

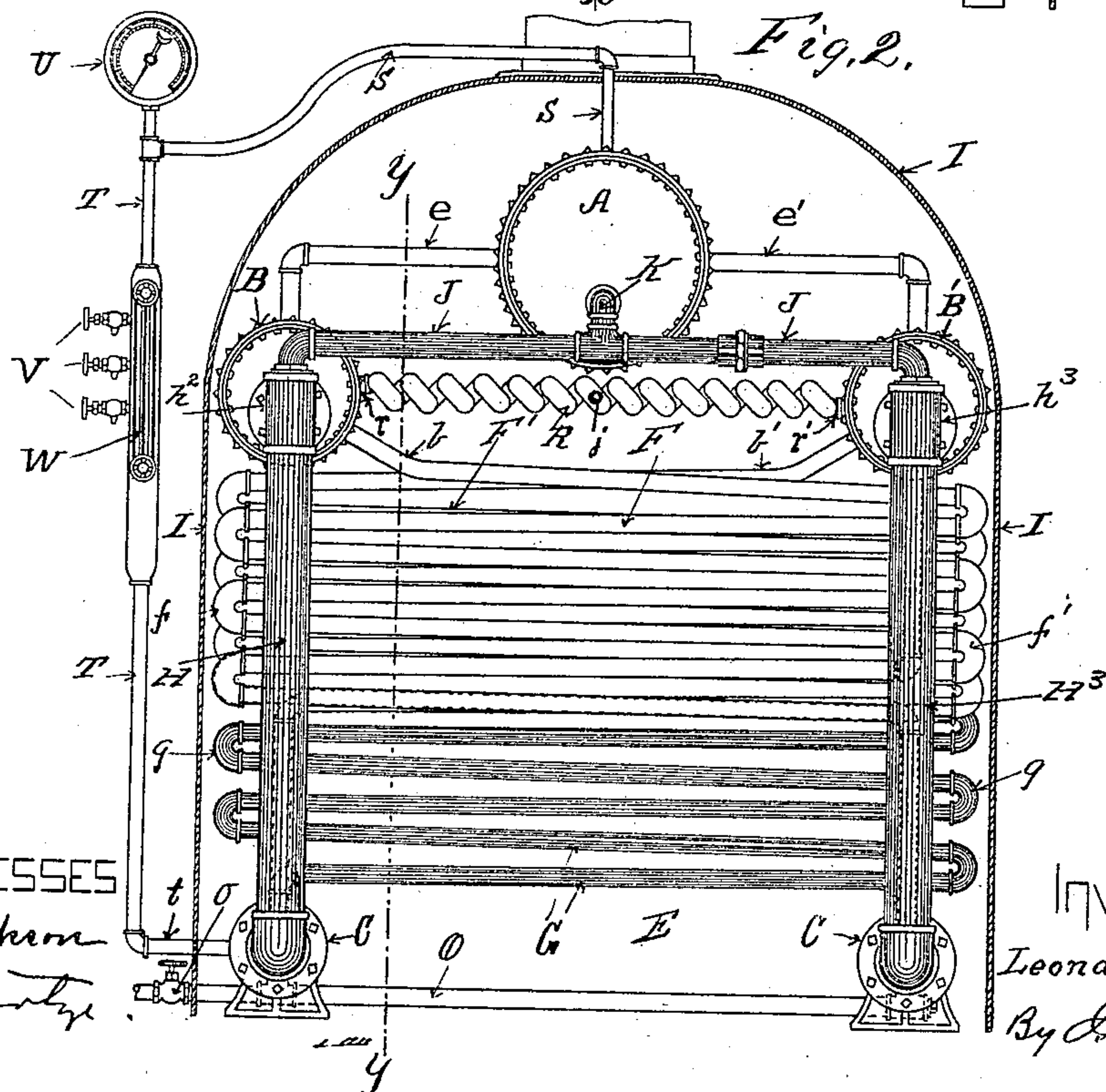
