

No. 676,037.

Patented June 11, 1901.

J. J. HERBRECHT.

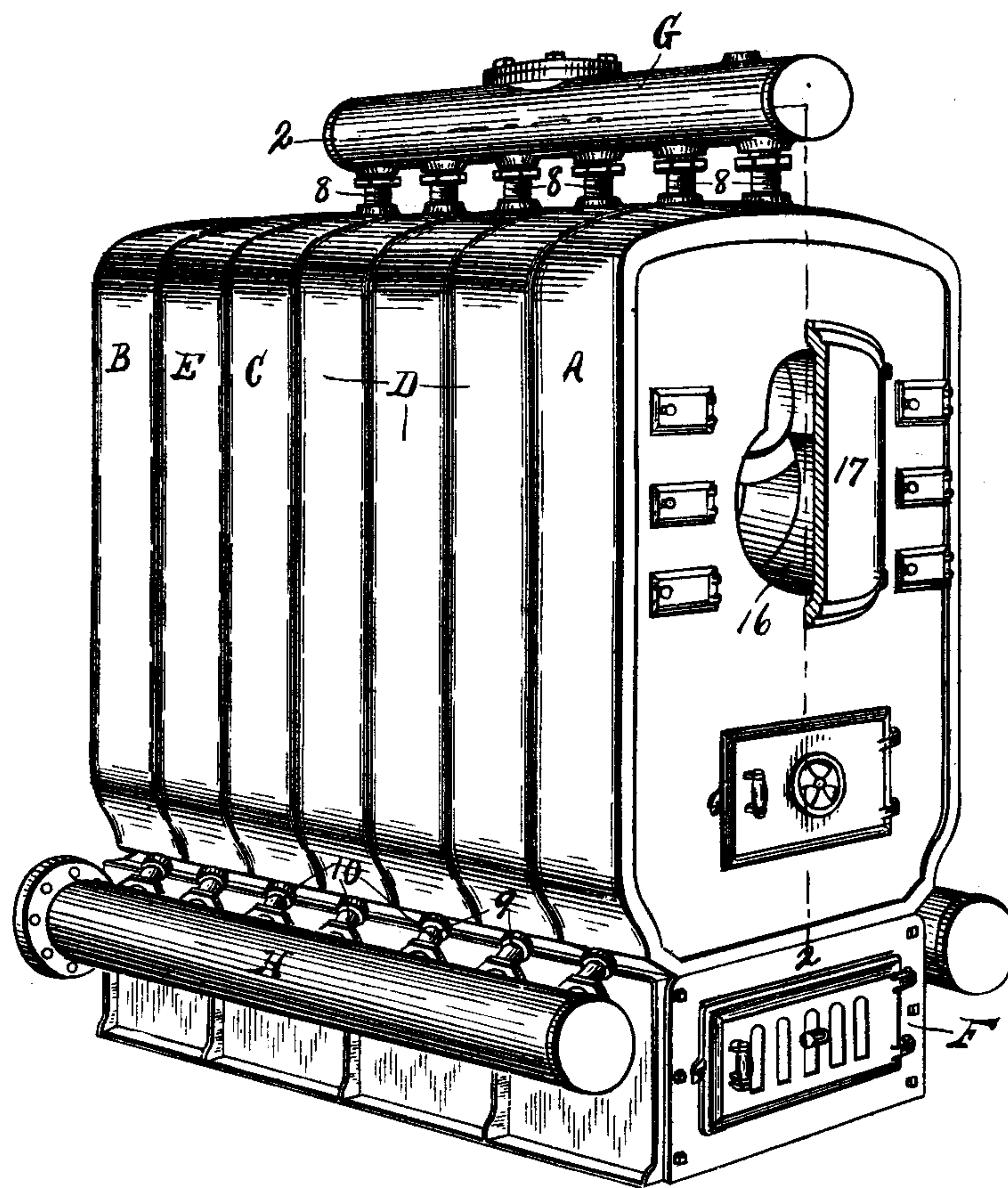
HEATER.

(Application filed Sept. 24, 1900.)

(No Model.)

3 Sheets—Sheet 1.

Fig. 1.



