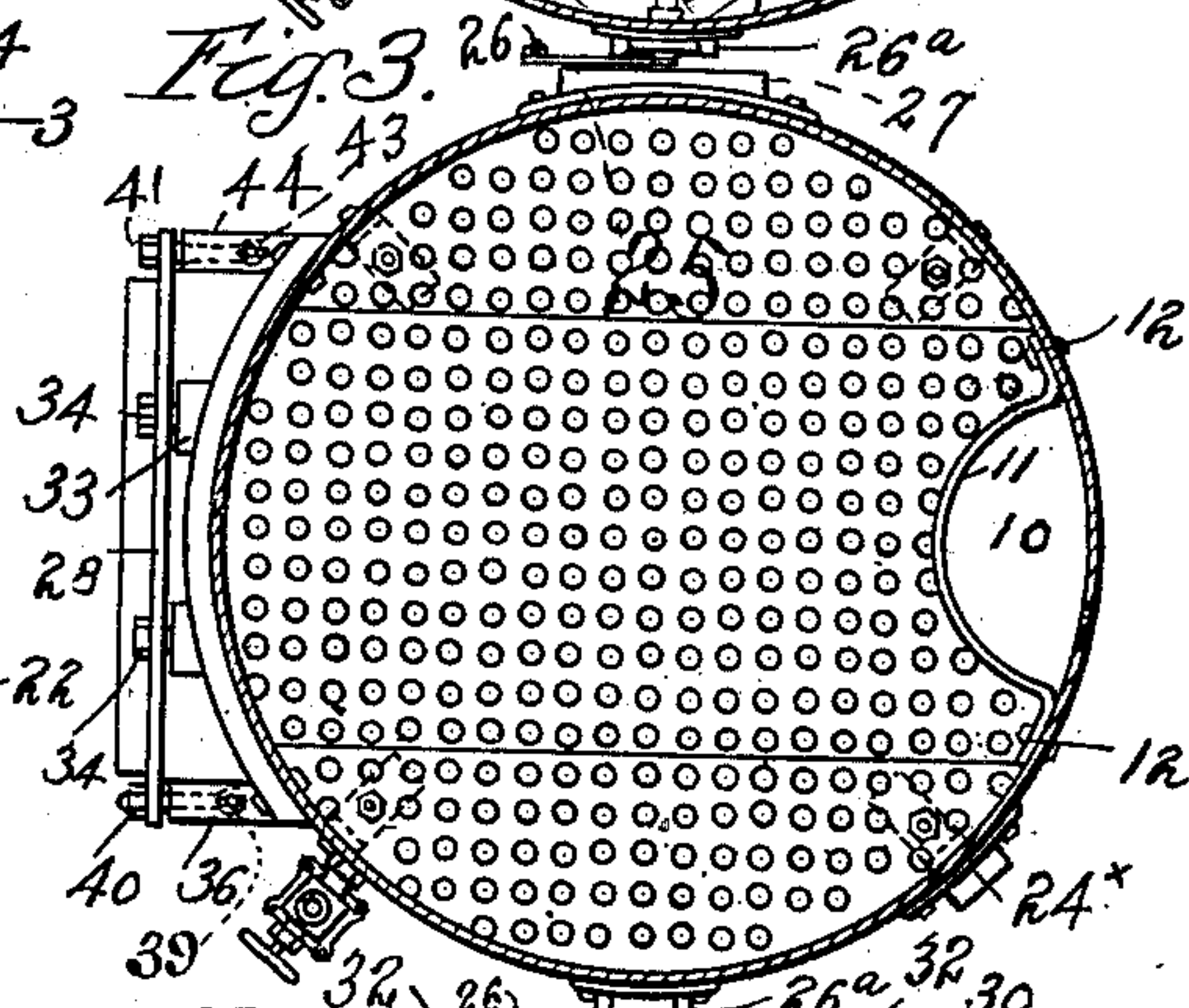
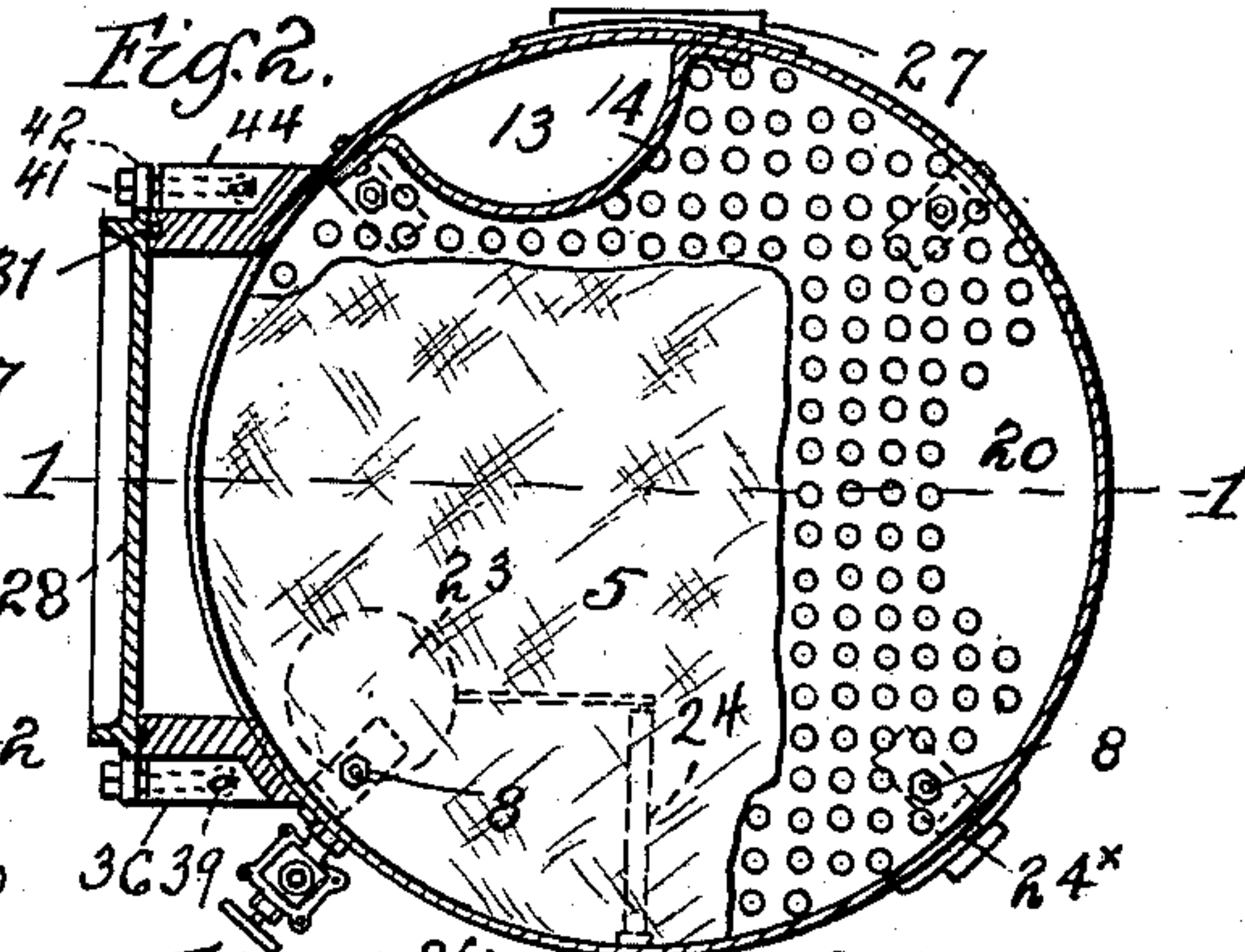
