

(No Model.)

C. AHRENS.
STEAM GENERATOR.

No. 287,211.

Patented Oct. 23, 1883.

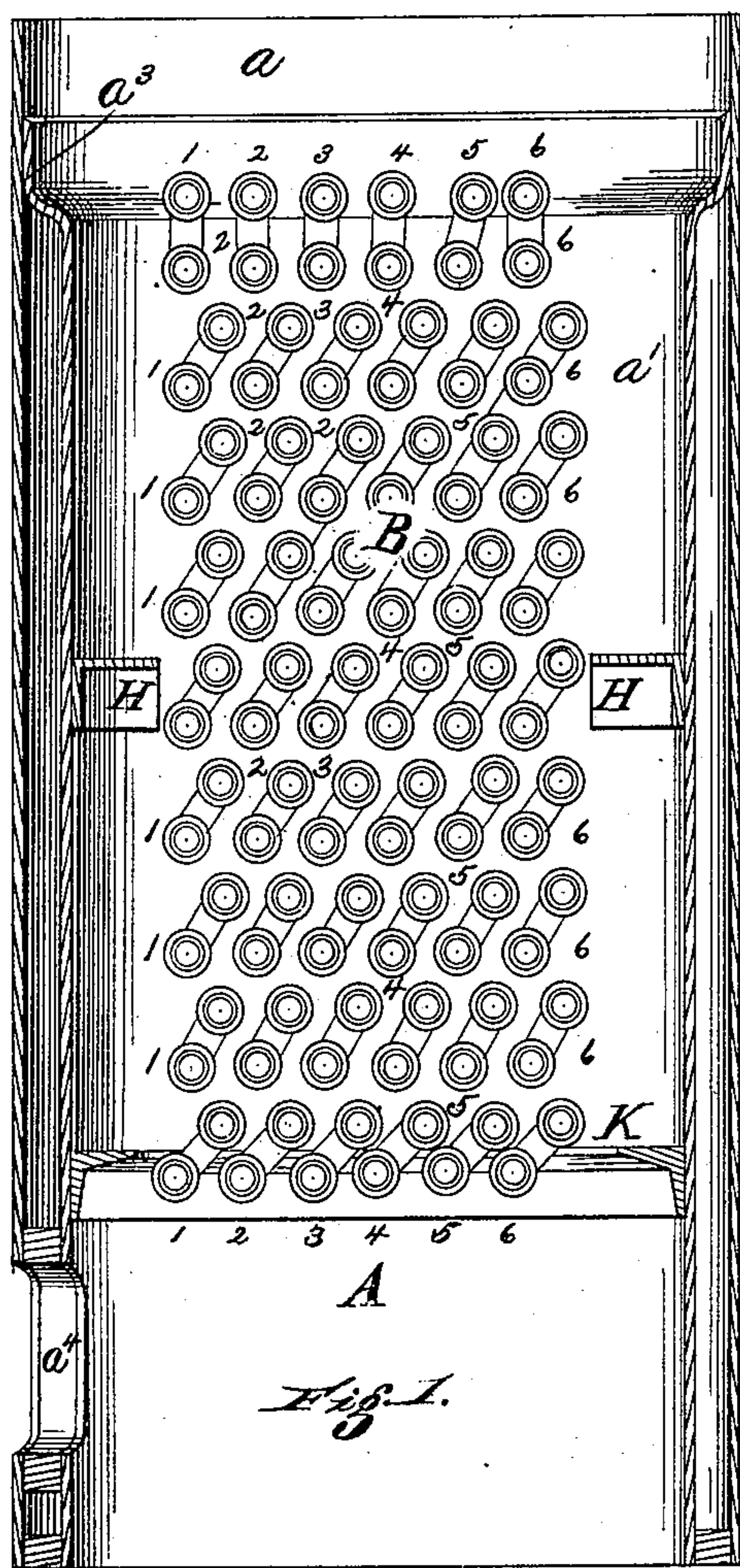


Fig. 1.

