April 19, 1966 C. F. PETERSON 3,246,644

PORTABLE WATER HEATER

Filed April 9, 1965

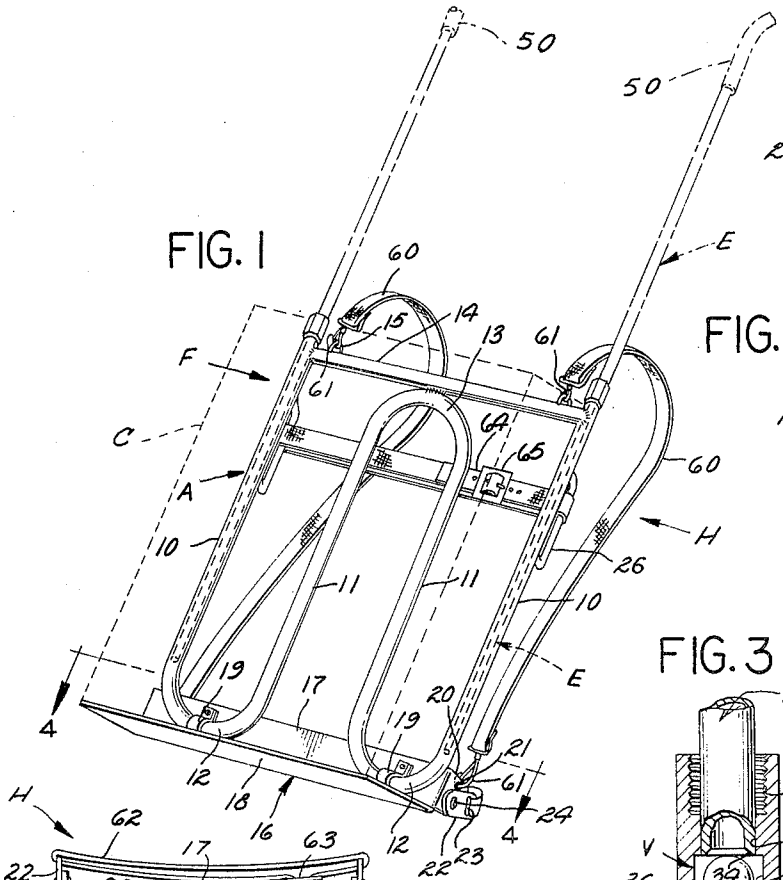


FIG. 1

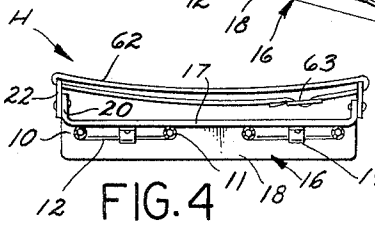


FIG. 4

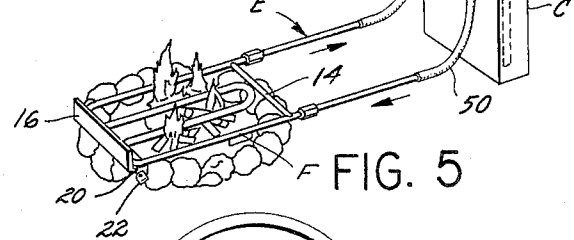


FIG. 5

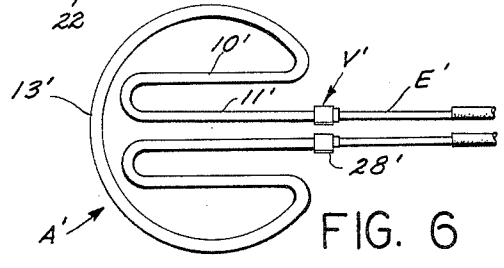


FIG. 6

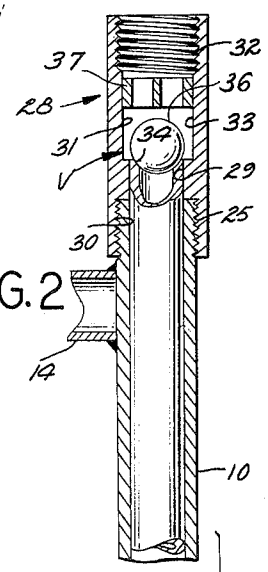


FIG. 2

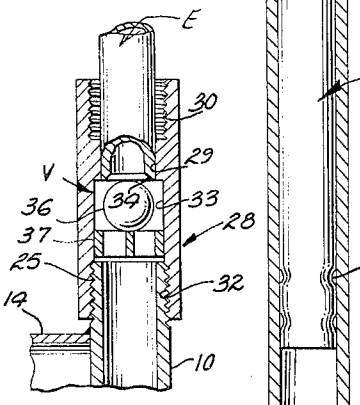


FIG. 3

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PORTABLE WATER HEATER

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8 Claims. (Cl. 126—344)

This invention relates to an improved portable combination water heater, fire grill and back rack.

For many years it has been common practice for campers, Boy Scouts, certain military personnel, and other outdoorsmen, to pack and carry camping equipment on their backs on what is commonly referred to as a back rack. Included in their equipment are suitable vessels, such as pots and pans, in which water can be heated over a camp fire. Due to the necessarily limited size and number of such pots and pans, and to fact that the camper does not carry a grill to place over a camp fire on which such pots and pans can be set for the purpose of heating water, hot water is a luxury and is ordinarily dispensed with in camp.

An object of the present invention is to provide a novel back rack, the frame of which serves as a campfire grill and a water heating coil.

Another object of my invention is to provide a back rack having a tubular steel frame formed to establish a flat water conducting coil having inlet and outlet ends.

It is another object of my invention to provide a water heating coil of the character referred to having tubular extensions telescopically related to each end thereof with which suitable flexible water conducting hoses can be coupled.

Still another object of my invention is to provide a novel water heater construction of the character referred to having valve means to establish and control the direction of flow of steam and water through the coil.

It is another object of this invention to provide a novel portable water heater having a suitable harness to facilitate engaging the heater on the back of a person for the purpose of transportation.