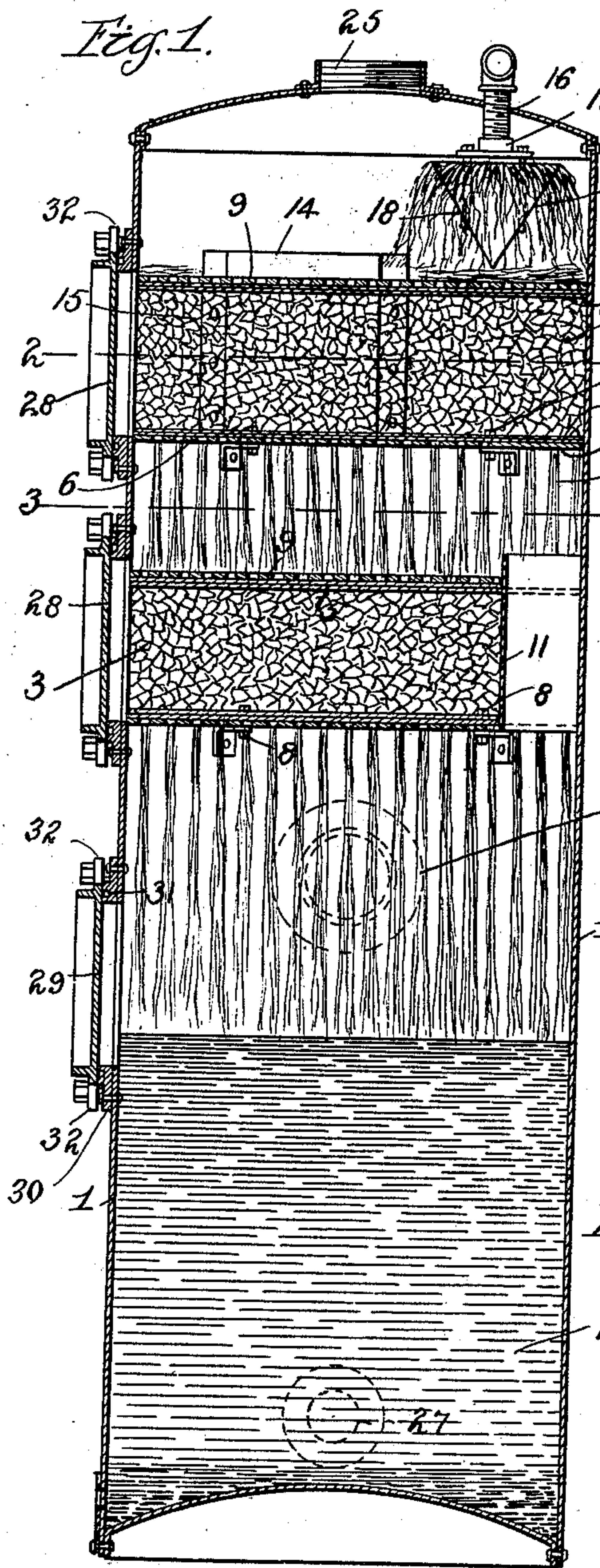