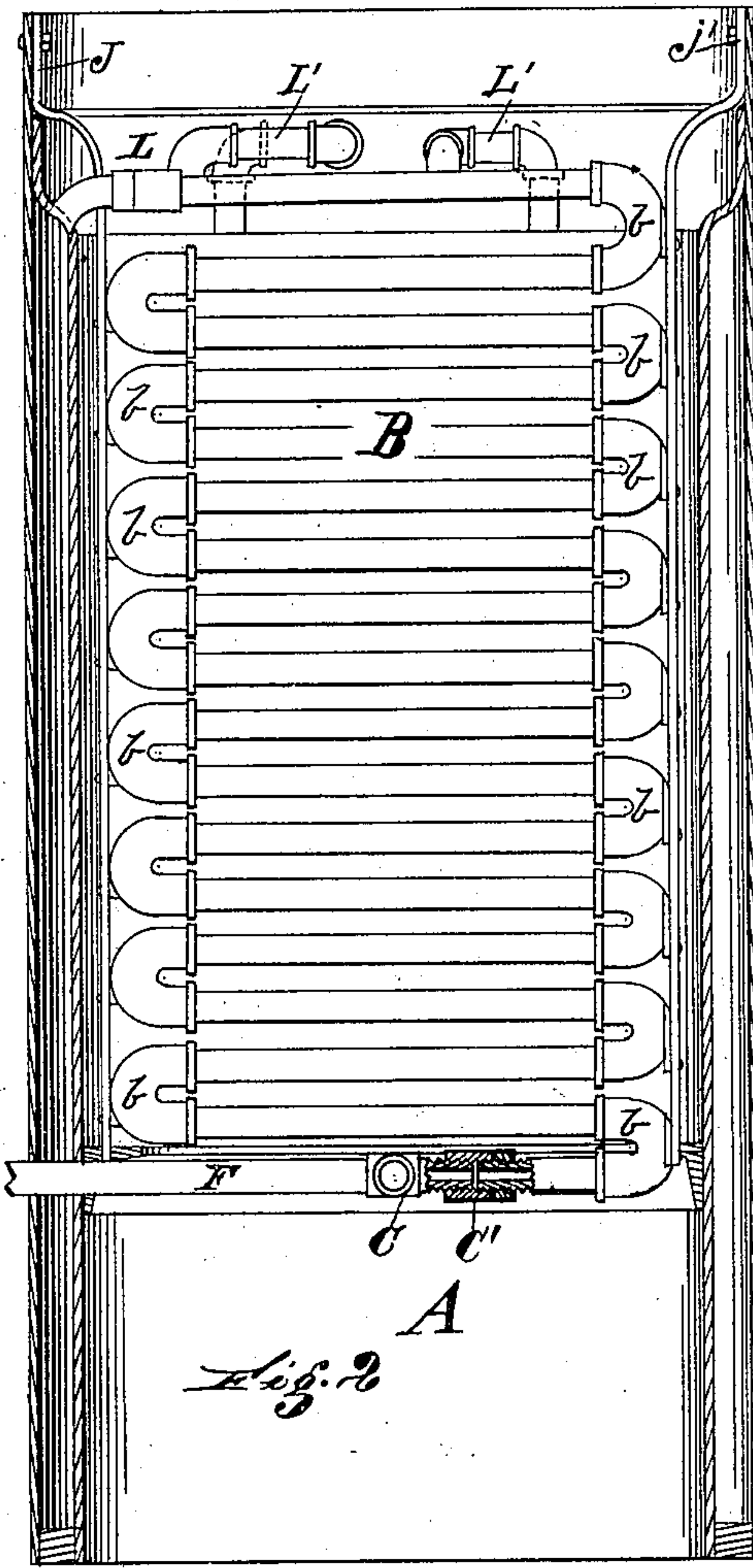


Fig. 2.

