Feb. 6, 1973 J. W. SPOTTS 3,714,938

CAMP STOVE

Filed April 20, 1971

FIG.1

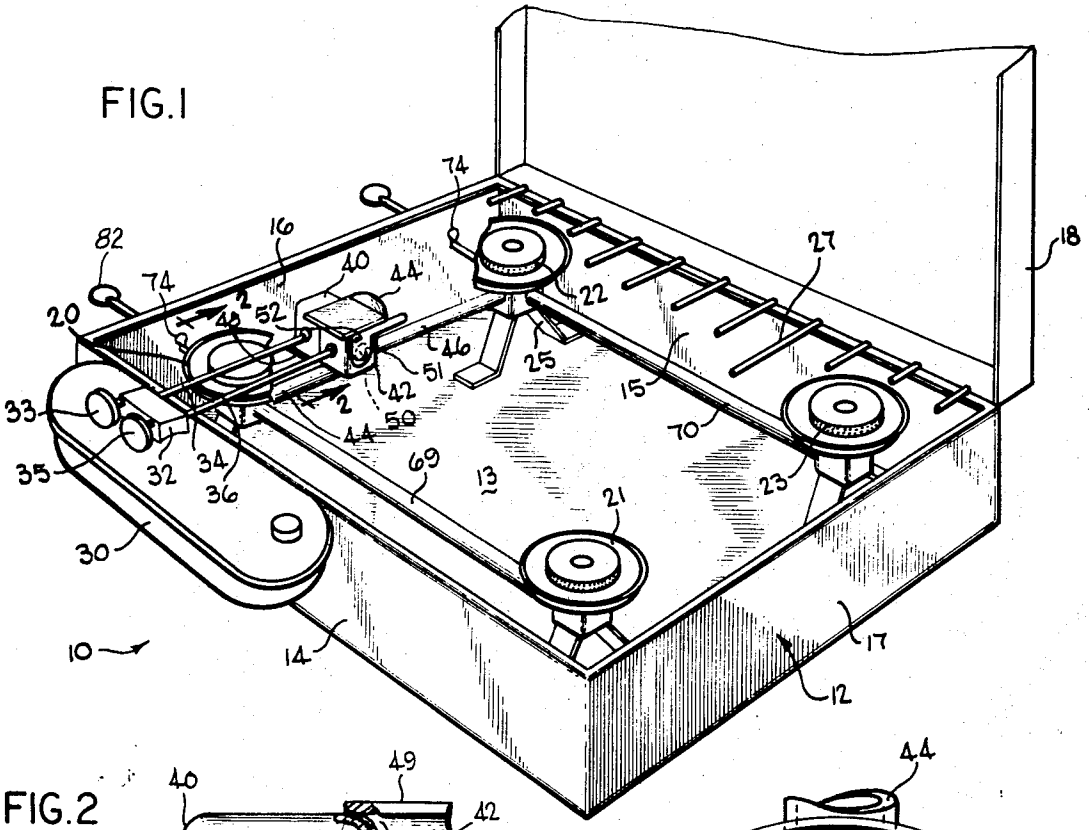


FIG.2

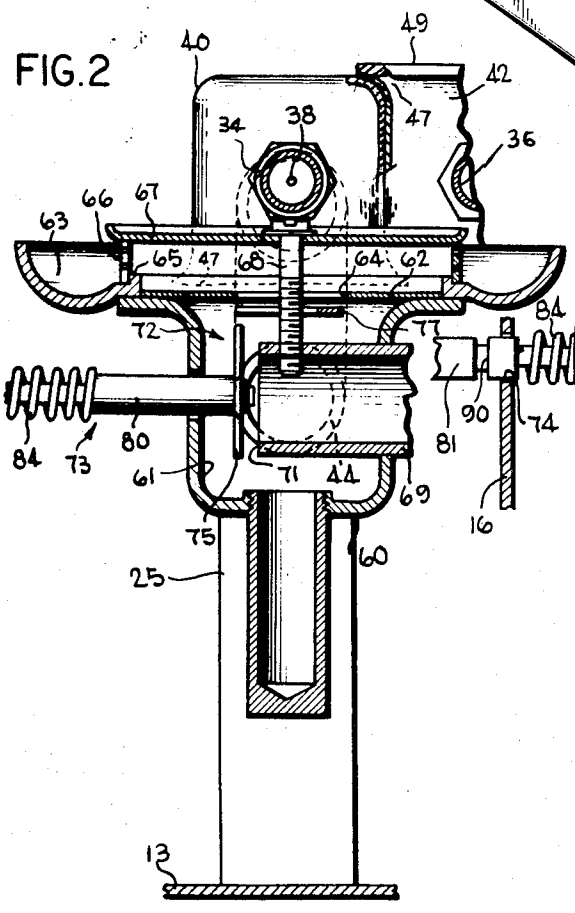
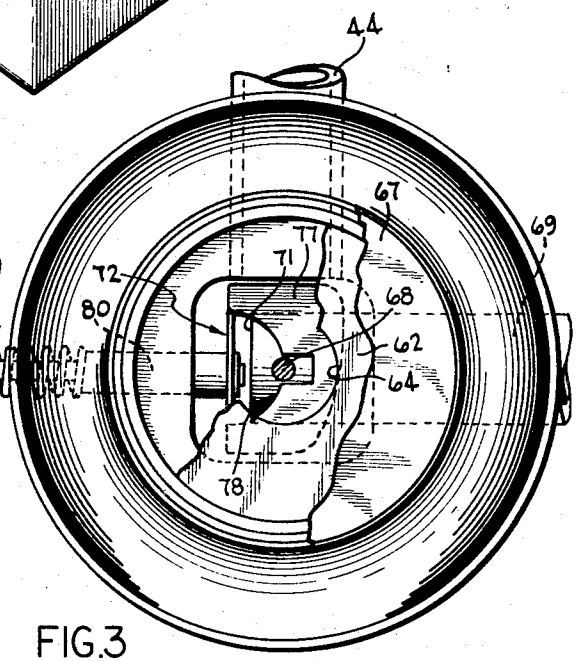