It is an object of my invention to provide a novel portable water heater of the character referred to having a tubular frame, a container releasably carried by the frame, a body engaging harness releasably coupled with the frame, and engageable over and with the shoulders and back of a person transporting the heater.

It is a feature of the present invention to provide a water heating coil for engagement over campfires or the like, having extensions to project from and clear of the fire, and with which water conducting hoses can be advantageously connected for establishing communication between the coil and and the water container.

Another object of my invention is to provide a portable water heater of the character referred to on which camping equipment can be packed, a heater construction which is light, neat and compact, and a heater which is highly effective and dependable in operation.

The various objects and features of my invention will be fully understood from the following detailed description of typical preferred forms and applications of the invention, throughout which description reference is made to the accompanying drawings, in which:

FIG. 1 is a perspective view of my new water heater showing the harness engaged therewith;

FIG. 2 is an enlarged detailed sectional view of a portion of my new water heater;

FIG. 3 is a view of a portion of the construction shown in FIG. 2, showing the parts in a different position;

FIG. 4 is a sectional view taken as indicated by line 4—4 on FIG. 1;

FIG. 5 is a perspective view of my new water heater, showing it in use; and

FIG. 6 is a view of a modified form of water heater provided by the present invention.

The portable water heater provided by my invention includes, generally, a frame F, a harness H related to the frame, a container C related to the frame, valve means V, and extension tubes E related to the frame.

The frame F is an elongate water and steam-conducting tubular unit having elongate straight, laterally spaced and parallel end portions **10**, straight parallel intermediate portions **11** spaced laterally of the end portions, and in a common plane therewith, and curved connecting portions **12** and **13** extending between one end of the end portions **10** and one end of the intermediate portions **11** and between the other ends of the said intermediate portions **11**, respectively.

The frame is established of a single length of stainless steel tubing, bent into the desired configuration.

