

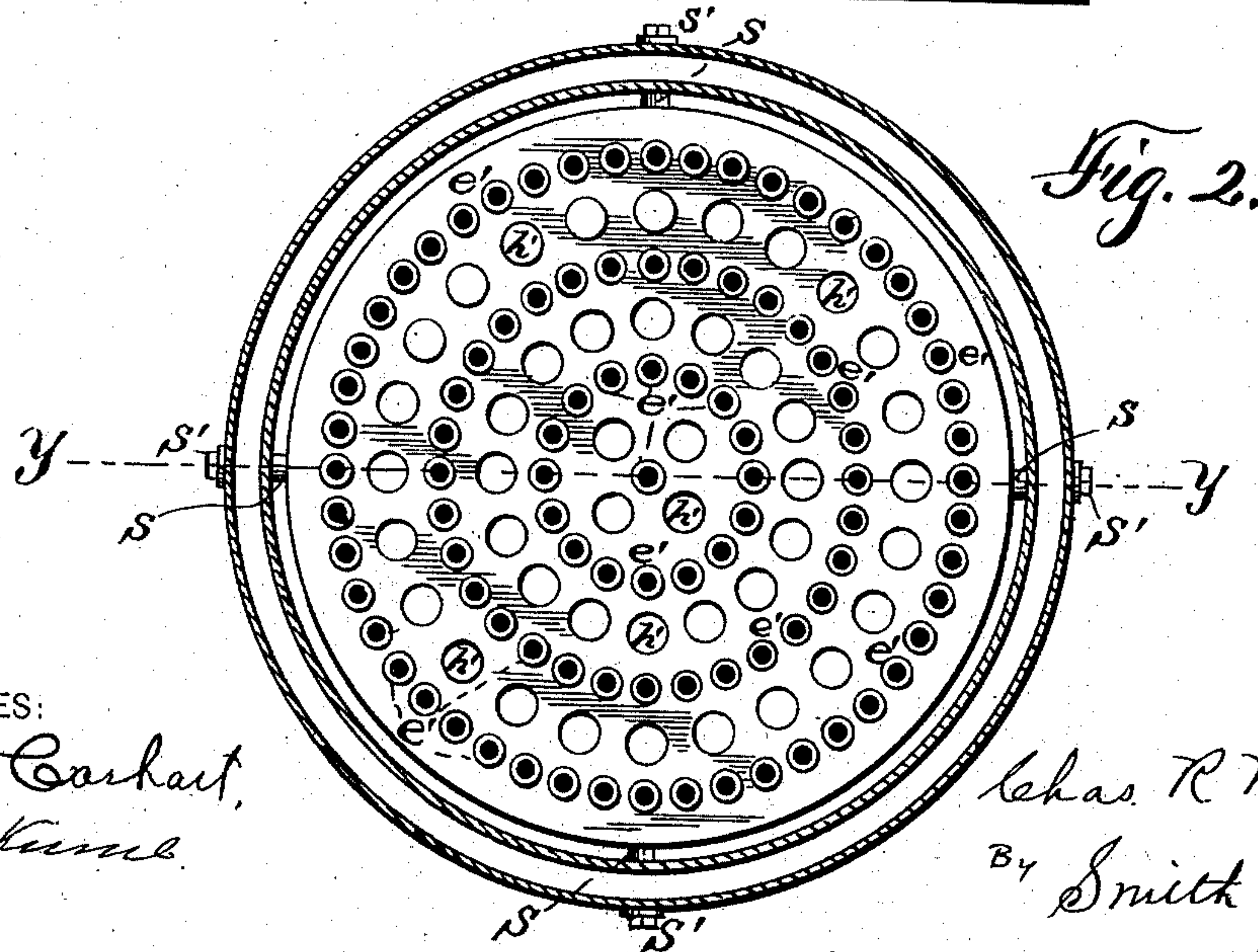