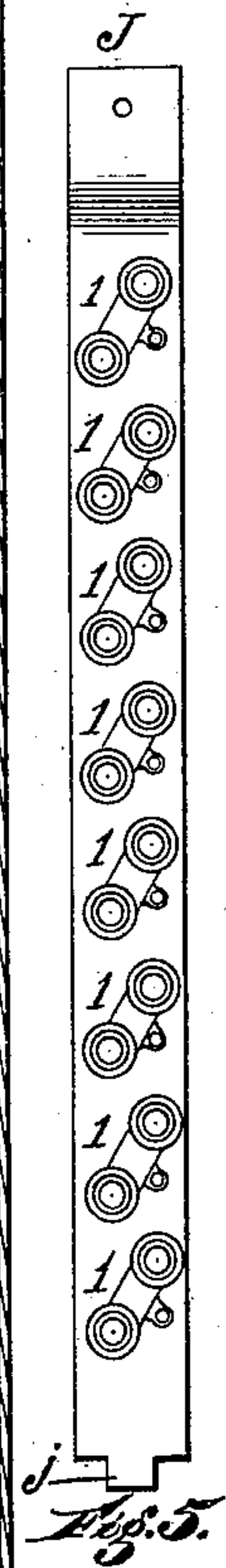


Fig. 3.