The frame F further includes a first or upper spreader **14** fixed to and extending between the upper free ends of the portions **10** and the connecting portion **13** of the frame. The spreader **14** is established of an elongate, straight length of steel tubing fixed to the said several portions of the frame, as by welding.

The spreader **14** serves to reinforce and hold the ends of the frame with which it is related in fixed relationship, and is provided with a pair of upwardly projecting, laterally spaced, loops **15**, which loops are adapted to be engaged by suitable hooks of the harness H, as will be hereinafter described. The loops **15** are simple U-shaped units of rod stock fixed to the spreader by welding, or the like.

Fixed to and extending between the other or lower part of the frame F is a second or lower spreader **16**. In the case illustrated, the spreader **16** is an elongate angle member established of sheet metal stock and has a primary, upwardly projecting primary flange **17** occurring in a plane parallel with the main portion A of the frame, and occurring adjacent the connecting portions **12** of the frame, and a secondary flange **18** occurring in a plane at right angles to the flange **17** and frame, and projecting rearwardly from the said flange **17** and frame to establish a container and/or pack-supporting shelf at the lower end of the frame.

The spreader **16** is equal in longitudinal extent with the lateral extent of the frame and is fixed to the connecting portions **12**, by welding or, as in the case illustrated, by suitable clips or brackets **19**.

The ends of the primary flange **17** of the spreader **16** are provided with forwardly turned tabs or ears **20**. The ears **20** are provided with apertures **21** in which hooks of the harness H are releasably engaged, and have forwardly projecting plates **22** pivotally connected therewith, which plates are provided with slotted openings **23** to cooperatively receive a waste web or belt of the harness H.

The plates **22** are pivotally connected to the ears by means of rivet type fasteners or bolt type fasteners **24** so that a desired amount of friction is established between the plates and the ears to prevent free relative rotation therebetween, but to allow for easy and convenient manual pivoting of the plates relative to the ears.

In addition to the foregoing, the frame F is provided with coupling-engaging threads **25** about the exterior of the upper or free ends of the end portions **10** and is provided with elongate back-web or belt-engaging bars **26**, spaced forwardly of the end portions **10** at the upper portions thereof. The bars **26** have rearwardly turned ends which are fixed to the said end portions of the frame by welding.

The extension tubes E that I provide are simple, straight tubular members corresponding in longitudinal extent and slidably engageable in the end portions **10** of the frame F.

The extension tubes E are provided at one end, hereinafter referred to as their free ends, with means to cooperatively engage and seal with a rubber or plastic hose, which means is shown as including a pair of axially spaced annular grooves **27**, established in the tubes as by rolling, and are provided at their other or opposite ends, hereinafter referred to as their upper or inner ends, with threaded couplings **28**, which couplings releasably engage the threads **25** on the ends of the portions **10** of the frame and which carry the valve means V.

Each coupling **28** includes an elongate body having a central bore **29**, an enlarged internally threaded bore **30** of limited longitudinal extent entering one end of the body and adapted to receive the threaded end portion of the frame related thereto (as clearly illustrated in FIG. 2 of the drawings), an enlarged bore **31** of considerable longitudinal extent entering the other end of the body and having an internally threaded outer portion **32** adapted to releasably engage the threaded end of the end portion **10** of the frame related thereto, and a smooth, uninterrupted inner portion defining a valve chamber **33**. The upper end of the tube E related to each coupling extends freely through the enlarged bore **30** and is engaged in the central bore **29**, in which it is fixed as by brazing, or the like. The upper end of the extension tube E terminates in the chamber **33** and establishes an annular valve seat **34** for the valve means V.

The valve means V shown in FIGS. 2 and 3 of the drawings is a simple check valve and serves to allow for the flow of steam and water in one direction through the construction. In addition to the chamber **33** established by the bore **31** in the coupling body and the seat **34** established by the end of the extension tube, the valve means V includes a spherical ball-check **36** in the chamber and a spider **37** engaged and fixed in the chamber in spaced relationship from the seat, with the ball check **36** arranged therebetween.

