

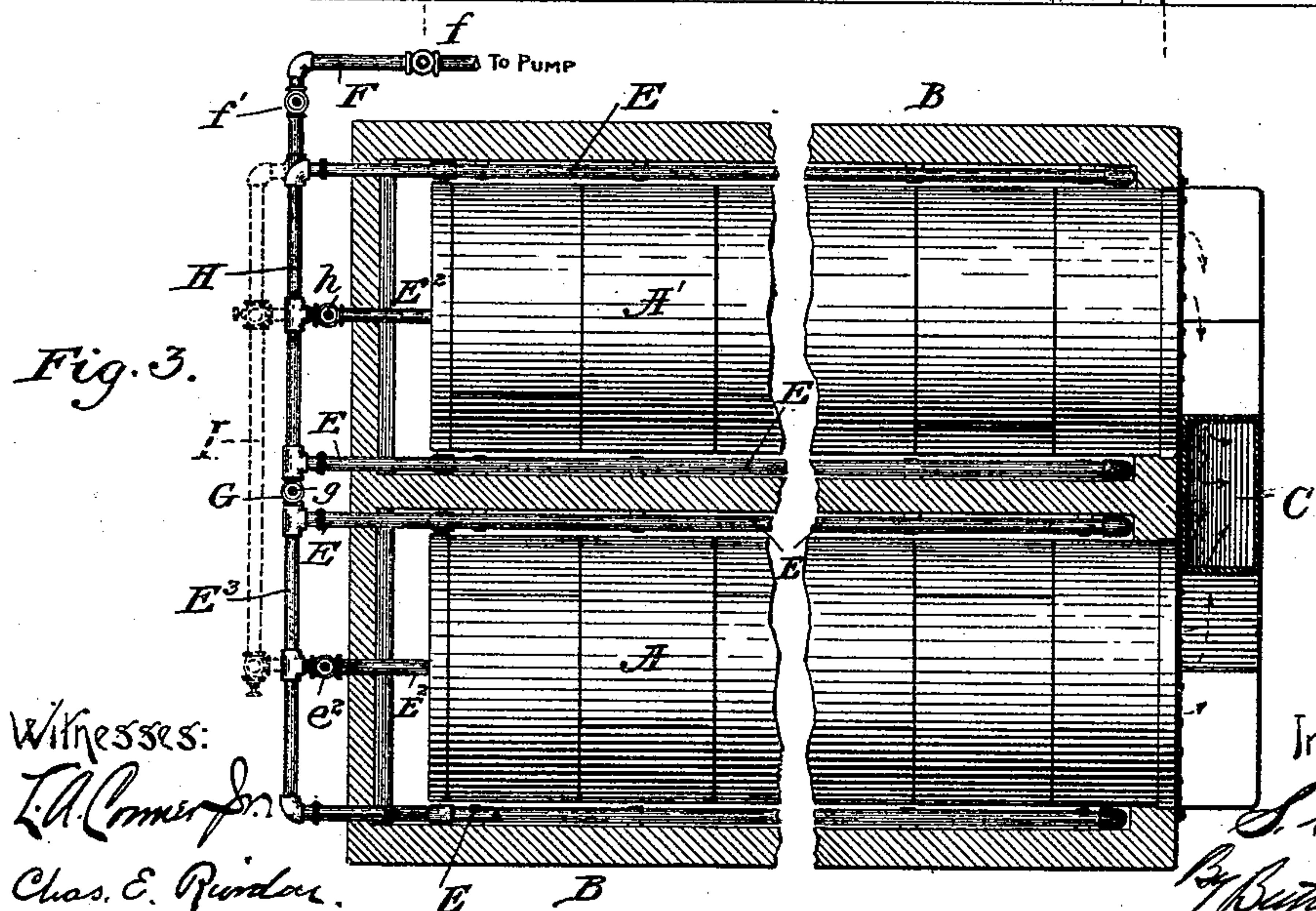
