(No Model.)

# W. G. SCHÖNHEYDER.

## WATER HEATING APPARATUS.

No. 306,647. Patented Oct. 14, 1884.

Fig. 1.

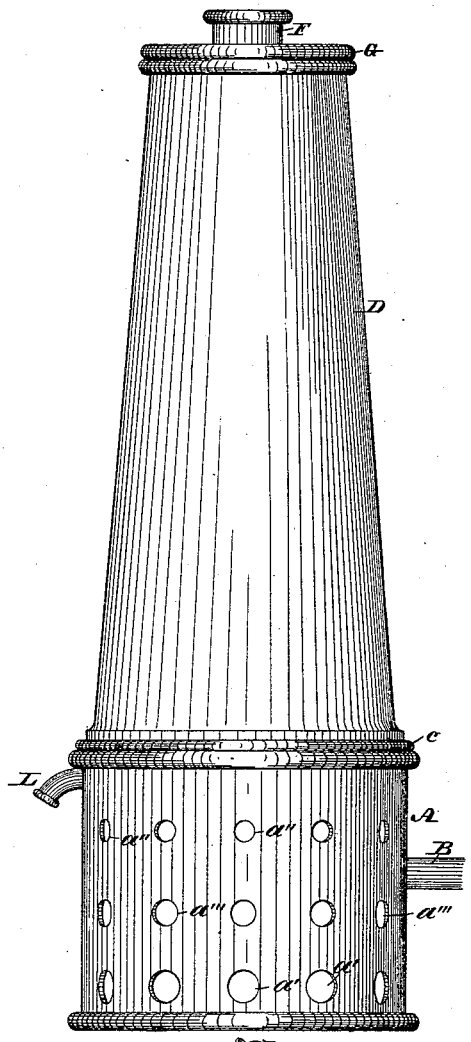



Fig. 2.

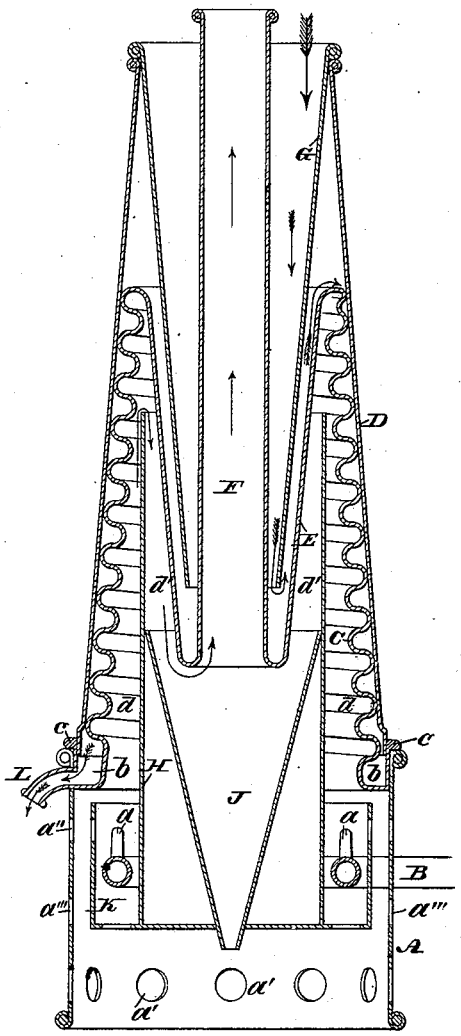
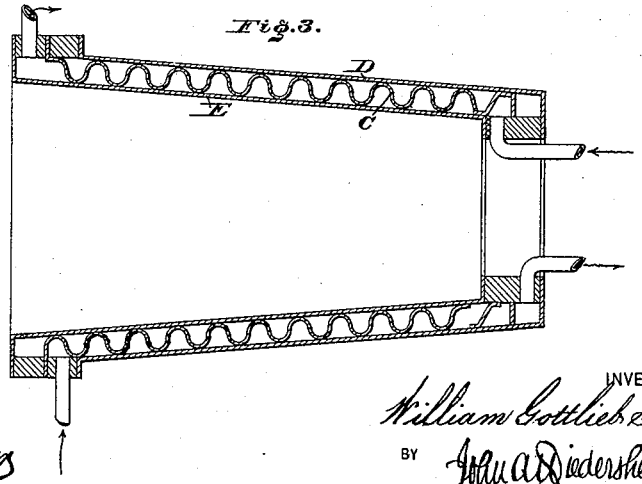



Fig. 3.




WITNESSES:

A. P. Grant,

W. F. Kircher

INVENTOR:

William Gottlieb Schönheyder

BY John A. Diedersheim, ATTORNEY.

# UNITED STATES PATENT OFFICE.

WILLIAM GOTTLIEB SCHÖNHEYDER, OF LONDON, ENGLAND, ASSIGNOR OF ONE-HALF TO HARRY OLRICK, OF SAME PLACE, AND EMANUEL STEIN, OF PHILADELPHIA, PENNSYLVANIA.

## WATER-HEATING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 306,647, dated October 14, 1884.

Application filed December 3, 1883. (No model.) Patented in England March 30, 1883, No. 1,604.

