No. 638,397. Patented Dec. 5, 1899.

E. McCONVILLE.

STEAM BOILER.

(Application filed Apr. 8, 1899.)

(No Model.) 2 Sheets—Sheet 1.

Fig. 1.

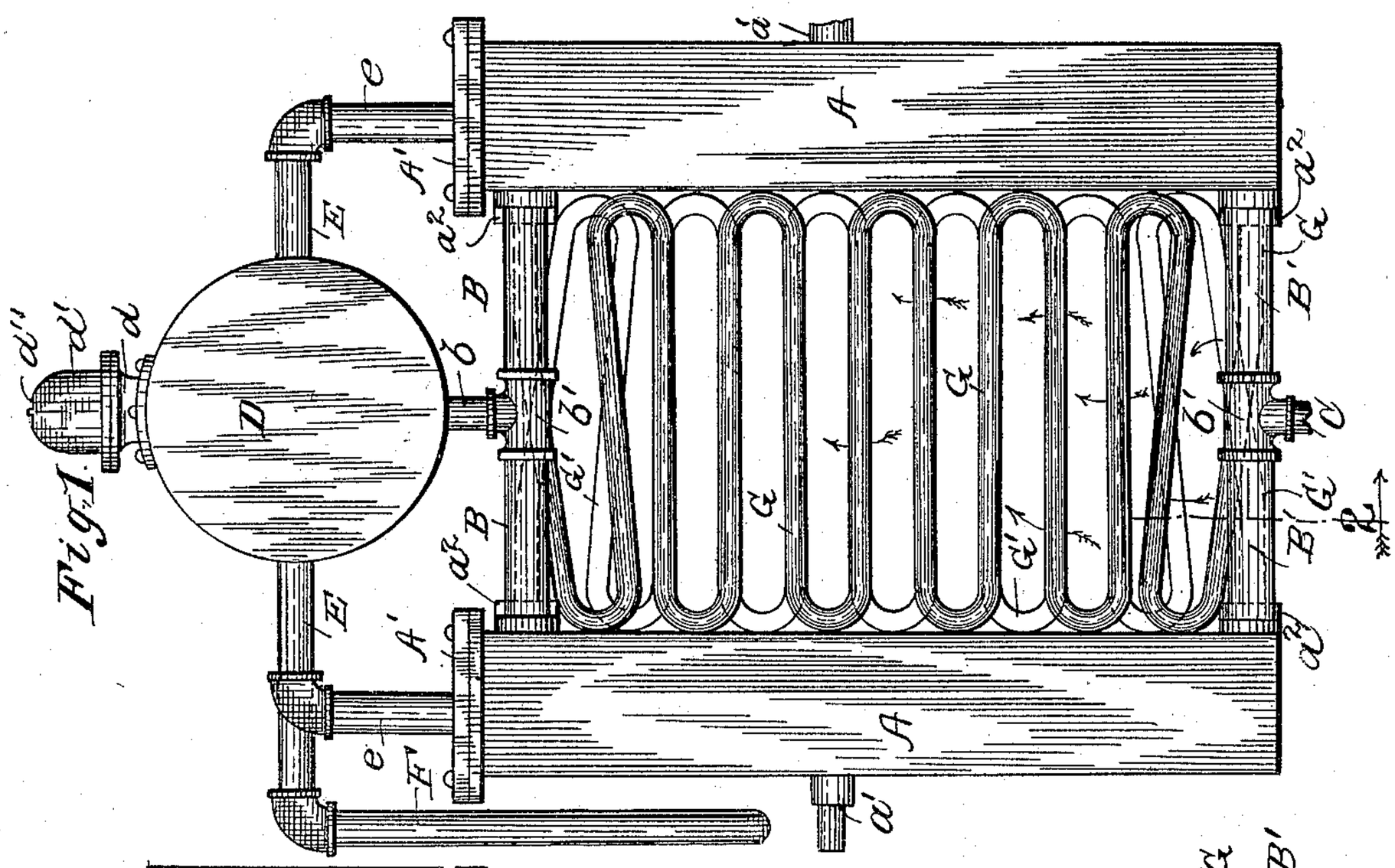
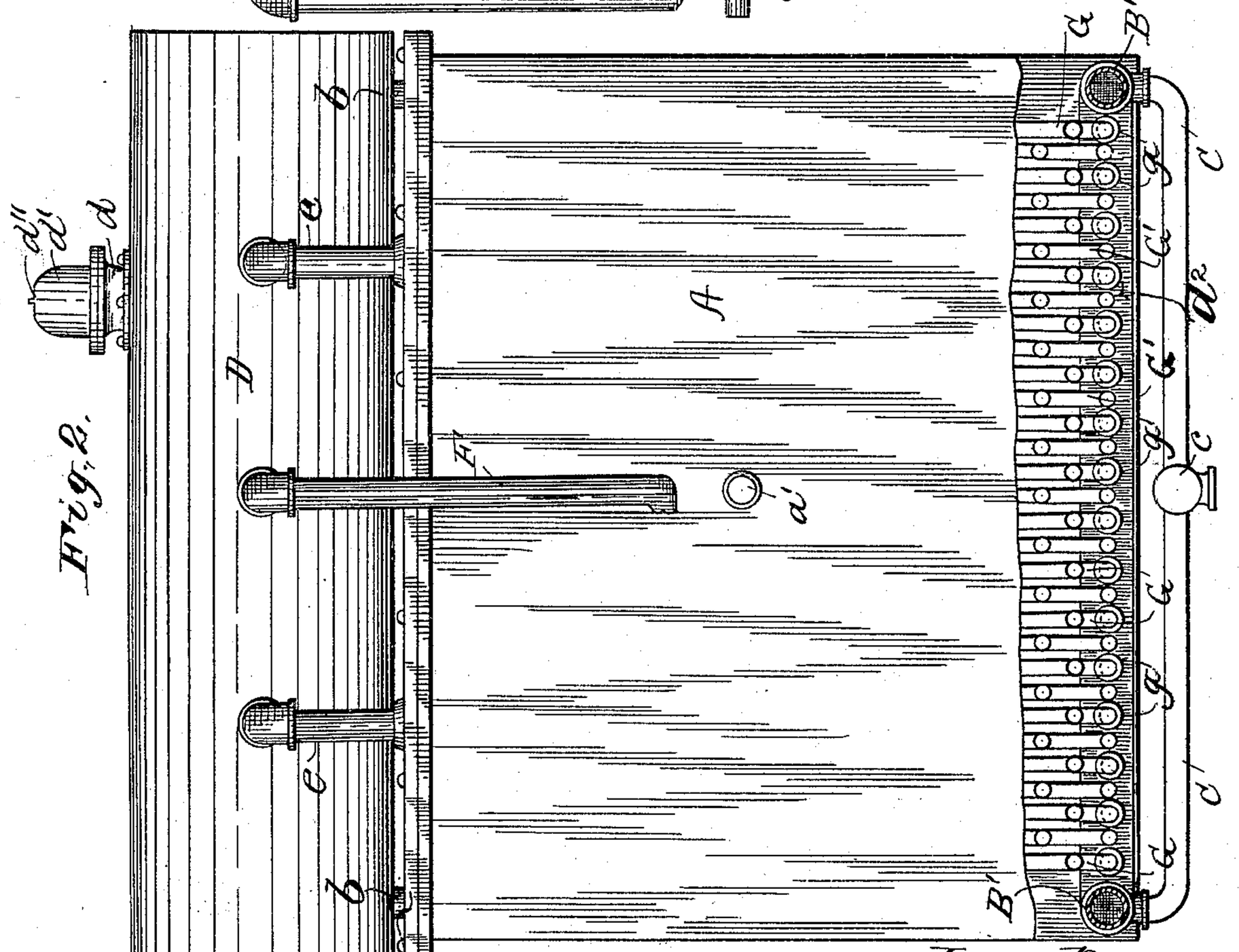


