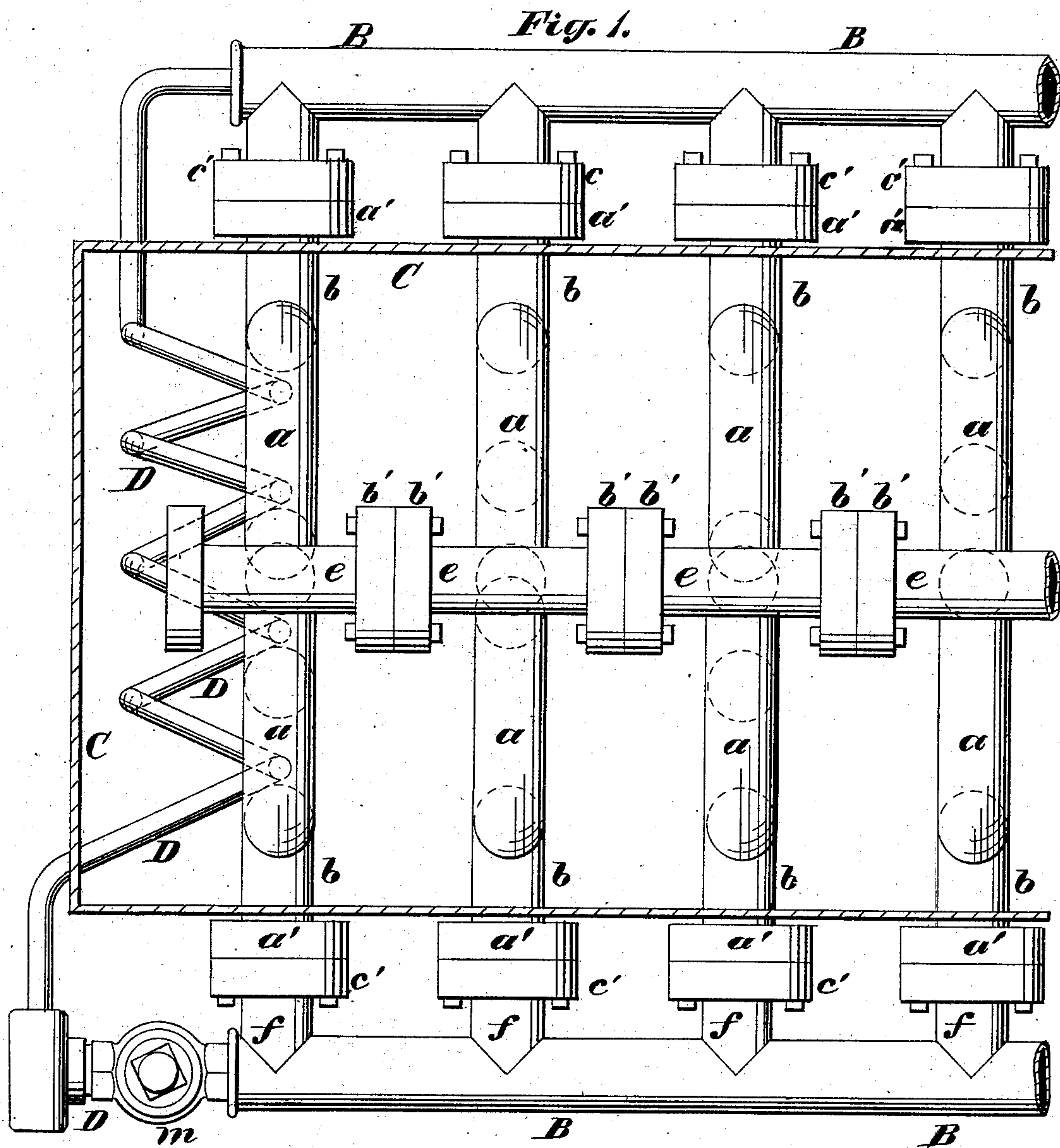


M. A. SUTHERLAND.
Steam Generator.

No. 238,008.