E. G. T. COLLES.  
FEED WATER HEATER AND PURIFIER.

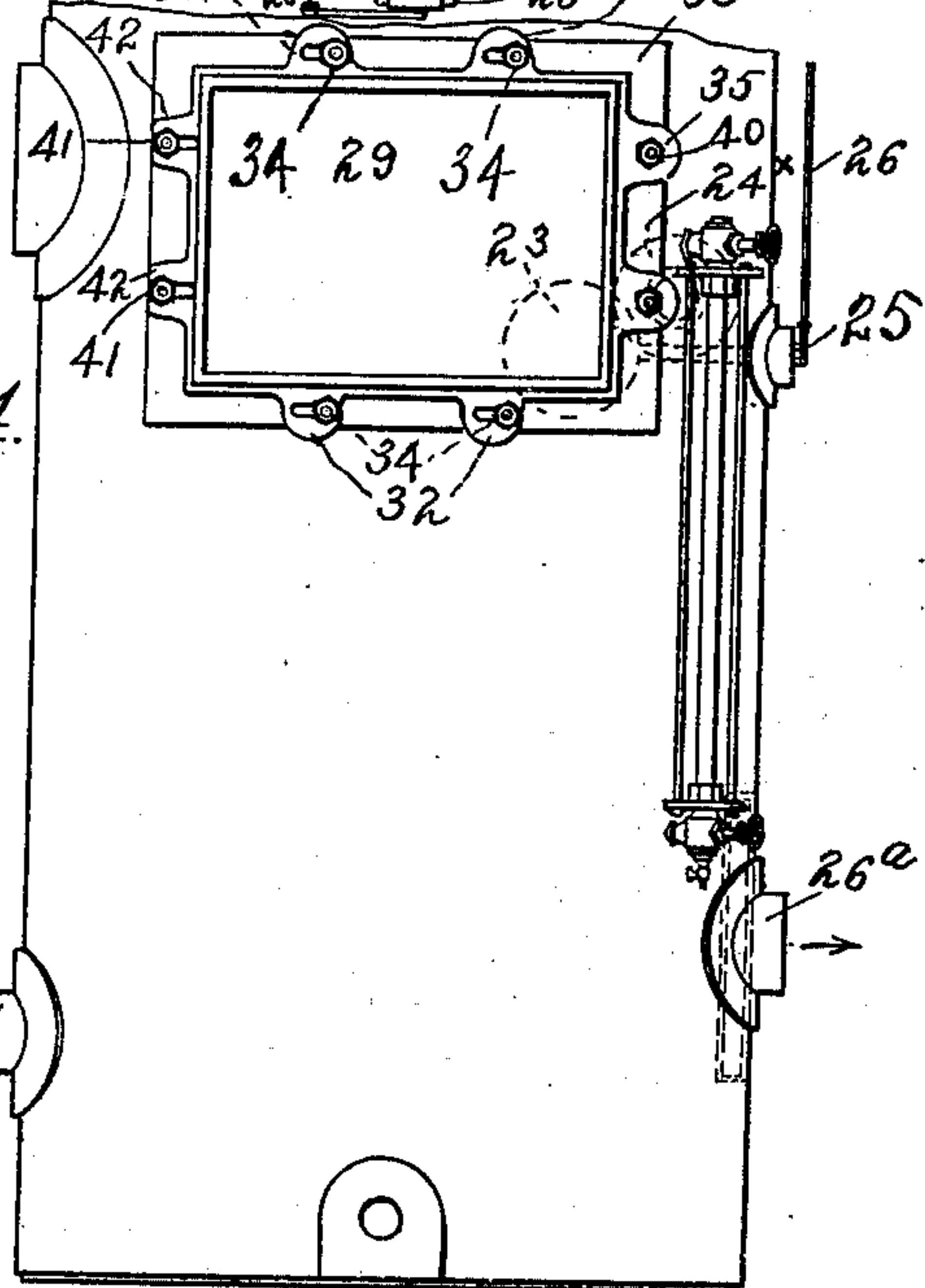
(Application filed Mar. 9, 1898.)

