

(No Model.)

3 Sheets—Sheet 1

A. DON.  
STEAM OR HOT WATER BOILER.

No. 596,486.

Patented Jan. 4, 1898.

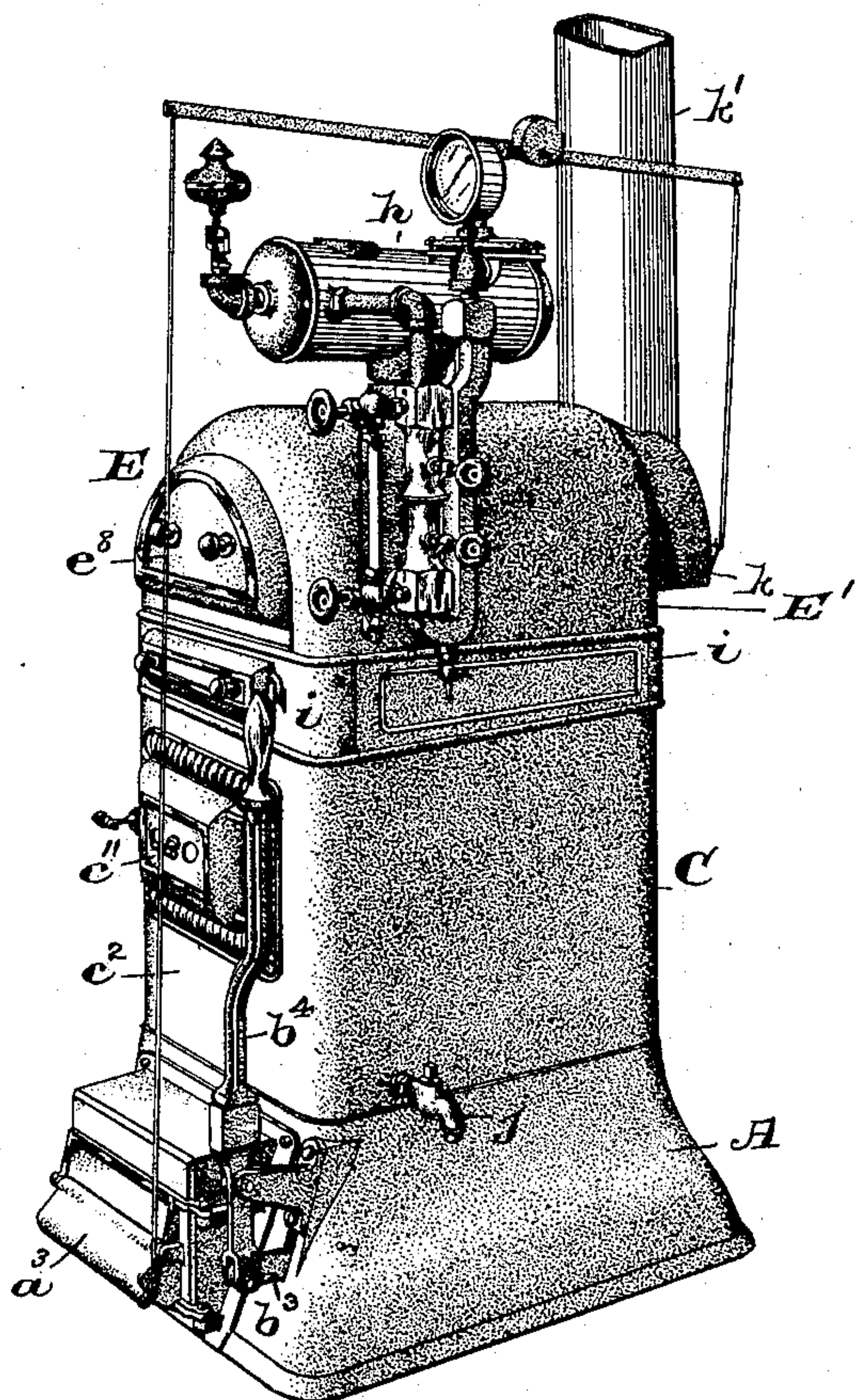


FIG. 1

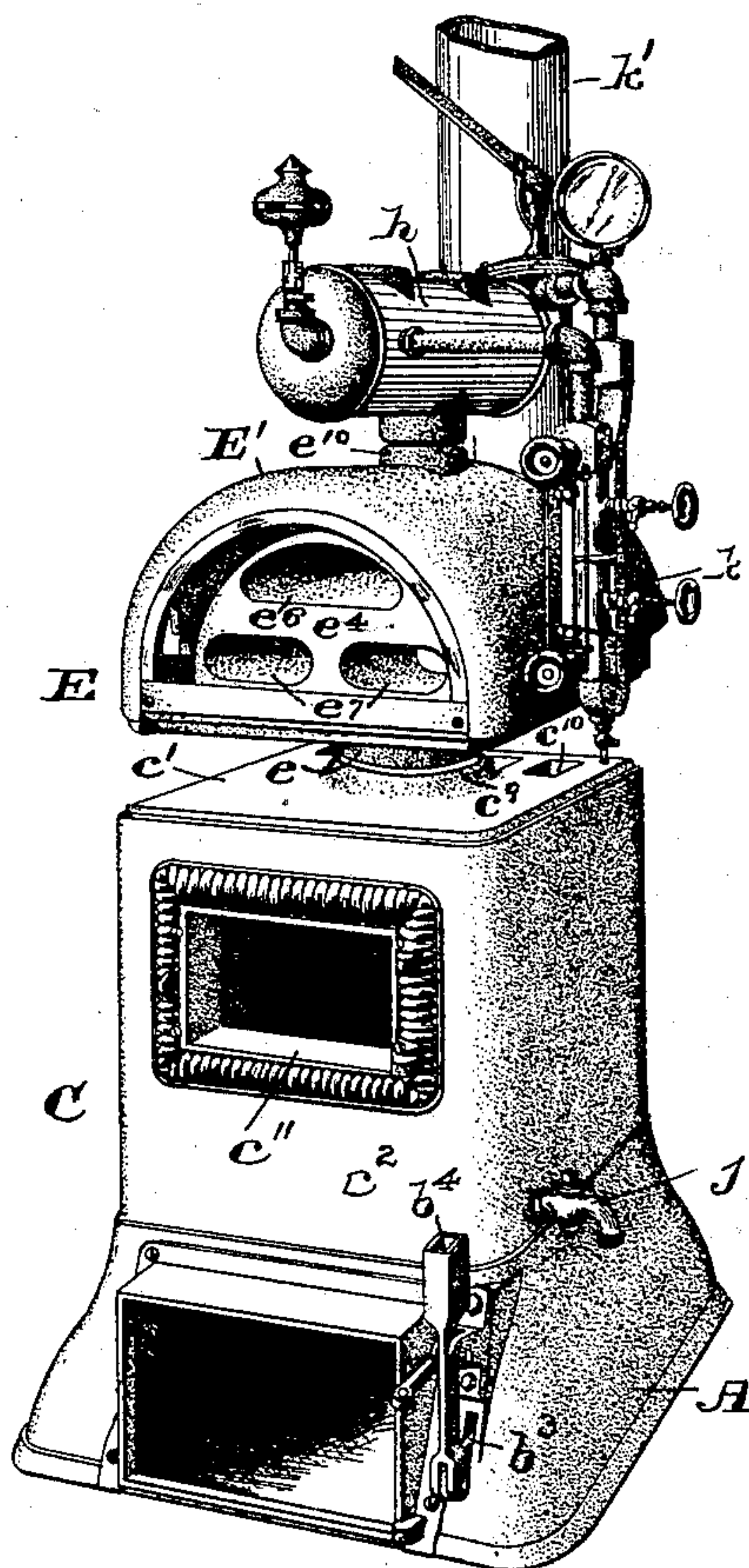


FIG. 2

WITNESSES:

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INVENTOR:

ALEXANDER DON,  
BY  
*Fred C. Graentzel,*  
ATTORNEY



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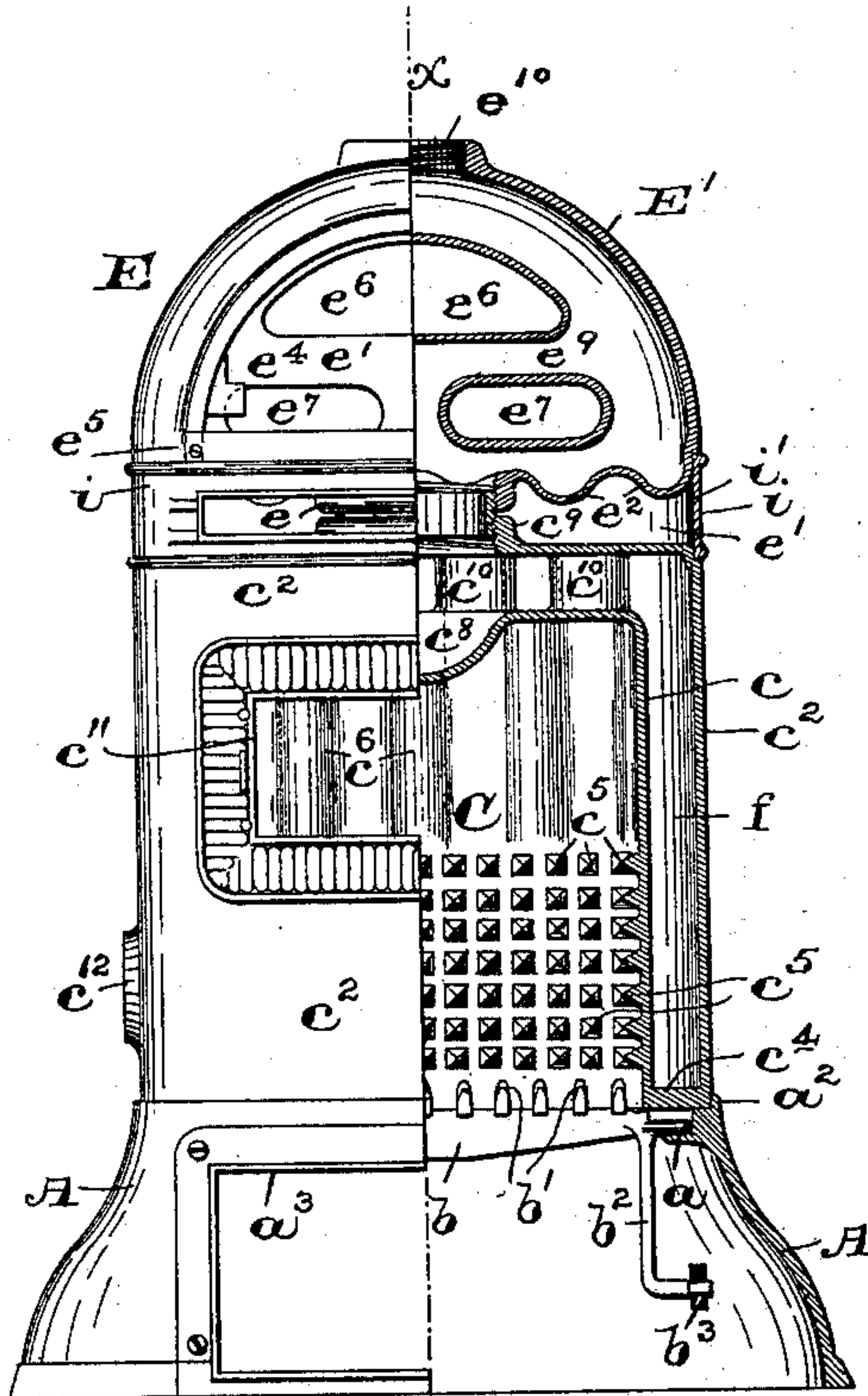