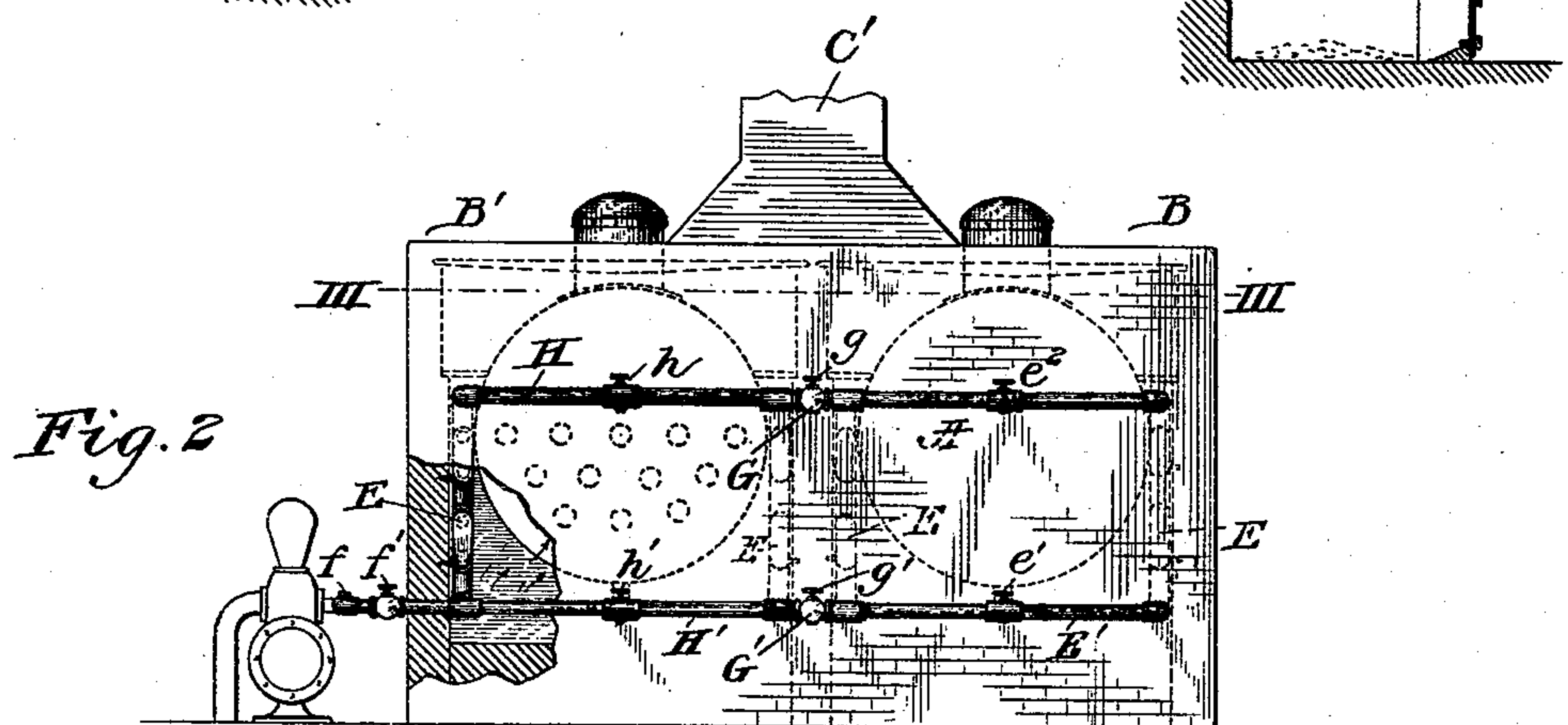