FIG.3



INVENTOR

J. WILLARD SPOTTS

Charles F. Lind

ATTY.

United States Patent Office

3,714,938
Patented Feb. 6, 1973

3,714,938

CAMP STOVE

J. Willard Spotts, Huntsville, Mo., assignor to McGraw-Edison Company, Elgin, Ill.

Filed Apr. 20, 1971, Ser. No. 135,617
Int. Cl. F24c 5/20
U.S. Cl. 126—38 9 Claims

ABSTRACT OF THE DISCLOSURE

A camp stove having separate burners that receive fuel from separate vaporizing tubes, but where one burner heats both of the vaporizing tubes; and further having a control as between two burners that receive fuel mixture from the same vaporizing tube such that when the control is closed it directs all of the mixture to the first burner but as it is shifted to admit fuel mixture to the second burner it also throttles the fuel mixture passage to the first burner so that fuel mixture is directed to the burners in approximately equal quantities when the control is fully shifted.

Camp stoves frequently burn an unleaded gasoline or other low volatility liquid petroleum product, which must be vaporized before it burns smoothly in a controlled manner. Consequently, a vaporizing tube commonly is held close to the actual burner flame and the liquid fuel is passed through the tube and heated to a temperature sufficient to become a gas. This gas fuel is then mixed in a carburetor with air for common discharge as a combustible mixture from the burner, and a control valve located upstream of the vaporizing tube typically at the fuel tank adjusts the heat output of the burner. To have the vaporizing burner and another operate simultaneously off the same vaporizing tube, a pipe commonly connects the carburetor also with a secondary burner and part of the total gas mixture is bled off as regulated by a control valve in the pipe. Since generally the run from the carburetor to the secondary burner is longer than from the carburetor to the vaporizing burner, the resulting greater pressure drop keeps the secondary burner output lower than the vaporizing burner output.

This invention discloses, and an object of the invention is to provide, an improved diverting control system between the carburetor and the vaporizing and secondary burners such that each passage between the carburetor and the respective burner changes in area progressively as the relative outputs of the burners are changed through the adjustment of the control, effective to make the burner outputs more nearly equal if such is desired.

Another common defect in existing camp stoves is the inadequate number of burners, frequently two burners or possibly three. This means that for larger families or greater demands, more than one stove must be used.

This invention describes, and another object of this invention is to provide, a camp stove having four burners where two control valves and two vaporizing tubes are utilized each to feed a pair of burners, but where each vaporizing tube is heated by the same vaporizing burner. This eases the manner of starting all other burners, and since the second burner ignited in use would be the other vaporizing burner, the arrangement provides independently controlled maximum heat outputs for the first two operating burners. Should three or four burner operation

be desired, a diverter valve in accordance with the first feature of the invention can be provided.

These and other objects of this invention will be more fully understood and appreciated after referring to the following specification, the accompanying drawing forming a part thereof, wherein:

FIG. 1 is a perspective view of the subject camp stove showing part of the components broken away for clarity of disclosure;

FIG. 2 is a sectional view as seen generally from line 2—2 in FIG. 1, showing details of construction of the carburetor, diverter valve mechanism, and the vaporizing tube arrangement; and

FIG. 3 is a top plan view of the burner shown in FIG. 2.