*To all whom it may concern:*

Be it known that I, WILLIAM GOTTLIEB SCHÖNHEYDER, a subject of Denmark, residing at London, England, have invented a new and useful Improvement in Heating Apparatus, which improvement is fully set forth in the following specification and accompanying drawings, in which—

Figure 1 is a side elevation of heating apparatus embodying my invention. Fig. 2 is a central vertical section thereof. Fig. 3 is a section of a modification.

Similar letters of reference indicate corresponding parts in the several figures.

My invention consists of an apparatus for heating water and other fluids in an expeditious manner, the same being of simple and inexpensive construction.

Referring to the drawings, A represents the base of the apparatus, within which is fitted and secured a gas-pipe, B, having one or more jets, *a*, said base having openings *a'* to admit air to the jets *a*, and openings *a''* for access to the same, whereby the gas may be lighted.

C represents a shell which is spirally fluted, its lower end being bent upwardly and outwardly, forming a chamber, *b*, and a rim, *c*, which rests on the top of the base A.

D represents a shell which incloses the shell C, and rests inside of the rim *c*, it being noticed that the two shells are of the form of truncated cones.

Depending from the top of the shell C, and secured thereto, is a shell, E, which is of the form of an inverted truncated cone, and rising from the bottom of said shell E, and secured thereto, is a flue, F.

Depending from the top of the shell D is a shell, G, of the form of an inverted truncated cone, the same projecting into the shell E to near the bottom thereof.

Rising from the base A is a cylindrical shell, H, which is interposed between the spirally-fluted shell C and the shell E, and extends above the bottom of the latter.

Within the shell H is secured a shell, J, which is of the form of an inverted truncated cone, the upper part, which is open, closely fitting said shell H, and the bottom being open for purposes to be hereinafter explained.

Between the base A and shell H is a cylinder, K, in which are openings coinciding with the openings *a''* in the base A for lighting purposes, openings *a'''* being also formed in said base for the admission of air for keeping the outer shell or base, A, in a cool condition. Water or other fluid to be heated is poured or run into the shell G and flows through the open bottom thereto into the shell E from below and fills the same, thus reaching the top of the spirally fluted or corrugated shell C, and, entering the passage formed by fluting or corrugation of said shell and the inclosing-shell D, it runs down said passage into the chamber *b*, from whence it is discharged through the spout L. When the gas is turned on and lighted, the products of combustion and heat rise in the space or flue *d* between the corrugated shell C and shell H, and descend in the space or flue *d'* between the cylindrical shell H and conical shell E, and so reach the flue F, whereby they are discharged. It will be seen that the water in the shell G is heated by the surface of the flue F, that in the shell E by the surface of the flue *d'*, and that in the spiral passage of the shell C by the surface-flue *d*, and thus the water is subjected to numerous heating-surfaces at different places. Furthermore, the water and products of combustion or heated gases travel in opposite directions, and thus a maximum of heating effects is secured. The conical shell T forms a closed air-space between the same and the shell H, and prevents heat from being conducted into said shell, the open bottom of said shell J serving to discharge the condensed vapors of the products of combustion created above the same.

The parts may be readily separated for purpose of cleansing and repairs, it being seen that the shell C rests freely on the base A. The shell D is freely fitted to the shell C, and the shell G is freely connected with the shell D.

It is evident that in lieu of gas I may use oil or other material as a heating medium.

In Fig. 3 the apparatus is shown adapted

for imparting heat from one fluid to another, the corrugated shell being inclosed both on the inside and outside by other shells, forming two independent spiral passages, each having its own inlet and outlet pipes, so that different fluids may be run through said passages, and the temperature of one may be utilized for warming the other.

The corrugations or fluted shell C may be formed of sheet metal properly spun or worked into shape, and the other shells may also be formed of sheet metal.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. A heater composed of two concentrically-arranged shells, one of which is helically corrugated, and both of which are adapted when brought together to form a continuous helical passage for the fluid to be heated.

2. The fluted shell C and the outer shell, D, in combination with the shell E, depending from said fluted shell, and inlet-jets *a*, and an outlet-flue, F, which allow the products of combustion to flow into and out of the space between plates C and E while the liquid is flowing in contact with the other faces of said plates, substantially as set forth.

3. The combination of the flue F, depending shell E, fluted shell C, and outer shell, D, with the shells G and H interposed, respectively, between C and E and E and F, all these shells together forming two passages, through one of which a current of liquid may flow in one direction while the products of combustion flow in the other, substantially as set forth.

4. The shells H and K, and the burners *a*, located between them, in combination with the tapering shell J, the base A, provided with inlets which supply air to said shells J K, the outlet-flue F, and the shells C E, which form with said shell H a passage for products of combustion from said burners to said flue, a passage for liquid being provided on the opposite side of said shells and flue, substantially as set forth.

WILLIAM GOTTLIEB SCHÖNHEYDER.

Witnesses:
WM. JOHN WEEKS,
CLAUDE WOODROW,
*Both of* 31 *Lombard Street, London.*