

No. 609,108.

Patented Aug. 16, 1898.

C. LLOYD.
STEAM BOILER.

(Application filed Mar. 5, 1898.)

(No Model.)

2 Sheets—Sheet 1.

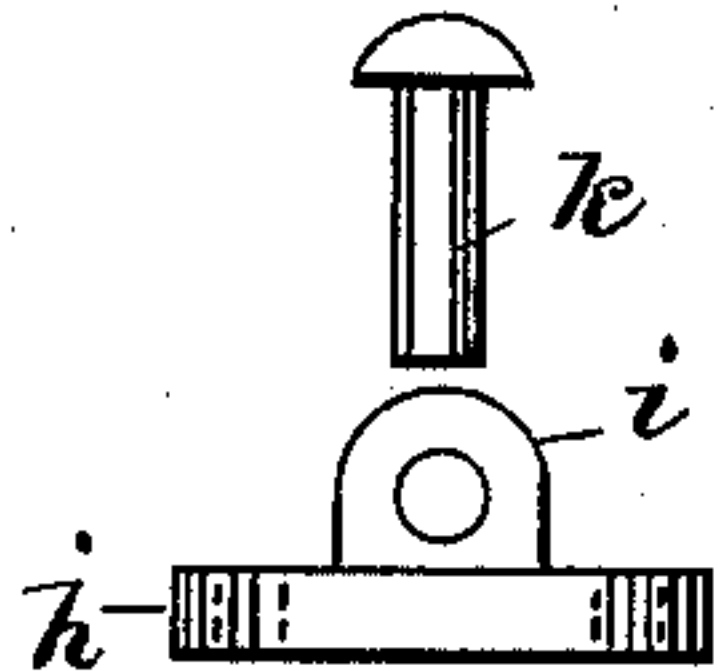


