

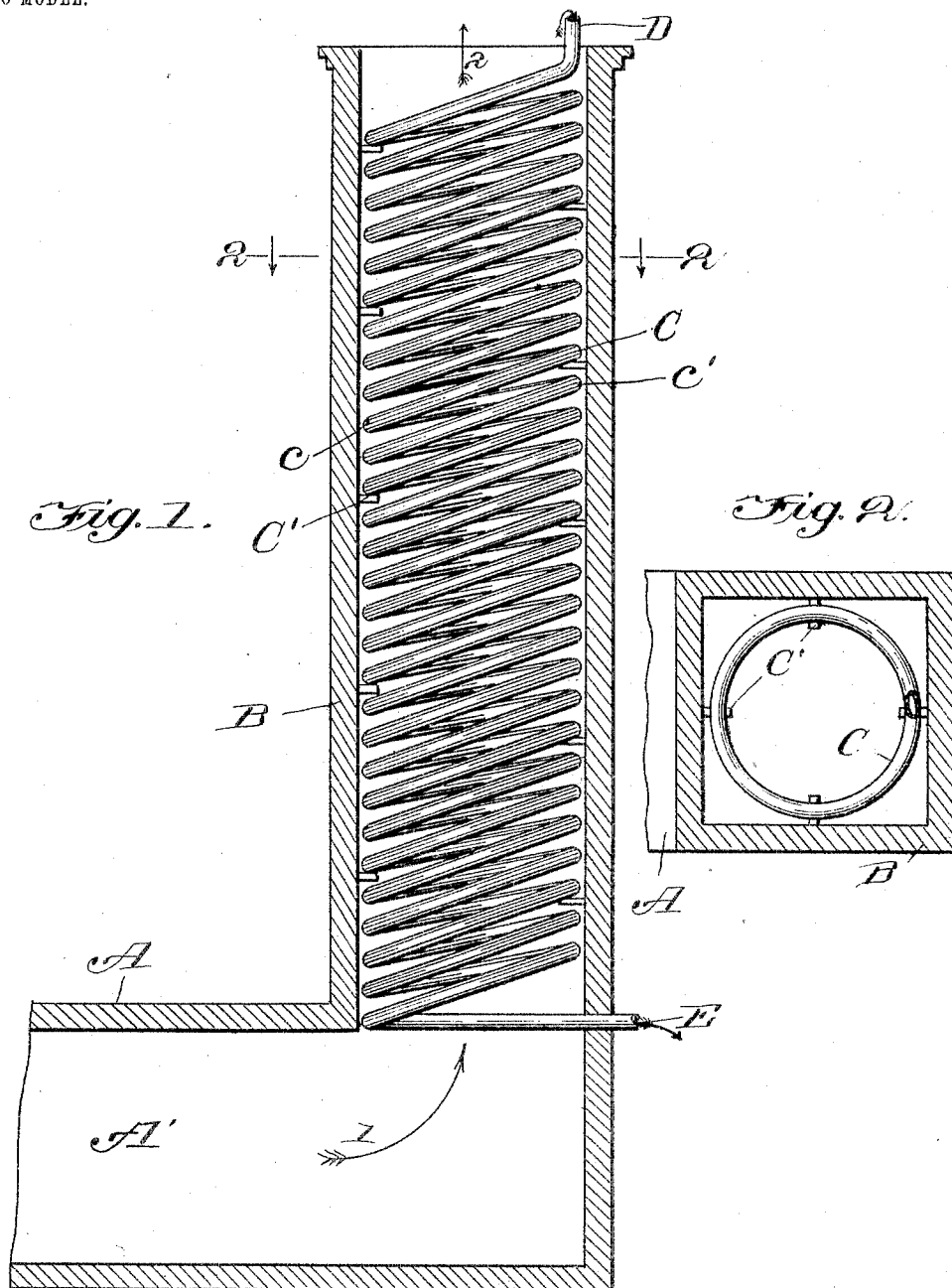
No. 777,083.

PATENTED DEC. 13, 1904.

B. W. DAVIS.  
APPARATUS FOR HEATING FLUIDS.

APPLICATION FILED SEPT. 14, 1903.

