

(No Model.)

3 Sheets—Sheet 1.

C. E. VAN AUKEN.
VALVE.

No. 442,595.

Patented Dec. 9, 1890.

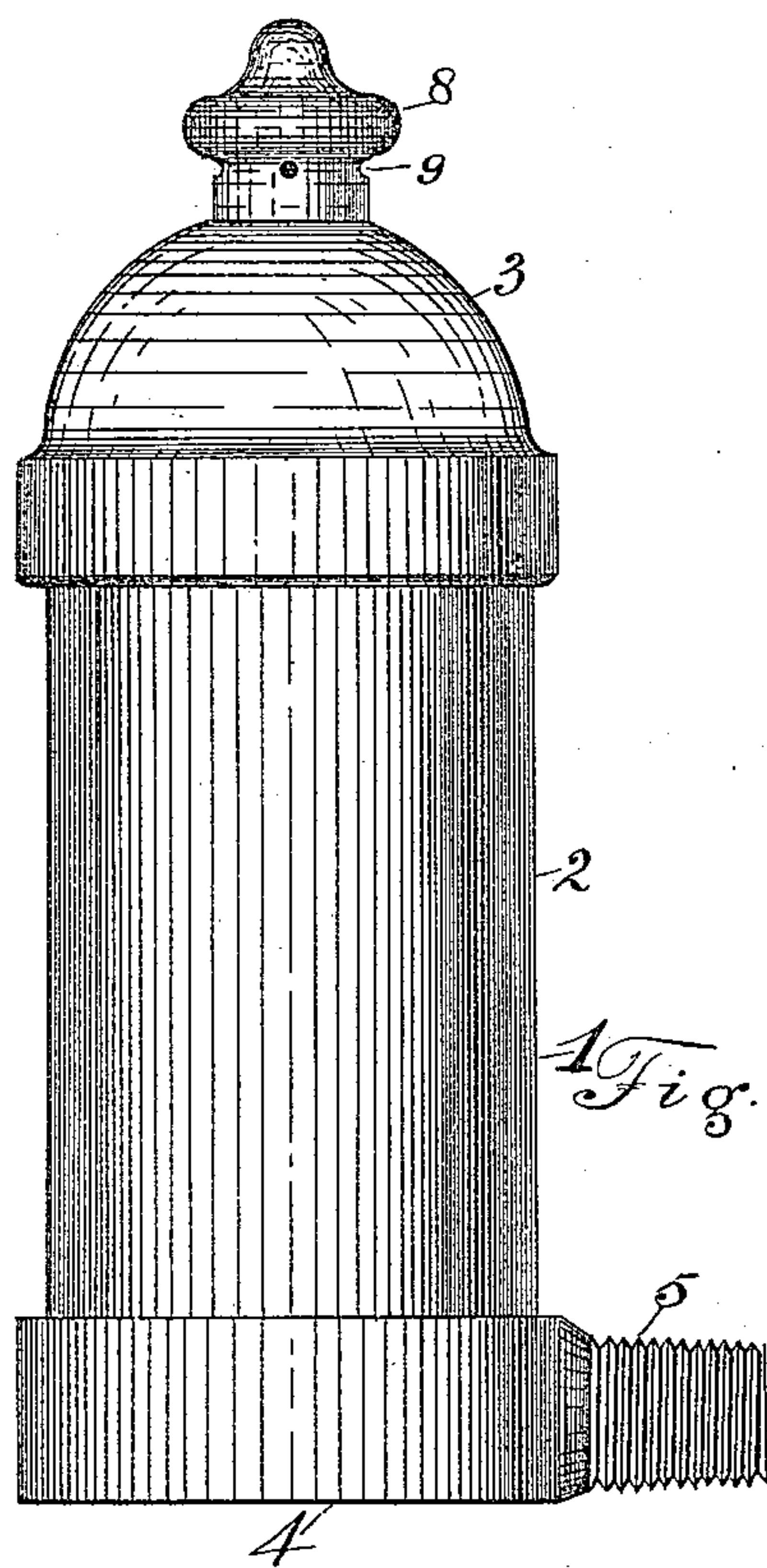


Fig. 1

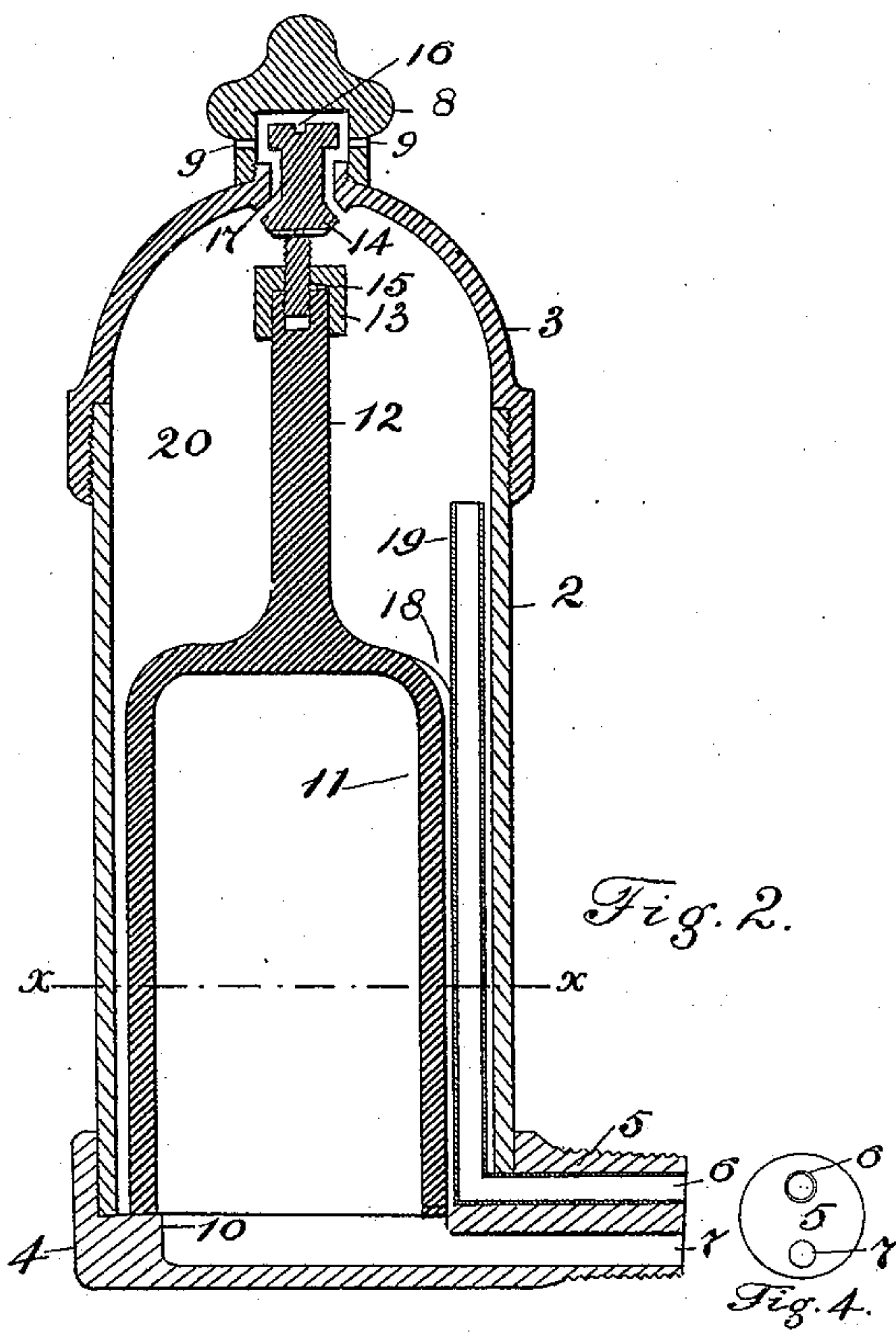


Fig. 2.