Fig. 3

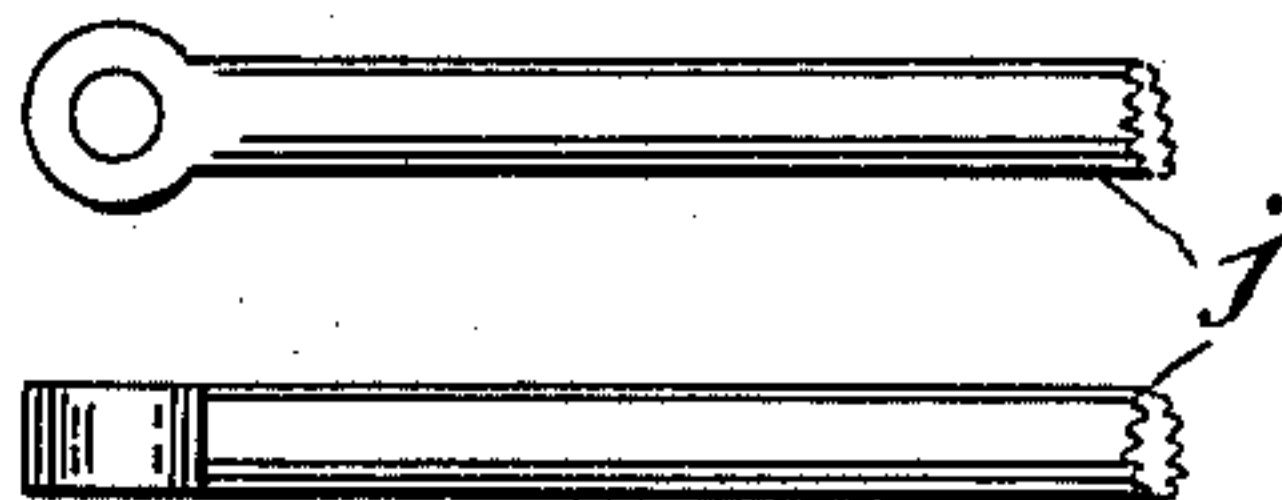


Fig. 5

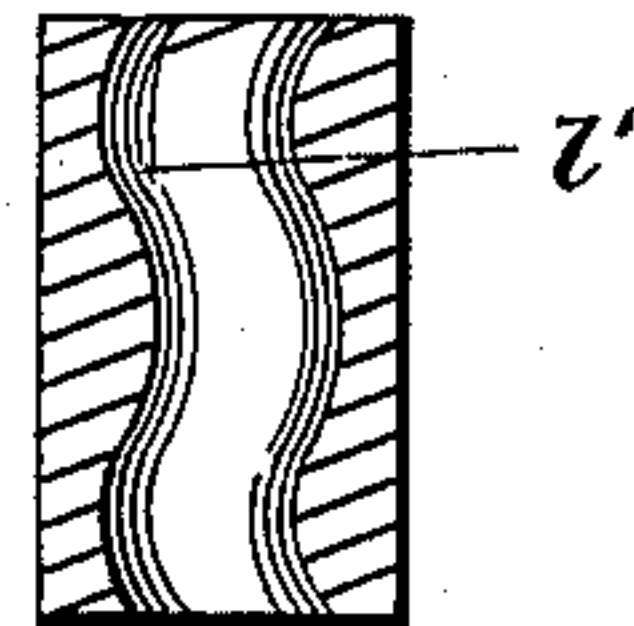


Fig. 6

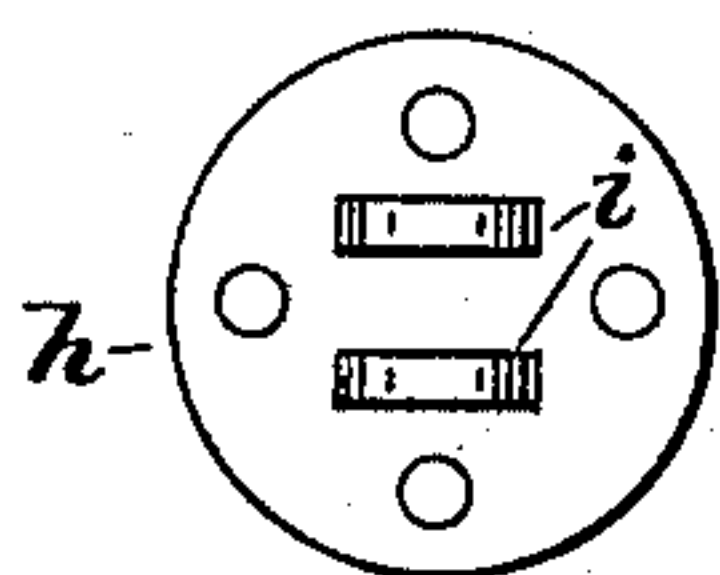


Fig. 4