Fig. 2.



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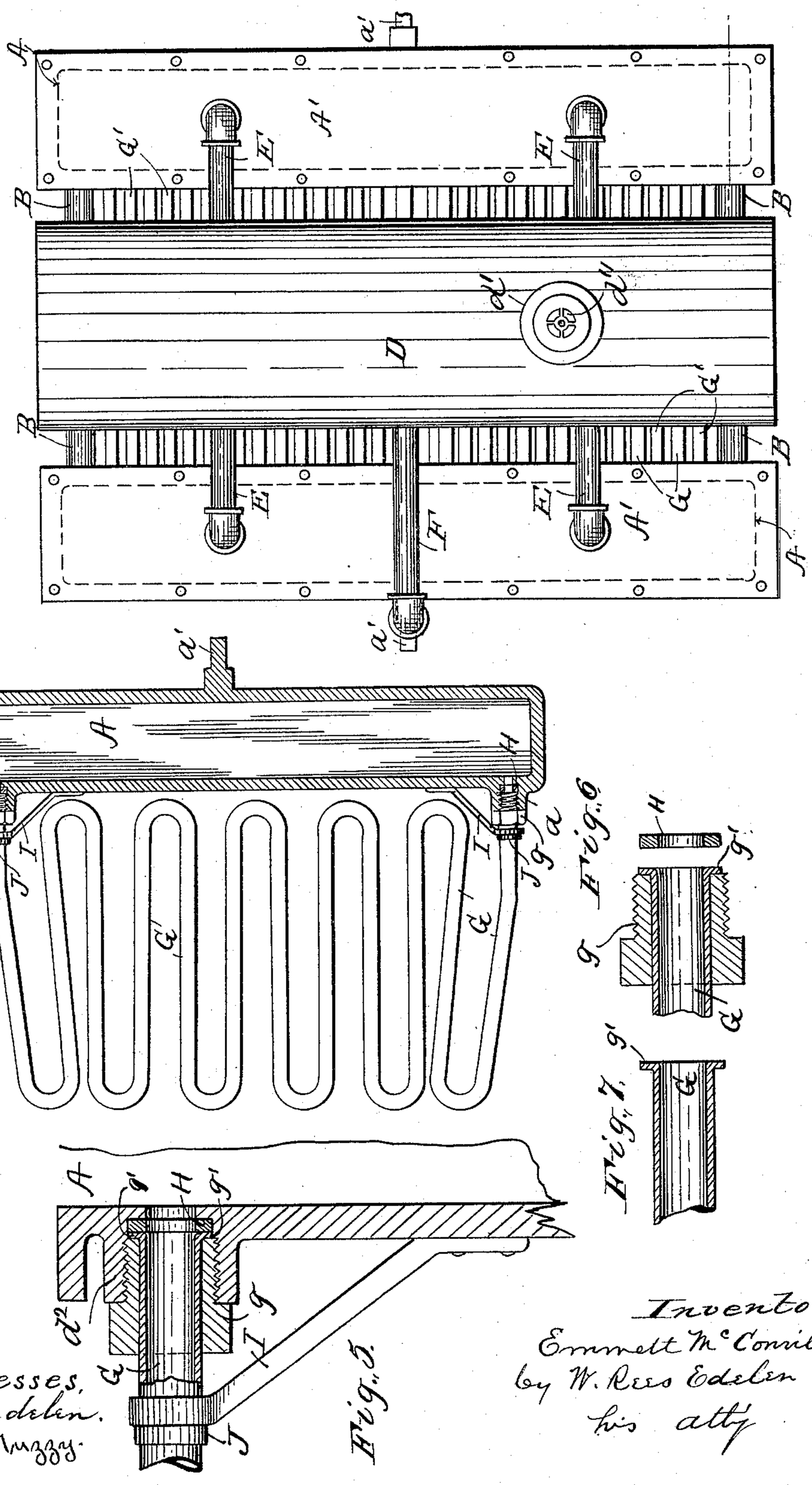

Fig. 3.

Fig. 4.

Fig. 6.

Fig. 7.

Fig. 5.

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UNITED STATES PATENT OFFICE.

EMMETT McCONVILLE, OF PITTSBURG, PENNSYLVANIA.

STEAM-BOILER.

SPECIFICATION forming part of Letters Patent No. 638,397, dated December 5, 1899.

Application filed April 8, 1899. Serial No. 712,301. (No model.)

To all whom it may concern:

Be it known that I, EMMETT McCONVILLE, a citizen of the United States, residing at Pittsburg, in the county of Allegheny and State of Pennsylvania, have invented certain new and useful Improvements in Steam Boilers or Generators; 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 has reference to improvements in steam generators or boilers which are preferably designed for steam-carriages, but more especially that class wherein water tubes or worms are employed in contradistinction to that class of boilers where the products of combustion pass through the tubes; and it consists of certain novel arrangements and means of construction which will be hereinafter fully set forth in the specification, in conjunction with the drawings, and clearly pointed out in the claims.