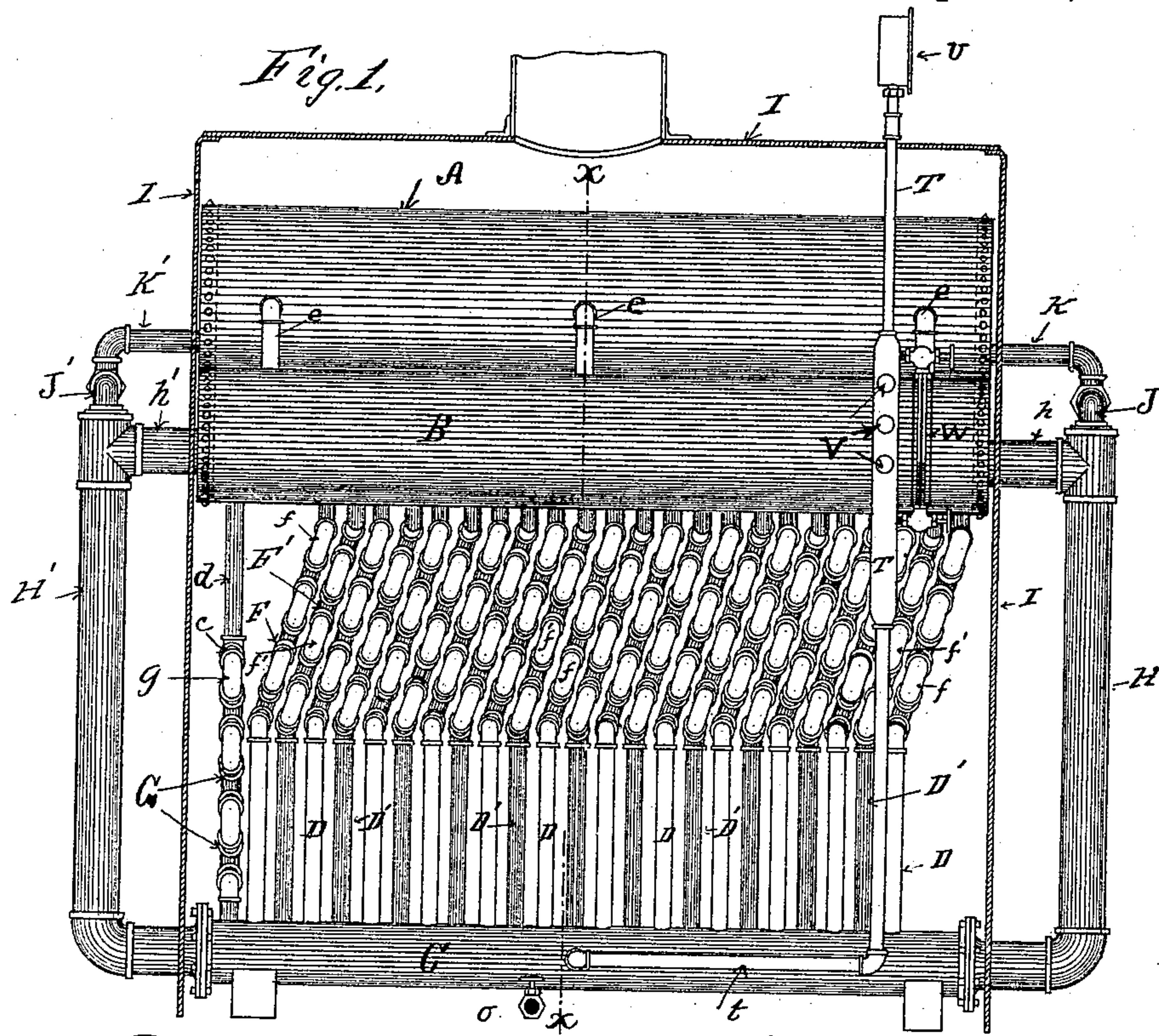
(No Model.)