Fig. 4.

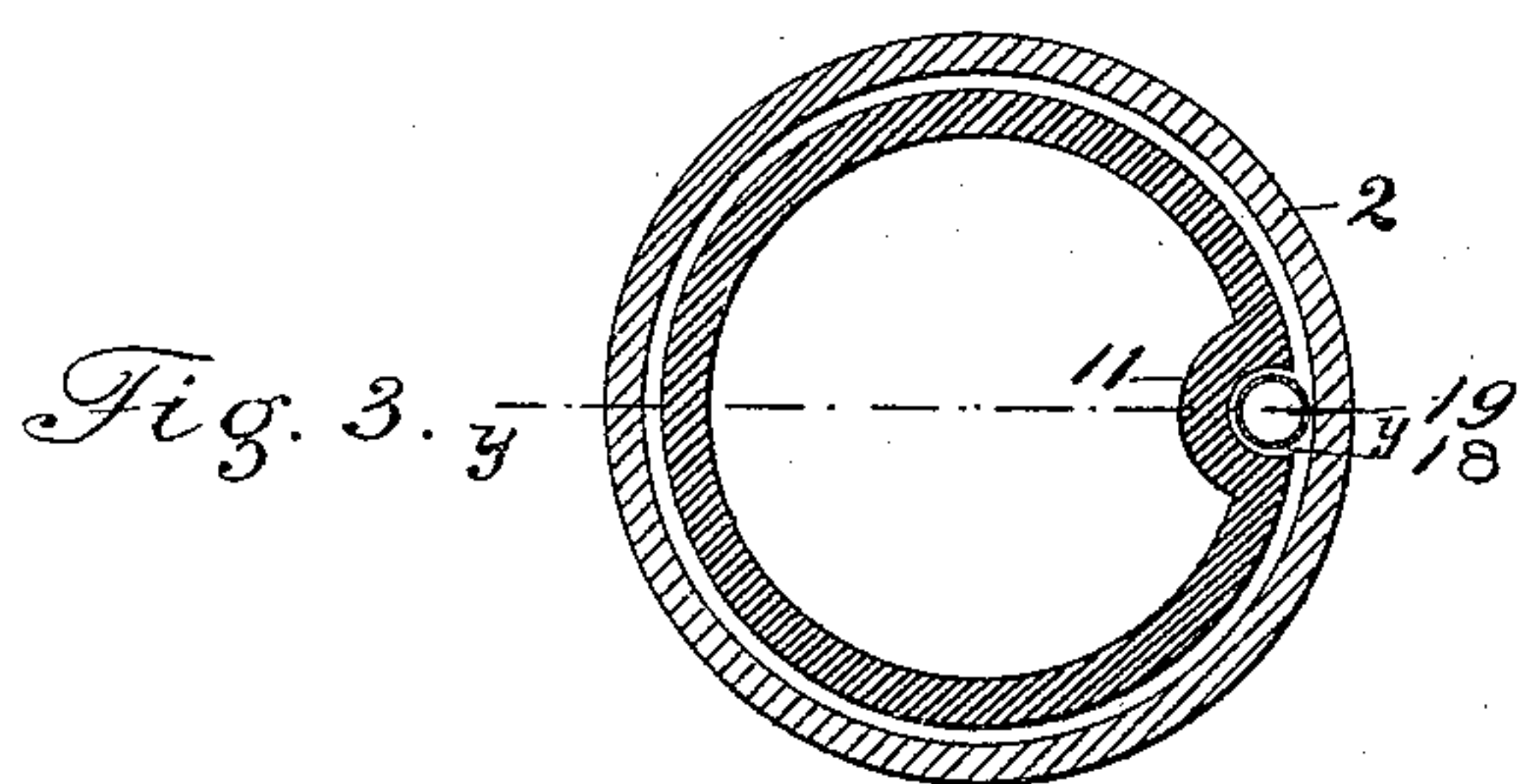


Fig. 3. y

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