WITNESSES

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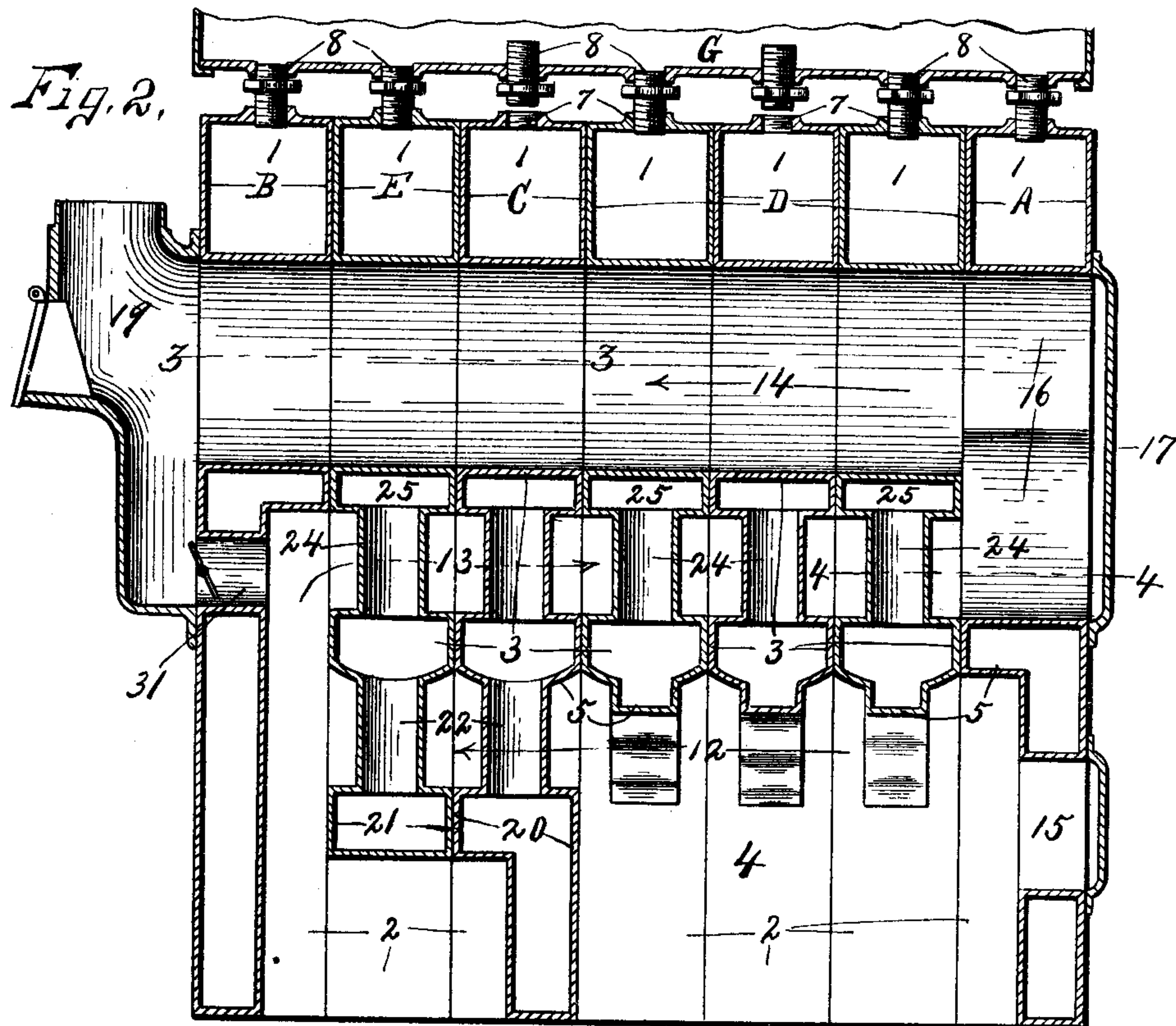
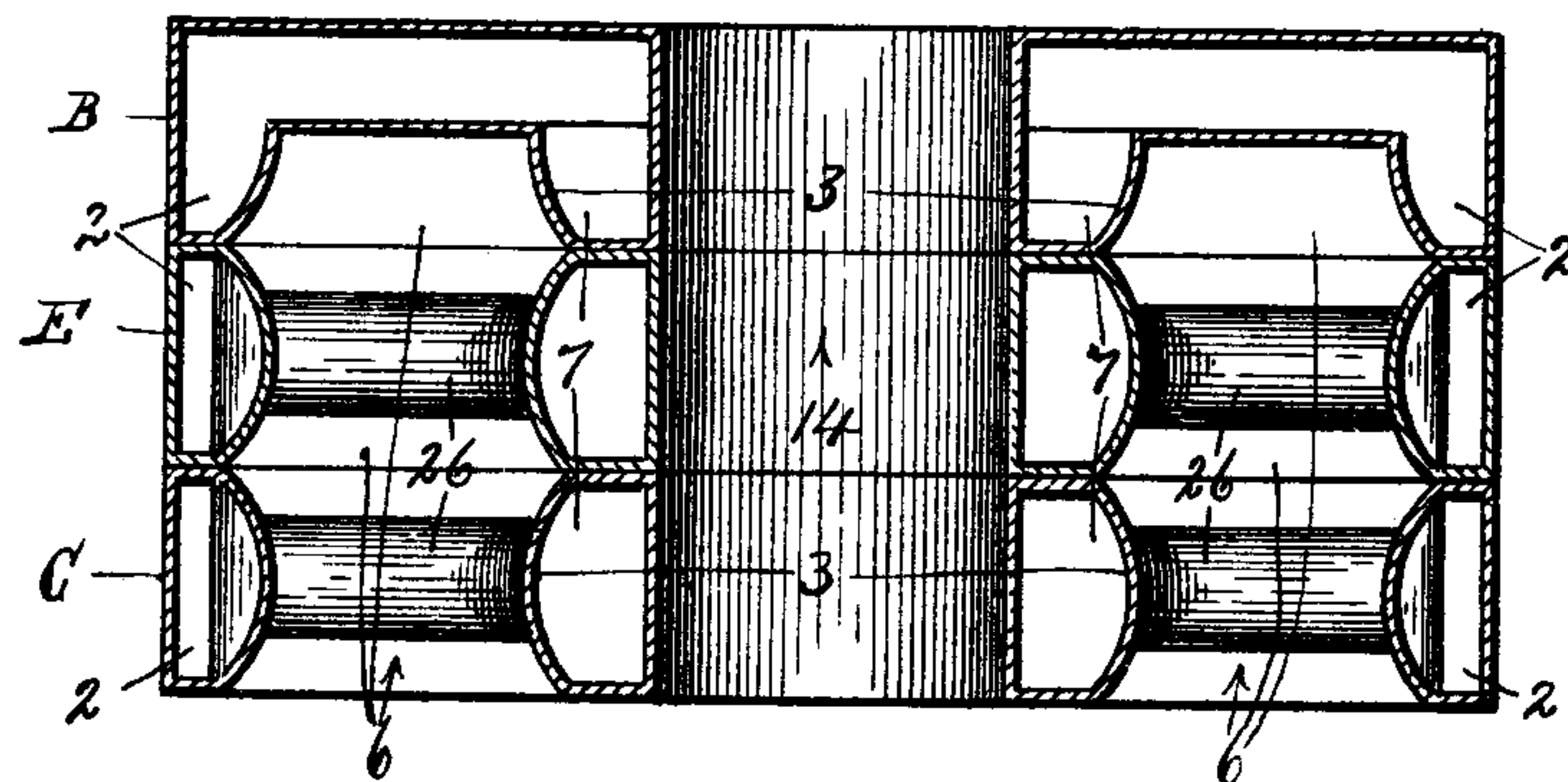


Fig. 3.