The valve means in the other coupling (not shown) is similar to that shown in FIGS. 2 and 3 except that a spider, or its equivalent, is arranged adjacent the upper end of the extension tube communicating with the chamber **33**, and an annular valve seat is engaged in the chamber **33** outward of the spider and the ball check, thereby providing a check valve which allows for the flow of steam and water in a direction opposite to that which is permitted by the particular valve means V illustrated in the drawings and described above.

With the coupling **28** and valve means V related thereto, set forth above, it will be apparent that the extension tubes E can be selectively arranged to occur within the end portions **10** of the frame related thereto, as shown in FIGS. 1 and 2 of the drawings, or can be reversed to extend axially from the ends of said end portions **10** of the frame, so that a hose **50** can be engaged with the outer free ends thereof, as illustrated in FIGS. 3 and 5 and in phantom lines in FIG. 1 of the drawing.

When the extension tubes E are in their extended, working or operating position, the valve means V allows for the free flow of water and steam in one direction through the frame F and positively prevents the establishment of a reverse flow or of a vapor lock, which would prevent or stop flow through the construction.

The container C that I provide is a simple, upwardly opening vessel and corresponds in lateral and longitudinal extent with the frame. In practice, when the water heater is being transported, the container C can be used to carry camping equipment and is engaged on the flange **18** and against the rear side of the frame in the manner illustrated in phantom lines in FIG. 1 of the drawings.

When the heater is used, as illustrated in FIG. 5 of the drawings, the container is filled with water and is set to one side or one end of the frame, which frame is arranged in a horizontal plane over a camp fire so as to serve as a gate or grill, and so that the water level in the container is above the plane in which the frame occurs. Hoses **50** are engaged with the outer free ends of the extension tubes E and are entered into the container C and the water therein.

The hose **50** connected with the inlet side or end of the water heater is filled with water and thereafter, by a syphoning action, continuously provides the heater with a supply of water under a sufficient head to normally open the check valve related thereto and establish a flow into the main portion of the frame. The check valve related to the inlet end of the heater prevents steam from blowing the water out of the hose **50** related thereto and interrupting or breaking the syphoning action.

The other hose **50**, related to the outlet end of the heater construction, conducts the steam and hot water back into the container C. The check valve related to the outlet end prevents a reverse or back flow into the heater which would result in surging, and which would tend to create a hammer and interrupt normal flow through the construction.

When it is desired to transport the water heater that I provide, the hoses **50** are disengaged from the extension tubes E, the extension tubes E are reversed to extend into the end portions of the frame and the container C is positioned against the rear of the frame and upon the flange **18**. When thus positioned, the container C can be lashed or secured to the frame in any suitable or desired manner and can, in addition to carrying the hoses **50**, be filled with other camping equipment, as desired.

The heater construction being thus arranged in its collapsed or normal position, the harness H provided to facilitate supporting and carrying the structure on a man's back, is applied thereto.

The harness H is shown as including a pair of elongate shoulder straps **60** having snap-type harness hooks **61** at each end. The straps **60** extend longitudinally of the frame or rack at the opposite sides thereof and adjacent the front. The hooks **61** at one end of the straps **60** are engaged in the loops **15** on the spreader **14**, and the hooks **61** at the other ends of the straps are engaged in the openings **21** in the ears **20** on the lower spreader **16**. Each strap **60** is adapted to extend forwardly and upwardly from the upper end of the frame, over one shoulder of the person carrying the construction, and to then extend or continue downwardly and rearwardly from the shoulder, to the lower end of the frame.