2 Sheets—Sheet 1.

L. D. DAVIS.
SECTIONAL STEAM BOILER.

No. 459,998.

Patented Sept. 22, 1891.



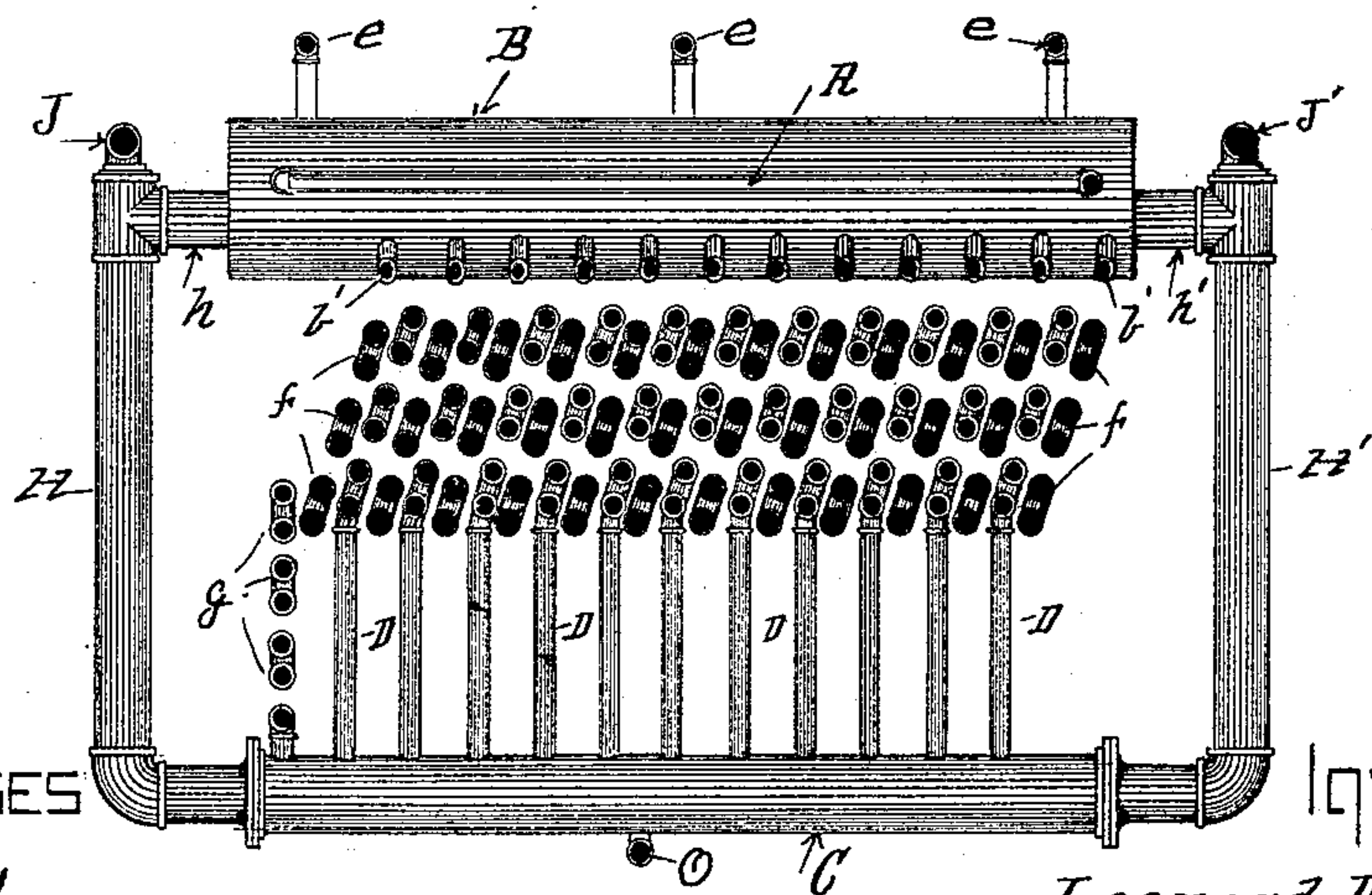
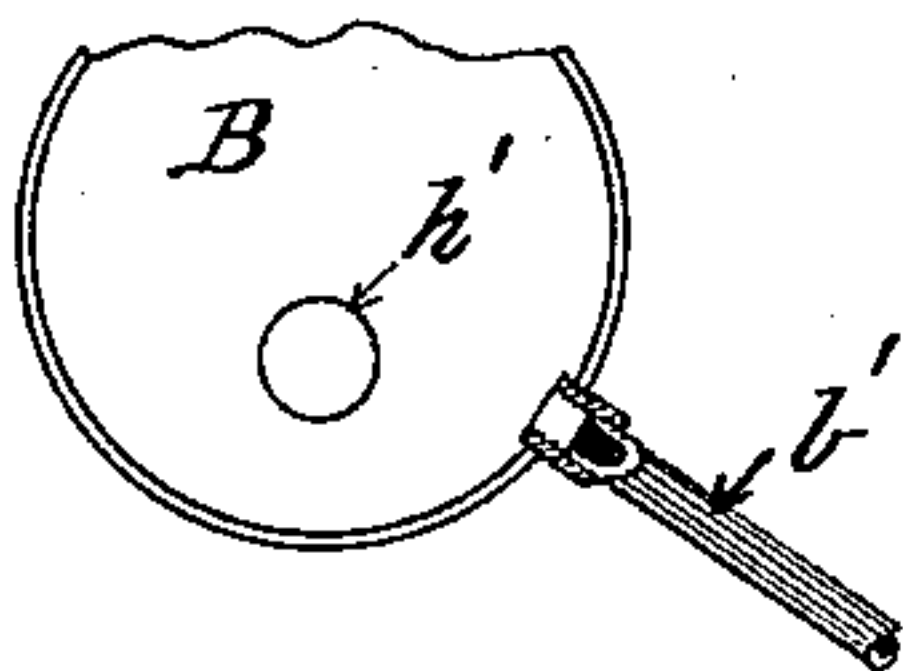
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2 Sheets—Sheet 2.

