

J. GRAVES.
PORTABLE HEATER.

No. 516,010

Patented Mar. 6, 1894.

Fig. 1. X

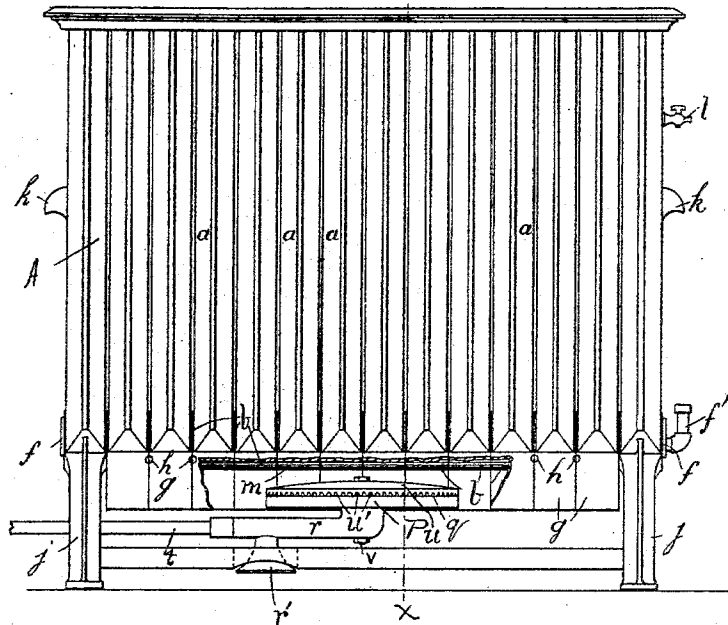


Fig. 3.

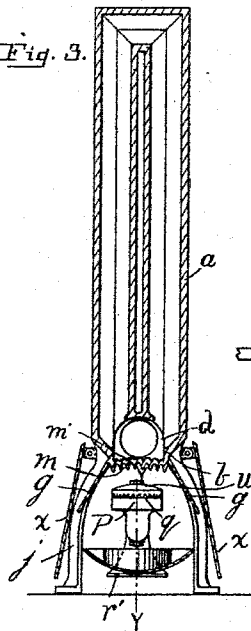


Fig. 4.

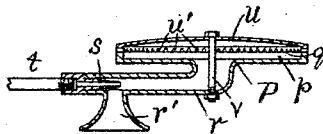
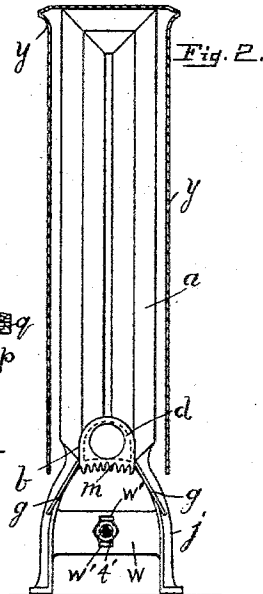
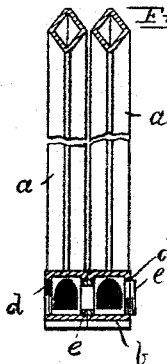


Fig. 5.



WITNESSES:

Arthur L. Hunt
Arthur L. Hunt

INVENTOR

John Graves

BY

S. W. Allen Brown

ATTORNEY

(No Model.)

2 Sheets—Sheet 2.

J. GRAVES.
PORTABLE HEATER.

No. 516,010.

Patented Mar. 6, 1894.

Fig. 6.

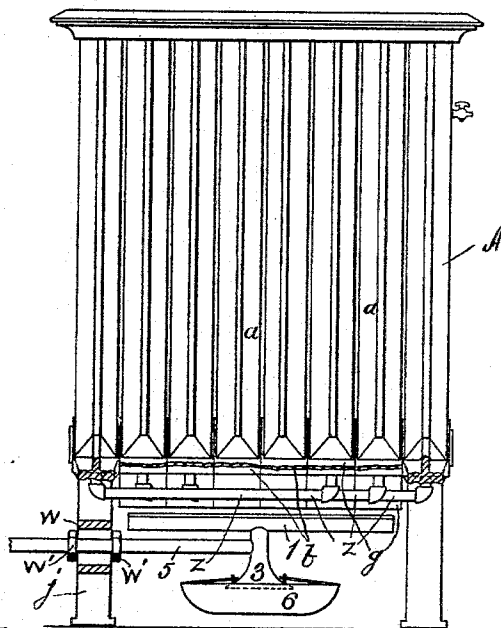


Fig. 6.

