

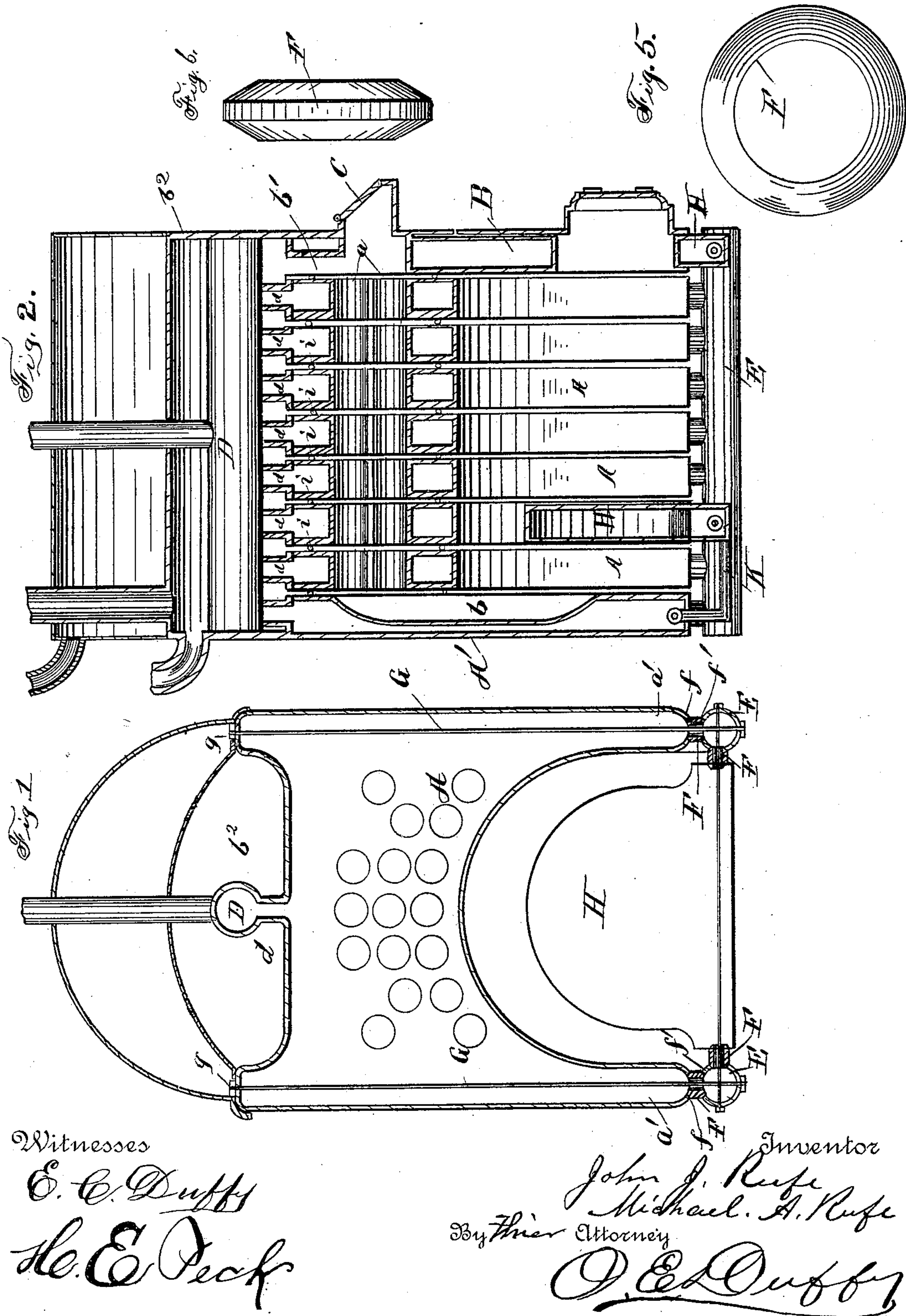
(No Model.)

