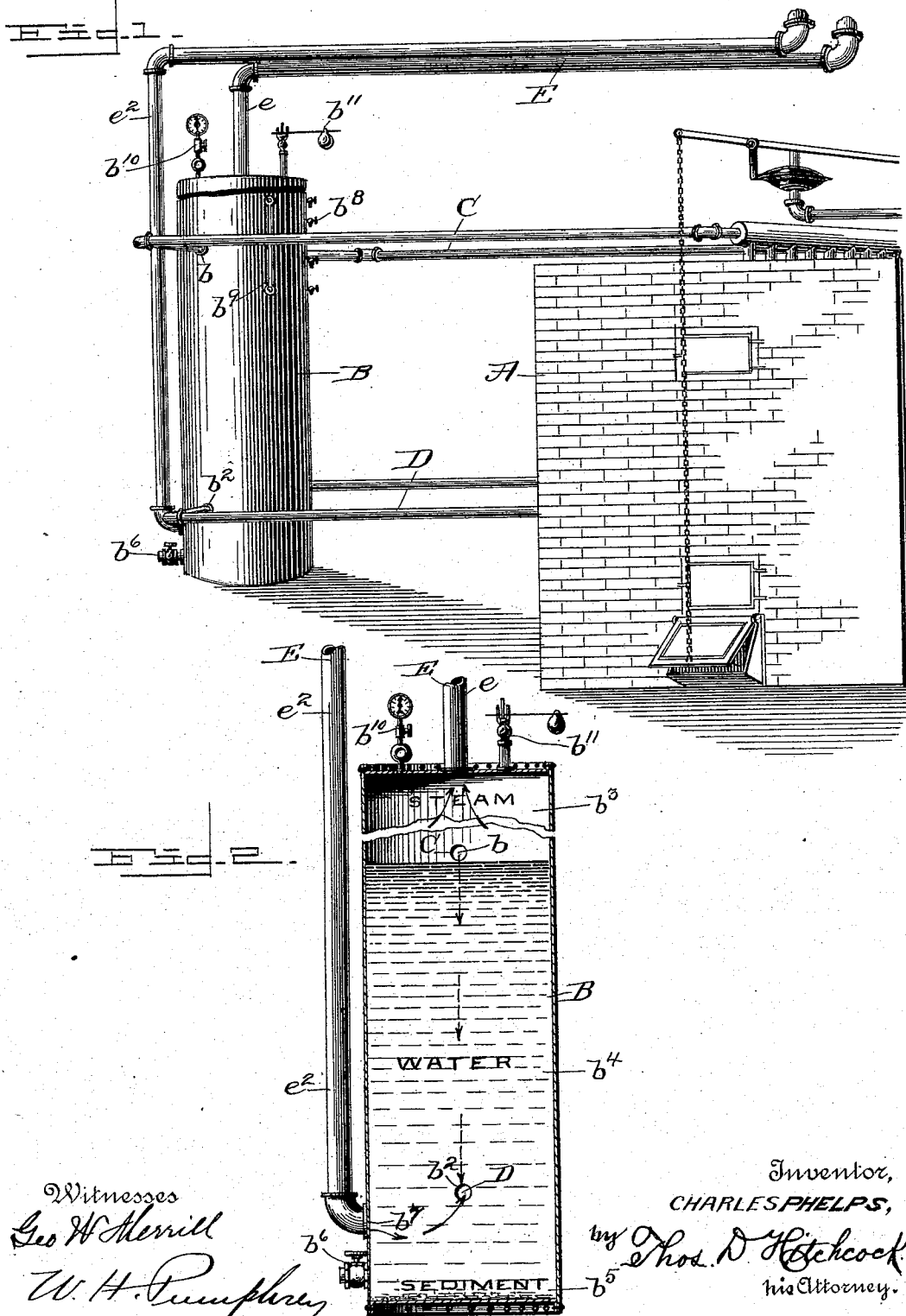


C. PHELPS.
HOT WATER CIRCULATOR.

No. 532,482.

Patented Jan. 15, 1895.



Witnesses
Geo H Merrill
W. H. Humphrey

Inventor,
CHARLES PHELPS,
by *Thos. D. Hitchcock*
his Attorney.