NO MODEL.



Witnesses:

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# UNITED STATES PATENT OFFICE.

BENJAMIN W. DAVIS, OF PHILLIPS, WISCONSIN.

## APPARATUS FOR HEATING FLUIDS.

SPECIFICATION forming part of Letters Patent No. 777,083, dated December 13, 1904.

Application filed September 14, 1903. Serial No. 173,065. (No model.)

*To all whom it may concern:*

Be it known that I, BENJAMIN W. DAVIS, a citizen of the United States, residing at Phillips, county of Price, State of Wisconsin, have  
5 invented a certain new and useful Improvement in Apparatus for Heating Fluids; and I declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it pertains to make and use the same, reference being had to the accompanying drawings, which form a part of this specification.

My invention has for its object the production of an apparatus for the economical heating of water or other fluid or the production of steam whereby the greatest efficiency of the heat can be utilized—that is, the greatest number of heat units be absorbed by the fluid.

The invention is applicable either as a boiler  
20 for originally generating steam or heating water or other fluid or it is applicable as a so-called “fuel-economizer”—that is, an apparatus located in the stack of a boiler or furnace or elsewhere to take up and utilize the otherwise  
25 waste products of combustion or other waste heat.

Figure 1 is a vertical section of an apparatus embodying my invention. Fig. 2 is a cross-section on the line 2 2 of Fig. 1.

30 In carrying out the invention A represents any suitable flue or chamber containing heat generated in any desired manner, the heat passing in the direction of arrow No. 1 and out of the stack B at arrow No. 2.

35 C is a coil of pipe in the stack B. These coils may be arranged in any suitable manner; but I prefer to arrange them, as shown, with one portion of *c'* of each coil at a higher level than the lower portion *c* of the coil next  
40 above. Supporting-pieces *C'* may, if desired, be provided to support the coil.

D represents the inlet, and E the outlet, of the coil.

45 I have found that with the current of heating fluid passing in the direction indicated (in this instance up the stack) I can by introduc-

ing the heat-absorbing fluid—as, for instance, water—at the inlet D, preferably under pressure, and forcing it down through the coil in a direction opposite to the current of heat and  
50 opposite to the direction it would naturally take (which would in this instance be upward) it absorbs the heat units much more effectively, since the cold water is introduced where the heat is lessened and discharged where the  
55 heat is greatest. By making the coil, as shown, with a portion of each convolution at a higher level than the lower portion of the convolution next above there will, in addition to the forced circulation above referred to, be a nat-  
60 ural circulation in each convolution.

While I have herein described but a single form of apparatus for utilizing my invention, it is obvious that various forms might be utilized without departing from the spirit of the  
65 invention, which consists, essentially, in forcing a current of the heat-absorbing fluid through a conduit comprising communicating sections, each section arranged on an incline with its upper portion in a plane above the  
70 plane of the lower portion of the next higher section in a direction opposite to that which it would naturally follow and in a direction opposite to the direction of the current of the heating medium.  
75

What I claim is—

1. An apparatus for heating a fluid consisting in a conduit composed of communicating inclined sections, the upper portion in each section being in a plane above the plane of the  
80 lower portion of the adjacent higher section, a surrounding heating-chamber, an inlet at the upper end of said conduit, an outlet at the lower end of said conduit, and means for causing the fluid to circulate through the conduit  
85 from the upper end of the top section thereof to the lower end of the bottom section in a direction opposite to the flow of the heating medium through the chamber.

2. An apparatus for heating a fluid consist-  
90 ing of a vertical series of convoluted pipes, each convolution arranged on an incline, the

upper portion of each convolution being in a horizontal plane entirely above the horizontal plane in which the lower portion of the convolution next above is located, a surrounding  
5 heating-chamber, an inlet at the upper end of the coil, an outlet at the lower end of the coil, and means for causing the fluid to circulate from the top to the bottom of the coil and in

a direction opposite to the flow of the heating fluid. 10

In testimony whereof I sign this specification in the presence of two witnesses.

BENJAMIN W. DAVIS.

Witnesses:

WALTER H. CHAMBERLIN,  
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