The object of the present invention is to construct a simple, efficient, and economical steam boiler or generator whereby steam can be generated in quantities much more rapidly than has been heretofore accomplished in boilers of a somewhat-similar type.

A further object of my invention is to employ vertical water and steam boxes, one opposing the other and held or tied together by suitable jointed tubes, and at the same time utilize said tubes or pipes which tie together and brace the vertical steam-boxes as passages for intercommunication for circulating steam at the upper extremities of the boxes, in conjunction with a steam-drum, and at their lower extremities for feed-water circulation.

My invention further consists in providing a number of continuous tubes or water-coils having their extreme ends attached to vertical water and steam boxes or generators, one end connecting to the lowermost feed-water extremity and the other end at the extreme end of the box for allowing the generated steam in said coils to enter the aforesaid boxes through the tubes that tie the boxes together and thence into the steam-drum.

My invention further consists in having the feed-water enter the vertical boxes at four points simultaneously through the medium of a pipe traversing the steam and water coils and connecting centrally at right angles to the two lowermost tubes which brace and hold the vertical boxes together.

My invention further consists in providing bushings at each free end of the water and steam coils and which embrace tightly the coil ends, with a portion of the coil ends turned up at right angles as a flange for the bushing to impinge against, in conjunction with a copper or other soft-metal washer for making a steam and water joint when said bushings are securely screwed into the vertical boxes.

My invention further consists in securing the water-coils near their free ends and contiguous to the bushings by means of braces secured to the vertical boxes in alinement with the coils and in conjunction with collars shrunk on said coils for preventing the braces from leaving their position through any strain or shock that may come upon the coils.

The great advantage of my steam-generator over existing water-tube generators is the continuous-coil system, whereby the coils are bent at each turn in the arc of a circle, thus offering a free path for the circulation of water and the generating steam, which entirely overcomes the hammering in the pipes when the generating steam and confined air begin to ascend when first starting up the generator.

In the drawings, Figure 1 is a front elevation of my improved steam-generator. Fig. 2 is a side elevation of the same with a portion of one box broken away and the pipes or coils in section. Fig. 3 is a plan view of my improved steam-generator. Fig. 4 is a side elevation of a single coil, illustrating the means for securing the coils to the water and steam boxes, these boxes being shown in vertical section. Fig. 5 is a side elevation, partly in section, illustrating the means, on an exaggerated scale, for securing and bracing the ends of the water and steam coils. Fig. 6 is a detail view of one of the screw-bushings with a portion of the end of a steam-coil therein and its accompanying copper washer contiguous thereto. Fig. 7 is a detail in section of a portion of a steam or water coil,

illustrating the turned-up or flanged end for securing said coils to the boxes, in conjunction with the bushings and washers.

My invention consists of boxes A, which are provided with covers A′ and tied together by sections of tubing B and B′ and T-couplings *b′*. Secured to the outside and immediately opposite each other on said boxes are trunnions *a′* for swinging the entire steam generator or boiler on suitable supports (not shown) of a carriage or other vehicle. Secured to the T's *b′* on tubing B′ is a feed-water pipe C. The water is fed in the boxes at *c*, and as the feed-water traverses said pipe C it enters the two lower sections of tubing B′, thus feeding water into the water-boxes at four distinct points simultaneously, by this means giving a free distribution of feed-water and preventing any quantities of sediment in the water from settling at any specified point in the boxes A previously referred to.

The generator or boiler is provided with a steam-drum D and is supported by steam-pipes *b*, *e*, and E. (See Figs. 1 and 2.) The steam-pipes just referred to supply steam to said drum D through the medium of the sectional tubes B and boxes A. Extending from the aforesaid steam-drum D is a steam-feed pipe F for supplying the engine with steam. The drum D is surmounted by a spring safety-valve *d*, having a hood *d′* for covering up the parts and an opening *d″* for allowing the overcharged steam to escape.

The water and steam boxes are reinforced by two strips of metal or stock d^2, (see Figs. 1 and 2,) so as to allow sufficient metal for screw-threading the numerous holes bored therein for the reception of screw-threaded bushings *g*, with their accompanying copper washers H.

The holes referred to are drilled the size of the bore of the coil-pipes G entirely through the boxes A. Then I counterbore each hole and screw-thread the same, so as to form a seat or shoulder for the copper washers H. (See Fig. 5, which fully illustrates the device on an exaggerated scale.)