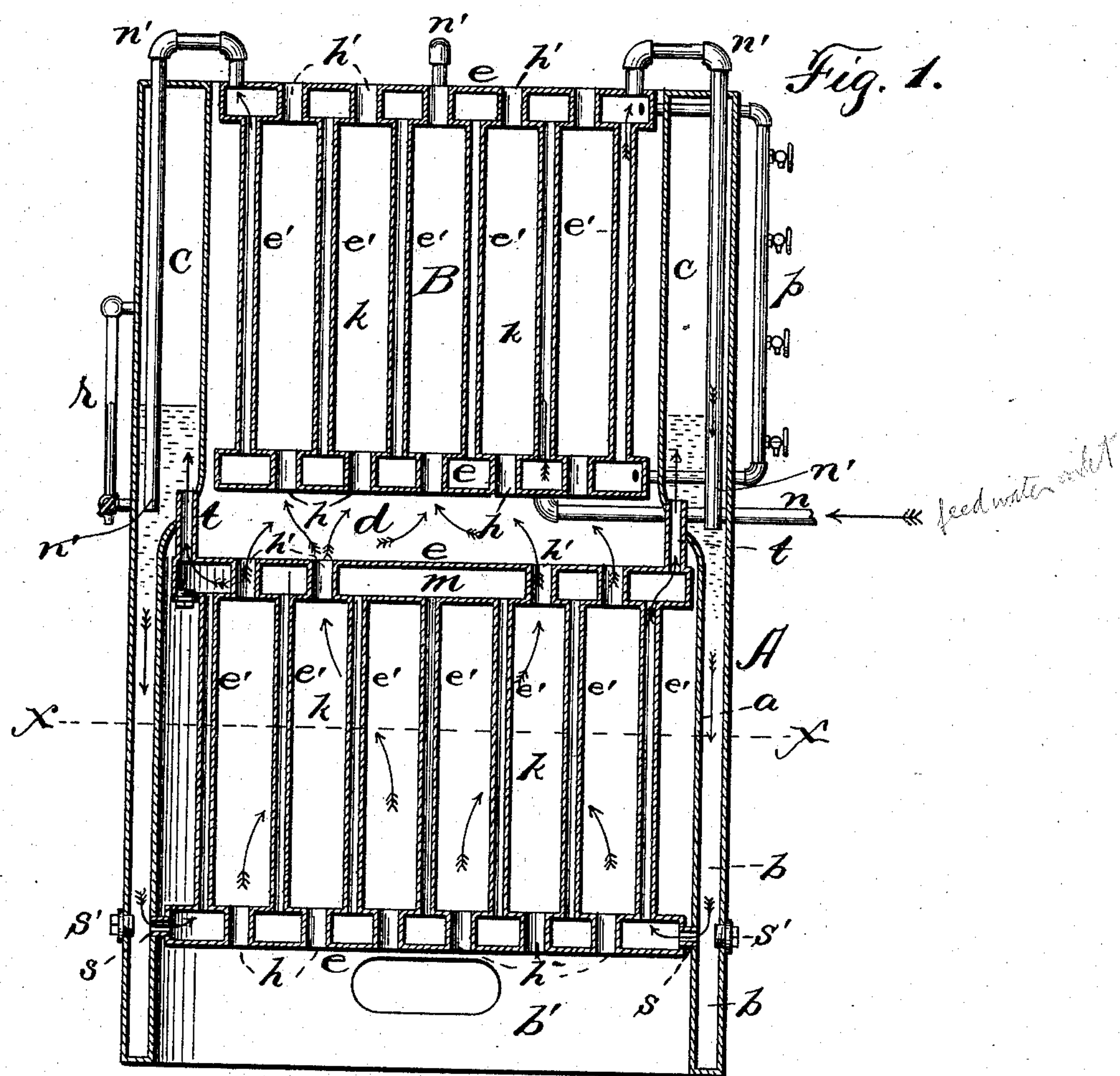
(No Model.)