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3 Sheets—Sheet 3.

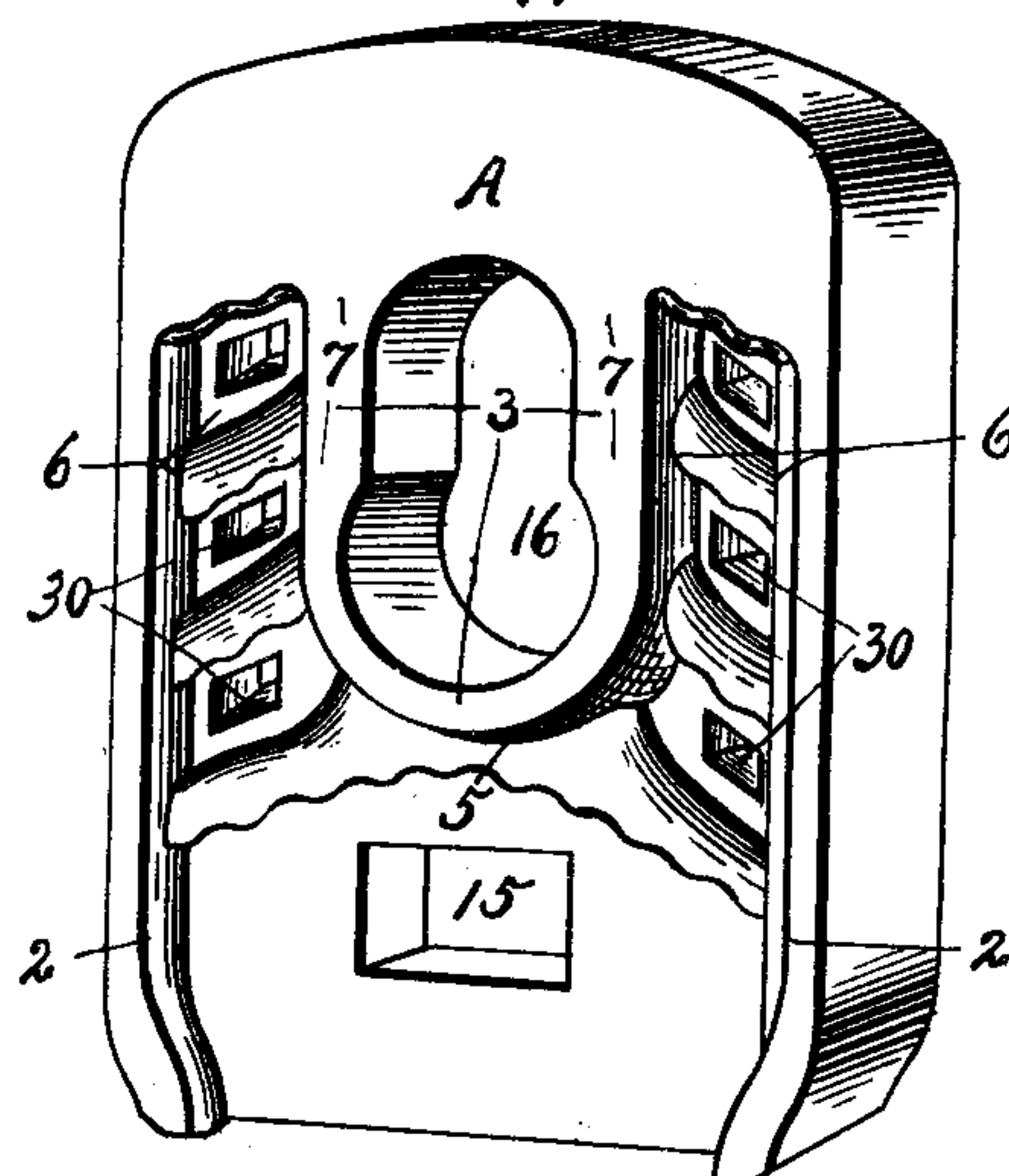