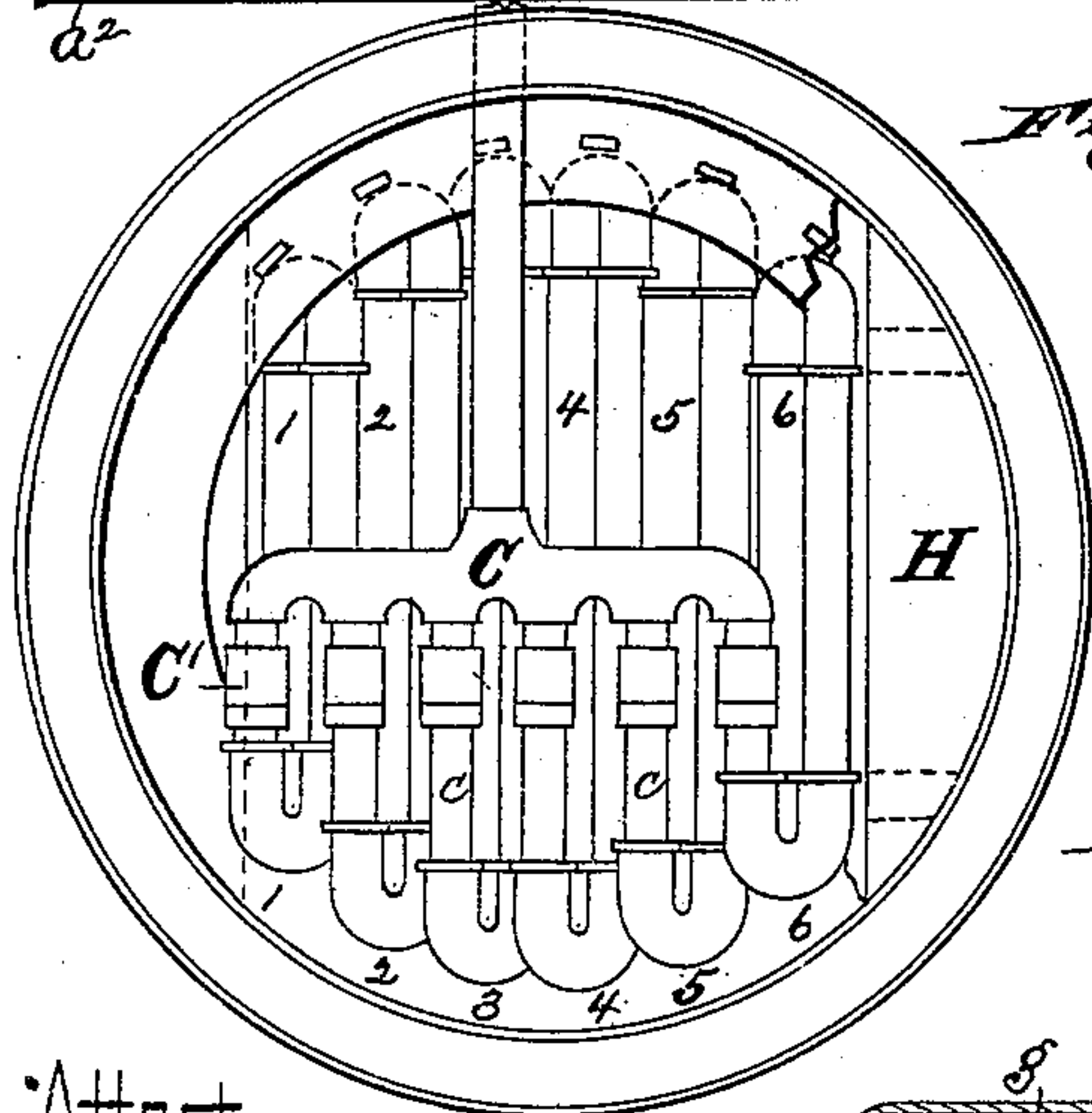


Fig. 4.

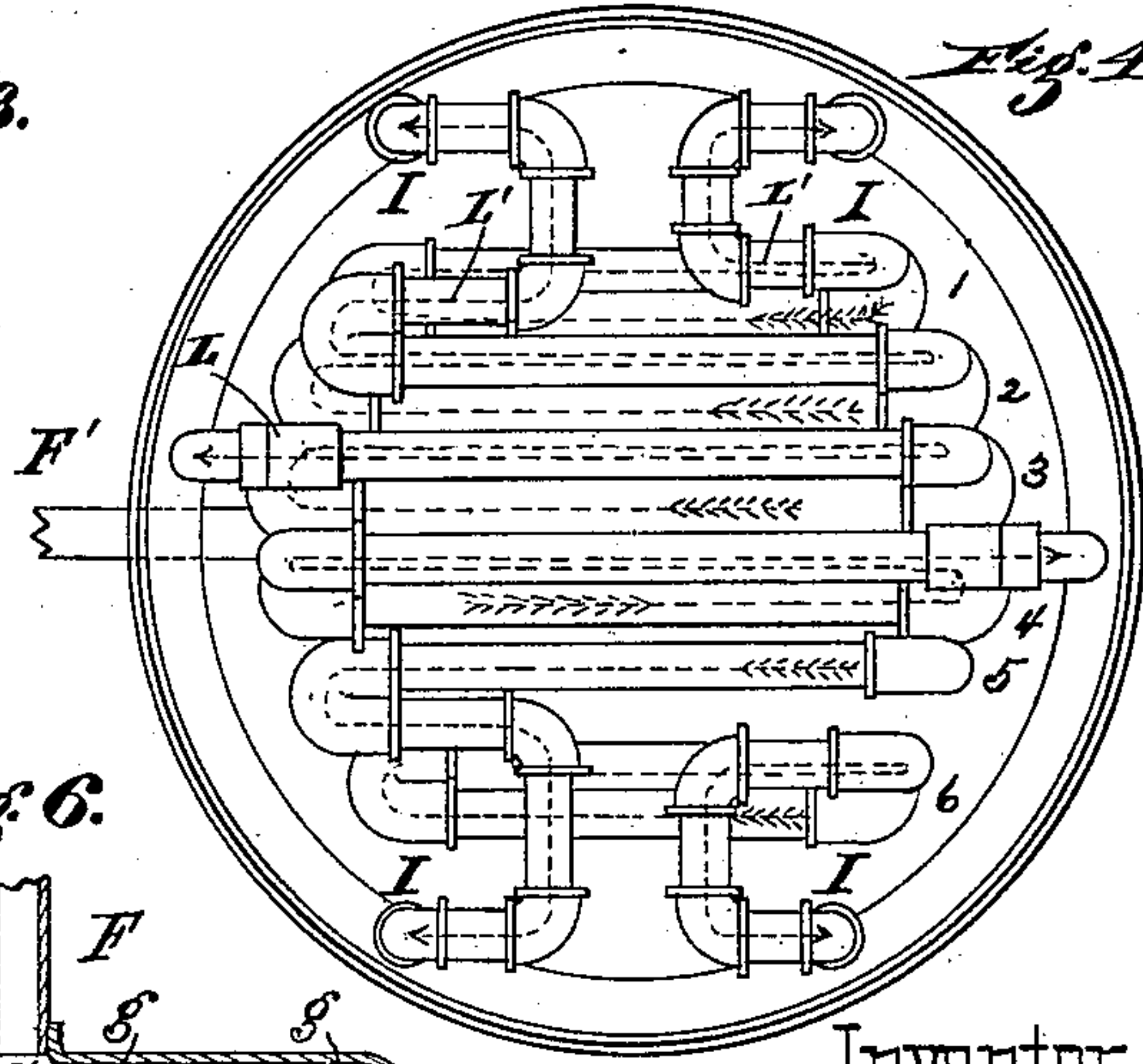


Fig. 5.