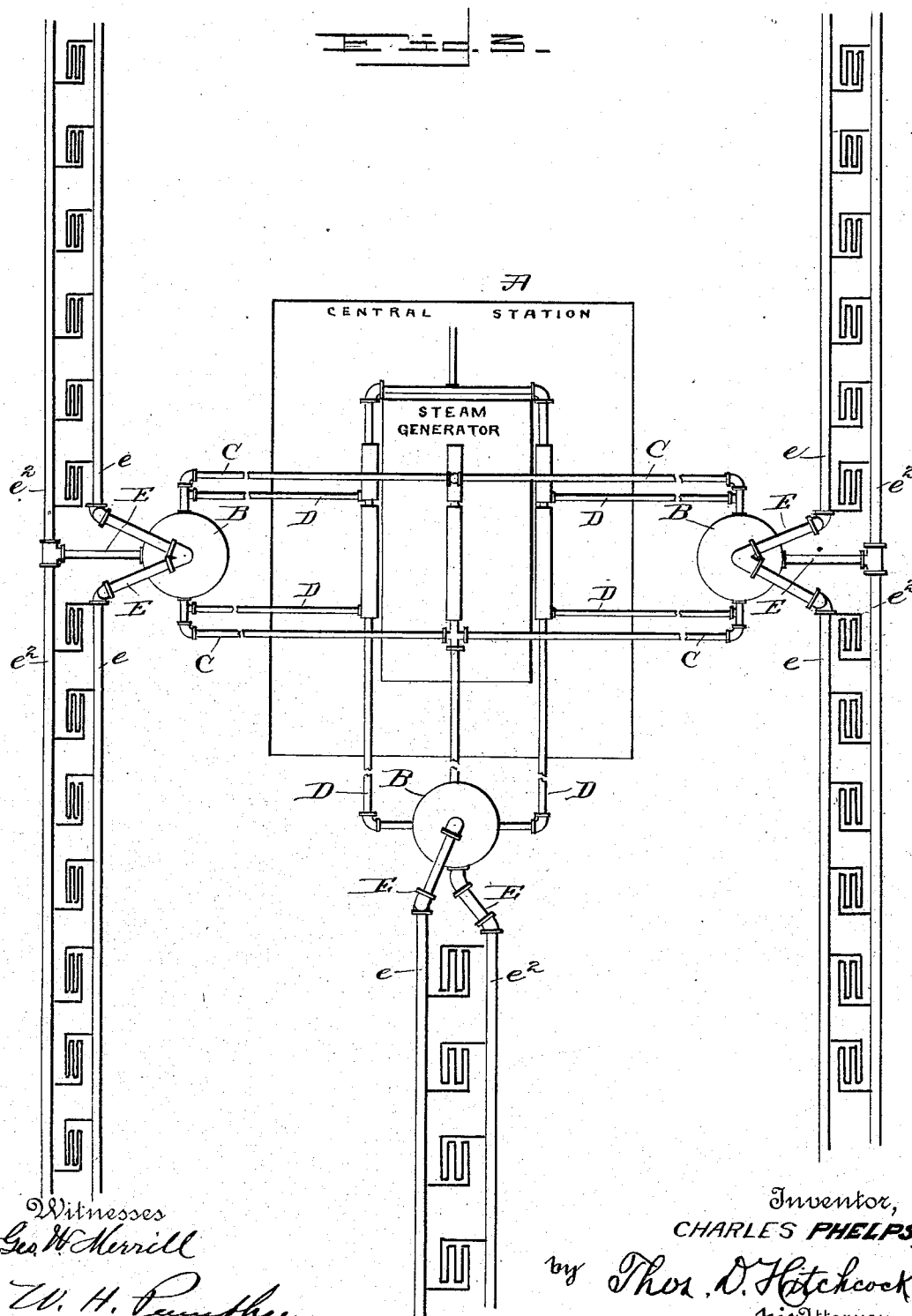
(No Model.)

2 Sheets—Sheet 2.

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UNITED STATES PATENT OFFICE.

CHARLES PHELPS, OF OSKALOOSA, IOWA.

HOT-WATER CIRCULATOR.

SPECIFICATION forming part of Letters Patent No. 532,482, dated January 15, 1895.

Application filed May 1, 1894. Serial No. 509,637. (No model.)

To all whom it may concern:

Be it known that I, CHARLES PHELPS, a citizen of the United States, residing at Oskaloosa, in the county of Mahaska and State of Iowa, have invented certain new and useful Improvements in Hot-Water Circulators or Boilers; 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 relates to hot-water circulators or boilers attached to hot-water heaters or generators of steam for heating buildings or for power purposes.

The objects of the said invention are,—first, to effect the greatest generation of steam at the least fuel cost; second, to prevent all possibility of the destruction of the boiler from deposits of mud or scale over the fire-surfaces and the consequent burning out of the iron; third, to suit the location of the circulator or boiler to the point where its utility is best subserved; fourth, to supply the boiler or circulator with water irrespective of the return flow of water from the radiators.

My invention is illustrated in the accompanying drawings, forming a part hereof, wherein—

Figure 1 is a perspective view of my invention attached to any hot-water heater or steam generator. Fig. 2 is a vertical section of my invention. Fig. 3 is a diagrammatic view of my invention showing its effectiveness in connection with a central generator for the distribution of steam over large areas.

Similar letters refer to similar parts throughout the several views.