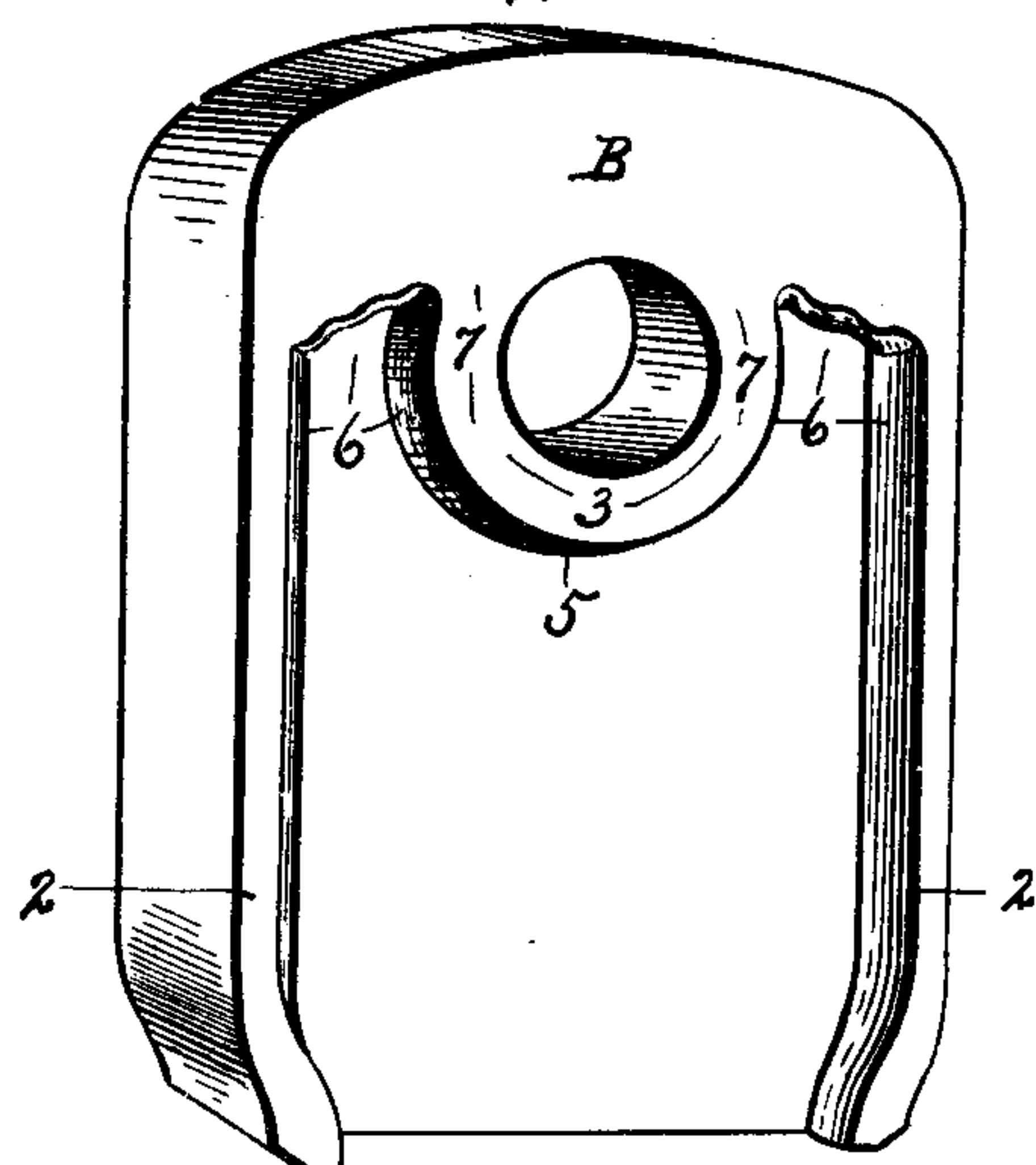
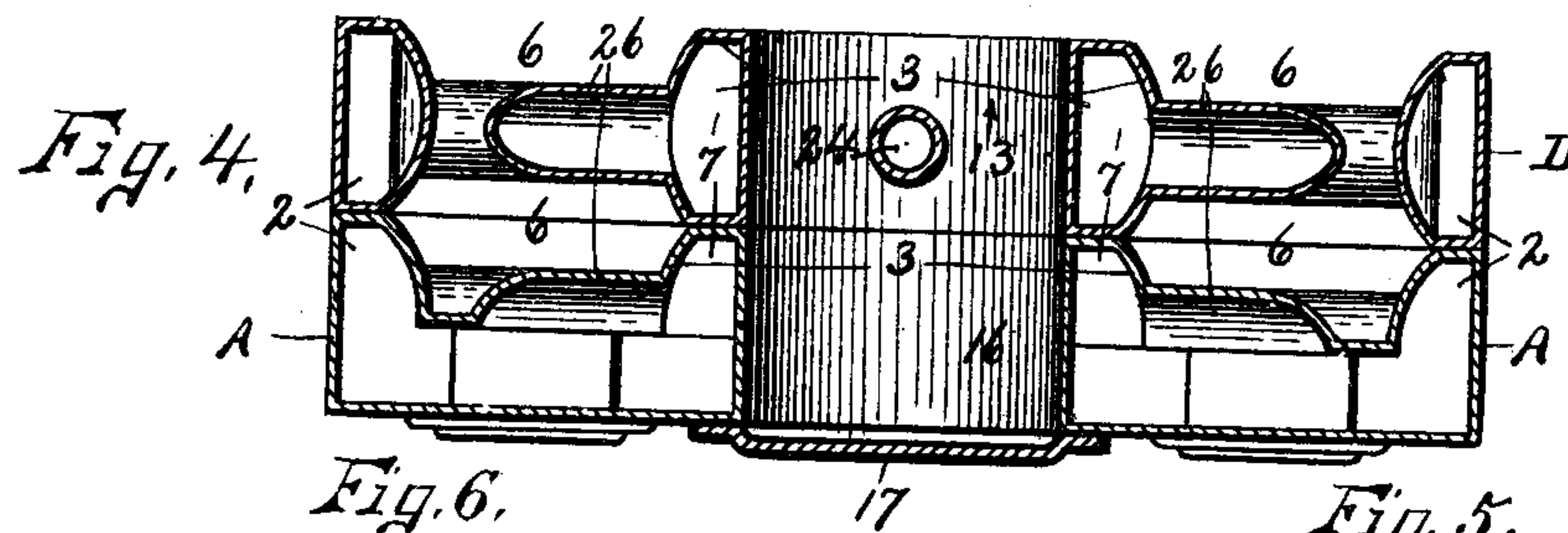