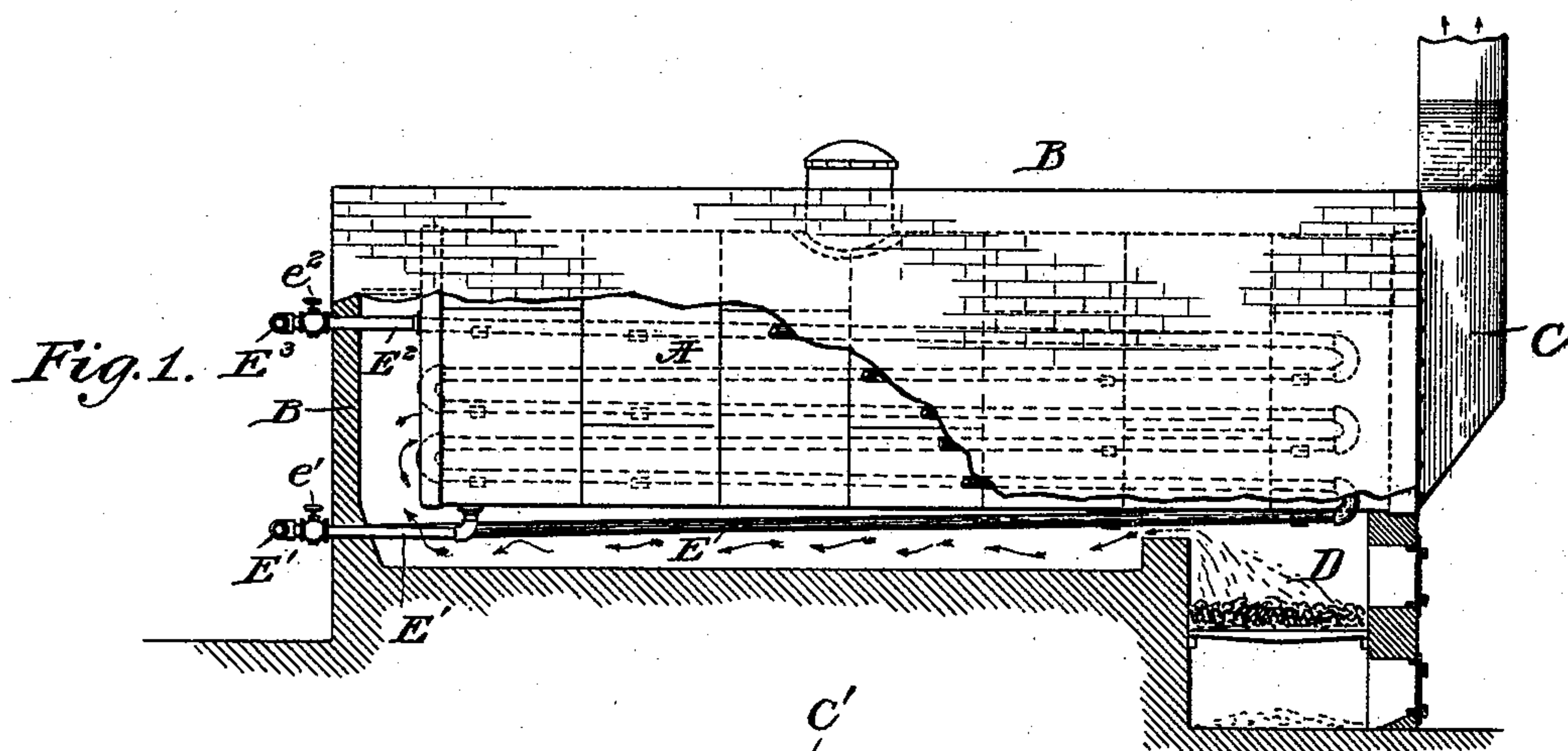
(No Model.)