I accomplish the objects of my invention as follows: I provide, in connection with a hot-water or steam generator, A, a receptacle, circulator, or boiler, B, of any desirable size, of any material strong enough to resist the pressure, outside of, and at any distance from, the generator, A, and resting upon the ground or any feasible support. At a suitable distance, b , from the top of the said receptacle, I enter the inflow pipes, C, having a suitable connection with the top of the generator, A, and by so doing provide, between this level b , and the top of the receptacle or circulator,

a space, b^3 , for the accumulation of steam. The height of this space may be varied to suit convenience as indicated by the broken line in Figs. 1 and 2. At a suitable distance, b^2 , from the bottom of the said receptacle or circulator, I attach the outflow pipes, D, having a suitable connection with the bottom of the generator, A, and, by so doing, I provide between this level and the bottom of the said receptacle or circulator a mud space drum, b^5 , the deposits in which may be at any time drawn off by the device at b^6 . The pipes, E, are the mains, e , connecting with the top of the steam space, b^3 , and extending to the radiators or the engine, serve to distribute the steam thereto; and e^2 , entering the circulator or receptacle at b^7 , is the return from the radiators or engine.

b^8 is the usual steam and water cocks; b^9 , the steam gage; b^{10} , the steam indicator; and b^{11} , the safety valve.

The water heater or steam generator may be of any conventional form having a free circulation from the bottom to the top and, consequently, a detailed description of it is unnecessary here.

It will be readily seen that the water heated in the generator, A, will rise therein and pass through the pipes, C, into the receptacle or circulator, B, at b , while a current from the said receptacle will pass, at b^2 , into the generator, A, through the pipes, D. Thus will be established a positive, free, and direct circulation of the water from the generator to the receptacle and through the waterspace, b^4 , of the receptacle downward to b^2 where it will pass to the generator through the pipes, D. Thus the water is passed again and again over the fire-surfaces of the heater, subjecting it constantly to the influence of the intense heat in the generator and passing it quickly, unchecked by any counter or cross currents, into the receptacle or circulator. In this way steam will be generated quickly and freely and will collect in the steam space, b^3 , whence it will be conducted to the point of application by the main, e . The portion, b^5 , of the receptacle, B, being below the level of the outflow orifice, b^2 , is outside of the strong current of circulating water and in it will be formed an eddy of comparatively quiet water in which gravity will cause the particles of mud or scale to sink to the bot-

tom. This being the only part of the apparatus which is not subjected to the influence of the strong current of circulating water, is the only point at which sediment will collect and, being away from the fire-surfaces, there can be no danger from the burning out of the fire-surfaces resulting from the deposits of mud or scale directly over the fire, as is the case in the conventional forms of steam boilers in the market. As this collects it may be drawn off at any time at the point, *b*⁶.

It will also be readily seen that the contents of the receptacle or circulator are entirely independent of the flow of water through the return, *e*², there always being a distinct current of water from the generator to the receptacle through the pipes, C. In this way the water is kept at the highest steam generating efficiency because the time during which it is outside the generator is greatly diminished and because, too, the numerous small streams from the generator are consolidated into one large body of water in the receptacle, thus contributing to the retention of heat and returning the water to the generator at a much higher temperature than it otherwise would if its supply depended upon the return flow from the radiators.

It will also be readily seen that the use of this receptacle with the generator renders it immaterial how small the water-spaces may be in the generator as, because of the direct and unimpeded circulation of the water out of the generator into the receptacle or circulator, there can be no checking of the water from conflicting currents in the small water spaces in the generator and, consequently, no blowing dry of these spaces by reason of the overheating of the water therein. Thus, with this receptacle or circulator attached, any hot-water heater may be converted into a steam boiler for power or other purposes and make a boiler superior to the conventional makes of boilers in the market as the fire-spaces in the latter have to be large to avoid the possibility of blowing dry; and by the use of this receptacle the fire-spaces may be increased almost indefinitely and, consequently, the steam generating efficiency increased.

It will be seen that the efficiency of steam is largely increased by applying it as directly as possible to the work to be accomplished as

its loss of heat is thus diminished by reason of the diminution of the time and distance necessary to convey it to the working point. By the use of this receptacle the steam may be had directly from the steam space at any point at which it is desirable to apply it. Thus, the generator may be centrally located, as at A, Fig. 3, in a large building and these receptacles or circulators, B, B, B, may be located in any part of the building most effective to the application of the steam, the return mains *e* and *e*² completing the connection with the radiators, and connection being had with the generator by the inflow pipes, C, and by the outflow pipes D, adapted to be attached to both generator and receptacle whatever may be their relative positions; or the generator may be in a separate building at a distance from the building to be heated or where the power is wanted and connection may be made by means of underground pipes with the circulators or receptacles placed at any desirable points in the building.

In the drawings illustrating my invention I have shown the preferred mode of construction; but I do not wish to limit myself to the size, form, or position there shown of the receptacles or circulators for these, as will be readily seen, will vary according to the amount of steam to be used and the purposes which the said receptacles are to subserve; but

What I do claim as my invention or discovery, and desire to secure by Letters Patent, is—

The combination with a steam generator, of one or more receptacles located exterior to the generator, inflow pipes leading to the receptacle at a suitable distance from the top thereof, above which is formed a space for steam, an outflow pipe leading from a point above the bottom of the receptacle and connections at the top whereby the steam is conveyed from, and connections at the bottom for its return to the receptacle, substantially as and for the purpose described.

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

CHAS. PHELPS.

Witnesses:

H. CUSHMAN,
D. W. LORING.