R. C. DUCHESNE.

STEAM-BOILER.

No. 192,685. Patented July 3, 1877.

Fig. 2.

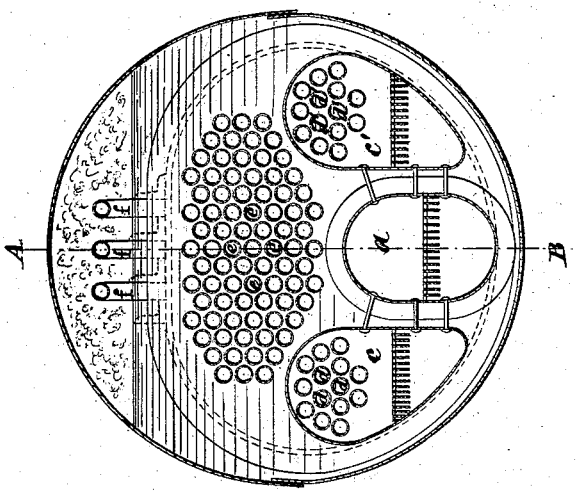
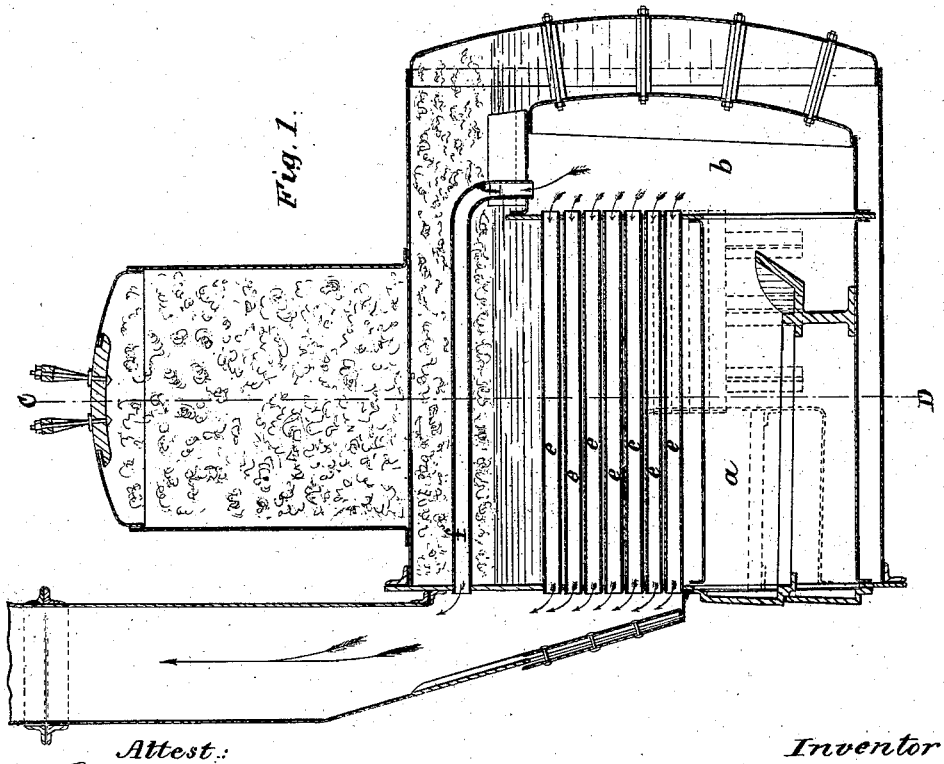


Fig. 1.



Attest.:

Erich Barsault

Chas. Finck

Inventor:

R. C. Duchesne

UNITED STATES PATENT OFFICE.

RENÉ CONSTANT DUCHESNE, OF VILLENEUVE-LA-LANDE, IN CHANTENAY, FRANCE.

IMPROVEMENT IN STEAM-BOILERS.

Specification forming part of Letters Patent No. **192,685**, dated July 3, 1877; application filed May 22, 1877.

To all whom it may concern:

Be it known that I, RENÉ CONSTANT DUCHESNE, of Villeneuve-la-Lande, in Chantenay, in the Department of Loire-Inferieure, France, have invented a new and useful Improvement in Steam-Boilers; and that the following is a full, clear, and exact description of the same, reference being had to the accompanying drawings, making part of this specification.