Patented Feb. 22, 1881.



Witnesses.

H. N. Parker

Chas. H. Doxat

INVENTOR.

Mosher A. Sutherland

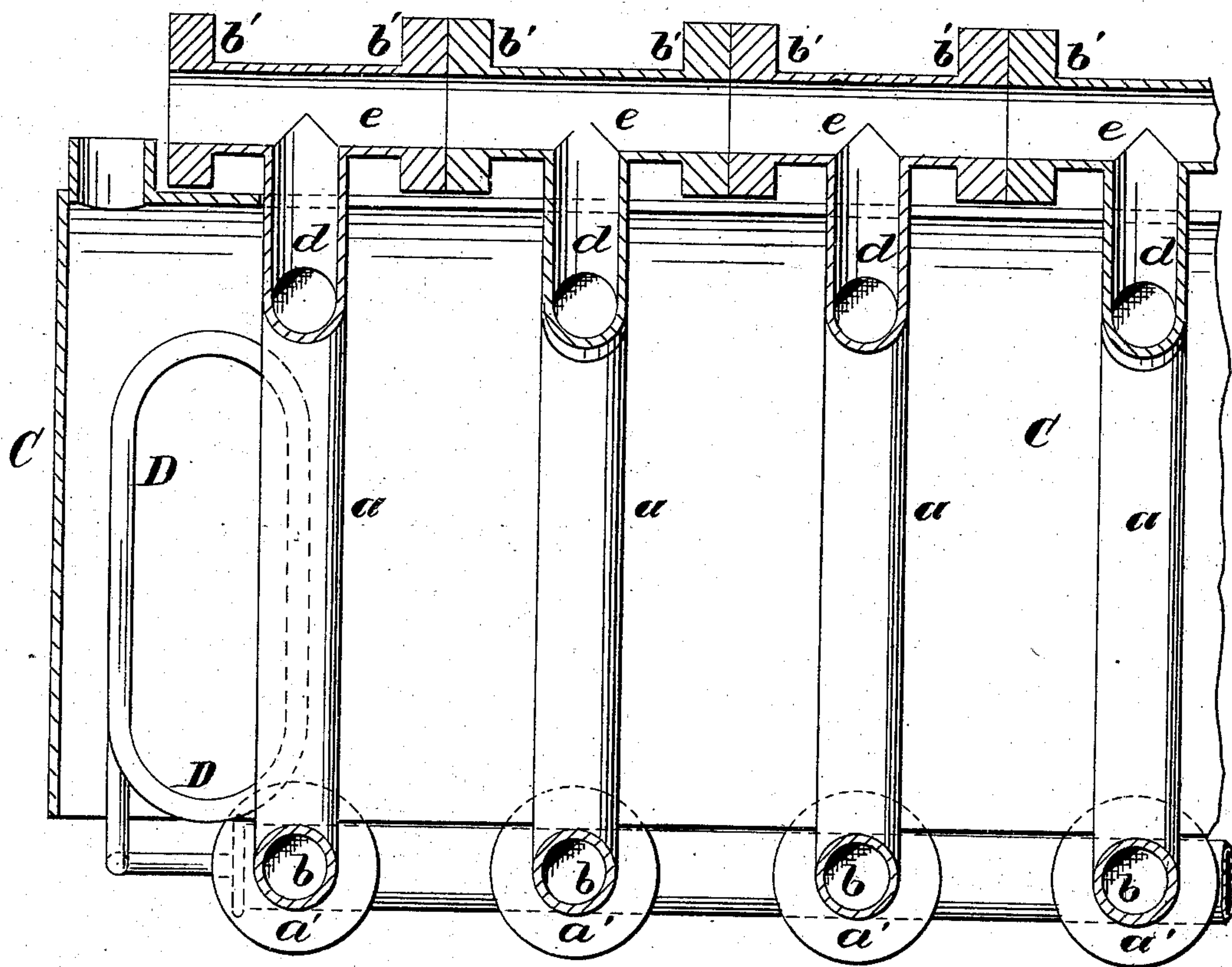
PER James A. Whitney
Att'y.