Secured to the bushings *g* are the free ends of the steam-coils G. The ends of said steam-coils are finished perfectly round and steam-tight and have their ends turned up at right angles to the body of the pipe, as shown at *g′*, Figs. 4 to 6, inclusive, thus forming a flange, which is made perfectly smooth and true for resting against the face of the bushing and also against the soft-copper washer. By screwing up the bushing firmly against the copper washer, with the flange *g′* of the coil G between them, it can be readily seen that the joint becomes steam-tight. Each water or steam coil is secured to one box A, as by this means leaky joints are obviated, as any leakage that might occur is confined to the four tie-tubes B and B′, respectively, thus overcoming the inconvenience of many joints such as used in boilers or generators for the purpose this is designed. With the old system of generators there would be over fourteen hundred connections with the boxes A. With my improved system I employ only sixty-four for the coils G. The main point to consider is the generating steam increasing gradually. With my system as the flames from gas envelop the tubes G the particles of steam generated at the bottom of the coils ascend, increasing in volume until reaching the uppermost portion of the boxes A, when it immediately enters the steam-drum D.

With a number of tubes of the old system entering direct from the bottom upward into the boxes C as steam is generated it must make contact with the boxes on opposite ends of its connections with said boxes, thus destroying the steam-globules and interblending them with the water in the boxes, which becomes heated by said steam-globules, and not until the water in the water-boxes is fully heated does the steam mount upward to the steam-drum. With my improved steam-coils every atom of steam that is generated is multiplied by its succeeding atom to ascend and each coil acts independent of the boxes A when the steam begins to generate, in contradistinction to the old method just referred to, whereby the generating steam must heat the water in the boxes sufficiently to generate steam. My device will produce steam immediately, which is owing to the construction of the coils G.

Near the extreme free ends of the coils G are collars J, which are shrunk on the ends of the pipe for receiving the thrust of braces I. The opposite ends of said braces are riveted to the boxes A, as indicated at Figs. 4 and 5. The object of these braces is to relieve the bushings *g* of any undue strain when assembling the coils or from any violent agitation in the coils when the steam is at first generating, owing, perhaps, to foreign substances in various kinds of water used.

When assembling my improved generator, I secure all the coils in one box A and also in its opposing box A. I then slip one set of coils between its opposing set until sufficiently close to use the tie-tubing B and B′, which are provided with right and left hand screw-threads. By this means my steam-generator becomes perfectly steam-tight. Before coupling the boxes together I insert the short pipes *b* into the drum D, and also in the T-couplings *b′*. The pipes E are also right and left hand threaded for the purpose as previously indicated.

A sheet-metal covering envelops my improved generator, preferably lined on the inside with asbestos. I preferably employ gas, which may be generated while using the same or stored by compression in a receptacle for the purpose. The sheet-metal covering is not shown in the drawings, as there is no novelty in employing such a device.

That which I desire to claim is—

1. In combination with two oppositely-arranged water-boxes, continuous water-coils

for generating steam arranged in series, each alternate coil being secured to its independent vertical box and said boxes tied together by water and steam circulating tubes, as shown and described.

2. In combination with two oppositely-arranged water-boxes having reinforcing-strips thereon, continuous water-coils arranged so that each alternate coil is secured to its independent box through the medium of screw-bushings, flanges on the free ends of said coils contacting soft-metal washers, or gaskets for the purpose as specified.

3. In combination with two water or steam boxes, continuous water or steam coils arranged so that each alternate coil is secured to its independent water or steam box through the medium of screw-bushings, of braces supporting each coil by means of adjacent collars and secured to the water or steam boxes, as specified.

4. In a steam-generator, consisting of water and steam boxes tied together by means of four sets of tubing having a T centrally located in each of the four sets of tubing, and a feed-water pipe connecting the two lower sets of tubing for delivering water to said generators at four distinct and distant points, in combination with water and steam coils secured individually to each water and steam box, as specified.

5. In combination with two water-boxes having reinforcing-strips thereon, tied together by means of water and steam circulating tubing, water and steam coils secured to said water-boxes by bushings and braces, collars contacting said braces, and one trunnion attached to each of the two water-boxes for supporting the same in a movable position as shown and described.

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

EMMETT McCONVILLE.

Witnesses:

W. REES EDELEN,

D. MC. CONVILLE.