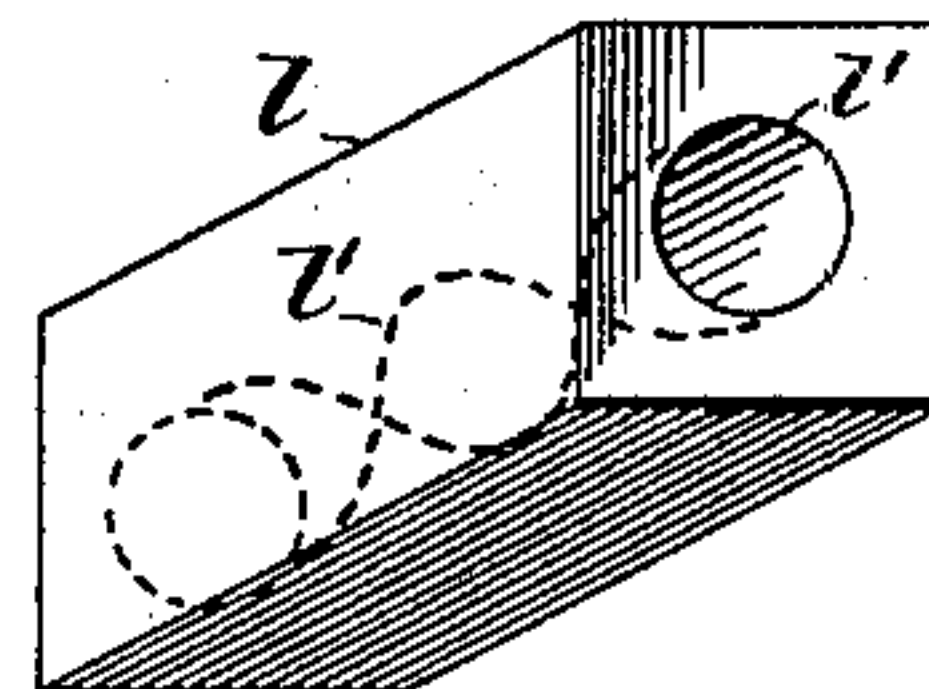


Fig. 7

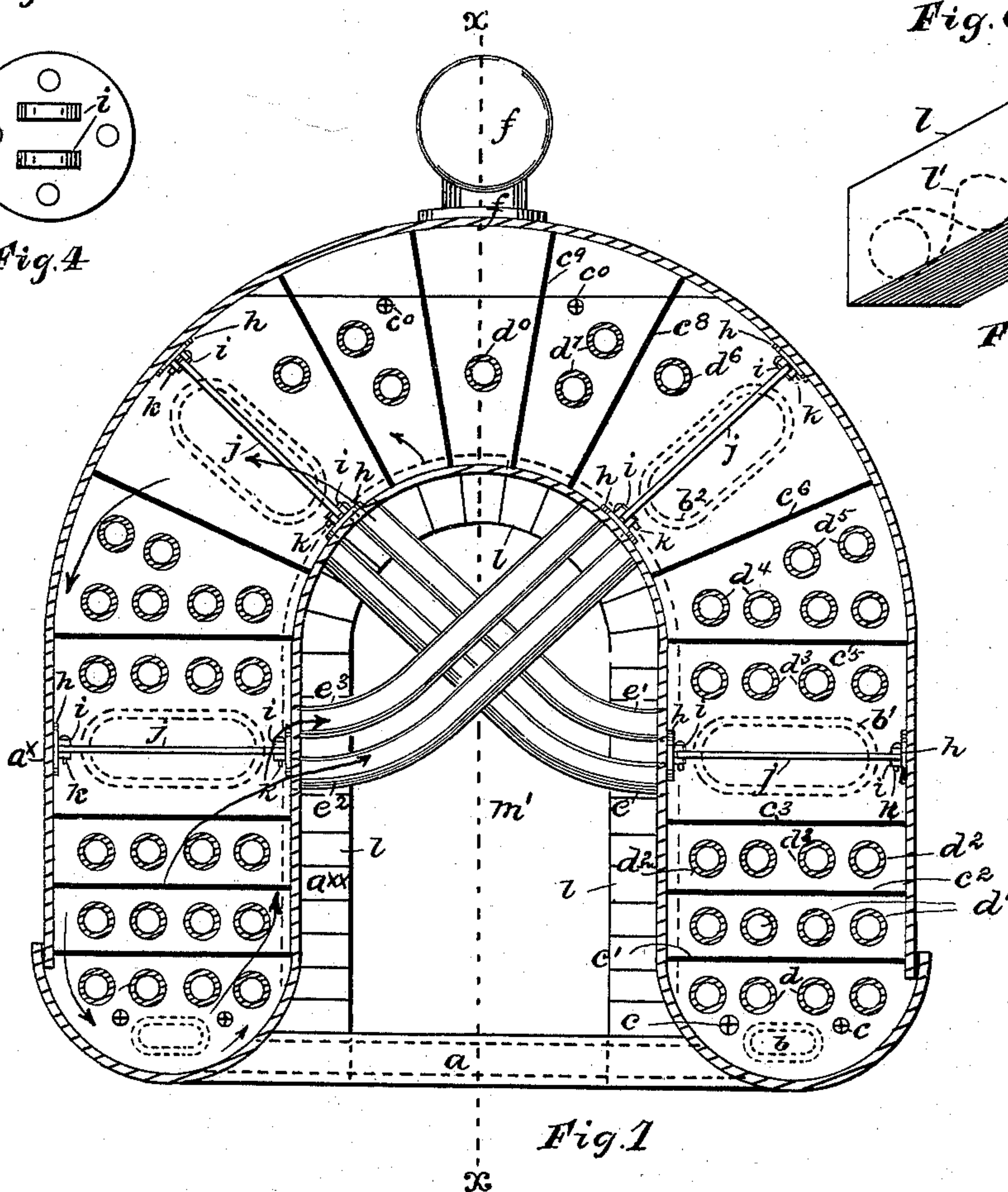


Fig. 1

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No. 609,108.