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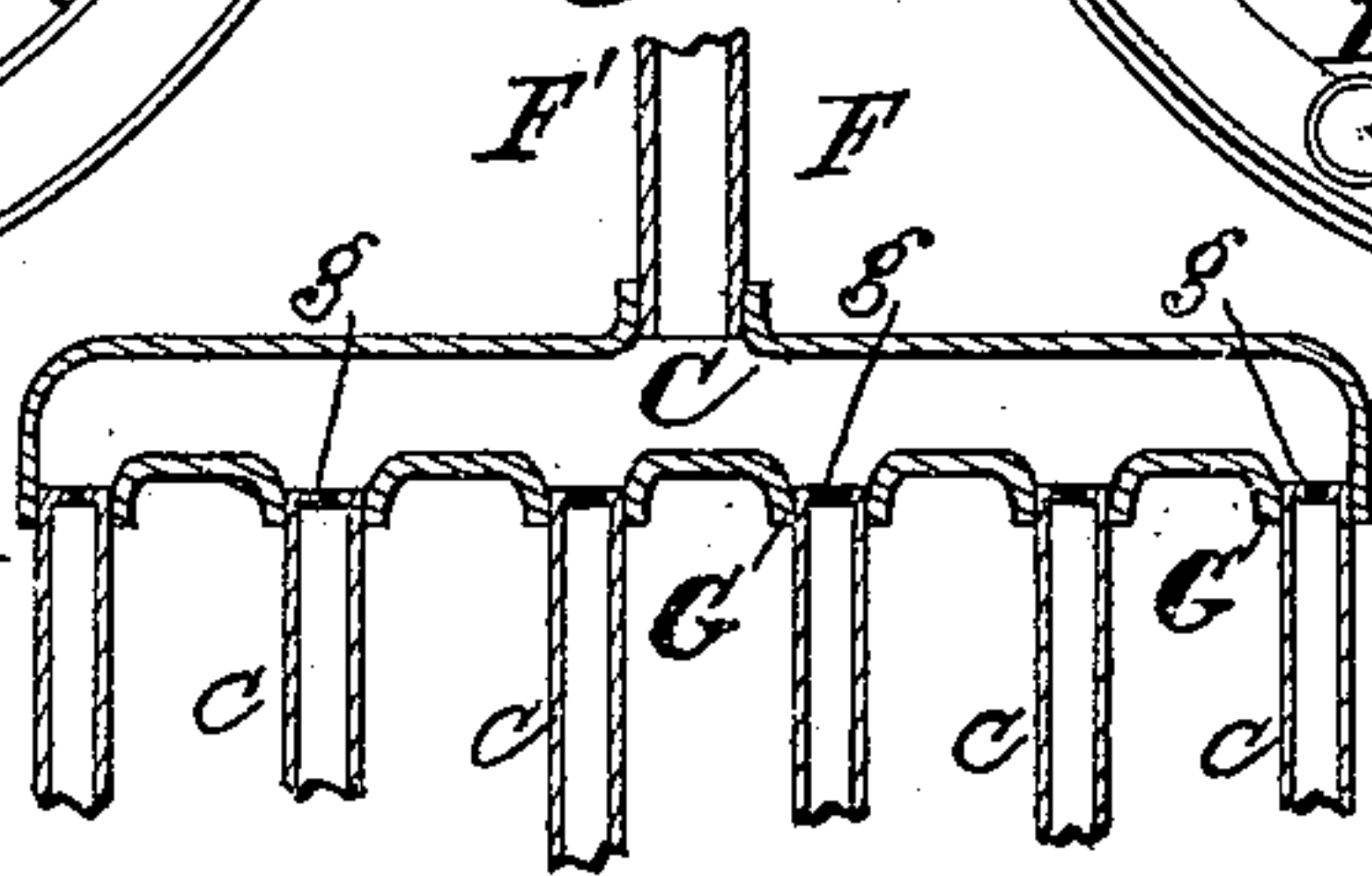


Fig. 6.