FIG. 3

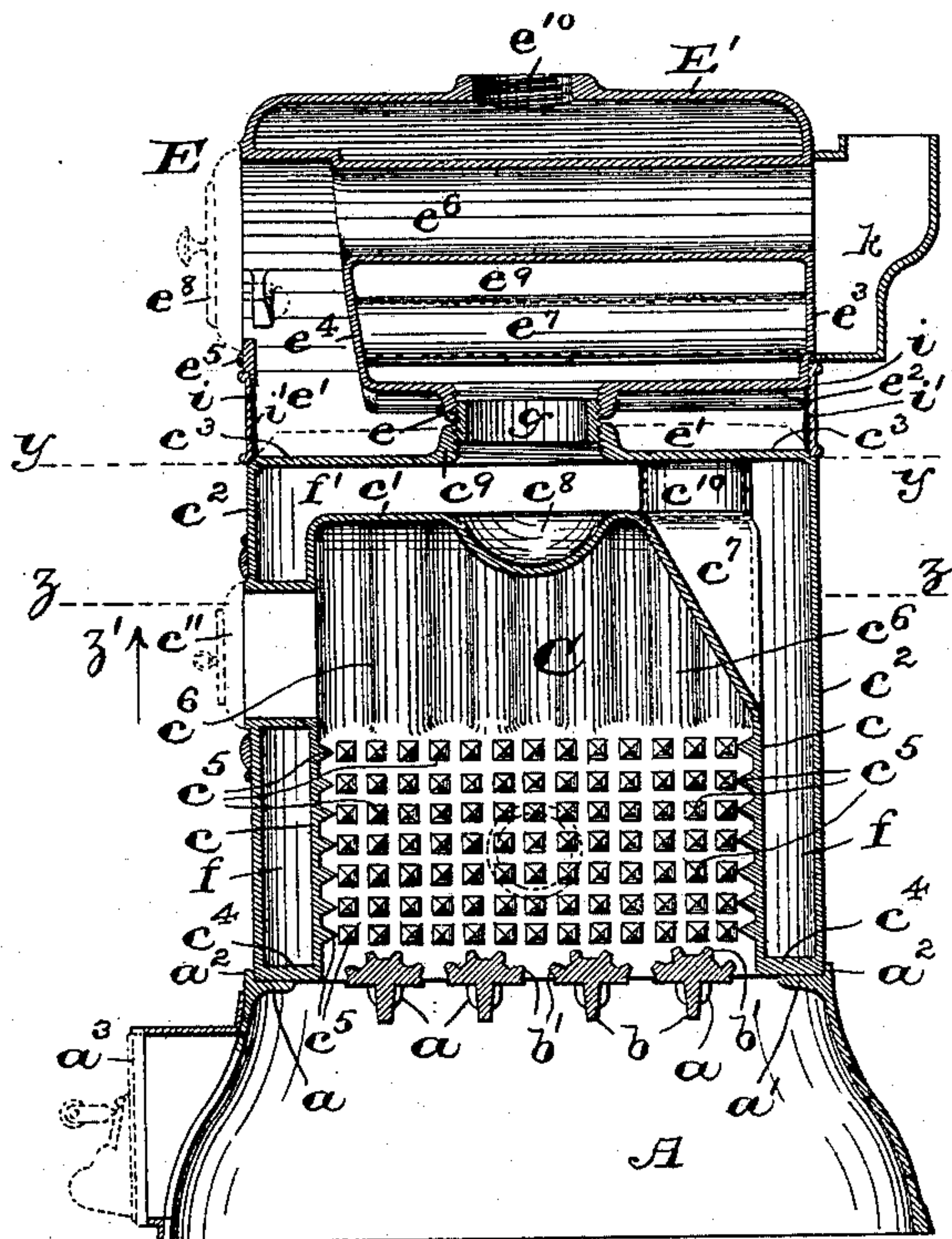


FIG. 4

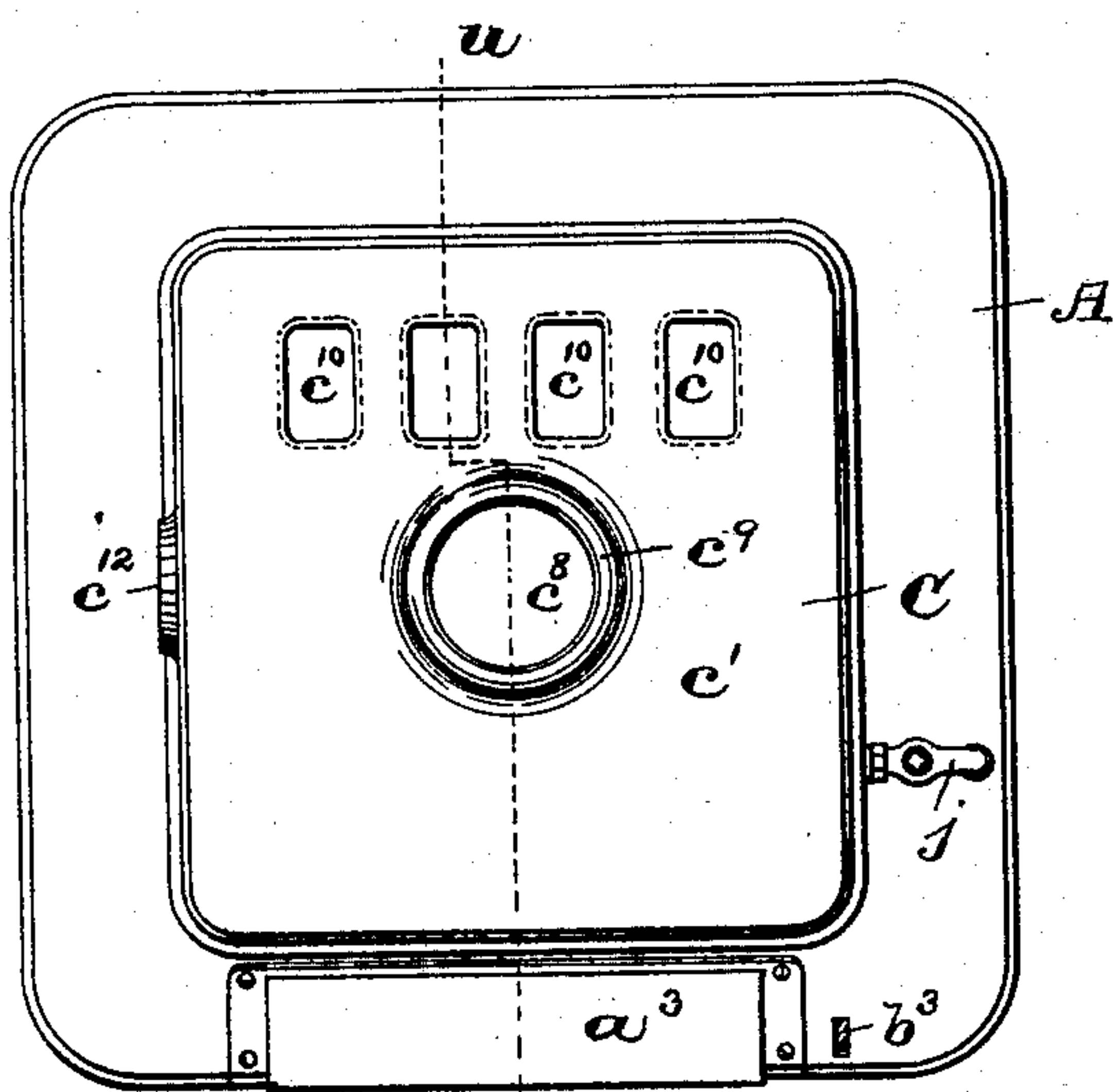