S. C. DESPRES.

## FEED WATER HEATER AND CIRCULATING SYSTEM.

No. 483,905.

Patented Oct. 4, 1892.



Witnesses:

L. A. Comer Jr.

Chas. E. Purdon.

Inventor

S. b. Despres

By Burton & Dowd  
Attys.



# UNITED STATES PATENT OFFICE.

STANISLAUS CHARLES DESPRES, OF TRAVERSE CITY, MICHIGAN.

## FEED-WATER HEATER AND CIRCULATING SYSTEM.

SPECIFICATION forming part of Letters Patent No. 483,905, dated October 4, 1892.

Application filed May 9, 1892. Serial No. 432,300. (No model.)

*To all whom it may concern:*

Be it known that I, STANISLAUS CHARLES DESPRES, a citizen of the United States, residing at Traverse City, in the county of Grand Traverse and State of Michigan, have invented certain new and useful Improvements in Feed-Water Heaters and Circulating Systems; and I do hereby 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 appertains to make and use the same.

My invention is an improvement in that class of attachments to steam-boilers in which a series of water-conducting tubes or pipes are arranged within or about the fire-box for the purpose of heating the feed-water on its passage to the boiler and increasing the steam-generating capacity of the device.

The primary object of my invention is to provide a combined water feeding, heating, and circulating system which will increase the capacity of the boiler, secure a greater heating-surface for a given amount of space, reduce the quantity of fuel required for heating purposes, and increase the steam-generating capacity of the apparatus.

A further object is to provide improved means for heating water inside of a boiler not in use or which may be held in reserve by causing a circulation of the water in said boiler through coils placed in an adjoining boiler which is in use, so that water in an unused boiler or boilers may be kept constantly heated without rendering it necessary to keep a fire continuously burning for the purpose of heating the reserve boiler or boilers.

The several objects are accomplished by a simple and inexpensive system of valved circulating pipes or tubes, which are arranged so that the infed water is delivered at the highest boiling-point in a boiling condition, while the circulation is from the boiler through a pipe or pipes connected therewith at its lowest point and thence to the boiler below the lowest safety water-line thereof, so as to insure a perfect circulation and at the same time prevent burning out the circulating-pipes, the latter being also adapted to prevent the formation of air-traps therein.

The invention will first be described in connection with the accompanying drawings, and

then particularly pointed out in the claims at the end of this specification.

In the drawings which form a part of this specification, Figure 1 represents a sectional side elevation of a steam-boiler and attachments embodying my invention. Fig. 2 is a rear view showing two boilers with connected circulating systems, and Fig. 3 is a horizontal section taken on line III III of Fig. 2.

Similar letters of reference are used to denote similar parts in each of the several views.

A denotes a boiler for steam-generating purposes, which may have therein an ordinary water and steam chamber and a series or collection of longitudinally-disposed pipes extending from the front to the rear of the boiler in the usual manner, so that the heat from the fire-chamber may pass through said pipes for the purpose of heating the water in contact therewith.

B denotes the furnace-walls, of brick or other suitable material, which may be arched or otherwise formed to suit the requirements of the boiler which is fitted therein.

C denotes the stack or chimney, and D the fire-box, these parts being constructed in any suitable manner.

E E denote suitable pipes or tubes, which may connect with an opening in the lowest point of the boiler by means of a pipe or tube E' of such size as is best adapted to the size of the boiler, so as to insure sufficient flow of water through said opening and pipe to supply a pipe or pipes E, which latter are placed inside of the fire-arch or fire-box or thereabout in such position that the fire or heat used in heating the boiler may come in contact with said pipes or tubes. The pipe or pipes E in any desired number may extend back and forth parallel with the boiler at either or both sides thereof and are secured in proper position to the walls of furnace or fire box in such manner as to insure room for expansion and contraction, the several pipes when constructed in sections being connected by union joints or couplings which will permit easy connection or disconnection between the circulating system and boiler. The free upper end or ends of the pipe or pipes E may connect with the boiler by means of a pipe or pipes E<sup>2</sup>, arranged to enter a suitable open-



ing or openings in the end or sides of the boiler of a size equal to the capacity of the pipe, such opening being placed below the lowest safety water-line of the boiler. The  
 5 pipes  $E'$   $E^2$  are provided with straight-way or other suitable valves  $e'$   $e^2$  for controlling the flow of water therein, these valves being located between the opening in the boiler and the pipe ends or T-coupling section  $E^3$  connecting the terminals of pipes  $E$   $E$  at either  
 10 side of the boiler with the pipes  $E'$   $E^2$ , so that a single valve will suffice to control the flow of water to both sets or series of pipes. The lowermost pipe or portion of one of the circulating-coils  $E$  at one side of the boiler may  
 15 communicate with a pump, inspirator, or other suitable device for supplying water to the boiler by means of a suitable pipe or tube  $F$ , which is provided with a check-valve  $f$  and  
 20 with a stop valve or cock  $f'$ , the stop-valve being designed to close the passage through pipe  $F$  when it is necessary to repair or replace the check-valve.