2 Sheets—Sheet 1.

C. R. MOORE.
BOILER.

No. 500,814.

Patented July 4, 1893.



WITNESSES:

N. A. Carhart,
B. B. Kime

INVENTOR

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Lehas R Moore

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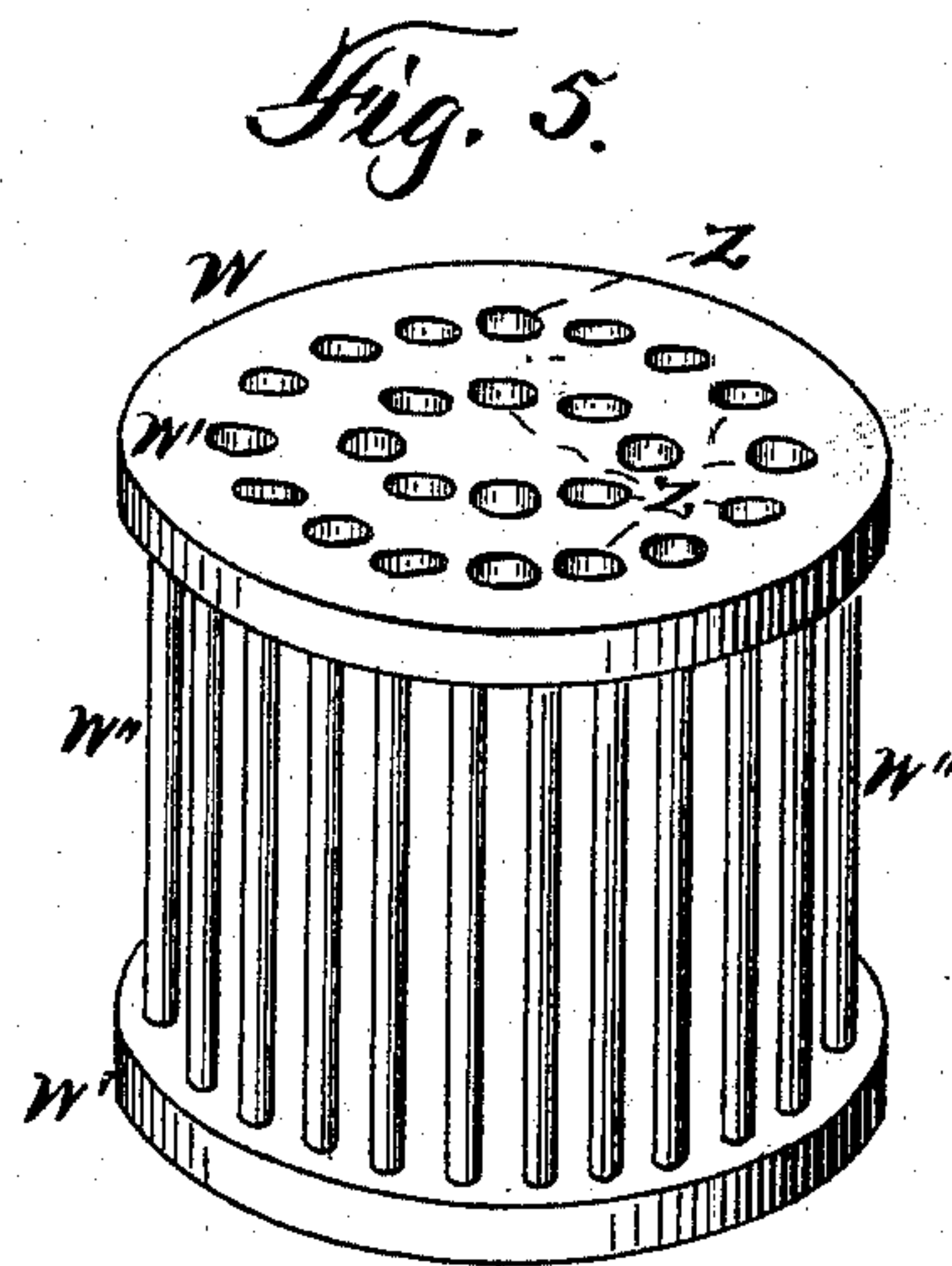
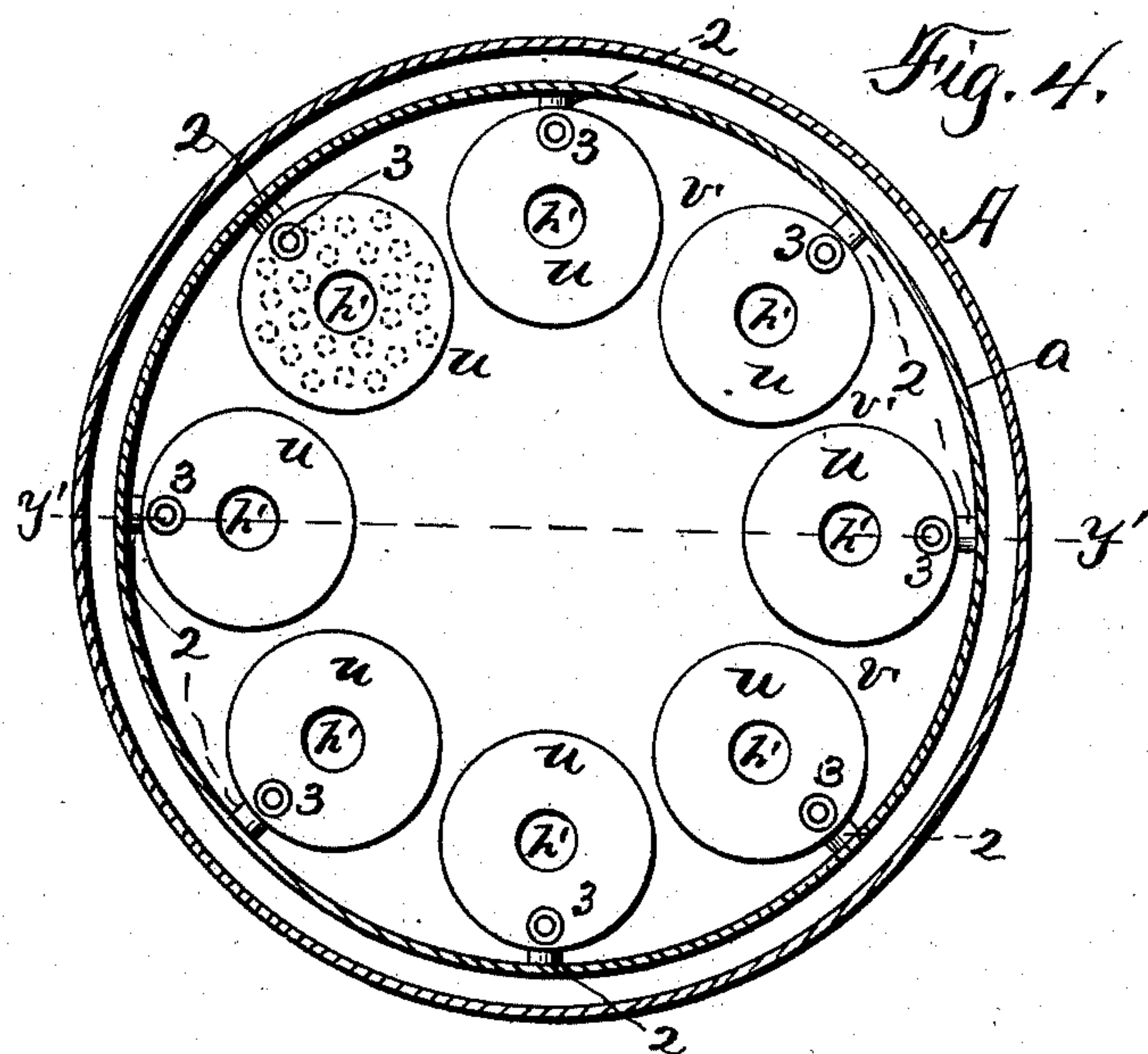
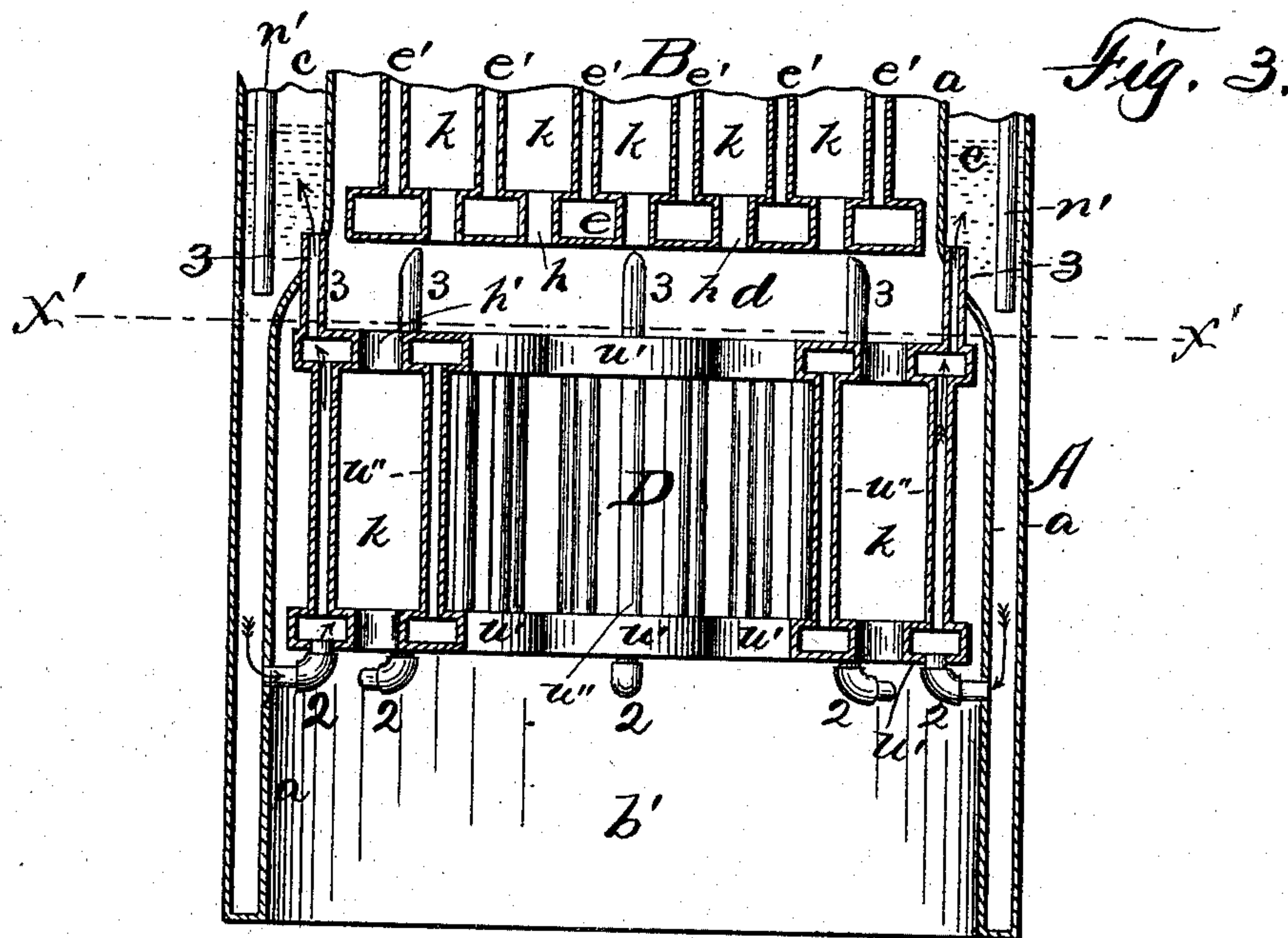
(No Model.)