(No Model.)

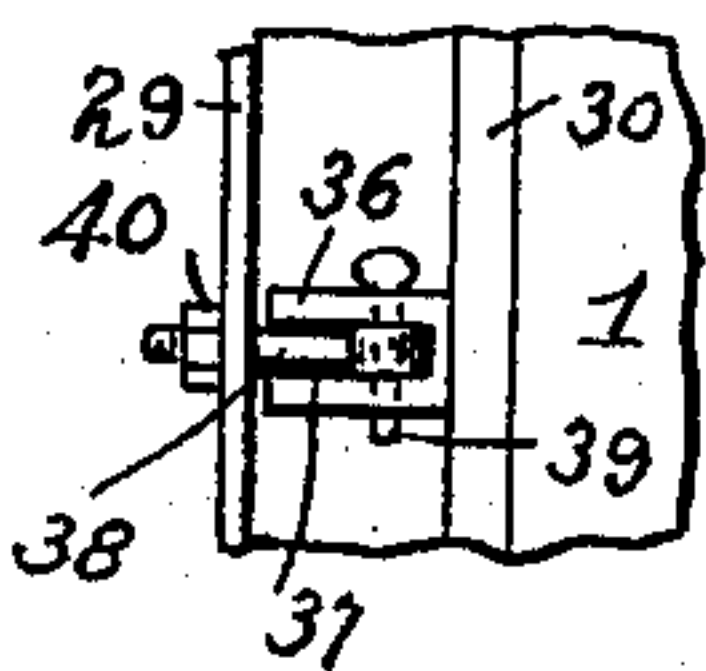
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*Fig. 4.*



*Fig. 5.*



Witnesses.

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H. B. Barrett

Inventor  
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by *Charles H. Hoff* attys.



No. 665,995.