With the described construction, the boiler  
 25 having been supplied with the necessary quantity of water through valves  $f'$   $e^2$ , valve  $e'$  is opened, and thereupon the water will circulate freely, passing directly from the bottom of the boiler through pipe  $E'$  and into the circulating-pipe  $E$  or lowermost section of the  
 30 series of pipes, and thence gradually rising in a serpentine course through said pipes  $E$  will return to the boiler through the pipe-section  $E^3$  near the top of the boiler at the highest  
 35 boiling-point, thereby producing a perfect circulation by gravitation and ebullition, which is accomplished by causing the cold water to enter the lowest pipe or point of the coil and allowing it to rise of itself, as it must when it  
 40 becomes heated and enter the highest boiling-point of the boiler in a boiling condition, thereby affording a circulation on the boiler, which is increased in accordance with the heat applied, regardless of the pressure on the  
 45 boiler as the pressure is equal on all sides, and the circulation must take place by gravitation and ebullition. Valve  $e^2$  is open at all times, except when necessary to cut off the circulating system from the boiler, either for  
 50 repairs or for the purpose of connecting the system with another or reserve boiler. Valve  $f'$  is closed and valve  $e'$  open, except when feeding. In feeding valve  $e'$  should be closed and valve  $f'$  opened, so that the feed-water  
 55 may pass into the lower pipe or lowest point of the coil and rise therein as it becomes heated, as already explained.

In cases where it is desirable to have a boiler or boilers in reserve ready for use on  
 60 short notice, as is the case with water-works, electric plants, large hotels, &c, it is necessary to keep a fire constantly burning under the reserve boiler or be subjected to the annoyance of waiting to get steam, which is very  
 65 essential in some of the cases above referred to. I therefore propose to provide means for heating water inside of a boiler or boilers not

in use by the circulation of the water in such boiler through coils placed in proximity to an adjoining boiler which is in use, so that the  
 70 water in the reserve boiler or boilers may be kept at a boiling-point without necessitating the extra expense due to the consumption of fuel in such cases. To this end I provide detachable pipe sections or couplings  $G$   $G'$ , which  
 75 connect the circulating coils or pipes  $E$  of the main boiler  $A$  with pipe-sections or T-couplings  $H$   $H'$  of similar circulating-coils and valved pipes placed within the fire-box or arched walls of the furnace inclosing an adjoining reserve boiler  $A'$ , as illustrated in  
 80 Figs. 2 and 3. The arrangement of the pipes or coils and the valves of the reserve boiler are the same as described with reference to the boiler  $A$ , except that the inlet is from the  
 85 circulating-coil in the fire-box of the main boiler through the straight-way valves interposed in the detachable coupling-sections, which valves may be opened or closed at will for the purpose of opening or closing communication between the two boilers.  
 90

The two boilers may be separated by a division-wall and provided with a common stack  $C'$  and fire-box in each for separate fires, if  
 95 necessary, or the reserve boiler may be disconnected entirely from the fire-box and stack of the main boiler.