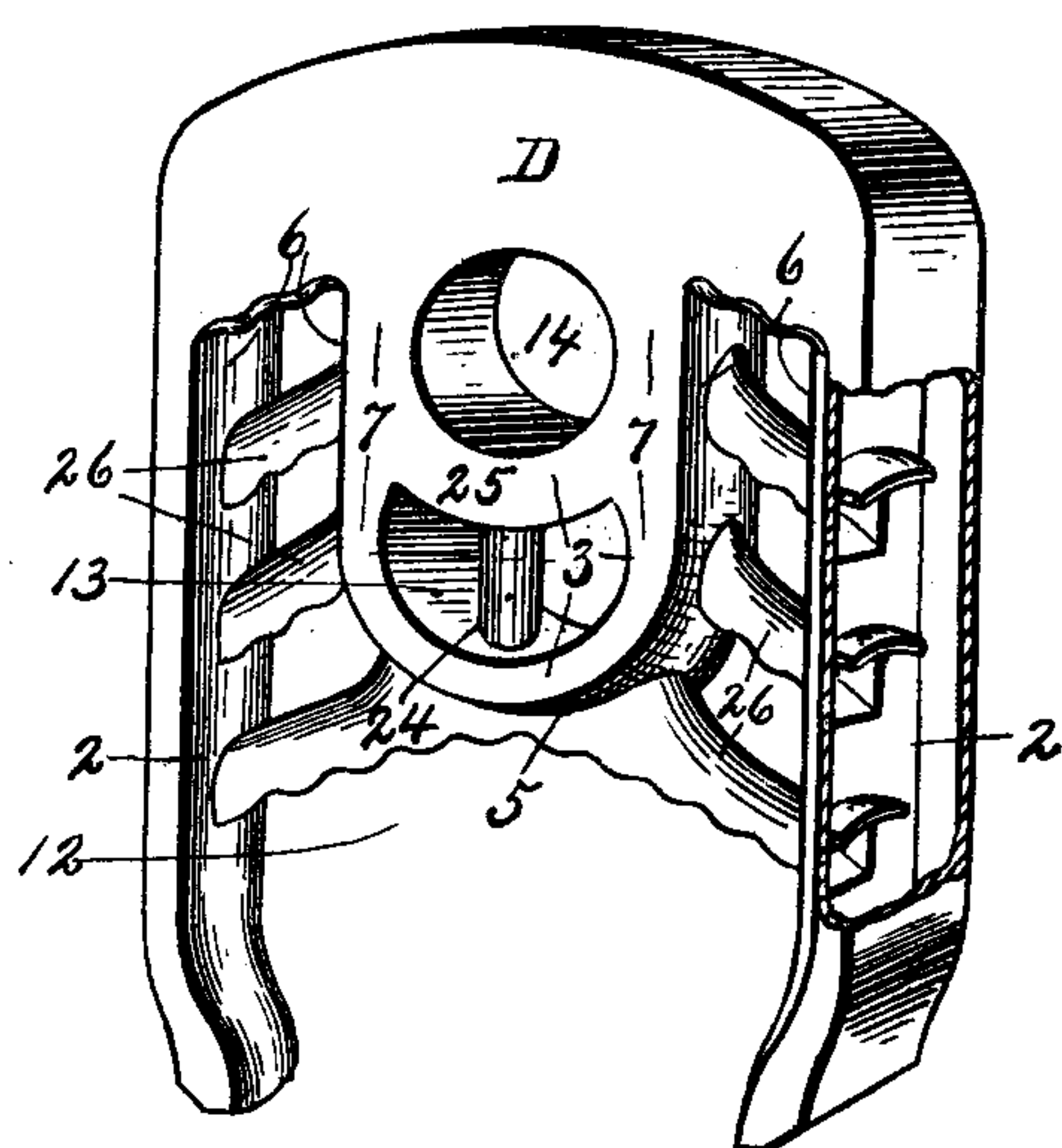
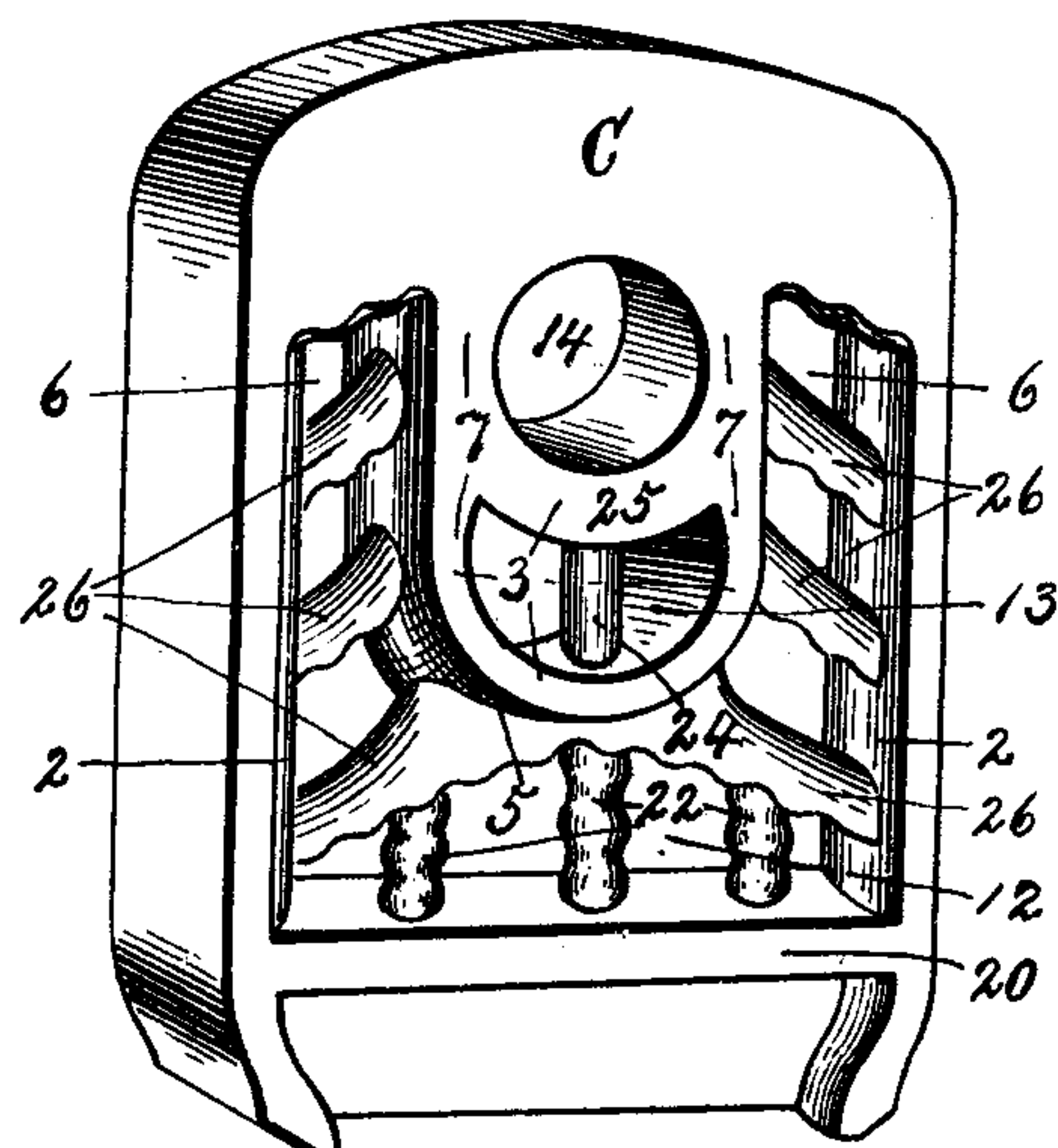