Referring to FIG. 1 of the drawing, the camp stove 10 shown has a sheet metal case 12 of box-like construction having a bottom wall 13, a front wall 14, a rear wall 15, and opposed side walls 16 and 17, and a cover 18 is hinged along the upper edge of the rear wall 15 to close the case in a known manner suitable for traveling. The case has mounted therein four burners being identified as front vaporizing burner 20, front secondary burner 21, rear vaporizing burner 22 and rear secondary burner 23. Each of the burners is supported from the bottom wall by means of a sheet metal foot or bracket typically shown at 25. A grating 27 formed of strong metal rods or the like is adapted to be removably supported adjacent the upper edge of the case 12 in overlying spaced relation to the burners for supporting cookware over the burner flame.

A fuel tank 30 is removably mounted by hook means or the like (not shown) relative to the front wall 14 of the case, and a valve block 32 on the fuel tank has a pair of components 33 and 35 communicating between the fuel tank and respective vaporizing tubes 34 and 36 extended from the valve block in general overlying relation to the burner 20. The free ends of the vaporizing tubes each has a nozzle 38 of typical construction for discharging a jet of vaporized fuel and this nozzle fits through an opening in the near side wall of a carburetor mixing device. Two carburetor devices 40 and 42 are used, being located side by side for the respective vaporizing tubes 34 and 36, and pipe 44 connects the carburetor 40 to the burner 20 and pipe 46 connects the carburetor 42 to the burner 22.

The carburetors are in effect an inverted cup having a solid top wall, an inlet opening for the fuel nozzle in one side wall, a pipe outlet opening to the burner in another side wall, and an opening in either the bottom wall or a remaining side wall for admitting air to provide a proper combustible mixture. Specifically, the devices might be formed of sheet metal stampings each having an enlarged flared open end 47 and the appropriate openings in the side walls for removably receiving the nozzle and for receiving the pipe which can be welded thereto. The device 40 utilizes the open end at the bottom for an air inlet, with a slide plate 48 adjustably covering the same to achieve a richer mixture as required particularly for cold starting. The device 42 has a solid closure plate 49 over the open end which is now located at the top, and the devices can be secured together in a side by side manner. Another opening 50 then can be punched or drilled in the last open side wall to serve as the air inlet, and a dimpled plate 51 is hinged at pin 52 adjacent the

side wall to adjustably cover the opening to regulate the fuel air mixture.

Each burner has a cup shaped manifold **60** where plate **62** closes the top of the manifold except for opening **64** and an annular piece **66** and cover **67** are fitted over upstanding ring **65** on the plate and held in place by a screw **68** threaded into the manifold structure. The opening **64** permits passage of the combustible gas mixture within the burner manifold for discharge through jets in the annular piece **66** to over the upwardly cupped burner plate **63** above which a flame develops. Fuel mixture pipe **44** is connected to the manifold of burner **20**, while pipe **46** is connected to the manifold of burner **22**; and diverter pipes **69** and **70** are connected between the manifolds of the front burners **20** and **21**, and the rear burners **22** and **23** respectively. Thus, vaporizing tube **34** operates through carburetor **40** to provide fuel for burners **20** and **21**, while vaporizing tube **36** operates through carburetor **42** to provide fuel for the burners **22** and **23**.

The particular control for operating either of the secondary burners **21** or **23** will now be disclosed. It can be noted from FIGS. 3 and 4 that the typical diverter pipe extends into the burner manifold a limited distance and is provided with an annular seat **71** at its open end. A diverter control element **72** is supported at the end of rod means **73** extended through an opening in the manifold wall and a slotted opening **74** in the case side wall **16**. The element **72** has a flat face **75** which is sufficiently large to completely close the open pipe end when it engages the seat **71** which then stops fuel mixture passage to the connected secondary burner. The element **72** also has a laterally extending leg **77** adjacent the underside of burner plate **62**, the leg having a keyhole shaped opening **78** which is aligned generally under the inlet opening **64** when the face is against the seat to provide the largest effective passage between the manifold and the primary burner through the openings **78** and **64**. The rod means **73** is preferably of two telescoping pieces **80** and **81** which are connected to the element **72** and to an actuating handle **82** respectively, and a spring **84** is confined between the telescoped pieces tending to separate them from one another. The outer piece **81** further is provided with a groove **90** which can fit into the slot of case opening **74** to hold the element **72** snugly against the seat and thereby close off the secondary burner.

To operate the secondary burner, the outer rod **81** is disengaged from the case wall and shifted outwardly to uncover the open end **71** of the diverter pipe to permit fuel mixture to flow to the connected secondary burner. Movement of control element **72** also causes the openings **78** and **64** to become misaligned to reduce the overall effective passage area between the manifold and the primary burner. This control element movement throttles the effective gas passage area to the primary burner while it opens the passage area to the secondary burner, and does so progressively as the element is moved away from the seat **71**, until at its opposite position the effective passage areas are approximately equal. This means that both burners receive approximately the same volume of gas mixture to operate at approximately equal outputs.