When it is desired to use boiler  $A$  alone, valves  $g$   $g'$  are closed. If boiler  $A'$  is to be used alone, valves  $e'$   $e^2$  should be closed and  
 100 valves  $g$   $g'$  opened. If boiler  $A$  is to be used and at the same time the water in the circulating-pipes thereof utilized for heating the water in the reserve boiler  $A'$ , valves  $e'$   $e^2$  are closed and valves  $g$   $g'$  and  $h$   $h'$  opened, and  
 105 thereupon the circulation will take place from the heated coils through the reserve boiler and may be cut off and turned on at will by manipulating the valves  $e$   $e'$   $g$   $g'$  for the purpose of keeping the water in the reserve boiler at any  
 110 desired temperature and causing a circulation through either boiler independently of the other. When the system is used on two or more boilers not having an equalizing-pipe, it will be necessary to connect the feed-pipe to  
 115 each boiler, as indicated by the dotted lines  $I$  in Fig. 3.

The several valves and union joints connecting the valved portions of the circulating system with the circulating-pipes inclosed  
 120 within the fire-box or furnace-walls are all placed outside of the brickwork or wall, so as to protect the same from the heat.

It is well known that water will not circulate through a horizontal pipe, and that to  
 125 obtain a perfect circulation the ends of the pipes taking the water and passing it back to the boiler must be under the water-line, otherwise you will only get steam back to the top of the boiler as fast as it forms in the  
 130 coils. It is also well known that a free circulation of water is prevented by the formation of air-traps in a spiral or abruptly-bent pipe or way along which the water must be con-



ducted. In view of these difficulties the disposition of the pipes and the inclination thereof in my system are such as to conduce to the free circulation of the water and entirely avoid the formation of air-traps in the coils or bends of the pipes. Furthermore, the circulating-coils are placed inside of the brick arch out of the way and in position to receive heat, which would otherwise be absorbed by the bricks, and the pipes are practically a protection to the walls of the fireplace or furnace.

Having thus fully described my invention, what I claim, and desire to secure by Letters Patent of the United States, is—

1. A combined water heater, feeder, and circulating system for steam-boilers, comprising a series of pipes or tubes arranged on opposite sides of the boiler, a pipe-section connecting the lower terminals of the series of pipes with the bottom of the boiler through a single controlling-valve, a similar pipe-section connecting the upper terminals of said series of pipes with the upper part of the boiler below the water-line therein, a single valve for controlling the flow of water through the last-mentioned pipe-section, and a valve-controlled feed-pipe communicating with both series of circulating-pipes, substantially as described.
2. In a water heater, feeder, and circulating system for steam-boilers, the combination of the series of pipes extending back and forth at either side on a gentle incline from the receiving to the delivery ends thereof, couplings connecting the two series of pipes at their receiving and delivery ends, an intermediate pipe-section connecting the lower coupling with the bottom of the boiler, a similar pipe-section connecting the upper coupling with the upper part of the boiler below the water-line therein, a single valve controlling the flow through each of said pipe-sections, and a valved feed-pipe communicating with both

series of circulating-pipes, substantially as described.

3. In combination with the main boiler and water-circulating pipes or coils and the valves for controlling such pipes, a reserve boiler and water-circulating pipes connected therewith, and interposed valve mechanism, substantially as described, whereby the water in the reserve boiler may be heated by the circulation of the water from the coils of the main boiler through the reserve boiler, and vice versa, substantially as set forth.

4. In combination with the main boiler and its valved circulating-pipes, the reserve boiler provided with a similar system of valved circulating-pipes, and the coupling connecting the pipes of the two boilers and provided with a valve for controlling the circulation between the same, substantially as described.

5. In combination with the boiler and furnace, the series of vertically-disposed circulating-pipes secured to the furnace-walls at either side thereof and connecting at one end with the boiler at or about at the highest boiling point and at the other end with the lowest point of the boiler, the feed-pipe with stop-valve therein, and the straight-way valves interposed in said circulating-pipes between said stop-valve and the pipe-sections leading to the boiler, together with the reserve boiler, provided with a similar double series of circulating-pipes and straight-way valves controlling the same, and the intermediate cut-off valves for opening and closing communication between the reserve boiler and adjacent circulating-coils, substantially as described.

In testimony whereof I affix my signature in presence of two witnesses.

S. CHARLES DESPRES.

Witnesses:

CHARLES J. KNULAND,  
JAS. G. JOHNSON.