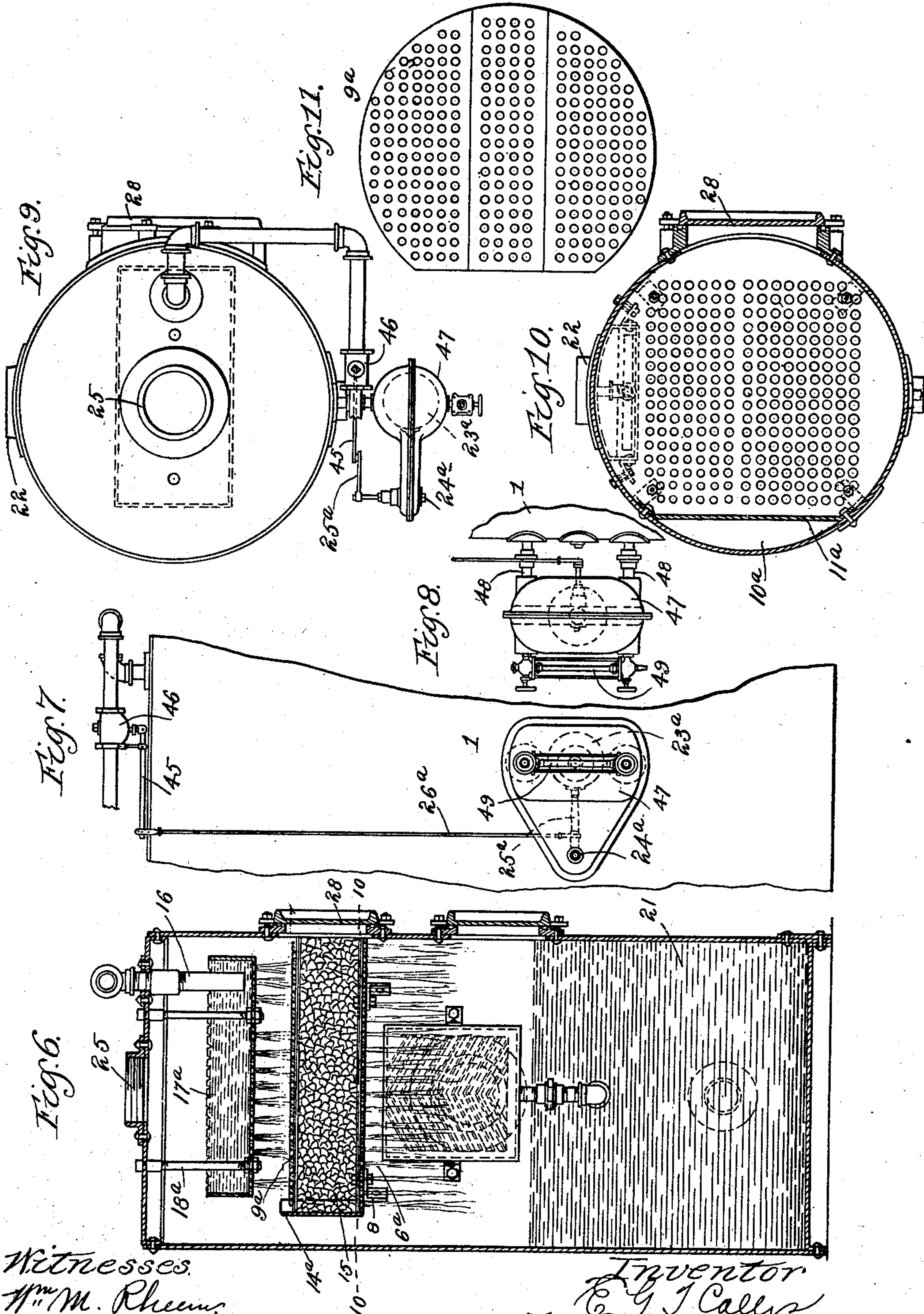
Patented Jan. 15, 1901.

E. G. T. COLLES.  
FEED WATER HEATER AND PURIFIER.

(Application filed Mar. 9, 1899.)

(No Model.)

2 Sheets—Sheet 2.



Witnesses.  
H<sup>m</sup> M. Rheum.  
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Inventor  
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# UNITED STATES PATENT OFFICE.

EDWARD G. T. COLLES, OF CHICAGO, ILLINOIS.

## FEED-WATER HEATER AND PURIFIER.

SPECIFICATION forming part of Letters Patent No. 665,995, dated January 15, 1901.

Application filed March 9, 1899. Serial No. 708,337. (No model.)

*To all whom it may concern:*

Be it known that I, EDWARD G. T. COLLES, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Feed-Water Heaters and Purifiers, of which the following is a full, clear, and exact specification.

My invention relates to that class of feed-water heaters and purifiers in which the feed-water is passed through one or more filters arranged in a suitable shell while it is being also subjected to the heat of the exhaust-steam taking a tortuous passage through the heater; and my invention has for its primary object to provide an improved, simple, and efficient form of heater and purifier for this purpose.

With this end in view my invention consists in certain features of novelty in the construction, combination, and arrangement of parts by which the said object and certain other objects hereinafter appearing are attained, all as fully described, with reference to the accompanying drawings, and more particularly pointed out in the claim.