FIG. 5

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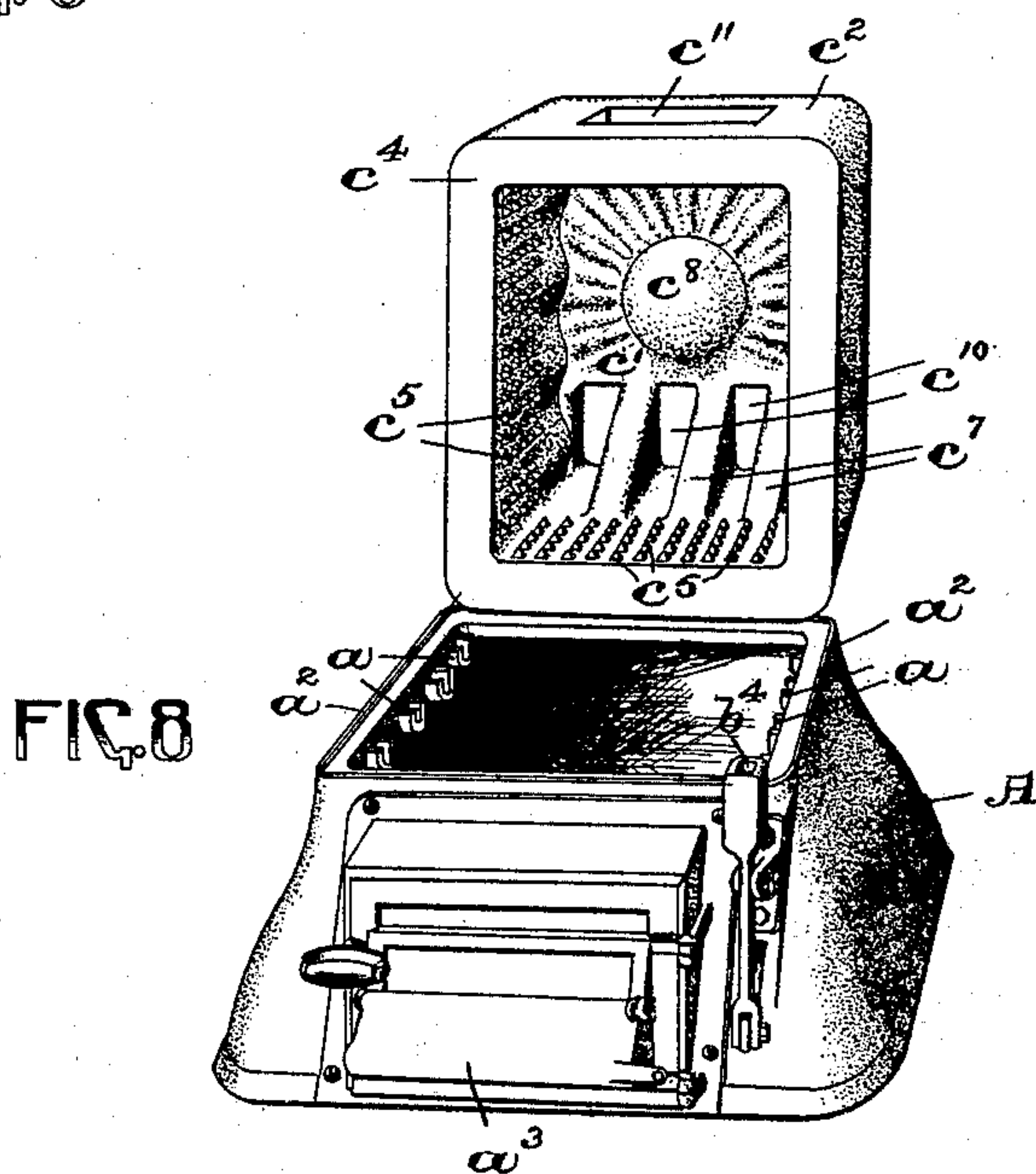