2 Sheets—Sheet 2.

C. R. MOORE.
BOILER.

No. 500,814.

Patented July 4, 1893.



WITNESSES:

H. A. Carhart
C. B. Thomas

Chas. R. Moore INVENTOR
By

Smith & Wilson
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UNITED STATES PATENT OFFICE.

CHARLES R. MOORE, OF ELMIRA, NEW YORK.

BOILER.

SPECIFICATION forming part of Letters Patent No. 500,814, dated July 4, 1893.

Application filed January 21, 1893. Serial No. 459,075. (No model.)

To all whom it may concern:

Be it known that I, CHARLES R. MOORE, of Elmira, in the county of Chemung, in the State of New York, have invented new and useful
5 Improvements in Boilers, of which the following, taken in connection with the accompanying drawings, is a full, clear, and exact description.

My invention relates to upright boilers of
10 that class commonly used for steam fire engines, being adapted to make steam very fast; and to that type which are constructed with two independent multitubular water-flue sections, the flues in which are connected to hol-
15 low heads and in which smoke flues of varying diameters surrounding and between the water-flues.

My object is to produce a boiler consisting
20 of separate, disconnected and independent water-flue sections, inclosed in an outer shell, operating in unison, each also provided with smoke or heating flues, the upper or primary section receiving the feed water, which is heated in its passage through it, and is thence
25 discharged by siphon discharge pipes into the water-leg water-chamber surrounding the flue sections, the lower or secondary or steam producing section being connected to said water-leg and taking water therefrom and discharg-
30 ing the steam from its upper side into the steam chamber surrounding the primary flue section; in which flue-section the flues are filled with water, as also the hollow heads in which the flues are set; in which the heads
35 are provided with smoke inlet and discharge flues, between which the products of combustion operate expansively and surround the water flues, thus retarding the flow of said products and utilizing more of their heat; in
40 which the lower flue section is provided with means to deflect the course of the products of combustion and to prevent their centering; and in which a chamber is provided between the flue sections; in which the products dis-
45 charged from the smoke flues of the secondary or lower flue-section are distributed to the inlet smoke flues of the primary flue-section.

My invention consists in the several novel
50 features of construction and operation hereinafter described and which are specifically set forth in the claims hereunto annexed. It

is constructed as follows, reference being had to the accompanying drawings, in which—

Figure 1, is a vertical longitudinal section 55 of the boiler, omitting the hood and smoke pipe or stack. Fig. 2, is a transverse section thereof on line $x x$, in Fig. 1. Fig. 3, is a vertical longitudinal sectional elevation, on line $y' y'$ Fig. 4, of a modified construction, 60 in which the lower flue-section is subdivided into separate flue-sections, each provided with an inlet pipe from the water-leg and a discharge pipe. Fig. 4, is a transverse section of Fig. 3 on line $x' x'$ therein, showing the 65 separate flue sections in top plan and leaving the center open. Fig. 5, is a plan perspective of a separate flue section, designed to be inserted into the open center of Fig. 3, the inlet and discharge pipes thereof being omitted 70 as also the connections which may be used to connect it to the other sub-sections surrounding it.

A, is the outer casing, and $-a-$ is the inner shell, concentric therewith and having its 75 upper portion of less diameter than the lower, creating the water-leg $-b-$ surrounding the fire-pot and combustion chamber $-b'-$ and also the enlarged steam chamber $-c-$. Within the inner shell, the flue sections B D are 80 mounted in any ordinary manner, detached from each other, creating a smoke chamber $-d-$ between them. These flue sections are substantially alike, so I will only describe one specifically, and specifically point out the dif- 85 ferences in them existing. Each consists of hollow heads $-e-$ in which the water flues $-e'-$ are secured and by which the heads are connected, and so that the water will freely flow and circulate through the flues 90 and the heads. Each head is also provided with smoke flues $-h-h'-$, the products of combustion flowing through the flues $-h-$ into the space $-k-$ between and around the water flues, and expanding therein, and be- 95 ing discharged therefrom through the smoke-flues $-h'-$. In both sections these smoke-flues are in vertical alignment, except that in section D part of the center of the upper head is made without smoke flues as at $-m-$, 100 and this portion constitutes a deflector to prevent the products of combustion from centering or converging to a common center, of greatest heat, and also by the reduced num-

ber of discharge smoke-flues operating to retard the flow of said products, retaining them longer in engagement or contact with the water flues.

5 The upper, or primary, section is provided with a feed water inlet-pipe —*n*— and with the siphon discharge pipe or pipes —*n'*— which extend down through the steam-chamber exposed to the heat of the steam therein,
10 so that their lower ends are below the bottom of this flue section, as well as below the normal water line in the water-leg, or water chamber. It is also provided with the try-cock mechanism —*p*— of any ordinary construction, as shown.

15 At —*r*— I show an ordinary water-glass to show the water level in the water chamber.

The lower, or secondary, flue section is connected to the water-leg by the pipe —*s*—
20 screwed into its lower head and through the inner shell, the same being inserted, or removed by taking out the screw plug —*s'*— of greater diameter than said pipe, inserting the pipe and replacing said plug. Any number
25 of these inlet pipe connections may be used. This lower flue-section is also provided with the steam and water discharge pipes —*t*—, extending up through the inner shell into the water chamber.