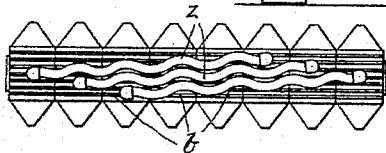


Fig. 7.

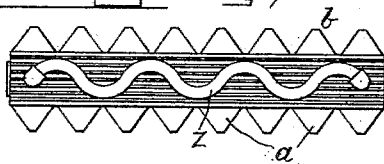
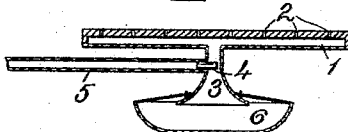


Fig. 8.



WITNESSES:

A. H. de Vos

Arthur H. de Vos

John Graves INVENTOR

W. Waller Brown BY

ATTORNEY

UNITED STATES PATENT OFFICE.

JOHN GRAVES, OF BROOKLYN, ASSIGNOR TO DEAN & GRAVES, OF NEW YORK, N. Y.

PORTABLE HEATER.

SPECIFICATION forming part of Letters Patent No. 516,010, dated March 6, 1894.

Application filed June 22, 1892. Renewed January 9, 1894. Serial No. 496,325. (No model.)

To all whom it may concern:

Be it known that I, JOHN GRAVES, a citizen of the United States, and a resident of Brooklyn, in the county of Kings and State of New York, have invented certain new and useful Improvements in Portable Heaters, of which the following is a specification.

My invention relates to portable hydro carbon heaters, and the purpose of the improvement is to produce a simple, cheap and effective steam heater.

The heater consists essentially of the combination with a suitable burner of a structure combining in one both radiator and boiler, the boiler being formed in or on the radiator base, and connecting with the radiator loops, and this base is formed externally with downwardly and outwardly flaring wings, which confine the flame and products of combustion laterally but permit them to extend longitudinally under the radiator base.

My invention also relates to the details of the construction of the radiator-boiler.

Referring to the drawings which accompany the specification to aid the description, Figure 1 is a side elevation, partly broken away, of the combined radiator boiler and the burner. Fig. 2 is an elevation of a loop of the radiator-boiler omitting the burner. Fig. 3 is a vertical section on the line X—X of Fig. 1, but showing the burner in elevation. Fig. 4 is a section of the burner on the line Y—Y of Fig. 3. Fig. 5 is a detail on smaller scale of two loops of the radiator-boiler showing the throughway in the base and the method of joining sections. Fig. 6 is an elevation of a modification of the boiler-radiator with water pipes in the bottom, the wings being broken away. Figs. 7 and 8 are views of the bottom of the radiator-boiler, with one or more pipes respectively. Fig. 9 is a detail of the burner with a water-pan beneath.

My radiator-boiler, A, is preferably composed of a plurality of similar loops, *a, a*, each of which is formed integral with a section, *b*, of the boiler. The boiler, *b*, is in fact, the modified radiator base, and is cast integral with the loops, *a*, and with heads, *d, d*, facing lengthwise of the radiator base, which heads, *d, d*, are centrally perforated with threaded

holes for the nipples, *e*, which unite the adjacent loops of the complete radiator-boiler. As many loops are taken as desired, and united by said nipples, *e*. Then screw plugs, *f, f*, are threaded into the outer heads of the end loops, one of said plugs having threaded into it the filler, *f'*, which is capped in the ordinary manner, and rises about to the top of the base, *b*. Now said boiler sections, *b, b*, each have integrally cast on each side, external downwardly and outwardly flaring rectangular wings, *g, g*, which, when the sections are put together form an inverted trough, as seen in Figs. 2 and 3, and each of these said wings, *g*, has in its edge near its junction with the said boiler sections a through and through semi-circular hole, *h*, which form when the sections are put together, a row of round holes, along each side of the radiator boiler, as seen in Fig. 1, for the escape of part of the heated air, which rises in the narrow interval between adjacent loops of the radiator. The end sections have legs, *j, j*, cast on them, also handles, *k, k*, to aid in carrying the apparatus about, and on one of said end sections will be the air valve, *l*, in the usual manner. Said boiler sections, *b, b*, are preferably each a little concave on the under side, as shown in Fig. 3, and provided with corrugations, *m*, inside and out to increase the heat absorbing surface, and form water-pockets, *m'*, in intimate contact with the burner flame. Under said boiler sections, and either near the middle length of the complete radiator-boiler, or near one end is placed the burner, P, I prefer to use a burner of the form shown in the drawings, and which consists of a hollow base, *p*, forming the mixing chamber preferably of oval plan, and having a plane upper edge, *q*, and communicating with a supply pipe, *r*, in which is an air inlet, *r'*, at right angles to the said pipe, *r*, and preferably bell mouth as shown. Said pipe, *r*, has a screw thread in the end, through which is threaded the gas nozzle, *s*, of the gas supply pipe, *t*, and the said nozzle, *s*, projects just across the aforesaid air inlet, *r'*. On said burner base, *p*, fits a hollow cap, *u*, having a corrugated edge whereby are formed numerous openings, *u'*, communicating with