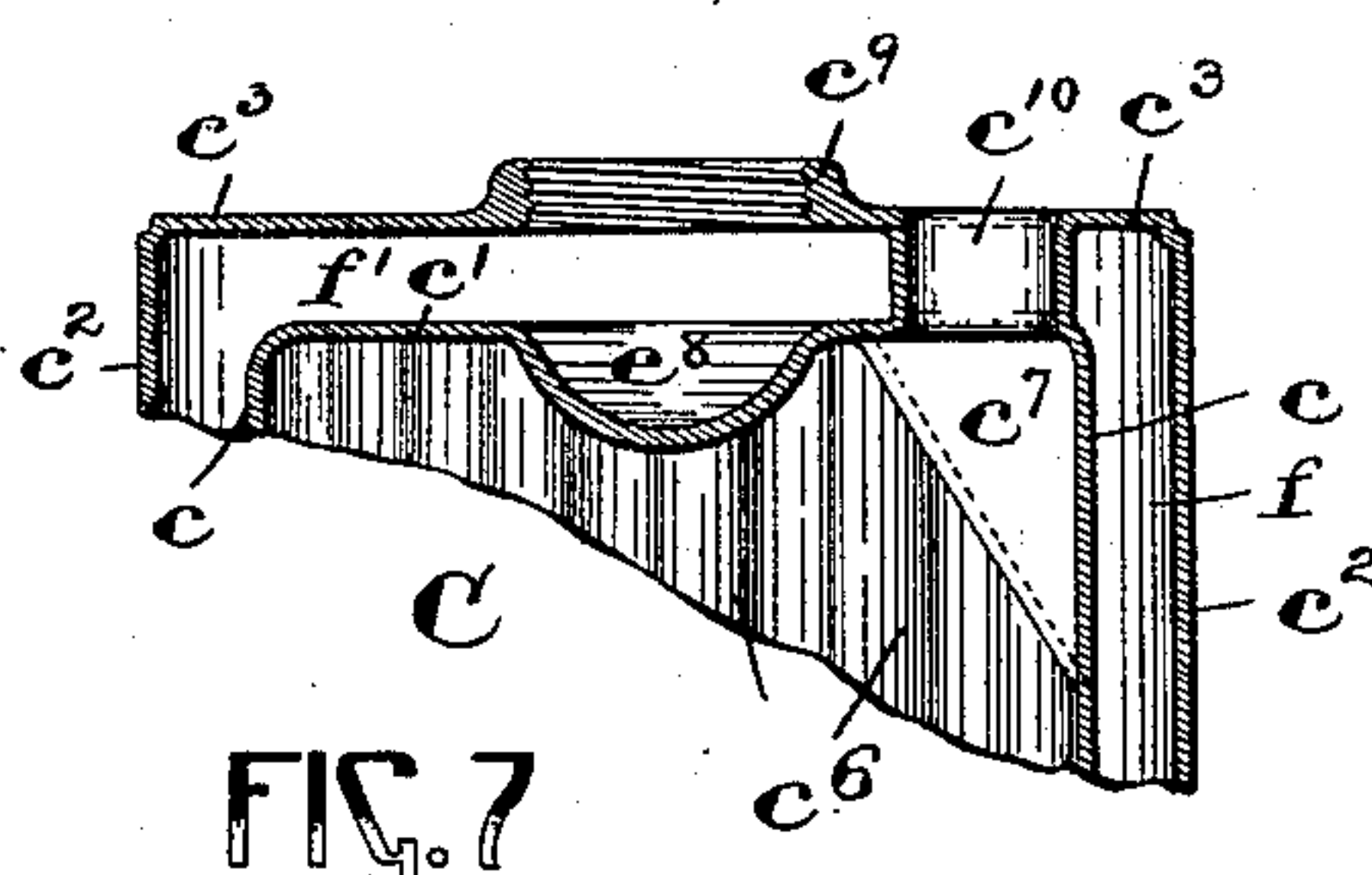
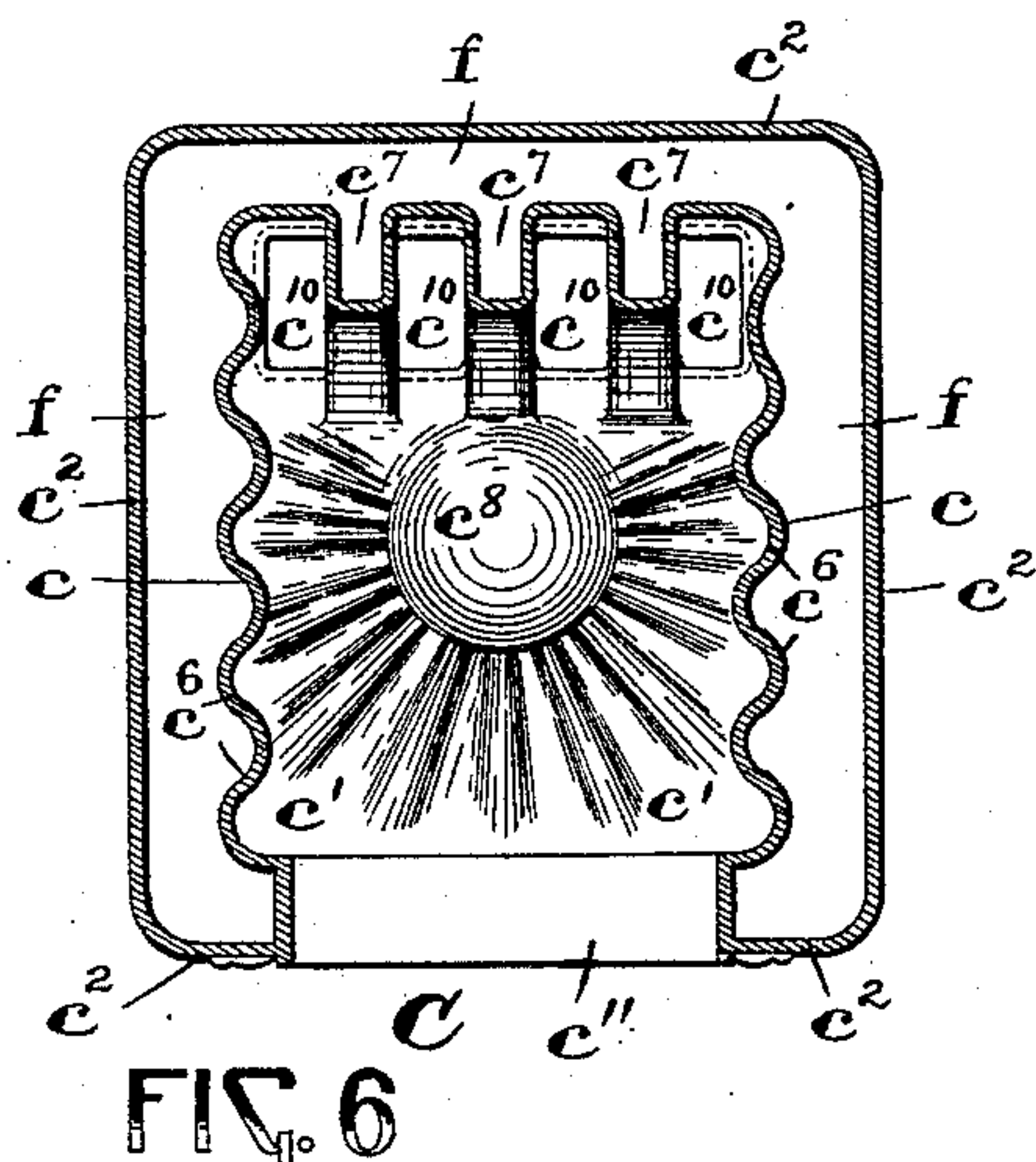
(No Model.)