In the said drawings, Figure 1 is a vertical sectional view taken on the line 1 1, Fig. 2. Fig. 2 is a plan section taken on the line 2 2, Fig. 1. Fig. 3 is a similar section taken on the line 3 3, Fig. 1. Fig. 4 is a front elevation of the lower end of the apparatus. Fig. 5 is a detail side view of the door-hinge. Fig. 6 is a view similar to Fig. 1, illustrating a modified form of my invention in which but one of the filters is employed. Fig. 7 is a side elevation, partly broken away, illustrating an exterior float-chamber. Fig. 8 is a view looking at right angles to Fig. 7 of the said float-chamber. Fig. 9 is a plan view of the heater shown in Fig. 6. Fig. 10 is a transverse section taken on the line 10 10, Fig. 6. Fig. 11 is a detail plan view of the top sectional plate of the filter.

1 represents a vertically-elongated shell in which are situated one or more filters 2 3, which are located at a slight distance apart, so as to form a chamber or space 4 between them. These filters are preferably composed

of any suitable filtering material, illustrated in the drawings located between one or more layers of burlap 5 or any other suitable fabric for preventing the filtrant from sifting through with the water. The lower burlap 5 rests upon a foraminous plate 6, supported in the shell 1 by any suitable brackets 7, having bolts 8 passing through the plate 6 and the burlap, while located on the top of the upper burlap 5 is a similar foraminous plate 9.

Each of the plates 6 9 of the lower filter is provided with a marginal opening 10 for the admission and passage of a stand-pipe 11, which is riveted or otherwise secured at 12 to the side of the shell 1, so as to project entirely through the filter and also extend a considerable distance above its top plate 6, and the plates 6 9 of the upper filter are provided with registering marginal openings 13 for the admission and passage of a stand-pipe 14, secured by rivets 15 or other suitable devices to the side of the shell 1, but at a point considerably removed from the stand-pipe 11. The stand-pipe 14 also extends a considerable distance above the upper plate 9 of the upper filter, as shown in Fig. 1. At a point removed from the stand-pipe 14 is located the feed-water or supply pipe 16, whose inner end may be provided with any suitable spreading-cone 17, supported on the lower end of the pipe 16 by a number of bolts or hangers 18, whose upper ends are secured in a flanged collar 19 on the end of the pipe 16, while their lower ends pass downwardly through the sides of the cone 17, as will be understood.

The water admitted by the cone 17 falls upon the plate 9 of the upper filter and after percolating through such plate and the filtrant below it falls in a shower through the chamber 4 onto the upper plate 9 of the filter below; but in order that this shower may not pass directly down the stand-pipe 11 the bottom plate 6 of the upper filter is provided directly over the stand-pipe 11 with a blind or imperforate portion 20. Both stand-pipes 11 14 are continued upwardly for the purpose of preventing the water from discharging therethrough without passing through the fil-



ters. The water after percolating through the lower filter falls in a shower into a settling-chamber 21 at the bottom of the shell, and in thus showering into such chamber 5 passes the steam-inlet 22, thereby bringing the filtered water into direct contact with the steam at its hottest point. Arranged in the settling-chamber 21 is a ball or other suitable float 23, connected to shaft 24, having crank-arm 25, which operates through the interme- 10 diary of rod 26 the usual supply-valve (not shown) in the inlet-pipe 16, so that the level of the water in the chamber 21 is maintained uniform, and there is consequently formed 15 between the bottom of the lowermost filter and the surface of the water in the chamber 21 a chamber for the admission of the exhaust-steam and for the commingling of such steam with the purified water in a finely-divided state. Any oil that may settle on the 20 surface of the water in the settling-chamber 21 is carried off through an overflow 24<sup>x</sup>. The steam after commingling with the showering water below the lowermost filter rises 25 through the passage 10 and enters the chamber 4, where it commingles with the water showering from the top filter and finally discharges through the passage 13 and the steam-exit 25. The purified water is drawn off 30 through outlet 26<sup>a</sup>, and 27 is an inlet for the condensation return.