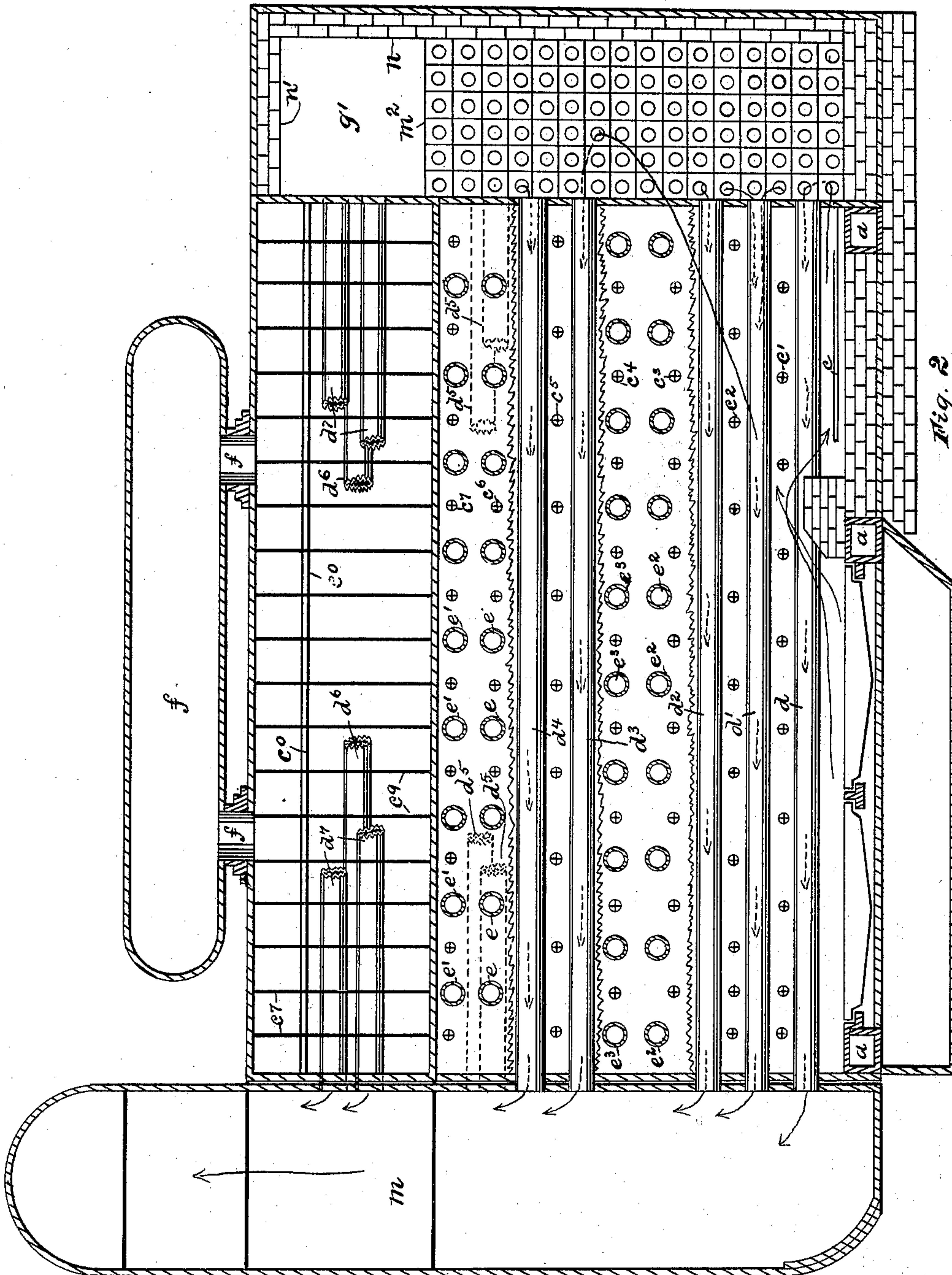
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2 Sheets—Sheet 2.



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UNITED STATES PATENT OFFICE.

CHARLES LLOYD, OF CHICAGO, ILLINOIS.

STEAM-BOILER.

SPECIFICATION forming part of Letters Patent No. 609,108, dated August 16, 1898.

Application filed March 5, 1898. Serial No. 672,639. (No model.)

To all whom it may concern:

Be it known that I, CHARLES LLOYD, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Steam-Boilers, which are fully set forth in the following specification, reference being had to the accompanying drawings, forming a part hereof, and in which—

Figure 1 shows a front elevation of my improved boiler, the front being removed to show the internal construction. In this figure is also shown the rear end of the smoke-chamber. Fig. 2 shows a central vertical longitudinal section of my said boiler, taken on the plane $x x$ of Fig. 1, having longitudinal strips of the shell removed to expose the interior construction. Fig. 3 shows the end of a stay-bolt with a bolt k to the lugs i . Fig. 4 is a plan view of h of Fig. 3. Fig. 5 shows the end of a stay-bolt in two views, top and side; and Fig. 6 shows a longitudinal section of a clay tile for the rear end of the smoke-chamber. Fig. 7 shows Fig. 6 in perspective.

Like reference-letters refer to like parts.