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CHRISTOPHER AHRENS, OF CINCINNATI, OHIO.

STEAM-GENERATOR.

SPECIFICATION forming part of Letters Patent No. 287,211, dated October 23, 1883.

Application filed June 2, 1883. (No model.)

To all whom it may concern:

Be it known that I, CHRISTOPHER AHRENS, of Cincinnati, in the county of Hamilton and State of Ohio, have invented certain new and useful Improvements in Steam-Generators, of which the following is a specification.

My invention is in the nature of an improvement upon a boiler for steam fire-engines for which Letters Patent No. 111,298, dated January 31, 1871, were granted myself and Frank Kamman, and has for its objects, first, the construction and arrangement of the devices for supplying circulating water to the several sections of the "coil," in such a manner that any number of feet of pipe desired can be employed in each section, while the supply of feed-water or circulation to each section may be exactly proportioned to the length of that section; second, the arrangement of deflectors to fill the segmental spaces between the outer sections of the coil and the inner shell of the water-jacket, whereby the flame of the fire, instead of freely passing up outside the coil, is forced around and between the several sections of the coil in its passage to the chimney; third, the construction and arrangement of the discharge-pipes constituting the head or top of the coil, whereby the discharge of heated water or steam from the several sections of the coil shall be distributed at equidistant points around the water-jacket, instead of localizing the discharge at the back of the jacket, as heretofore; and, fourth, in the construction and arrangement of the several independent sections of the coil in such a manner that each section shall consist of one vertical tier of horizontal pipes, whereby said several sections may be more easily constructed and introduced and removed from the coil than with the arrangement of pipes hitherto employed, all of which will be fully explained hereinafter.

In the accompanying drawings, Figures 1 and 2 are sectional elevations of a steam fire-engine boiler containing my improvements. Fig. 3 is a plan of the bottom of water-jacket and coil. Fig. 4 is a plan of top of water-jacket and coil; Fig. 5, a sectional elevation of one section of the coil, and Fig. 6 a sectional plan of distributing devices.

Similar letters of reference indicate similar parts.

A is the water-jacket of a steam fire-engine boiler, consisting of outer shell, *a*, inner shell, *a'*, ring *a*², flange *a*³, and fire-door *a*⁴.

B is the coil, consisting of six or any convenient number of sections of vertical tiers of horizontal pipes or tubes, 1 2 3 4 5 6, the ends of which tubes are joined by return-bends *b b*, and the receiving ends of which, as shown in Fig. 3, are joined to the distributing-manifold C by nipples *c c*, with running threads and lock-nut couplings C'. The manifold or distributor C, as shown in Figs. 3 and 6, has upon one side thereof a nozzle, F, for the reception of circulating-pipe F', and upon the opposite side as many nozzles G as there are sections of tubes in the coil B. In this instance six nozzles are shown, corresponding with the six sections of coil. The "circulation" is drawn from the bottom of water-jacket A, and, by means of the customary circulating-pump, fed into the manifold C through inlet-pipe F'. From the manifold or distributor C the circulation passes into the several sections, 1 2 3 4 5 6, of the coil B by the apertures *g g*, which apertures are formed by first tightly plugging the ends of nipples, and then drilling through said plugs holes of such diameter in relation to each other that the area of apertures shall be proportionally equal to the lengths of corresponding sections. Thus, if sections 3 and 4 contained forty lineal feet of pipe, sections 2 and 5 thirty lineal feet of pipe, and sections 1 and 6 twenty lineal feet of pipe, then the areas of apertures to said several sections would be in the proportion of two, one and one-half, and one; and if the apertures *g g* of sections 3 and 4 were of one-quarter square inch area, then the area of apertures *g g* for sections 2 and 5 would be three-sixteenths inch area, and area of apertures *g g* for sections 1 and 6 would be one-eighth inch area. In this manner the sections 1, 2, 3, and 6 may be of any desired length, and the apertures *g* so proportioned the one to the other that the quantity of circulation passed through each shall be exactly proportioned to the length of section supplied.