3 Sheets—Sheet 3.

A. DON.  
STEAM OR HOT WATER BOILER.

No. 596,486.

Patented Jan. 4, 1898.



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# UNITED STATES PATENT OFFICE.

ALEXANDER DON, OF NEWARK, NEW JERSEY.

## STEAM OR HOT-WATER BOILER.

SPECIFICATION forming part of Letters Patent No. 596,486, dated January 4, 1898.

Application filed December 4, 1896. Serial No. 614,397. (No model.)

*To all whom it may concern:*

Be it known that I, ALEXANDER DON, a citizen of the United States, residing at Newark, in the county of Essex and State of New Jersey, have invented certain new and useful Improvements in Steam or Hot-Water 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 letters of reference marked thereon, which form a part of this specification.

My invention relates to the type of hot-water and steam boilers used for heating buildings, which are made or cast in sections; and the invention has for its objects to materially increase the area of the surfaces against which the flames and the products of combustion act, to provide a continuous and unobstructed passage for the water, to provide an increased grate-surface to carry the fire, to provide a shaking mechanism adapted to most easily shake and clean the fire, to join the several parts together by such a means as not to allow of any leakage, and to accomplish these ends in the simplest manner.

With these and other ends in view my invention consists in the novel construction and the combinations and arrangements of the several parts to be hereinafter fully described, and finally embodied in the clauses of the claim.

To enable others to understand my invention, I will proceed to a detailed description thereof in connection with the accompanying drawings, in which—

Figures 1 and 2 are perspective views of my novel construction of steam or hot-water boiler. Fig. 3 is a view of the base, fire-pot, grate, and dome, partly in section and partly in front elevation. Fig. 4 is a section on line  $x$  in said Fig. 1, and Fig. 5 is a horizontal section on line  $y$  in said Fig. 4, showing a plan or top view of the fire-pot section. Fig. 6 is a sectional view along the line  $z$  in Fig. 2, looking in the direction of arrow  $z'$ . Fig. 7 is a sectional view of the top of the fire-pot section along the line  $u$  in Fig. 5, and Fig. 8 is a perspective view of the fire-pot section and base detached.

Referring to the drawings, in which similar letters of reference are employed to indicate corresponding parts, A denotes the base, provided with a grate which is made up of a series of bars  $b$ , each bar being formed by a shaft having the upwardly-extending projections, which have on their upper surfaces a series of pointed projections  $b'$ .

$a$  denotes the rests for the grate-bars, which may be either cast integral with the base A or may be made separately and fastened thereto to provide a means for holding the bars  $b$  in position. The grate-bars are turned on their journals at their ends by means of a link  $b^2$ , (shown in elevation in Fig. 1,) which is operated by a single lever  $b^3$  and the handle  $b^4$  in front of the boiler.