Fig. 8.



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UNITED STATES PATENT OFFICE.

JOHN J. HERBRECHT, OF SYRACUSE, NEW YORK.

HEATER.

SPECIFICATION forming part of Letters Patent No. 676,037, dated June 11, 1901.

Application filed September 24, 1900. Serial No. 30,884. (No model.)

To all whom it may concern:

Be it known that I, JOHN J. HERBRECHT, of Syracuse, in the county of Onondaga, in the State of New York, have invented new and
5 useful Improvements in Heaters, of which the following, taken in connection with the accompanying drawings, is a full, clear, and exact description.

This invention relates to improvements in
10 heaters, and particularly to the upright sectional class for low-pressure steam or hot-water service, one object being to so construct and arrange the several sections as to yield the greatest heat efficiency with the least possible amount of fuel by causing the water to
15 travel in shallow bodies along tortuous paths and over an extensive heating-surface.

The further objects of this invention are to facilitate circulation of the water or steam
20 and to permit either of the sections to be readily removed and another section replaced without disturbing the remaining sections or the steam and return drums.

To this end the invention consists in the
25 construction and arrangement of the parts of a sectional heater, as hereinafter fully described, and pointed out in the claims.

Referring to the drawings, Figure 1 is a perspective view of my improved sectional
30 heater. Figs. 2, 3, and 4 are sectional views taken, respectively, on lines 2 2, Fig. 1, and 3 3 and 4 4, Fig. 2. Figs. 5 and 6 are isometric views, respectively, of the detached front and rear sections as seen from their inner faces.
35 Figs. 7 and 8 are similar isometric views of the detached bridge-wall section, looking from its rear face, and one of the intermediate sections, portions of Fig. 8 being broken away for showing the interior partitions in the wa-
40 ter-legs.

Similar reference characters indicate corresponding parts in all the views.

This invention consists of front and rear sections A and B, a bridge-wall section C, intermediate sections D, interposed between the
45 front section and the bridge-wall section, and one or more additional sections E, interposed between the bridge-wall section and the rear section, all of which are formed hollow and of the same general outline and are arranged
50 face to face, one in advance of the other, and are mounted on a suitable base F, having the

usual ash-pit and grate. Each of these sections are so constructed as to establish a complete and independent water and steam circulation within itself from its extreme low
55 point to its upper apex and to divert the heated water from the sides of the combustion-chamber over more intensely heated surfaces and concentrate the steam-globules toward
60 the apex or outlet of the sections. These various sections each comprise an upper chamber 1, having depending water-legs 2 2 and a central hollow portion 3, communicating at their upper ends with the chamber 1, the water-legs 2 2 being extended beneath the lower
65 face of the central portion 3 for forming the side walls of a combustion-chamber 4 and the central portion 3 being extended beneath the upper ends of the water-legs and formed of
70 less width than the distance between said water-legs for forming a hollow crown-sheet 5 and upwardly-diverging branch fire-passages 6 6 of the combustion-chamber.

The upper wall of the chamber 1 of each of
75 the sections is provided with a discharge-opening 7, each of which is connected by a detachable nipple 8 to a suitable steam-drum G. The lower ends of the water-legs of each section are provided with inlet-openings 9, di-
80 verging downwardly from the lower ends of their outer walls, and are connected by independent detachable nipples 10 to oppositely-arranged return water-drums H. These re-
85 turn-drums are preferably arranged with their upper faces in a plane beneath the lower end faces of the water-legs in order that any one of the sections may be readily disconnected from the drums G and H and with-
90 drawn laterally over either of the return-drums without displacing the remaining sections or the steam and return drums.

The lower ends of the side walls or water-legs of the several sections adjacent to the
95 base F are preferably inclined inwardly toward each other, which gives a neater appearance to the heater and slightly increases the heating-surface of the combustion-chamber. The hollow central portion 3 of each of
100 these sections is provided with one or more substantially central fire-flues, which extend from front to rear of the sections in a plane beneath the upper ends of the fire-passages 6 6 and forms said central portion with a

shallow conduit between the combustion-chamber and fire-flue having upright portions 7 7, communicating with the chamber 1, and a downwardly-curved lower portion 8, which
 5 forms a shallow water-containing crown-sheet for the combustion-chamber and fire-passages, the lower curved wall serving to deflect the heated products upwardly toward the upper ends of the water-legs and into the
 10 branch fire-passages 6 6.