The principle upon which my new system of steam-generator is based consists in the employment of an internal fire-chamber, so located and arranged that the flame of the fuel, while acting powerfully in heating the generator, may arrive in a smoke-box or distributing-chamber, into which are also conveyed the inflammable but not inflamed gases from one or more other fire-boxes, through tubes presenting a large heating-surface.

By this arrangement the products of combuston that arrive in the smoke-box or distributing-chamber are inflamed again by the flame coming directly from the interior fire-chamber, and all the products of the various fire-boxes then pass through tubes, presenting a large heating-surface before reaching the chimney, and yield the greatest possible quantity of caloric either to convert the water in the boiler into steam, or to superheat the steam already formed, or to both generate and superheat steam.

Other modes of utilizing the heat evolved by the inflaming of inflammable gases, as described, may be employed to obtain similar or different results. It will be understood, however, that the object of my invention is to reinflame, by means of the flame of one or more furnaces or fire-chambers, the gases of one or more other furnaces or fire-chambers, a large portion of the caloric of which gases has already been used efficiently by passing them through numerous tubes within the boiler, presenting a large heating-surface, so that, by reinflaming these gases, they can be utilized again simultaneously with those coming directly from a furnace or furnaces, by conveying them to the chimney through tubes presenting a large heating-surface.

Although the arrangement of parts through which the advantages of my invention are realized may be varied, I will give, in illustration of my invention, an arrangement which I have found in practice to be one of the best.

Figure 1 is a longitudinal section of a boiler taken upon the line A B of Fig. 2, and Fig. 2 is a transverse section taken at the line C D.

The flame from the central furnace *a* enters directly and freely into the smoke-box or distributing-chamber *b*. To the right and to the left of the central furnace are arranged the furnaces *c c'*, whose products of combustion are drawn into the smoke-box *b*, but only after they shall have passed through the two series of tubes *d d d*, *d' d' d'*. The flame of the central furnace meeting with no obstructions during its passage into the smoke-box, will arrive there in the condition of a flame, and thus reinflame or kindle the gases which, coming from the side furnaces and obliged to pass through their respective series of tubes, already described, will arrive at the smoke-box in the form of gaseous fuel. The united products of combustion or ignited gases from all the furnaces reach the chimney through tubes, one portion passing through the tubes *e e e*, and the other through the series of tubes *f f f*, heating, in this manner, the water contained in the boiler, and also drying and superheating the steam already formed.

I will add, also, that by the construction shown, as well as in others readily suggested, boilers can be made in a very simple and strong manner, at the same time permitting the level of the water within to be at the proper height, and, as shown in the drawings, the three furnaces can be easily united, and the back of the smoke-box secured to the rear of the boiler. The upper part of the smoke-box, which is rather flat, can be strengthened, as shown, by adding a few pieces of angle-iron.

The doors of the furnaces, the man and hand holes, &c., are attached as in all other well-constructed boilers.

Another arrangement that I would mention as an illustration of modifications without departure from my invention, consists in the chimney, instead of being located in front,

passing through the steam-dome, all the other parts retaining their characteristic forms, and the relative position of the furnace.

Having thus described my invention, and the manner in which the same is or may be carried into effect, what I claim, and desire to secure by Letters Patent, is—

1. The combination, in a steam generator or boiler, of one or more furnaces or fire-chambers with one or more other furnaces or fire-chambers, under the construction substantially as shown and described, so that the products of combustion of the one shall be ignited or reinflamed by the other.

2. In a steam generator or boiler, a central furnace or fire-box, the products of combustion of which pass through a single flue into the smoke-box, in combination with lateral furnaces and fire-boxes, the products of combustion of which pass through nests of tubular flues into the same fire-box, substantially as shown and set forth.

3. The combination, with one or more furnaces carrying its or their products of combustion to the fire-box in a flamed condition, and one or more furnaces conveying its or their products of combustion to the fire-box in a non-inflamed but inflammable condition, of return-flues passing the mingled and inflamed gases to the chimney through the steam or water portion of the boiler, or through both, substantially as shown and set forth.

In testimony whereof I have signed my name to this specification before two subscribing witnesses.

R. C. DUCHESNE.

Witnesses:
EMILE BARRAULT,
AUG. VINCK.