combination according to claim 2 wherein the ribbon is in the form of a delta configuration disposed with its apex at the location adjacent the mouth of the inlet port.

6. The combination according to claim 5 wherein the ribbon terminates at ends spaced apart from one another opposite the apex.

7. A gas diverter for use in the primary gas distributing chamber of a multi-unit gas burning device, comprising a ribbon of metal formed generally in a delta shape, and adapted to be disposed in use within such chamber, with the plane defined by the delta horizontal, and a disk applied to the upper edge of said ribbon, of a size and shape such that when the diverter is disposed in operative relation to the chamber said disk is adapted to cover

and close such chamber, said disk being perforated for passage of gas in controlled quantity from its lower to its upper side.

8. A gas diverter for use in the primary gas distributing chamber of a multi-unit gas burning device, comprising a ribbon of metal formed generally in a delta shape, and adapted to be disposed in use within such chamber, with the plane defined by the delta horizontal, the delta shape being of a size and shape such that when so disposed its three points, including its apex, will contact the side walls of such chamber, and a perforated disk applied to the upper edge of said ribbon, said disk being of a size and shape such that when the diverter is disposed in operative relation to the chamber said disk is adapted to cover and close such chamber.

9. A gas diverter according to claim 8 wherein the ribbon and the disk are joined together at points intermediate the ends of the legs of the delta at opposite sides of its apex, but the ribbon is left free from such points to the ends of the delta opposite its apex, for flexing.

10. A gas diverter according to claim 9 wherein the upright free ends of the ribbon, opposite the apex of the delta, are spaced apart when relaxed.

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