30 In Figs. 3, 4 and 5 the flue sections are shown as subdivided into groups —*u*— each consisting of hollow heads —*u'*—, tubular water flues —*u''*— between them and connecting them, a smoke flue —*v*— through each
35 head, enlarged between the heads, permitting expansion of the products of combustion therein, and either having the spaces —*v'*— between the heads horizontally or not, as desired, or having the center open, as shown in
40 Fig. 4, or closed partially, at least, by the insertion of a central flue section —*w*— (Fig. 5) having hollow heads —*w'*— water flues —*w''*— connecting said heads, and smoke flues —*z*— through the heads and adapted to
45 permit the free expansion of the products of combustion around the water-flues between the heads. Each of these sub-divisions is provided with an inlet pipe —*2*— and a discharge pipe —*3*— passing through the inner
50 shell of the boiler.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. An upright boiler comprising a casing, a shell within and separated unequally therefrom creating a water-leg and chamber below
55 and a steam-chamber above, an upper water-flue section within said shell, consisting of hollow heads, tubular water-flues connecting them, smoke-flues through said heads, an inlet pipe let into the lower head, and siphon
60 water-discharge pipes connected to the upper head and passing down through the steam chamber to a point below the lower head and below the water line in the boiler, and a lower
65 water-flue section consisting of hollow heads, tubular water-flues connecting them, smoke-flues through said heads, inlet water-pipes

connecting the lower head thereof to the water-leg, and discharge pipes from the upper head thereof opening into the water-chamber
70 below the water line in the boiler; in combination.

2. In an upright boiler, an upper flue-section consisting of hollow heads, tubular water-flues connecting them, smoke-flues through
75 said heads whereby the products of combustion can expand laterally around the water-flues and be retarded in the flue-section, a feed-water inlet-pipe connected to the lower head, and siphon discharge pipes connected
80 to the upper head, and extending downward below the lower head through the surrounding steam and water chamber and opening into the latter in combination with a lower flue section consisting of hollow heads, tubular
85 water-flues and smoke flues through said heads like the upper flue section, and a casing inclosing both sections.

3. In an upright boiler, the combination with the fire-box and combustion chamber,
90 the inner and the outer shells, and the water-leg, water chamber and steam chamber between them, of a flue-section consisting of hollow heads, tubular water-flues connecting them, smoke flues through the lower head,
95 whereby the products of combustion can enter the chamber around said flues between said heads, smoke-flues in less number through the upper head, whereby said products are retarded in said chamber, and are deflected
100 from the center of the upper head, a water inlet-pipe connecting the lower head to said water-leg, and discharge pipes connected to the upper head and opening into the water chamber below the normal water-line therein.
105

4. In an upright boiler, the combination with the inner and outer shells, creating a water-leg, a water-chamber and a steam-chamber between them, and the upper and
110 lower flue sections, each consisting of hollow heads, tubular water flues connecting the heads, smoke flues through said heads, and water inlet and discharge pipes connected to said heads of a smoke chamber between said flue-sections receiving the products of combustion from the lower flue section and from
115 which they are distributed into the upper flue section.

5. In an upright boiler, an outer shell, upper and lower flue sections mounted therein
120 with a steam and water chamber between them and the shell, each section consisting of hollow heads, tubular water flues connecting them, smoke flues through said heads, a feed water inlet pipe connected to the lower
125 head of the upper section, and siphon discharge pipes connected to the upper head of the upper section and extending down exterior to said section below the bottom section thereof and below the normal water line, in
130 combination.

6. In an upright boiler, the combination with the shell, and the upper and lower flue sections erected within it and detached there-

from creating a steam and water chamber between them, each section consisting of hollow heads, tubular water flues connecting the heads, smoke flues through the heads and the
5 water inlet pipes, of the smoke chamber between said flue sections receiving the products of combustion from the lower flue section and from which they are distributed into the upper flue section, and siphon discharge pipes

connected to the upper head of the upper section and extending down between it and said shell to a point below the normal water line.

In witness whereof I have hereunto set my hand this 14th day of December, 1892.

CHAS. R. MOORE.

Witnesses:

C. W. SMITH,

HOWARD P. DENISON.