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UNITED STATES PATENT OFFICE.

LEONARD D. DAVIS, OF ERIE, PENNSYLVANIA.

SECTIONAL STEAM-BOILER.

SPECIFICATION forming part of Letters Patent No. 459,998, dated September 22, 1891.

Application filed December 30, 1890. Serial No. 376,306. (No model.)

To all whom it may concern:

Be it known that I, LEONARD D. DAVIS, a citizen of the United States, residing at Erie, in the county of Erie and State of Pennsylvania, have invented certain new and useful Improvements in Sectional Steam-Boilers; 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, reference being had to the accompanying drawings, and to the letters of reference marked thereon, forming part of this specification.

My invention consists in the improvements in sectional steam-boilers hereinafter set forth and explained, and illustrated in the accompanying drawings, in which—

Figure 1 is a side elevation of my improved sectional steam-boiler. Fig. 2 is a front end elevation of same. Fig. 3 is a vertical cross-section of same on the line $x x$ in Fig. 1. Fig. 4 is a vertical longitudinal section of same on the line $y y$ in Fig. 2, looking in the direction of the arrow. Fig. 5 is a sectional detail showing the pipe connections to the side drums of the boiler.

Like letters refer to like parts in all of the figures.

In the construction shown in the drawings of my improved sectional steam-boiler, A is a longitudinal central steam-drum; B B', longitudinal side drums located, preferably, near the top and sides of the boiler and somewhat on a lower plane than the central drum A, and C C' are longitudinal mud-drums at the bottom of the sides of the boiler, preferably directly under the side drums B B', these being connected together by a system of pipes, as hereinafter described.

From the mud-drums C and C' vertical pipes D and D' extend upward to a sufficient height to form the sides of the fire-box E, where they are coupled to horizontal pipes F and F', the pipes F being coupled to the pipes D in the mud-drum C and the pipes F' to the pipes D' in the mud-drum C', so as to alternate with each other and extend transversely across the top of the fire-box E from side to side of the boiler, where, by means of slightly-oblique return-bends f and f' , the pipes F and F' are carried back and forth at a slight inclination

above the fire-box E in the shape of oblong coils, as illustrated in Figs. 2 and 3, until the ends of the uppermost pipes b and b' of these coils are connected to the side drums B and B'. The coils F and F' are also preferably somewhat inclined from a perpendicular position, so as to stagger the coils, as illustrated in Figs. 1 and 4, so as to the better expose the surfaces thereof to the action of the fire and heat from the fire-box E below them.

At the rear end of the fire-box E, I connect the lower end of a return-bend coil G to one of the mud-drums C C', which coil G extends back and forth transversely across the boiler by means of slightly-oblique return-bends g , so as to form the rear end of the fire-box E, and from the uppermost pipe c of the coils G a vertical pipe d extends upward and connects with one of the side drums B B', as shown in Fig. 1 and also by dotted lines in Fig. 2. Between the side drums B and B' is also a horizontal return-bend coil R, substantially of the same length as the drums A and B B', the ends rr' of this coil being connected with the drums B and B' on each side thereof and forming a direct connection between said drums. To one of the central of the return-bends of the coil R, I preferably also connect the feed-water pipe j , so that the feed-water passes through the coil R each way directly into the drums B B'. From the tops of the drums B B' pipes $e e'$ extend to and are connected with the central drum A, preferably about midway of its height.