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Fig. 2.



WITNESSES.

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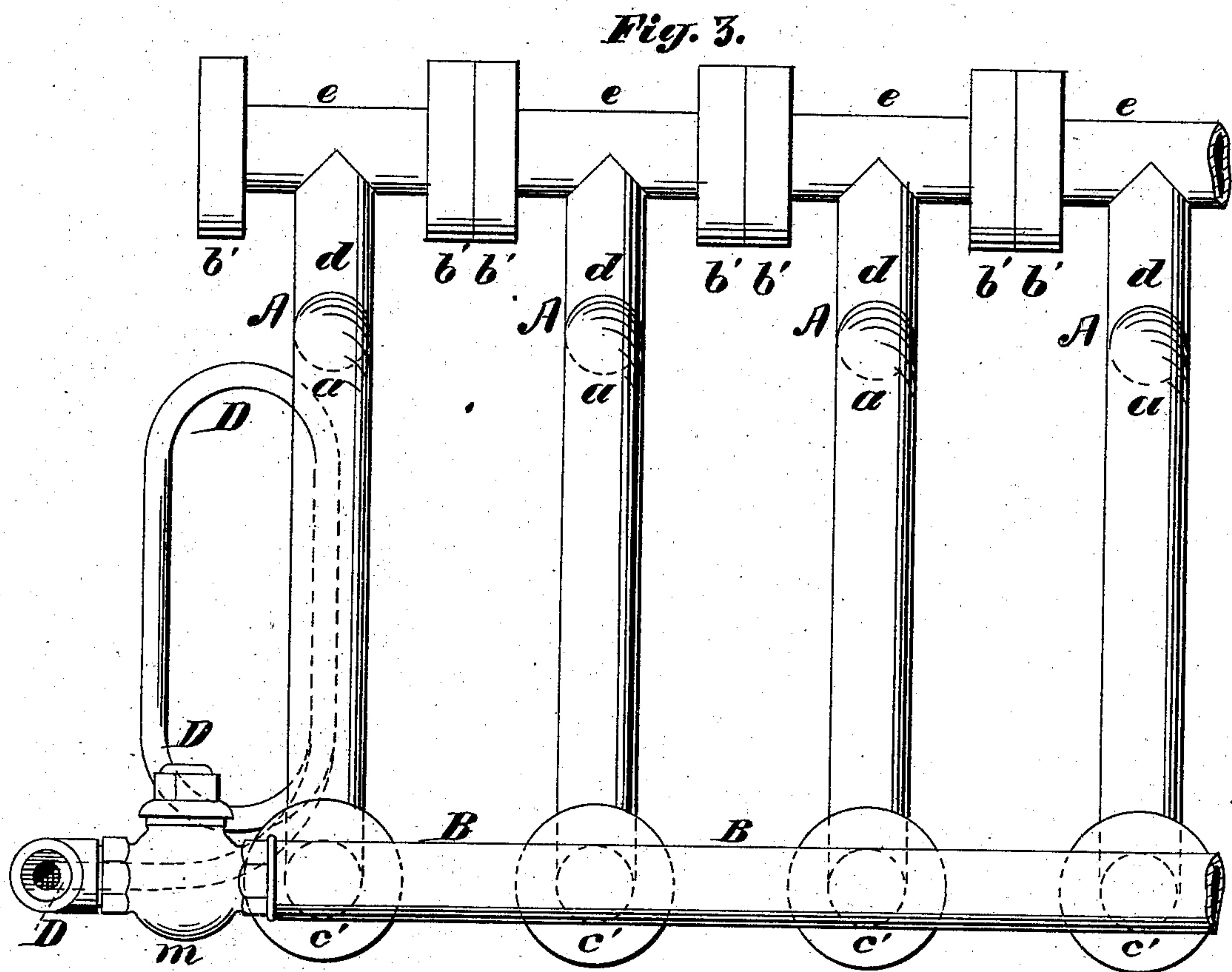