The harness H further includes a waist-engaging web or belt **62** extending transverse the lower end of the frame and spaced forwardly of the lower spreader **16**. The belt **62** is a simple length of webbing engaged through the slot-like openings **23** in the plates **22** and has its ends connected together by means of a suitable conventional buckle **63**. The belt **62** is adapted to extend across, engage, and rest upon the lower lumbar region of the wearer and serves to hold the lower end of the frame clear of the wearer's back, and to distribute the major portion of the load onto the lower portion of the wear's back. By pivoting the plates **22** relative to the ears **20** of the spreader, the plane in which the belt **62** occurs can be angularly related to the plane of the frame and to compensate for the curvature of the wearer's back, to the end that the belt **62** establishes flat bearing engagement across the wearer's back and is not subject to biting into or otherwise irritating the wearer and becoming uncomfortable.

The harness H also includes an upper back-engaging belt or web **64**, which web extends transverse the upper portion of the frame and is spaced forward thereof. The web **64** is a simple length of webbing engaged around and extending between the bars **26** on the frame. The ends of the web are connected together by means of a suitable conventional buckle **65**.

The web **64** is adapted to extend across, engage and rest upon the upper portion of the wearer's back and to thereby hold the frame in spaced relationship from the wearer's back, and so that, in addition to preventing chafing and bruising of the wearer's back by the frame, air is free to circulate between the frame and the wearer's back.

It will be apparent that the harness H that I provide can be easily and quickly engaged with or removed from engagement with the frame, there being but four easy-to-operate snap hooks and two conventional buckles to operate in order to perform either operation.

When the construction is used to heat water, the harness must be removed to prevent it being burned.

The modified or second form of the invention shown in FIG. 6 of the drawings is a smaller portable water heater than the previously described form and is such that it can be placed in the bottom of a standard, conventional water bucket for storage and transport, and is such that it can be engaged in a campfire or over the grate of a conventional camp stove, when in use.

This second form of the invention distinguishes from the first in that there there are no spreaders and no harness, and in the manner in which the intermediate and connecting portions of the frame are arranged.

In the form of the invention now under consideration, the intermediate portions **10'** of the frame are arranged laterally outward of the end portions **11'**, and the connecting portion **13'** is an enlarged, semi-circular portion substantially surrounding the other portions, to the end that the frame establishes a round, substantially flat unit.

The extension tubes E', couplings **28'**, and valve means V' in this second form of the invention are the same as in the first form of the invention, so that description thereof can be dispensed with.

An important feature of the second form of the invention resides in the fact that the coil or frame A' occurs in a single flat plane and as a result can be inserted between the grate of a stove and a pot or pan, without throwing the pot or pan out of level or requiring the provision of leveling or stabilizing means and devices such as have been required in other water heater coils for use in connection with cooking ranges.

Having described only typical preferred forms and applications of my invention, I do not wish to be limited or restricted to the specific details herein set forth, but wish to reserve to myself any modifications or variations that may appear to those skilled in the art and fall within the scope of the following claims.

Having described my invention I claim:

1. A combination back pack, portable water heater and grate of the character referred to including, an elongate, flat, normally vertically disposed planar frame having upper and lower ends, parallel sides and defining flat front and rear planes, said frame comprising elongate vertically spaced horizontally disposed and transversely extending top and bottom spreaders, an elongate serpentine tubular fluid conducting member having elongate, laterally spaced, vertically disposed and upwardly opening end portions, elongate, laterally spaced, vertically disposed intermediate portions arranged in spaced parallel relationship between the end portions and turned connecting portions between the lower end of each end portion and the lower end of the intermediate portion adjacent thereto and between the upper ends of the intermediate portions, said top spreader extending between and fixed to the upper end portions of the end portions and the uppermost portion of the connecting portion between the intermediate portions, said bottom spreader fixed to and extending between the lowermost portions of the connecting portions between the end and intermediate portions, said frame adapted to be shifted and arranged in a horizontal plane, with its rear plane disposed upwardly and to be engaged and supported above a fire, when in operation as a grate and water heater; an elongate tubular fluid conducting extension tube slideably engaged in each end portion of the frame from the upper open end thereof to normally occur within said end portions of the frame and shiftable to project axially outwardly from said end portions of the frame to points remote from the frame when the frame is arranged in said operating position and to connect with fluid conducting hoses; said bottom spreader having a rearwardly projecting transversely extending load supporting flange to engage and support objects arranged adjacent the rear plane of the frame when the frame is in its normal position, said top and bottom spreaders having pairs of laterally spaced fastener engaging projections to occur adjacent the opposite side portions of the frame, and elongate flexible shoulder straps having releasable projection engaging fastening means at their opposite ends and normally arranged to extend longitudinally of the side portions of the frame in forward spaced relationship thereto and releasably engaged with the projections on the spreaders related thereto when the construction is in its normal position, said straps adapted to be removed from engagement with the projections when the construction is arranged in its operating position.