It is customary in the construction of the coils to employ one size of pipe for all sections; but should it be found convenient to make the several sections of different sizes of

pipe, then the areas of the apertures g would be proportioned with one another as the heating-surface in the respective sections.

The great advantage of the devices described is that each section of the coil is forced to do its proportionate amount of work, whereby a coil of given dimensions will steam better and steam faster than with the distribution devices previously employed, which would permit the long sections to receive the least water and the short sections to receive the most water, thereby reversing the true operation of the several sections in the coil.

H H are the deflectors, of segmental form, of sheet-iron, or, if desired, of a refractory material—as fire-tile—set in the vacant spaces between sections 1 and 6 of the coil and shell a' of the water-jacket, by which means the flame and hot gas, instead of passing up by the quickest route to the chimney, is forced in among and around the several sections of the coil, thereby materially increasing the steaming qualities and economy of the boiler.

I I are the connections between the upper ends of sections 1, 2, 3, and 6, respectively, and the annular spaces at top of the water-jacket, between the shells a a' , through which the heated water or vapor found in the sections of coil is discharged into the jacket. These several connections or discharge-nozzles are distributed equidistant around the circumference of the jacket, as shown in Fig. 4, whereby the discharge from the several sections is divided around the jacket, instead of being localized in a small space upon one side thereof, (as in the boiler of patent referred to.) The improved arrangement of discharge-nozzles obviates one of the serious defects of the former boiler—viz., the burning of the shell a' upon the side opposite to the point where the discharge from the sections of coil entered the jacket.

J J are the strips to which the pipes of the several sections 1 2 3 are respectively attached, which strips are provided with tongues j j , fitting corresponding slots or recesses in the angle-iron ring K, and are further secured at the top to the shell a' by means of screw-bolts j' j' .

The pipes 1 1 or 2 2, as the case may be, are so arranged upon the strips J J by staggering, as shown in Fig. 5, that the width of section from out to out is somewhat less than the width of strips, and by disconnecting the running joint C' at the bottom and running joint

L or right and left nipple L' at the top of coil, either section may be readily removed for repairs without disturbing the balance of the coil.

I am aware that the former patent referred to provided for the removal of the separate sections of coil; but each of those sections contained two or three vertical tiers of pipe, and were unhandy and difficult to handle for repairs, excepting by skilled mechanics. In the construction now shown an ordinary engineer can readily remove the separate sections and make any necessary repairs with facility, while the labor required to connect and disconnect the several sections is very materially diminished. The arrangement of pipes, as shown in Fig. 5, also enhances the steaming capacity of the boiler by more effectually intercepting and dividing up the currents of hot gas to the chimney.

Having described my invention, what I claim is—

1. In steam-generators, the combination of two or more sections of heating-coils of varying length or heating-surface, and means, substantially as set forth, for supplying to the series of varying sections a circulation proportioned to the length or heating-surface of the respective sections supplied, substantially as described.

2. In combination with the several sections of a coil-boiler, the supply-pipe F', distributing-manifold C, and nipples c , provided with varying apertures g , when constructed and operating substantially as and for the purpose described.

3. In combination with the shell a' and coil B, composed of a series of sections, the vertical tiers of horizontal tubes joined by return-bends at their ends, and the segmental deflecting-plates H, arranged between the sections of the first and last sections of the series and the shell, substantially as described.

4. The combination, in a coil-boiler, of the separate sections of staggered pipes 1 1 or 2 2, strips J, with tongues j and screw-bolts j' , running joints C' and L, and right and left nipples L', when arranged and operating substantially as and for the purpose described.

In testimony whereof I have signed my name to the foregoing specification in the presence of two subscribing witnesses.

CHRISTOPHER AHRENS.

Witnesses:

JOHN W. HILL,
JOSEPH W. SIMS.