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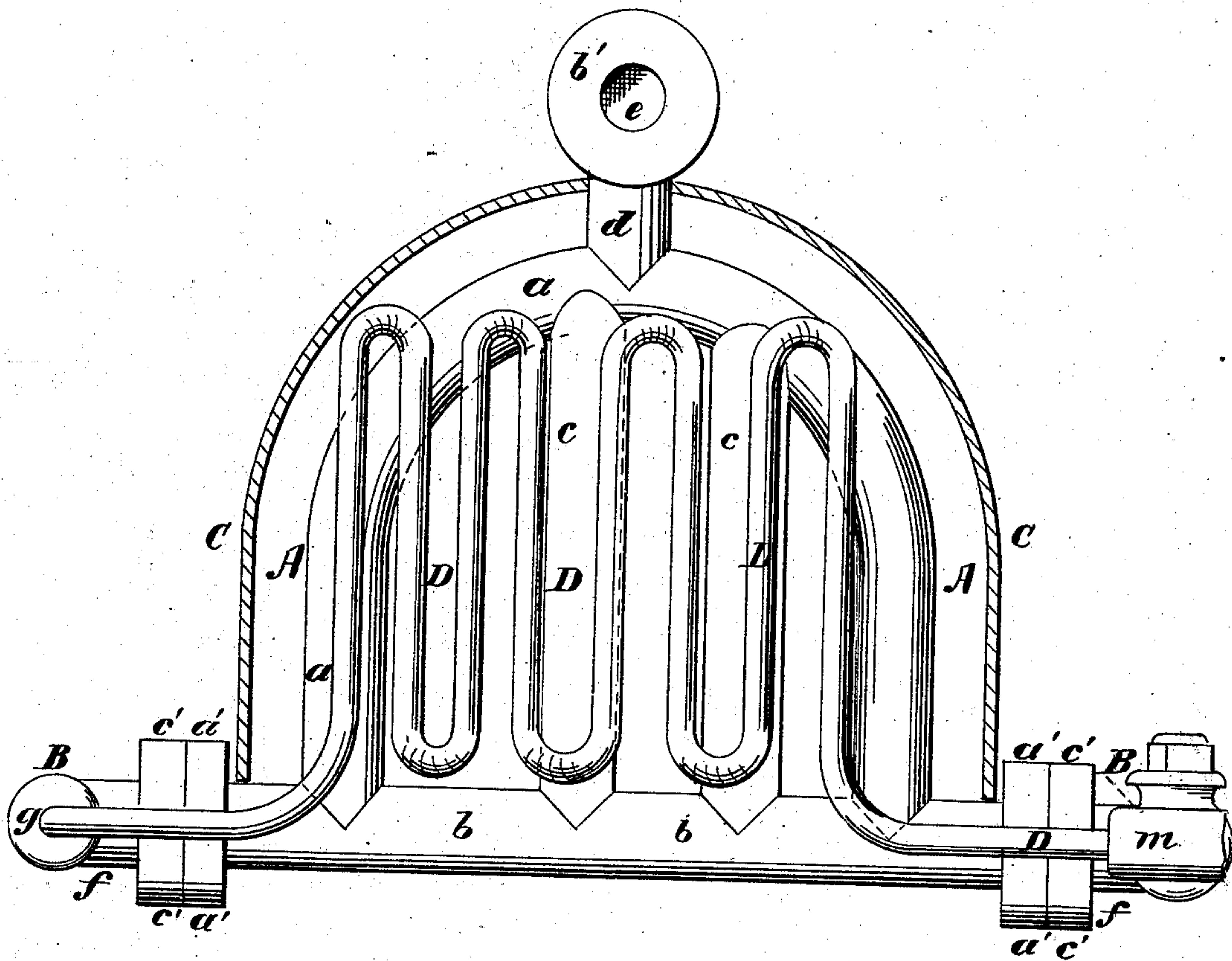
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Fig. 4.