2. A combination back pack, portable water heater and grate of the character referred to including, an elongate, flat, normally vertically disposed planar frame having upper and lower ends, parallel sides and defining flat front and rear planes, said frame comprising elongate vertically spaced horizontally disposed and transversely extending top and bottom spreaders, an elongate serpentine tubular fluid conducting member having elongate, laterally spaced, vertically disposed and upwardly opening end portions, elongate, laterally spaced, vertically disposed intermediate portions arranged in spaced parallel relationship between the end portions and turned connecting portions between the lower end of each end portion and the lower end of the intermediate portion adjacent thereto and between the upper ends of the intermediate portions, said top spreader extending between and fixed to the upper end portions of the end portions and the uppermost portion of the connecting portion between the intermediate portions, said bottom spreader fixed to and extending between the lowermost portions of the connecting portions between the end and intermediate portions, said frame adapted to be shifted and arranged in a horizontal plane, with its rear plane disposed upwardly and to be engaged and supported above a fire, when in operation as a grate and water heater; an elongate tubular fluid conducting extension tube slideably engaged in each end portion of the frame from the upper open end thereof to normally occur within said end portions of the frame and shiftable to project axially outwardly from said end portions of the frame to points remote from the frame when the frame is arranged in said operating position and to connect with fluid conducting hoses; said bottom spreader having a rearwardly projecting transversely extending load supporting flange to engage and support objects arranged adjacent the rear plane of the frame when the frame is in its normal position, said top and bottom spreaders having pairs of laterally spaced fastener engaging projections to occur adjacent the opposite side portions of the frame, and elongate flexible shoulder straps having releasable projection engaging fastening means at their opposite ends and normally arranged to extend longitudinally of the side portions of the frame in forward spaced relationship thereto and releasably engaged with the projections on the spreaders related thereto when the construction is in its normal position, laterally spaced, upper back strap supporting means projecting forwardly from the upper portion of the side portions of the frame, laterally spaced lower back strap supporting means projecting forwardly from the ends of the bottom spreader, and upper and lower elongate flexible back straps with releasable fastening means securing their ends together and engaged in looped engagement with their related support means to normally extend transverse and in forward spaced relationship with the frame, said shoulder and back straps adapted to be removed from engagement with the related fastener engaging projections and support means when the construction is arranged in its operating position.

3. A structure as set forth in claim 1 wherein said tubular extensions have inner and outer ends, elongate couplings with inner and outer ends fixed to the outer ends of the extensions, said inner ends of the couplings being releasably threadedly engaged with the upper ends of their related end portions of the frame when the construction is in its normal position, said outer ends of the couplings being releasably threadedly engaged with the upper ends of their related end portions of the frame when they are shifted to project outwardly therefrom and when the construction is in its operating position, said inner ends of said extensions being adapted to be slideably engaged with water conducting hoses communicating with a vessel containing a supply of water to be heated.

4. A structure as set forth in claim 1 wherein said tubular extensions have inner and outer ends, elongate couplings with inner and outer ends fixed to the outer ends of the extensions, said inner ends of the couplings being releasably threadedly engaged with the upper ends of their related end portions of the frame when the construction is in its normal position, said outer ends of the couplings being releasably threadedly engaged with the upper ends of their related end portions of the frame when they are shifted to project outwardly therefrom and when the construction is in its operating position, said inner ends of said extensions being adapted to be slideably engaged with water conducting hoses communicating with a vessel containing a supply of water to be heated, and a check valve in one of said elongate couplings to allow for free flow of fluid through the construction in one direction only.