The fire-pot C is made in one piece, and consists of an inner wall  $c$   $c'$  and an outer wall  $c^2$   $c^3$ , the said walls being united at their lowest parts by a margin or web, as  $c^4$ , whereby a waterway  $f$  is formed at the sides and a waterway  $f'$  is also formed at the top and between the several walls, substantially as illustrated. The inner wall  $c$  is provided on its lower part with teats or projections  $c^5$ , which extend into the fire-pot and form a means of protecting the live fire from the surface of the metal wall, which is backed up by the water behind it, while the remainder and upper portion of the inner walls is formed with corrugations  $c^6$ , as shown in Figs. 4, 6, 7, and 8, thus providing as much heating-surface in the fire-pot section as is possible.

The rear and top waterways are connected by suitable water-legs  $c^7$ —any desirable number—which are integral with the fire-pot and form increased passages for the water where it is most needed and where it will be acted on by the full force of the flames and products of combustion as they pass from the fire-pot into the upper parts of the boiler. The crown-sheet or upper wall  $c'$  is provided with a bowl or depression  $c^8$ , allowing the water to more easily rise at the central water connection  $c^9$  in the upper wall  $c^3$  of the fire-pot C and into the dome above it, which obviates the liability to crack the crown-sheet, while at the same time it operates to spread the flames against the under surface of the crown-sheet or upper wall  $c'$  of the fire-pot. In said screw-threaded flange  $c^9$ , forming the central



water connection in the upper wall  $c^3$ , herein-  
above mentioned, is screwed a ring or nipple  
 $g$ , onto which is secured the screw-threaded  
flange  $e$  of the dome  $E$ , thereby forming a  
5 means of central water connection with the  
water-passages surrounding the fire-pot sec-  
tion and the water-passages in the dome  $E$   
above said fire-pot section. There are sev-  
eral other means in which this central water  
10 connection may be made, but the screw-nip-  
ple  $g$  is the preferred form of construction.  
Flues  $c^{10}$  lead from the fire-pot section through  
the top of the fire-pot at its upper walls  $c'$   
and  $c^3$  into the space  $e'$  between the fire-pot  
15 and the dome, forming a passage for the es-  
cape of the products of combustion. The  
front of the fire-pot is provided with a con-  
venient opening  $c^{11}$  for a door for the admis-  
sion of fuel.

20 As shown in Figs. 4 and 8, the base  $A$  is  
provided with the shoulder or lugs  $a'$  and the  
upwardly-projecting flange  $a^2$ , on which the  
fire-pot section  $C$  is operatively, but remov-  
ably, arranged, as will be clearly evident.  
25 Said base  $A$  is provided with the usual open-  
ing  $a^3$  for the ash-pit door.

The dome-section  $E$  consists of an outer  
shell  $E'$ , of a semicircular or other preferred  
form, with its lower side  $e^2$  preferably corru-  
30 gated, as shown, which when the dome is in  
position is horizontal and parallel with the  
top or upper wall  $c^3$  of the fire-pot section  
and is provided with a screw-threaded flange  
 $e$ , hereinabove mentioned, which corresponds  
35 to the flange  $c^9$  on the fire-pot section  $C$ , these  
two flanges forming the means for connecting  
the two sections  $C$  and  $E$  together by means  
of said screw-nipple  $g$ , or any other preferred  
method. As has been stated, the said lower  
40 side  $e^2$  of the dome  $E$  is formed with corruga-  
tions, thus increasing the surface to be acted  
upon by the products of combustion. The  
dome  $E$  is provided with a back  $e^3$ , cast in-  
tegrally with the main shell, and a front  $e^4$ ,  
45 which is set slightly back from the front  $e^5$   
of the dome and at an angle, forming an open  
chamber in front of the flue-spaces  $e^6$  and  $e^7$   
in the dome, said front  $e^4$  being arranged at  
an angle to insure the proper distribution of  
50 the products of combustion into the various  
flues. In the front  $e^5$  of the dome  $E$  is an  
opening  $e^8$  for a door, directly in front of the  
space before said front  $e^4$ , which door can be  
opened or removed to enable the cleaning  
55 out of the several flues  $e^6$  and  $e^7$ . The said  
spaces  $e^6$  and  $e^7$ , of which there may be any  
desired number, have their walls cast in-  
tegrally with the ends of the outer shell  $e^3$   
and the front  $e^4$  of the dome, and the water  
60 circulates from the bottom of the dome-sec-  
tion through waterways  $e^9$  around said flues  
and leaves the dome at the top  $e^{10}$ , where a  
connection is provided with a small chamber  
or dome  $h$ , which can be used to advantage  
65 above the dome  $E$  to provide a space for the  
steam as it is generated and a better means  
of taking off the water connections for the

feed-pipes in the case of hot-water heating  
to the rooms of a building.

The chamber  $e'$ , formed between the fire-  
70 pot and the dome-sections, is inclosed by a  
metallic casing  $i$ , thus providing a chamber  
through which the products of combustion  
pass in their passage from the flues  $c^{10}$ , con-  
nected with the fire-pot  $C$  to the dome  $E$ . 75  
This casing may be provided with suitable  
clean-out doors and is lined with a suitable  
non-conductor  $i'$  to prevent the radiation of  
the heat, as will be seen from an inspection  
of Fig. 4. 80

The smoke and products of combustion are  
gathered at the rear of the dome by a cover  
 $k$ , covering the several outlet ends of the va-  
rious flues  $e^6$  and  $e^7$ , where the smoke and  
gases are united and conducted to the smoke-  
85 pipe  $k'$ . This collar or cover  $k$  is made sepa-  
rate from the dome and screwed or otherwise  
secured thereto.