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Per James C. Whitney
Atty.

UNITED STATES PATENT OFFICE.

MOSHER A. SUTHERLAND, OF NEW YORK, N. Y.

STEAM-GENERATOR.

SPECIFICATION forming part of Letters Patent No. 238,008, dated February 22, 1881.

Application filed January 17, 1880.

To all whom it may concern:

Be it known that I, MOSHER A. SUTHERLAND, of the city, county, and State of New York, have invented certain Improvements in Steam-Generators, of which the following is a specification.

This invention relates to cast-iron sectional boilers, and its object is to provide a boiler in which will be secured a most efficient and thorough circulation of the water, a great extent of heating-surface, a great economy in the heat applied to the generation of steam, and freedom from injury to the joints which connect the sections.

The invention comprises a boiler composed of peculiarly-shaped tubular sections bolted together in such a manner that complete provision is made for the upward movement of the steam and water in order to insure the most efficient circulation within the boiler, and at the same time to secure the most effective action of the flame and hot products of combustion from the furnace upon the heating-surfaces of the tubular sections aforesaid, the said boiler being surrounded by a shell which constitutes the walls of the furnace or fire-box.

The invention further comprises a check-valve so connected with the aforesaid tubular coil and with one of the tubular passages of the boiler itself as to direct the feed-water through the coil previous to its entrance to the boiler, and yet in case of the generation of steam within the coil to yield to the pressure from the latter, so as to permit a circulation of steam and water through the coil in the same manner as through the boiler, thereby preventing the destruction of the coil either from burning out or explosion, which would be likely to occur if no such circulation were afforded through it.

The invention further comprises a novel combination of horizontal connecting-pipes attached to the lower lateral portions, and also to the upper portions, of the system of tubular sections outside of the shell which constitutes the walls of the fire-box or furnace of the boiler, by which means injury to the joints or connections of the sections by the action of heat or changes of temperature is avoided.

Figure 1 is a plan view of a steam-gener-

ator embracing my said invention, but with the shell or walls of the fire-box or furnace shown in horizontal section. Fig. 2 is a vertical longitudinal section of the said generator. Fig. 3 is a side view thereof with the shell removed, and Fig. 4 is an end view looking from the rear and with the shell or walls of the furnace or fire-box shown in vertical transverse section.

A represents the sections, each of which is composed of a curved or semicircular pipe, *a*, extending upward from a horizontal pipe, *b*, and with intermediate vertical pipes, *c*, connecting the upper or central portions of the curved pipe *a* with the central portions of the horizontal pipe *b*. Extending upward from the top of the curved pipe *a* is a short vertical pipe, *d*, and formed transversely on the top of this is a horizontal pipe, *e*. Upon each end of the horizontal pipe *b* is a coupling-flange, *a'*, and in like manner upon each end of the horizontal pipes *e* is a similar coupling-flange, *b'*. The pipes *a b c d e*, together with the accompanying flanges *a' b'*, are all to be of cast-iron casting, by the usual methods of forming iron castings or such other as may be deemed appropriate.

B represents horizontal pipes, each of which has along its length and at right angles to its said length short horizontal tubular pipes *f*, corresponding in number to the number of sections A of which the boiler is composed. Upon the inner end of each of these short pipes *f* is provided a coupling-flange, *c'*. The pipes B, together with their short pipes *f* and coupling-flanges *c'*, are, like the sections A, of cast-iron. The pipes B are connected with the sections A by bolting the coupling-flanges *c'* of said pipes B to the coupling-flanges *a'*, provided on the sections A, as hereinbefore explained, the passages of the pipe B being thus rendered continuous with the passages of the sections A. The sections A as thus put in position have their coupling-flanges *b'* bolted together, thereby forming a continuous passage through the several coincident pipes *e*, which said passage is of course continuous with the other passages through the sections A and with those of the pipes B.