The object of my invention is to improve the construction of steam-boilers and to make the same more economical in the consumption of fuel, to increase their efficiency by providing means for the circulation of the water, to cause a more efficient consumption of the smoke, to render them less liable to cause fires by having the furnace within the boiler, and to so arrange all parts as to make them readily accessible for inspection and repairs, and other advantages, as will be hereinafter more fully set forth.

To attain said desirable ends, I construct my said new and improved steam-boiler in substantially the following manner, namely: I make an exterior shell a^x and an interior shell a^{xx} , separated sufficiently for the water and pipe spaces, and connect the same with round bottoms, so as to form a saddle-shaped structure, about as shown. In the front of said structure are manholes $b b' b^2$ to each side. Said manholes are indicated in broken lines to show the place they occupy in the boiler-front. The said lower manholes b are for the purpose of reaching the bottoms of the water-legs to remove the mud and sediment, while the holes higher up are for admitting a

person for the purpose of replacing or repairing the pipes $e e' e^2 e^3$. The stay-rods j are constructed, as shown in Figs. 3, 4, and 5, so as to be removable and give room for a man to work. The said rods may be removed by simply driving the bolts k from the head or end plates h , provided with lugs i , between which the rods j are held by passing the bolt k through the lugs and ends of the rods j , each provided with holes to receive the bolt k . Said head-plates have a set of holes for rivets to pass through and through the boiler sides, to which they are thereby secured. Said pipes $e e' e^2 e^3$ project into the smoke-space from the boiler sides, and from said boiler sides said pipes are curved upward, so as to bring the opposite ends of the tubes into an angle of about forty-five degrees to the horizontal, and entered into the arched part of the shell a^{xx} , as shown. At the entrance through the shell of said tubes there is another series of removable stay-bolts j , removable from their heads, like those already described.

Near the bottom of each side or leg of the boiler are longitudinal stay-rods c^0 , and above the rods c are the transverse rods $c' c^2 c^3 c^5 c^6 c^8 c^9$ for each half of the boiler, and between said rods are the series of longitudinal tubes $d d' d^2 d^3 d^4 d^5 d^6 d^7$, secured in each head end, for smoke-passages, and at the rear end of the boiler is an arch of fire-clay tile l , each tile having a central spiral longitudinal hole l' .

The central arched fire and smoke space m' is continued beyond the rear end of the boiler in an arch m^2 , made of tile l , which extends to a rear wall n , whereof the top has an arch n' extending to the boiler, and thereby forming the smoke-space g' , the smoke and fire passing through the space m' from the furnace, thence through the spiral tile-openings l' , whereby the temperature of said tiles is raised to a point where the soot becomes ignited and consumed in passing through said tiles, and after the smoke has entered the chamber g it passes through the flues $d d' d^2 d^3 d^4 d^5 d^6 d^7 d^0$, from which it emerges into the smoke-stack chamber m , following the course indicated by the arrows. Said chamber g' extends down to the bottom of the boiler sides and is indicated by the broken line near

the shell a^{xx} , which indicates the outer line of the tiles l . A steam-dome and its connections to the boiler are shown at $f f f$. By means of the pipes $e e' e^2 e^3$ and their inclined position the heat passing through the space m' is absorbed by said pipes and a rapid upward current of the water established, which thereby creates a downward current at the shell a^x to the bottom, from whence along the inner shell there will be an upward current, which will then pass through the said pipes $e e' e^2 e^3$, where it will be greatly heated and thereby accelerated and converted into steam. The three connecting or cross tubes a connect the two water-legs and afford means for equalizing the circulation at the bottom and prevent any undue accumulation of heat at any one point.

The arrows within the boiler shown in Fig. 1 indicate the direction of the water-currents in the boiler.

What I claim is—

1. A boiler with saddle-limbs extending from head to head thereof inclosing a fire-chamber of like length with water-tubes from a lower level of each saddle-limb to its oppo-

site saddle-limb near its upper level and cross-tubes from the lowest edges of the saddle-limbs, substantially as specified.

2. The saddle-shaped and connected double shells $a^x a^{xx}$ with longitudinal and arched smoke-flue between the water-legs, extended to the rear wall n by means of tiles having longitudinal spiral flues, a smoke-space g' connected with said arched smoke-flue through said tile-flues and longitudinal smoke-flues through the water-space of the boiler connected with said chamber g' , substantially as specified.

3. A boiler with saddle-limbs extending from head end to head end thereof, inclosing a fire-chamber of like length, with water-tubes from a lower level of each saddle-limb to its opposite saddle-limb near its upper level, removable stay-rods at upper end of said tubes and manholes at upper ends of said tubes and in line therewith and said stay-rods, substantially as specified.

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Witnesses:

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