2 Sheets—Sheet 1.

J. J. & M. A. RUFÉ.
SECTIONAL STEAM BOILER.

No. 397,026.

Patented Jan. 29, 1889.



Witnesses

E. C. Duff

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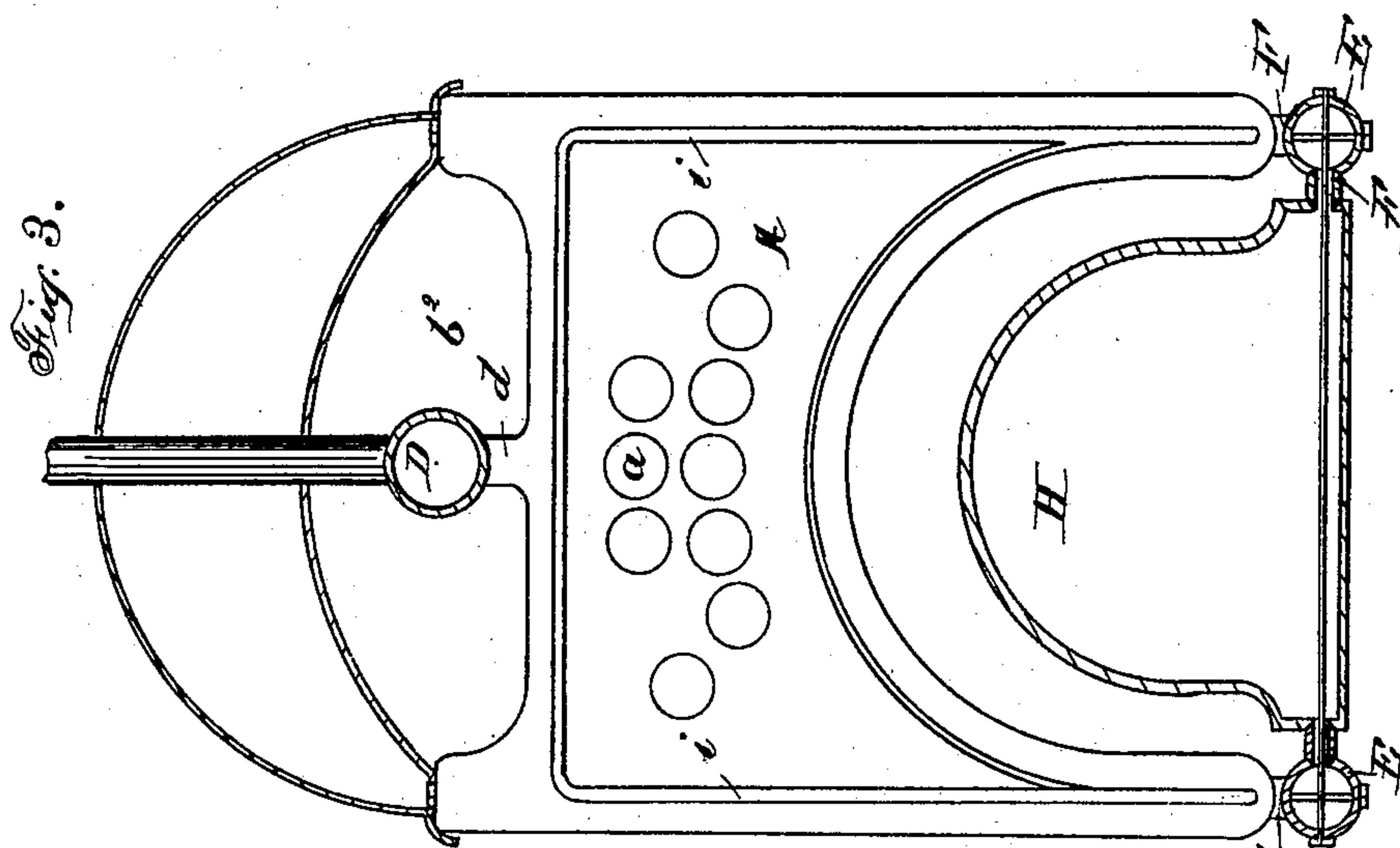
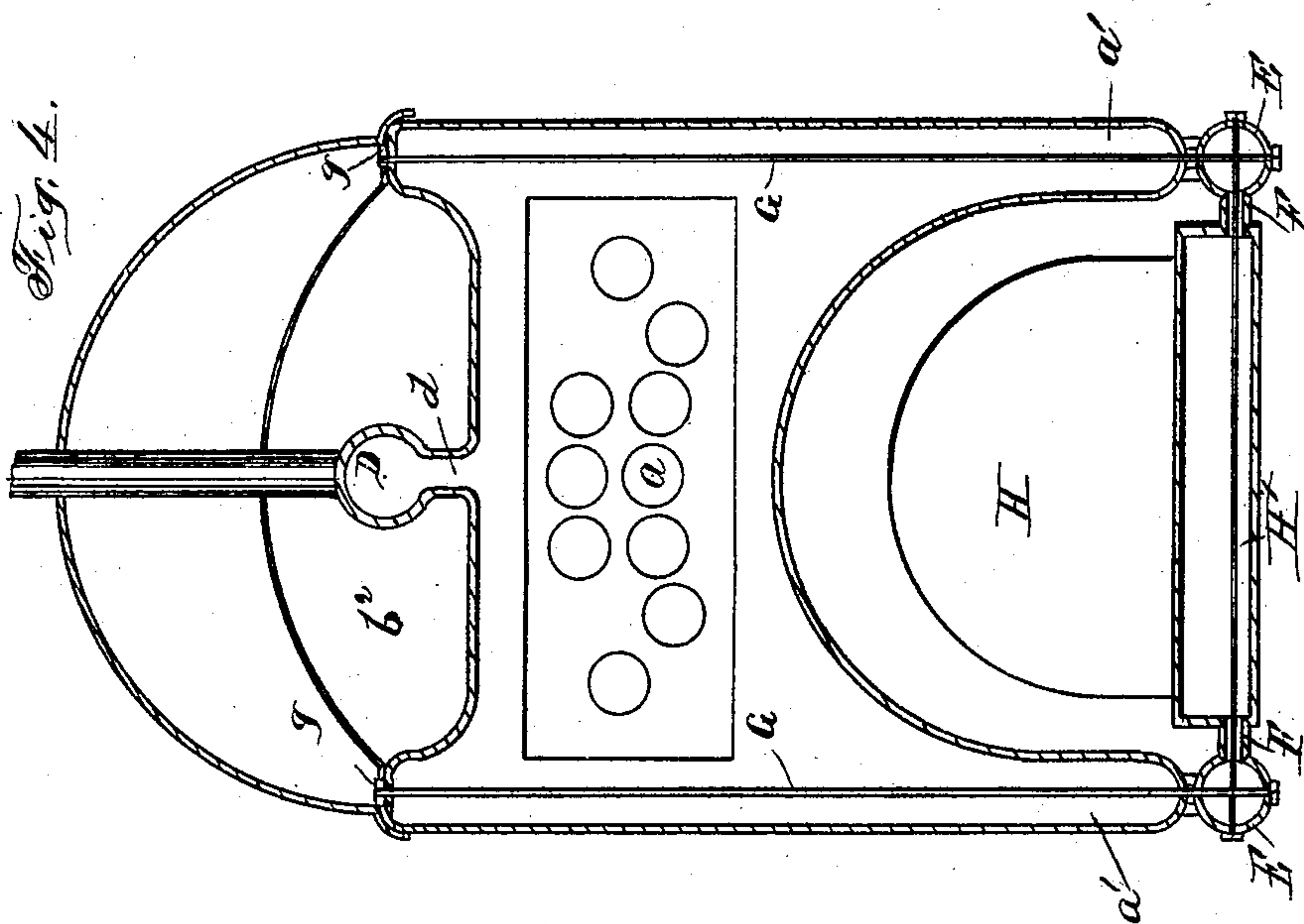
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UNITED STATES PATENT OFFICE.