the space within the base, *p*, and said cap, *u*, is held in place on the base, *p*, by the bolt, *v*. Said burner is adjustable with respect to distance below the boiler-sections, by having lock nuts, *t'*, *t''*, on the pipe, *t*, which lock said pipe at any height in the slot *w'*, formed in the cross bar *w*, which connects the legs of the apparatus.

In place of casting the radiator boiler in sections, as before described, I might form it in one piece, without departing from my invention, which is in this respect essentially a combined radiator-boiler with the wings as hereinbefore explained. I also find it desirable to hinge doors, *x*, *x* on the sides of the base, to conceal the burner and protect it from drafts of air, and I can greatly increase the heating efficiency of the apparatus by placing over the radiator the hood, *y*, which is in effect an inverted trough depending well down the sides of loops but open at the ends.

The whole operates as follows: The boiler being filled with water through the filler, *f'*, and gas being turned on the burner and ignited, air entering to mix with the gas through the inlet, *r'*, the flames surround the cap, *a*, and impinge on the middle part of the corrugated boiler bottom, and, being confined laterally by the wings, *g*, *g*, are compelled to spread longitudinally under the bottom of the boilers toward the ends of the whole structure. At the same time some of the highly heated air escapes through the holes, *h*, *h*, and heats the loops of the radiator. Steam is therefore formed in the boiler sections and superheated in the loops, while condensation taking place at the surface of the loops, the condensed water trickles down the loops into the boilers, thus maintaining the circulation.

The radiator-boiler shown in Figs. 6, 7, and 8 is the same as hereinbefore described, with the addition of the pipe or pipes, *z*, *z*, which are extended lengthwise under the radiator base, with elbows and nipples that are tapped up into the base as seen in Fig. 6. The pipe (or the pipes) is preferably bent to and fro laterally as seen in Figs. 7 and 8. The burner is composed of a long chamber, 1, cast with burner holes, 2, 2, in the top, and forming a mixing chamber. Perpendicularly connected therewith is the bell-mouth air inlet, 3, into

which enters the nozzle, 4, as shown, and connected with the gas pipe, 5. I prefer to turn the bell-mouth air inlet, down and suspend below in any manner the water-pan, 6, the said water-pan, 6, not being filled quite up to the bell mouth. The burner may be supported in a cross bar between the radiator legs in the same manner as hereinbefore described.

Now, having described my improvement, I claim as my invention—

1. A hydro carbon heater consisting of a boiler and a radiator in one structure and of wings projecting from the boiler and forming an inverted trough with open ends, substantially as and for the purpose described.

2. The combination in a hydro-carbon heater of a radiator and boiler in one structure without independent circulating system, wings on said boiler forming an inverted trough open at the ends, corrugations on the bottom of the boiler parallel with said wings, and a burner between said wings, substantially as described.

3. A hydro-carbon-heater consisting of a radiator and boiler in one structure, and of wings projecting from said boiler and forming an inverted trough, openings in said wings for the escape of products of combustion, and a burner between said wings, substantially as described.

4. The combination in hydro-carbon heaters, of a radiator and boiler in one structure, wings projecting from said boiler and forming an inverted trough open at the ends, and pipes between said wings lengthwise of said boiler and connected with said boiler, substantially as and for the purpose described.

5. In hydro carbon heaters, the combination with the radiator of a hood let down over the top of the radiator and inclosing said radiator on both the long sides thereof, and said hood being open at the ends, substantially as and for the purpose described.

In testimony that I claim the foregoing as my invention I have signed my name, in presence of two witnesses, this 11th day of June, 1892.

JOHN GRAVES.

Witnesses:

ALVAN F. SERVIN,
LOUIS M. FULTON.