Arranged in the side of the shell opposite each of the filters is a door 28, and below the lowermost filter is a door 29. All these doors 35 may be the same in construction, and hence the description of one will suffice. Secured to the shell around each of the openings of such doors is a flanged frame 30, having a groove 31 in its face for the reception of a suitable packing which extends entirely around 40 the opening of the door and against which the back of the door rests, as clearly shown in Fig. 1. The door is provided at top and bottom with one or more ears 32 and the 45 flanges 30 with corresponding bosses 33, which receive bolts 34, passing through the ears 32 and screwing into the bosses 33. One end of the door is provided with a pair of ears 35, behind each of which on the flange 30 is 50 formed a boss 36. These bosses 36 are each provided in their outer sides with an elongated or slotted cavity 37, in each of which is arranged an eyebolt 38, the eye of the bolt being arranged at the inner end of the cavity 55 and being pierced by a pintle or pin 39, so that the bolt 38 may be turned outwardly from the cavity 37, as clearly shown in Fig. 5. The outer end of each of the bolts 38 passes through one of the ears 35 and is held 60 therein by nut 40. Thus it will be seen that the bolts 38 serve as hinges upon which the door may be turned back out of the way after the nuts of the bolts 38 have been removed, the ears 32 being slotted to enable them to 65 clear the ends of the bolts 34. The other end

of the door is held by bolts 41, which pass through ears 42, slotted entirely through their ends to permit the bolts 41 being turned outwardly from the slotted ears 42, the bolts 41 being eyebolts like the bolts 38 and hinged 70 by pins 43 in their slotted bosses 44 the same as the bolts 38.

In the form of my invention shown in Figs. 6 to 10 the filtrant 15 is supported between two perforated plates 6<sup>a</sup> 9<sup>a</sup>, as heretofore described; but instead of being provided in their 75 edges with circular openings, as in the other form, their edges are simply segregated on a straightline, as indicated more clearly in Figs. 10 and 11, so as to form a passage-way 10<sup>a</sup> be- 80 tween the edges of the plates and the side of the shell, one wall of this passage-way being constituted by a straight plate 11<sup>a</sup>, arranged vertically or on its edge and secured at its ends to the sides of the shell, as indicated in 85 Fig. 10, the edge of the plate 11<sup>a</sup> projecting above the top plate 9<sup>a</sup> and constituting a flange 14<sup>a</sup> for preventing the water from flowing directly down the passage 10<sup>a</sup>. The bottom 90 plate 6<sup>a</sup> is an integral plate secured in the shell by the brackets 8 before the head of the shell is put in place, but the top plate 9<sup>a</sup> is made in a number of sections, as shown in Fig. 11, and the filter thus constructed is lo- 95 cated directly opposite the door 28, which is of sufficient width to admit all of the sections separately, whereby both the filtrant material and the upper one of the filter-plates, as well as the layers of burlap or other fabric here- 100 tofore described, may be taken out at will for cleaning. In this form of the invention but one of the filters thus described is used, and located directly over it is a water-distributing 105 pan 17<sup>a</sup>, supported by hangers 18<sup>a</sup>, the pan, if desired, being perforated through the bot- tom and notched around its upper edges.

Located directly opposite the steam-inlet 22 is an oil-catcher 23 of any suitable form.

The float 23<sup>a</sup> is located on the exterior of the shell on a rocker-shaft 24<sup>a</sup>, having crank- 110 and-rod connection 25<sup>a</sup> 26<sup>a</sup> with a lever 45, which operates the water-supply valve 46. The float is arranged in an exterior chamber 47, composed, preferably, of two sections, in 115 which the shaft 24<sup>a</sup> is journaled, and such chamber is connected at top and bottom by pipes 48 with the main shell 1. The water-gage 49 is also attached to the float-chamber 47 instead of to the shell.

Having thus described my invention, what I claim as new therein, and desire to secure 120 by Letters Patent, is—

In a feed-water heater and purifier the combination of a shell having a door in the side and a water-inlet at top and a settling-cham- 125 ber with a water-outlet at the bottom, the semicylindrical plate 11 having flanges riveted to the wall of said shell and forming a vertical passage with said shell, arranged on a level with said door, a perforated plate hav- 130



ing its edge cut away and fitted around said plate 11 near the lower end thereof and filling the cross-section of said shell, a filtrant material supported on said perforated plate and  
5 packed against said semicylindrical plate 11, and a perforated plate 9 supported over said filtrant and having its edge cut away and fitted around said semicylindrical plate 11 at

a distance from the upper end thereof, and a steam-inlet to said shell below said filtrant, so substantially as set forth.

EDWARD G. T. COLLES.

Witnesses:

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EDNA B. JOHNSON.