JOHN J. RUFÉ AND MICHAEL A. RUFÉ, OF DOYLESTOWN, PENNSYLVANIA.

SECTIONAL STEAM-BOILER.

SPECIFICATION forming part of Letters Patent No. 397,026, dated January 29, 1889.

Application filed June 16, 1888. Serial No. 277,328. (No model.)

To all whom it may concern:

Be it known that we, JOHN J. RUFÉ and MICHAEL A. RUFÉ, of Doylestown, in the county of Bucks and State of Pennsylvania, have invented certain new and useful Improvements in Sectional Steam-Boilers; and we do hereby declare that the following is a full, clear, and exact description of the invention, which will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form part of this specification.

Our invention relates to an improvement in sectional steam-boilers.

The object of our invention is to provide an improved boiler of the class mentioned which shall be more durable, cheap, and effective than those heretofore in use, and in which the heat and products of combustion can have access to a greater surface of the sections and other portions in which water is located than heretofore, whereby the steam is quickly and thoroughly generated and a great saving of fuel is accomplished; and a further object is to provide improved means for connecting the sections, manifolds, bridge-wall, &c., whereby expansion and contraction are allowed for, and to provide a removable casing to form the upper horizontal exit-flue over the sections, and to provide the sections with ribs or other means, whereby a space is left between the sides of the sections to admit the heat and products of combustion to the sides of the section, and thereby economize the heat and cause a better circulation of the water.

With these ends in view our invention consists in certain novel features of construction and combinations of parts, more fully described hereinafter, and particularly pointed out in the claims.

Referring to the accompanying drawings, Figure 1 represents a vertical cross-section taken on a plane through one of the intermediate sections. Fig. 2 is a central vertical longitudinal section. Fig. 3 is a cross-section in a plane falling between two sections and passing through the bridge-wall. Fig. 4 is a vertical cross-section taken in a plane passing through the front section of the boiler; and Figs. 5 and 6 represent, respectively, a plan

and an edge view of the metallic collar or packing-ring forming the joint between the various parts.

In the drawings, the reference-letter A indicates the several independent vertical hollow water-sections composing the boiler, and which are each provided with the usual transverse tubes or flues, *a*, and below said flues with a central inverted-U-shaped recess forming a pair of downwardly-extending water-legs, *a' a'*, so that when the sections are placed in position side by side said recesses and downwardly-extending legs register and form the top and sides of the combustion-chamber, and the flues *a* also register, forming the usual horizontal flues or passages through the water above the combustion-chamber, and forming a portion of the exit for the smoke and products of combustion.

The rear ends of the combustion-chamber and the boiler tubes or flues *a* are closed by the hollow section A', which forms the back piece of the boiler, and is of about the same general flat-form construction as the intermediate sections, A, except it does not have the transverse tubes nor the central recess in its lower part, but closes the rear end of the combustion-chamber and forms a flue or conduit, *b*, from the rear upper portion of the combustion-chamber to the series of horizontal tubes or flues extending the length of the boiler and formed by the registering tubes of each section.

The front of the boiler is formed by the hollow section B, the interior of which is filled with water and communicates with the interiors of the other sections, and its central portion opposite the front ends of the series of horizontal tubes is open, as shown, and said opening is normally closed by a door, C, or the like, whereby access can be had to the horizontal tubes for any desired purpose. The lower portion of said hollow front at the front end of the combustion-chamber is open to allow access to the fire, and the opening is provided with the usual fire-door. This hollow front forms a flue, *b'*, from the front open ends of the series of the horizontal tubes upwardly to the front end of a flue or chamber, *b''*, extending over the tops of the sections and formed by having the upper edges of each section slightly concaved, making a continuous groove

or depression throughout the top of the completed boiler, and the top wall of the flue or chamber is formed by a casing or hood removably secured to the tops of the sections at its longitudinal edges and curved upwardly at its center, as shown, and said chamber or flue is closed at its front end preferably by a door, and is also closed at its rear, through which the smoke-pipe extends.