At the corners of the boiler and connecting with the ends of the mud-drums C and C' are four large upright pipes H H' H² H³. These pipes I preferably place outside of the casing I of the boiler, and from the upper ends of the pipes H H' H² H³, I run connecting-pipes $h h' h^2 h^3$ into the ends of the side drums B and B' near the bottoms thereof, and I also connect the upper ends of the pipes H H³ and H' H² together by means of transverse horizontal pipes J and J', and to the centers of the pipes J and J', I connect pipes K and K', which extend through the casing I into the lower portion of the ends of the central drum A.

In the central steam-drum A, at each side thereof, I secure hood-shaped deflectors $k k'$, which extend from the inside of the shell of the drum A down over the inlets of the pipes

e and *e'*, so as to deflect any water carried into the drum A by said pipes downward toward the bottom of the drum, and in the top of the drum A, I also place a longitudinal deflector L, forming a dry-steam chamber M, the steam entering said chamber M by passing between the edges of the deflector L and the sides of the drum A. I also place deflectors N N' in the upper parts of the side drums B and B' to receive the impact of a sudden upflow of water from the pipes *b b'* and prevent it somewhat from being carried by the force of the steam through the pipes *e e'* into the drum A.

From the top of the central drum A a pipe S extends laterally to a vertical pipe T outside of the boiler-casing I, the lower end of said vertical pipe T being connected by a lateral pipe *t* to one of the mud-drums C', forming a continuous pipe connection between the steam-chamber M in the top of the steam-drum A and the water in the mud-drum C. On the top of the pipe T, I place a steam-gage U, and in the side of the pipe T, I place gage-cocks V and a water-glass W of usual and ordinary construction. To the central portion of the bottoms of the mud-drums C and C', I couple a blow-off pipe O, having a stop-cock *o*. The grate-bars P extend from the front to the rear of the fire-box and rest upon supports of any convenient construction.

In operation the water and steam rise through the coils F, F', and G into the side drums B and B', and from thence the steam and such water as may be carried therewith pass to the central steam-drum A, the water circulating back through the pipes J J' from the central drum A and through the pipes *h h' h² h³* to the downflow-pipes H H' H² H³ into the mud-drums C and C', from whence it passes upward again through the pipes D and D' and coils F and F' and coils G again to the drums B and B' and A at the top of the boiler.

By the arrangement of the pipes and drums hereinbefore described I am enabled to present a very large and efficient heating-surface and at the same time get such water-circulation that I am enabled to operate the boiler with great economy and efficiency.

Having thus described my invention so as to enable others skilled in the art to which it

appertains to construct and use the same, what I claim as new, and desire to secure by Letters Patent of the United States, is—

1. The combination, in a sectional steam-boiler, of a central drum A, side drums B B', and mud-drums C C', with upflow-coils F F' and downflow-pipes connecting said drums A and B B' to said mud-drums C C', substantially as and for the purpose set forth.

2. The combination, in a sectional steam-boiler, of longitudinal drums at the top and bottom of the sides of the boiler, a central steam-drum at the top of said boiler, with upflow return-bend coils inclined both horizontally and vertically, connecting the side drums at the bottom and top of the boiler together, pipes *e e'*, connecting the side drums at the top of the boiler to the central steam-drum at the top of the boiler, horizontal downflow-pipes connecting the central steam-drum with the ends of the side drums at the top of the boiler, and vertical downflow-pipes connecting the ends of the upper side drums with the lower side drums, substantially as and for the purpose set forth.

3. The combination, in a sectional steam-boiler, of drums A, B, and B' and C C' and downflow connecting-pipes J J, *h h' h² h³*, and H, H', H², and H³, connecting said drums A and B B' with the drums C C', with upflow-pipes D D' and return-bend coils F, F', and G, connecting the drums C C' with the drums B B', a horizontal return-bend coil R, connecting the drums B B', and pipes *e e'*, connecting the drums A and B B', substantially as and for the purpose set forth.

4. The combination, in a sectional steam-boiler, of side drums B B' at the top of the boiler, and a central drum A, with pipes *e* and *e'*, connecting said side drums to said central drum, and hood-shaped deflectors on the inside of the drum A over the ends of the pipes *e e'*, substantially as and for the purpose set forth.

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

LEONARD D. DAVIS.

Witnesses.

ALBERT C. MCKENDREE,
JOHN W. LEECH.