C is the shell which constitutes the walls of the fire-box or furnace, and which may be

of brick-work for stationary boilers, or of wrought-iron or other suitable material for the furnaces of marine boilers. A fire-box and grate of any suitable construction or kind may be arranged in due relation to the said shell, so that said shell shall form a portion of the walls of the furnace, or shall form the walls of the furnace so far as concerns confining the flame of products of combustion in due relation with those portions of the sections A inclosed in said shell.

It is to be observed that the ends of the pipes *a*, together with the coupling-flanges thereon and together with the pipes B and their adjuncts, are placed outside of the shell, out of contact with the flame and away from the heating action of the furnace, as represented more fully in Figs. 1 and 4. In like manner the upper portions of the vertical pipes *d*, together with the pipes *e* and their coupling-flanges *b'*, are placed above and outside of the top of the shell aforesaid, as shown in Figs. 2 and 4, with similar results—namely, the bringing of the parts last mentioned away from the direct action of the flame within the shell.

It will be noted, by reference to Fig. 4, that the vertical pipes *e* are placed a little toward one side of the section. This is done in order that by simply reversing the position of one section with reference to the other, the pipes *e*, looked at in a horizontal direction, will be staggered, so that the flame of the fire-box or furnace, in passing lengthwise through the shell C, will be more effectually split up and divided by striking against the vertical portions of the sections, and by impinging thereon will more readily heat the same.

D is a coil of pipe, of either cast or wrought metal, one end of which connects at *g* with the feed-water inlet of the boiler, and at the other connects with the chamber of a stop-valve, *m*, into which the feed-water is directed in the supply of the boiler. This stop-valve is so placed as to be incapable of yielding to the pressure of the water when forced into the chamber thereof, and thereby causes the feed-water to pass into and through the coil D before passing to the boiler, the feed-water being thus heated by the hot products of combustion at the place where the latter escape from the shell C; but should the coil D become so

heated that steam is generated within it, the stop-valve at *m* yields from behind, through the pressure of the steam of the water behind it, and thereby permits the water within the boiler to flow therefrom back into the coil D, and so on into the boiler, circulating in the said coil in the same manner as through the boiler itself, and thereby preventing it from being burned out or from explosion by excess of pressure.

It is to be noted that inasmuch as the joints by which the sections A and horizontal pipes B are connected are entirely outside of the shell and away from the direct action of the heat, they are not subject to any considerable changes of temperature, and are not injured by the action of heat, as is the case with the sectional boilers hitherto in use.

It is to be understood that an ordinary steam-drum may be placed upon the head of this boiler and connected therewith, if desired, and that along the length of the pipe B hand holes or openings may be provided for the removal of accumulations of sediment.

What I claim as my invention is—

1. In a sectional steam-generator, the cast-iron sections composed of the pipes *a*, *b*, *c*, *d*, and *e*, cast in one piece, the boiler composed of said sections being provided with a suitable shell or walls, all substantially as and for the purpose herein set forth.

2. In a sectional steam-generator, the cast-iron sections composed of the parts *a*, *b*, *c*, *d*, and *e*, cast in one piece, the circulating heating-coil D, and yielding valve M, the boiler composed of said sections being provided with a suitable shell or walls, all constructed and arranged substantially as and for the purpose herein set forth.

3. The horizontal pipes B, connected with the ends of the horizontal pipes *b* of the sections A by joints outside of the shell C of a sectional boiler, in combination with the horizontal pipes *e* of the sections, connected by joints also external to the said shell C, all substantially as and for the purpose herein set forth.

MOSHER A. SUTHERLAND.

Witnesses:

CHAS. H. F. DOXAT,
H. F. PARKER.