5. A structure as set forth in claim 1 wherein, said fastener engaging projections on the top spreader include metal loops fixed to the spreader, said fastener receiving projections on the bottom spreader involving apertured ears projecting forwardly from the ends of the spreader, said projection engaging fastener means at the ends of the shoulder straps including snap-type harness hooks fixed to the ends of the straps.

6. A structure as set forth in claim 2 wherein, said fastener engaging projections on the top spreader include metal loops fixed to the spreader, said fastener receiving projections on the bottom spreader including apertured ears projecting forwardly from the ends of the spreader, said projection engaging fastening means at the ends of the shoulder straps including snap-type harness hooks fixed to the ends of the straps; said upper back strap mounting means including a U-shaped member having upper and lower legs fixed to the end portions of the frame and an elongate strap engaging bar extending between the legs in forward spaced parallel relationship with their related portions of the frame; said lower back strap mounting means including plates pivotally connected to the ears on the bottom spreader to project forwardly therefrom and having elongate slots in their forward portions defining elongate strap engaging bars, said releasable fastening means on the back straps including belt buckles at one end of each strap to engage the other end of said strap.

7. A structure as set forth in claim 1 wherein said tubular extensions have inner and outer ends, elongate couplings with inner and outer ends fixed to the outer ends of the extensions, said inner ends of the couplings being releasably threadedly engaged with the upper ends of their related end portions of the frame when the construction is in its normal position, said outer ends of the couplings being releasably threadedly engaged with the upper ends of their related end portions of the frame when they are shifted to project outwardly therefrom and when the construction is in its operating position, said inner ends of said extensions being adapted to be slideably engaged with water conducting hoses communicating with a vessel containing a supply of water to be heated; said fastener engaging projections on the top spreader including metal loops fixed to the spreader, said fastener receiving projections on the bottom spreader including apertured ears projecting forwardly from the ends of the spreader, said projection engaging fastening means at the ends of the shoulder straps including snap-type harness hooks fixed to the ends of the straps; said upper back strap mounting means including a U-shaped member having upper and lower legs fixed to the end portions of the frame and an elongate strap engaging bar extending between the legs in forward spaced parallel relationship with their related portions of the frame; said lower back strap mounting means including plates pivotally connected to the ears on the bottom spreader to project forwardly therefrom and having elongate slots in their forward portions defining elongate strap engaging bars, said releasable fastening means on the back straps including belt buckles at one end of each strap to engage the other end of said strap.

8. A structure as set forth in claim 1 wherein said tubular extensions have inner and outer ends, elongate couplings with inner and outer ends fixed to the outer ends of the extensions, said inner ends of the couplings being releasably threadedly engaged with the upper ends of their related end portions of the frame when the construction is in its normal position, said outer ends of the couplings being releasably threadedly engaged with the upper ends of their related end portions of the frame when they are shifted to project outwardly therefrom and when the construction is in its operating position, said inner ends of said extensions being adapted to be slideably engaged with water conducting hoses communicating with a vessel containing a supply of water to be heated, and a check valve in one of said elongate couplings to allow for free flow of fluid through the construction in one direction only; said fastener engaging projections on the top spreader including metal loops fixed to the spreader, said fastener receiving projections on the bottom spreader including apertured ears projecting forwardly from the ends of the spreader, said projection engaging fastening means at the ends of the shoulder straps including snap-type harness hooks fixed to the ends of the straps; said upper back strap mounting means including a U-shaped member having upper and lower legs fixed to the end portions of the frame and an elongate strap engaging bar extending between the legs in forward spaced parallel relationship with their related portions of the frame; said lower back strap mounting means including plates pivotally connected to the ears on the bottom spreader to project forwardly therefrom and having elongate slots in their forward portions defining elongate strap engaging bars, said releasable fastening means on the back straps including belt buckles at one end of each strap to engage the other end of said strap.

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