The adjacent faces of the marginal walls of the combustion-chamber 4 and fire-passages 6 6 of each of the several sections are disposed in substantially the same plane, and it
 15 is thus evident that the adjacent faces of the crown-sheet of each section lies in substantially the same plane as the corresponding faces of its water-legs and that when the sections are properly assembled the products of
 20 combustion are confined between the water-legs and prevented from reaching the fire-flues except through channels provided therefor and hereinafter described.

In order to facilitate the circulation of the
 25 expanded water from the crown-sheet of the central portion 3, the cross-sectional areas of the water-passages through the upright portions 7 7 are gradually increased upwardly to the point of union with the chamber 1.

The parts of my improved heater relating to the upright sections thus far described are common to all of the sections; but the parts
 30 hereinafter specified relate more particularly to their combinations and individual construction.

The intermediate sections C, D, and E are preferably formed with lower, intermediate, and upper fire-flues 12, 13, and 14, the flues 13 and 14 being previously referred to as extending through the central chambers 3, and
 40 the flues 12, consisting of the upper portion of the combustion-chamber and openings, extending through the bridge-wall section C and the additional section E, both of which will
 45 be presently described. The portion of the front section between the water-legs 2 and the central portion 3 is preferably of less depth from front to rear than the water-legs and extends downwardly to the lower ends of
 50 said water-legs for forming the hollow front wall and a portion of the crown-sheet of the combustion-chamber and the upwardly-extending fire-passages at the sides of the central portion 3. The front section A is also
 55 provided with a fuel-opening 15, extending through its front wall beneath the central portion 3 and is also formed with a fire-flue 16, previously referred to, which connects the front ends of the intermediate and upper
 60 flues 13 and 14 of the intermediate sections with each other, the front end of the flue 16 being closed by a suitable door 17. The portion of the rear section between its water-legs and the central portion 3 is also formed of
 65 less depth from front to rear than the water-legs, extends downwardly to the lower ends of said water-legs, and forms a hollow rear

wall of the combustion-chamber. This construction of the rear section forms a portion of the crown-sheet and fire-passage 6 6 of the
 70 combustion-chamber and also serves to connect the rear ends of the lower and intermediate flues with each other. The main fire-flue of this rear section is alined with the upper fire-flues of the remaining sections and
 75 discharges into a suitable smoke conduit or chamber 19, which in turn is connected to a chimney. (Not illustrated.)

The bridge-wall section C and the section E are each provided with hollow transverse
 80 base portions 20 and 21, connected to their respective central portions 3 by suitable up-flow-conduits 22, which extend across the lower flues or fire-passages, said portions 20 and 21 having their opposite ends connected
 85 to their respective water-legs.

The hollow transverse base portion of the section C forms the bridge-wall of the combustion-chamber, for a purpose well known and unnecessary to further describe, and usu-
 90 ally extends beneath the corresponding base portion of the section E to the lower end faces of the water-legs.

The intermediate sections C are all of substantially the same construction, their lower
 95 portions between their water-legs being cut away for forming the main portion of the combustion-chamber. Any number of these sections C may be used for increasing or diminishing the heating capacity of the heater, it
 100 being understood that the front and rear sections A and B and the sections D and E are used with any number of the sections C.

The intermediate sections C, D, and E are each provided with one or more upflow-con-
 105 duits 24, extending across the intermediate fire-flue 13 and connecting the lower shallow conduits of the central portions 3 with transverse conduits 25, which connect the opposite upright hollow walls of said central portion
 110 between the fire-flues 13 and 14.

In order to properly distribute the water rising in the water-legs, I provide each of the intermediate sections C, D, and E with oppositely-arranged series of conduits 26, the con-
 115 duits of each series being arranged in planes one above the other and having their outer ends connected to the water-legs and their inner ends inclined upwardly and connected to the opposite walls of the central portion 3.
 120 The upper walls of the outer ends of these conduits are preferably extended into the water-legs, partially across the water-passage therein, for forming partitions in said legs and diverting a portion of the upflow water
 125 through the conduits and to the central portion 3. These partitions preferably project outwardly from the walls of the legs adjacent to the combustion-chamber, the upper partitions or deflectors being extended into
 130 the water-legs a greater distance than the next lower partition. This feature of my invention is particularly important, since it is well known that the water adjacent to the

inner walls of the legs is heated to a higher degree, and therefore expands upwardly more rapidly, than the portion of the water more remote from the combustion-chamber, and that if allowed to continue upwardly in said legs, thereby receding from the source of heat, a local circulation is established in the water-legs and the distribution of the heated water is retarded, thereby causing undue waste of fuel and time in obtaining a proper circulation through the distributing-pipes and radiators. These partitions or deflectors are designed to obviate this waste of time and fuel and serve to deflect the first-expanded water in small volumes directly over the combustion-chamber, where the same is additionally heated and expanded through the shallow conduits of the central portion 3 and is readily discharged as steam or highly-heated water through the enlarged upper chamber 1 into the steam-drum and to the distributing-pipes.

The operation of my invention will now be readily understood upon reference to the foregoing description and the accompanying drawings, and it will be noted that the transverse conduits 26 of the intermediate sections are formed of less width from front to rear than the corresponding width of their water-legs 2 and intermediate chambers 3 for permitting the fire to pass upwardly from the combustion-chamber and to impinge against the upper walls of the fire-passages 6. It will be further noted that the front section is provided with clean-out openings 30, which are alined with the spaces between the transverse conduits 26 for permitting the surfaces of said transverse conduits and the walls of the fire-passages 6 to be cleaned when desired.