As will be seen from Figs. 3 and 5, the fire-  
90 pot section is provided with the usual open-  
ing  $c^{12}$  for the return of the system of piping  
for conveying the steam or hot water through  
the building and back into the boiler, and  $j$   
is an ordinary cock, preferably provided with  
a threaded end for the attachment of a hose 95  
or pipe thereto to admit water into the boiler  
or to draw the water off therefrom, as may be  
desired.

Changes in the form and proportions of the  
parts and details of construction may be 100  
made without departing from the spirit of  
or sacrificing the advantages of my invention,  
and I therefore do not limit my present in-  
vention to the exact arrangements and combi-  
105 nations of the parts herein described and  
illustrated, and I reserve the right to make  
such modifications as fairly fall within the  
scope of my invention.

Having thus described my invention, what  
I claim is— 110

1. In a boiler for steam or hot water, a fire-  
pot section, consisting, of an inner wall, an  
outer wall, and an intermediate and vertical  
waterway, the two walls joined integrally to-  
115 gether, a horizontal crown-sheet, an upper  
horizontal wall above said crown-sheet pro-  
vided with a means of central water connec-  
tion, a horizontal waterway between said  
crown-sheet and upper horizontal wall, ver-  
tical smoke-flues at the back connecting the 120  
crown-sheet with said upper horizontal wall,  
and a series of water-legs cast integral with  
said inner wall, providing a means of direct  
communication for the water between said  
vertical and horizontal waterways, said wa- 125  
ter-legs being alternately spaced in relation  
to said flues, whereby the spaces between any  
two water-legs form a continuation of the  
smoke-flues into the fire-pot, substantially as  
and for the purposes set forth. 130

2. In a steam or hot-water boiler, a fire-pot  
section made in one piece of metal, consist-  
ing, of an inner wall, an outer wall, forming  
vertical and horizontal waterways, a series of



water legs or passages communicating between said vertical and horizontal waterways, vertical flues connecting said inner and outer walls for the passage of the products of combustion, the lower part of said inner wall being provided with a multiplicity of teats or projections, and the remainder of the inner wall formed directly above said teats, with vertical corrugations, substantially as and for the purposes set forth.

3. In a steam or hot-water boiler, a fire-pot section made in one piece, consisting, of a vertical inner wall, vertically-arranged corrugations in said walls, a horizontal crown-sheet, a vertical outer wall and an upper horizontal wall, forming vertical and horizontal waterways, and a bowl or depression in said crown-sheet, substantially as and for the purposes set forth.

4. In a steam or hot-water boiler, a fire-pot section made in one piece, consisting, of a vertical inner wall, vertically-arranged corrugations in said walls, a horizontal crown-sheet, a vertical outer wall and an upper horizontal wall, forming vertical and horizontal waterways, a bowl or depression in said crown-sheet, and vertical flues connecting said crown-sheet and said upper horizontal wall, for the passage of the products of combustion, substantially as and for the purposes set forth.

5. In a steam or hot-water boiler, a fire-pot section made in one piece, consisting, of a vertical inner wall, a horizontal crown-sheet, a vertical outer wall and an upper horizontal wall, forming vertical and horizontal waterways, a bowl or depression in said crown-sheet, vertical flues connecting said crown-sheet and said upper horizontal wall, for the passage of the products of combustion, and the lower part of said inner wall being provided with a multiplicity of teats or projections and the remainder of said inner wall formed directly above said teats with vertical corrugations, substantially as and for the purposes set forth.

6. In a steam or hot-water boiler, a dome or top section, consisting, of an outer shell of metal, a lower corrugated side  $e^2$ , horizontal flue space or spaces, waterways surrounding said flue space or spaces, and a means of central water connection for connection with a fire-pot section, substantially as and for the purposes set forth.

7. In a steam or hot-water boiler, a dome or top section having a central water connection

for connection with a fire-pot section, and provided with horizontal waterways and flue or flue-spaces, and having its lower side horizontal and provided with corrugations and its upper surface of a circular or curved outline, substantially as and for the purposes set forth.

8. In a steam or hot-water boiler, a top or dome section, consisting, of an outer shell of metal, a lower corrugated side  $e^2$  and provided with waterways, a horizontal flue space or spaces, means of central water connection with a fire-pot section, a removable front, and a cover, as  $k$ , connecting said flue or flues with a chimney, substantially as and for the purposes set forth.

9. In a steam or hot-water boiler, the combination, with a fire-pot section, consisting of an inner and an outer wall, an intermediate water-space, one or more vertical flues, of a dome-section, consisting, of an outer shell of metal, interior waterway, horizontal flue space or spaces, and a means of central water connection, for connecting said dome-section with the fire-pot section, substantially as set forth.

10. In a steam or hot-water boiler, the combination, with a fire-pot section, consisting, of an inner wall, an outer wall, a horizontal crown-sheet, provided with a means of central water connection and an upper horizontal wall, vertical smoke-flues at the back connecting the crown-sheet with said upper horizontal wall, providing a direct communication for the water between the several waterways, and water-legs alternately spaced in relation to said smoke-flues, whereby the spaces between any two water-legs form a continuation of the smoke-flues into the fire-pot, of a dome-section, consisting, of an outer shell of metal, interior waterway, horizontal flue-spaces, a means of central water connection, for connecting said dome-section with said fire-pot section, a detachable front or door for said dome-section, a smoke cover or collar, as  $k$ , connecting said flues with a chimney, and a shell or casing between said dome and fire-pot sections, forming a smoke-chamber, between said sections, substantially as and for the purposes set forth.

In testimony that I claim the invention set forth above I have hereunto set my hand this 25th day of November, 1896.

ALEXANDER DON.

Witnesses:

FREDK. C. FRAENTZEL,  
WM. H. CAMFIELD, Jr.