It will be seen that the smoke and products of combustion pass from the combustion-chamber upwardly through the flue *b*, surrounded by water and at the rear of the boiler, into the rear ends of the series of horizontal flues surrounded by water, and through said tubes into the upwardly-extending flue *b'*, surrounded by water and located at the front of the boiler, and from thence into flue or chamber *b''* and out through the smoke-pipe. Thus it will be seen that the heated smoke and products of combustion throughout this lengthy and tortuous path are surrounded by water, thereby taking up and economizing the heat and more quickly heating a larger body of water and producing a greater quantity of steam than heretofore. The steam from all the sections passes into a cylindrical horizontal steam-drum, *D*, centrally located within the flue or chamber *b''*, by means of vertical tubes or pipes *d*, connected by screw-joints with and opening into the sections, each section being provided with a steam-pipe extending from its top into the bottom of the steam-drum.

The steam in the steam-drum is dried and superheated by the heated air, smoke, and products of combustion in the chamber or flue *b''*, and the radiated heat from said chamber can be utilized for various purposes.

A pair of cylindrical manifolds or mud-drums, *E*, are horizontally located beneath the sections, one drum being located beneath the lower ends of each series of legs *a'* on the opposite sides of the combustion-chamber, and extending the longitudinal length of the boiler, and said manifolds are closed at their ends in any suitable manner and are provided with any suitable cocks and ports for blowing out the sediment, cleaning, &c.

Each vertical hollow section *A* is separately and independently secured to each manifold in the following manner: An outwardly-flaring aperture or opening, *f*, is drilled, reamed, or otherwise formed through the bottom of each leg of every section, and corresponding outwardly-flaring apertures or openings, *f'*, are drilled through the top sides of the manifolds opposite and so as to register with each opening *f* in said legs, and between each pair of apertures *f* and *f'* a metallic packing ring or collar, *F*, is interposed, said collar being provided with beveled edges at its opposite sides, which are so formed as to fit snugly and tightly into the registering or aligned openings in the manifolds and sections. These joints are fastened and the sections and manifolds clamped together by vertical rods *G*, each rod passing from the bottom of its mani-

fold upwardly through the same and through a pair of aligned or registering apertures, *f* and *f'*, through the packing-collar interposed between the same, and upwardly throughout the vertical height of its section and through the top of the same, where it is provided with a nut, *g*, or similar device, whereby the various parts can be secured together. Thus it will be seen that each section is independently clamped to the manifolds by tight and hollow metallic joints that allow free communication between the interiors of the sections and manifolds, and also allow for a slight expansion and contraction of the various parts without affecting the tightness of the joint or breaking and cracking of the parts.

The vertical rods act as braces and strengthen the structure and allow the boiler to be readily taken apart for cleaning or the like, or for the addition or removal of sections to increase or diminish its capacity.

H indicates a bridge-wall extending upwardly in the rear of the combustion-chamber, and preferably formed of a hollow casting to be filled with water and in communication with interiors of the sections and manifolds, and said bridge-wall is secured to the manifolds at its opposite edges by means of a horizontal bolt passing through the manifolds and the lower portion of said wall, and the joints between the manifolds and edges of the wall are formed by the interposed collars *F*, and in a similar manner as the joints between the manifolds and lower ends of sections, to allow free communication and passage for the water through the sections, bridge-wall, and manifolds. Between the front ends of the manifolds beneath the fire-door in the hollow front of the boiler a hollow casting, *H'*, is located and forms the lower portion of the frame for said door, and said casting *H'* is adapted to be filled with water and be in communication with the interiors of the manifolds, &c., and is secured in position to and extending transversely between the manifolds by a horizontal bolt or rods and packing-collars *F*, in a similar manner with the bridge-wall forming hollow tight joints from the interior of each manifold to the interior of said casting. Thus it will be seen that the fire-door is surrounded by water which is in circulation with the water in the sections and manifolds.