In operation, the control valve **33** is initially opened which feeds through the carburetor device **40** to the front burner **20** which can be and when ignited heats the vaporizing tube **34** for sustaining vaporized fuel feed to the burner. While the burner **20** is operating, the vaporizing tube **36** is likewise being heated although with the valve closed no fuel will be discharged. Should operation of a second be needed, it would be preferable to then ignite the rear burner **22** upon opening control valve **35** which feeds through the carburetor device **42**. Each of the burners **20** and **22** is then controlled independently by the respective control valve. Should a third burner be needed, either of the secondary burners **21** and **23** can be ignited and regulated by the respective diverter control to where the connected pair of burners can have virtually equal outputs, and likewise for a fourth burner. The fuel tank is typically provided with hand pump means (not shown) to force the liquid gas through the vaporizing tubes under the direct adjustment of the valve means **33** or **35**.

What is claimed is:

1. A camp stove comprising a case, first and second burners supported in the case and having respective carburetor mixing devices connected thereto, a fuel tank having first and second vaporizing tubes through which fuel can be discharged, first and second control valves for regulating fuel discharge through the respective vaporizing tubes, and means for mounting the fuel tank on the case such that the first and second vaporizing tubes are operatively associated with the respective carburetor mixing devices to discharge fuel thereto and are further disposed in heat receiving proximity to the first burner whereby the first burner heats both the first and second vaporizing tubes, said first burner having a manifold including an outlet opening therefrom to jets of the first burner, a third burner supported in the case, fuel conveying means connecting the first burner manifold with the third burner, and a flow control located in the manifold operable in one extreme position to close the connecting means and operable upon movement from this one extreme position to progressively open the connecting means and to reduce the effective area of the manifold outlet opening to the first burner jets.

2. A camp stove according to claim **1**, wherein the flow control includes a single element having spaced control faces that cooperate with the fuel conveying means and with the manifold outlet opening, respectively.

3. A camp stove comprising a case, first and second burners supported in the case and having respective carburetor mixing devices connected thereto, a fuel tank having first and second veporizing tubes through which fuel can be discharged, first and second control valves for regulating fuel discharge through the respective vaporizing tubes, and means for mounting the fuel tank on the case such that the first and second vaporizing tubes are operatively associated with the respective carburetor mixing devices to discharge fuel thereto and are further disposed in heat receiving proximity to the first burner whereby the first burner heats both the first and second vaporizing tubes third and fourth burners supported in the case, and fuel conveying means connected between the first and third burners and between the second and fourth burners, respectively, each such fuel conveying means including a flow control operable to regulate the fuel discharge to the respective third or fourth burners as a percentage of the fuel discharge to the first or second burners.

4. A camp stove comprising a case, two burners supported in the case, one of the burners having a manifold including an outlet opening therefrom to jets of the said one burner, fuel conveying means connecting the one burner manifold with the other burner, a flow control located in the manifold operable in one extreme position to close the connecting means and operable upon movement from this one extreme position to progressively open the connecting means and to reduce the effective area of the manifold outlet opening to the one burner jets, a fuel tank having a vaporizing tube through which fuel can be discharged, a control valve for regulating fuel discharge through the vaporizing tube, and means for mounting the fuel tank on the case such that the vaporizing tube is operatively associated with the one burner manifold to discharge thereto and is further disposed in heat receiving proximity to the one burner.

5. A camp stove according to claim **4**, wherein the flow control includes a single element having spaced control faces that cooperate with the fuel conveying means and with the manifold outlet opening, respectively.

6. A camp stove according to claim **5**, wherein an actuator is connected to said flow control element and

extends exteriorly of the manifold and the case operable to be shifted by an operator to move the flow control.

7. A camp stove according to claim 6, wherein said actuator is composed of cooperating telescoping rod elements where one element is connected to to flow control element, a spring tending to separate the rod elements axially, and lock means on the other rod element and case which when engaged compresses the spring to shift the flow control to the one extreme position.

8. A camp stove according to claim 5, wherein still a third burner is supported in the case, a carburetor device connected for discharge to the third burner, a second vaporizing tube supported from the fuel tank and a separate control valve for regulating fuel discharge through the second vaporizing tube and the second vaporizing tube being operatively associated with the carburetor device

to discharge fuel thereto and being in heat receiving proximity to the said one burner.

9. A camp stove according to claim 8, wherein an actuator is connected to the flow control and extends exteriorly of the manifold and the case operable to be shifted by an operator to move the flow control.

References Cited

UNITED STATES PATENTS

626,745	6/1899	Woodward et al.	431—234
1,671,618	5/1928	Thatcher	431—234
1,796,767	3/1931	Schmidt	431—234 X
1,827,951	10/1931	Mummery	126—38 X
3,126,047	3/1964	Green	431—234

EDWARD G. FAVORS, Primary Examiner