The rear section is generally provided with a supplemental or direct draft-flue 31, extending through its hollow base portion beneath the flue 14 and connecting the combustion-chamber directly with the smoke-chamber 19.

One of the primary objects of constructing the various sections with upwardly-extending fire-passages between the water-legs and the central chamber is to produce a high combustion-chamber, which not only divides the hollow sections into a series of shallow water-containing chambers, but also increases the fire-surface of said sections and renders the heater more efficient in producing steam and augmenting the circulation of the water.

Having thus described my invention, what I claim, and desire to secure by Letters Patent, is—

1. A heater-section having outer depending water-legs, and an intermediate hollow crown-sheet depending beneath the upper end of the water-legs and formed of less width than the distance between the water-legs for forming fire-passages between said water-legs and crown-sheet.

2. A heater-section having outer depending water-legs, and an intermediate hollow crown-

sheet depending beneath the upper end of the water-legs and having one of its marginal faces disposed in substantially the same plane as the corresponding face of the water-legs, said crown-sheet having downwardly-converging side walls for deflecting the products of combustion upwardly and laterally toward the upward end of the water-legs.

3. A heater-section having outer depending water-legs, and an intermediate hollow crown-sheet depending beneath the upper end of the water-legs and formed of less width than the distance between the water-legs for forming fire-passages between said water-legs and crown-sheet, said crown-sheet having substantially upright side walls and a rounding lower wall uniting the lower ends of the side walls, one of the marginal faces of the crown-sheet being disposed in substantially the same plane as the corresponding faces of the water-legs.

4. A heater-section having outer depending water-legs, and an intermediate water-chamber depending beneath the upper end of the water-legs and provided with fire-flues extending through its front and rear faces.

5. A heater-section comprising a shell having depending water-chambers, and a conduit connecting the water-chambers and having one of its walls extended partially across one of the chambers.

6. A heater-section comprising a shell having depending water-chambers, and a conduit connecting the water-chambers and having its upper wall extended into one of the chambers beyond its adjacent wall.

7. A heater-section comprising a shell having depending water-chambers united at their upper ends, and an inclined conduit connecting said chambers and having the lower end of its upper wall extended into and partially across the adjacent chamber.

8. A heater-section comprising a shell having depending water-chambers, and a series of conduits connecting said chambers and having the corresponding ends of their upper walls extended unequal distances into the adjacent chamber.

9. A heater-section comprising a shell having depending water-chambers connected at their upper ends, and a series of conduits connecting the chambers in planes one above the other and having corresponding ends of their upper walls extended into and partially across the adjacent chamber.

10. A heater-section comprising a shell having opposite water-legs and an intermediate water-chamber depending between the water-legs and having a hollow crown-sheet, conduits uniting the water-legs to the chamber, said conduits inclining upwardly from their outer ends and having the outer ends of their upper walls extended partially across the interior of the water-legs.

11. A heater-section comprising a shell having opposite water-legs and an intermediate hollow portion depending between the water-

legs and provided with a fire-flue extending therethrough for forming a hollow crown-sheet, a series of conduits connecting each of the water-legs with the adjacent portions of the intermediate chamber, the conduits of each series being inclined upwardly from the water-legs in planes one above the other and the upper walls of the upper conduits being extended into the water-legs a greater distance than the next lower conduit.

12. A heater-section comprising a shell having depending water-legs and an intermediate water-chamber depending beneath the upper ends of the water-legs, and conduits connecting said legs and chamber and having their front and rear faces depressed within the corresponding faces of the shell.

13. A heater-section comprising a shell having opposite water-legs and an intermediate chamber depending beneath the upper ends of the water-legs, passages connecting the water-legs and chamber, and partitions extending partially across the interior of the water-legs in planes one above the other for diverting a portion of the upflow water from the legs through said passages.

14. A heater-section having depending water-legs and an intermediate chamber depending beneath the upper ends of the water-legs and provided with lower and upper fire-flues extending therethrough from front to rear for forming shallow water-chambers beneath and above the lower flue.

15. A heater-section having depending water-legs and an intermediate chamber depending beneath the upper ends of the water-legs and provided with lower and upper fire-flues extending therethrough from front to rear for forming shallow water-chambers beneath and above the lower flue, and conduits connecting the opposite sides of the chamber to the adjacent water-legs.

16. A heater-section having depending wa-

ter-legs and an intermediate chamber depending beneath the upper ends of the water-legs and provided with lower and upper fire-flues extending therethrough from front to rear for forming shallow water-chambers beneath and above the lower flue, the opposite side walls of the intermediate chamber being formed hollow and increasing in cross-sectional area toward their upper ends.

17. A heater-section having depending water-legs and an intermediate chamber depending beneath the upper ends of the water-legs and provided with lower and upper fire-flues extending therethrough from front to rear for forming shallow water-chambers beneath and above the lower flue, said intermediate chamber having opposite upright water-channels increasing in cross-sectional area toward their upper ends, and conduits arranged in planes one above the other and connecting the water-legs to the upright channels.

18. A heater comprising a supporting-base, a plurality of upright water-containing sections mounted on the base and arranged face to face one in advance of the other, said sections being each provided with a detachable upflow-pipe, a return-flow drum having its upper face disposed in a plane beneath the plane of the meeting faces of said sections and the base, and independent nipples or pipes detachably connecting each of the sections with the return-flow drum whereby any one of the sections may be removed laterally over the upper face of the return-flow drum without displacing either of the other sections or the drum.

In witness whereof I have hereunto set my hand this 17th day of September, 1900.

JOHN J. HERBRECHT.

Witnesses:

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MILDRED M. NOTT.