The vertical hollow sections *A* are provided upon their outer sides with laterally-projecting ribs *i*, so that when the sections are placed in position side by side their outer faces will be held a suitable distance apart by the ribs, thereby leaving a space or forming a chamber between the sides of each pair of sections, and thus deriving the benefit of the fire and heat between the sections and obtaining more and enlarged heating-surfaces.

The ribs are so formed as to surround the series of tubes *a* through each section and to extend down each leg, and said ribs are coated

on the outside with asbestos or similar material to prevent the escape of heat. Thus it will be seen that a chamber is formed between each pair of sections inclosing the tubes and

5 surrounded by the ribs, thereby preventing the escape of smoke, and the ribs extending down the legs *a'* close communication between the sections from the combustion-chamber.

10 K indicates a water-pipe extending from the hollow bridge-wall into the hollow rear section of the boiler, whereby the circulation of water through the various parts is facilitated and direct communication between the

15 wall and hollow back established.
The boiler can be provided with the usual steam and water supply pipes and other attachments necessary and essential to the proper operation of a boiler of this kind.

20 The great advantages and economy of heat and fuel attained by the use of the herein-described boiler will be clearly obvious to all persons experienced in the art; hence an enumeration of these advantages is not deemed

25 necessary.
It is obvious that numerous changes might be resorted to in the form and arrangement of the various parts described without departing from the spirit and scope of our invention; hence we do not wish to limit ourselves to the precise construction herein set forth, but consider ourselves fully entitled to all such changes as fall within the spirit and scope of our invention.

35 What we claim is—

1. The combination of the hollow sections, the combustion-chamber, the manifolds, and the hollow bridge-wall extending between and secured to the manifolds by means of hollow

40 water-tight joints, whereby the interiors of the sections, manifolds, and bridge-wall are in communication with each other, as set forth.
2. In a sectional boiler, the combination of the combustion-chamber, the sections, the

45 manifolds, the hollow front provided with an opening for the fire-door, and a hollow casting extending between the front ends of the manifolds at the bottom of said opening, said casting being secured to and in communication

50 with the interior of the manifolds, in the manner and for the purpose substantially as described.
3. The combination, with the hollow vertical sections, and the hollow back, of the hollow

55 low bridge-wall in communication with said

sections, and connections whereby direct communication is established between the bridge-wall and the hollow back.

4. In a sectional boiler, the combination of the hollow vertical sections, the upper edge 60 of each section being concaved, the combustion-chamber, the horizontal flues, a rear flue from combustion-chamber to horizontal flues, the upwardly-curved hood or casing secured to the tops of said sections over said concaved 65 recesses and forming a longitudinal chamber, a flue extending from the front ends of the horizontal flues to said chamber, and the steam-drum longitudinally located in said chamber.

5. In a sectional boiler, the combination of the series of vertical hollow sections, the manifolds located beneath the ends of the sections, the sections and manifolds having registering apertures, packing-rings having beveled edges 75 interposed between said apertures, and vertical rods passing through the manifolds, apertures, packing-rings, and upwardly through the sections, and provided with nuts on their upper ends, whereby the sections are separated and independently secured to the manifolds.

6. In a sectional boiler, the combination of the hollow sections, the manifolds, and the hollow bridge-wall extending between the 85 manifolds and secured to the same by hollow joints, and a rod extending through the manifolds and bridge-wall.

7. In a sectional boiler, the combination of the hollow sections, the hollow bridge-wall, 90 the manifolds, the hollow front provided with an opening in its lower portion, a hollow casting extending between and secured to the manifolds by hollow joints at the bottom of said opening, and a rod extending through 95 the manifolds and said casting.

8. In a sectional boiler, the combination of the hollow sections, a hollow back, a hollow bridge-wall in communication with the manifolds, and a pipe extending from the bridge-wall to the hollow back.

In testimony that we claim the foregoing as our own we affix our signatures in presence of two witnesses.

JOHN J. RUFÉ.
MICHAEL A. RUFÉ.

Witnesses:

WM. HOFFMAN,
ISAIAH B. LONG.