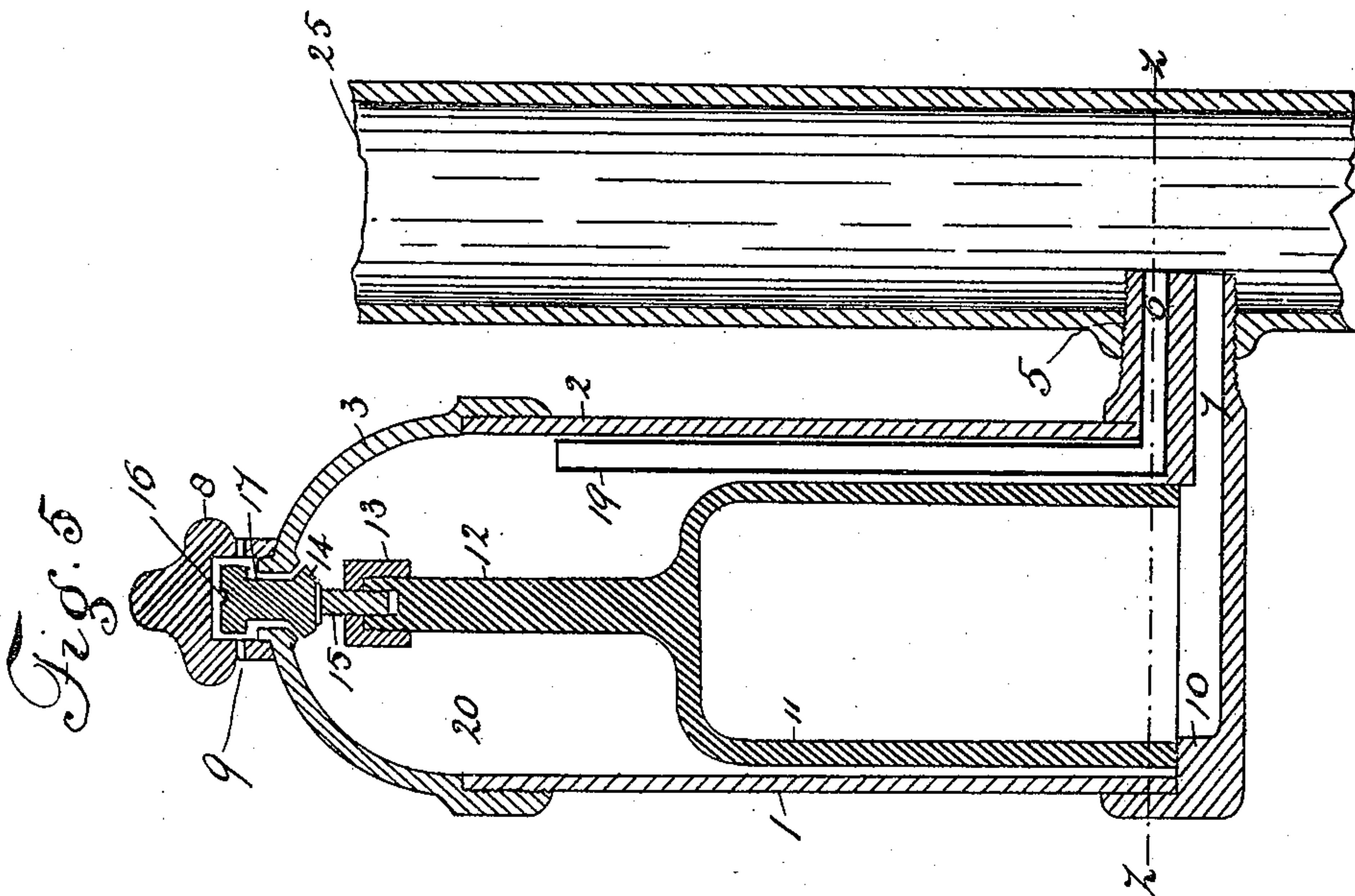
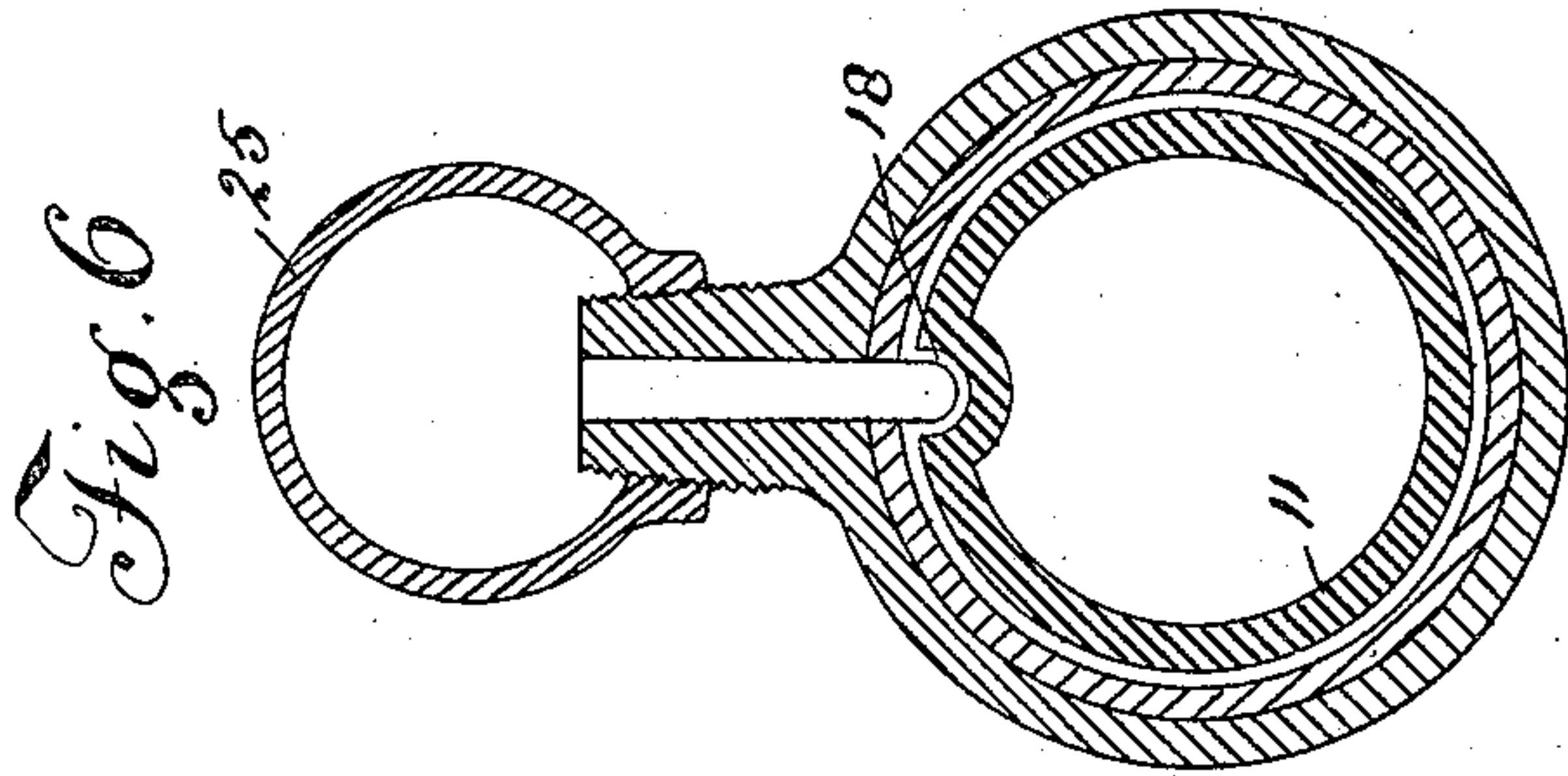
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C. E. VAN AUKEN.
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3 Sheets—Sheet 2.

No. 442,595.

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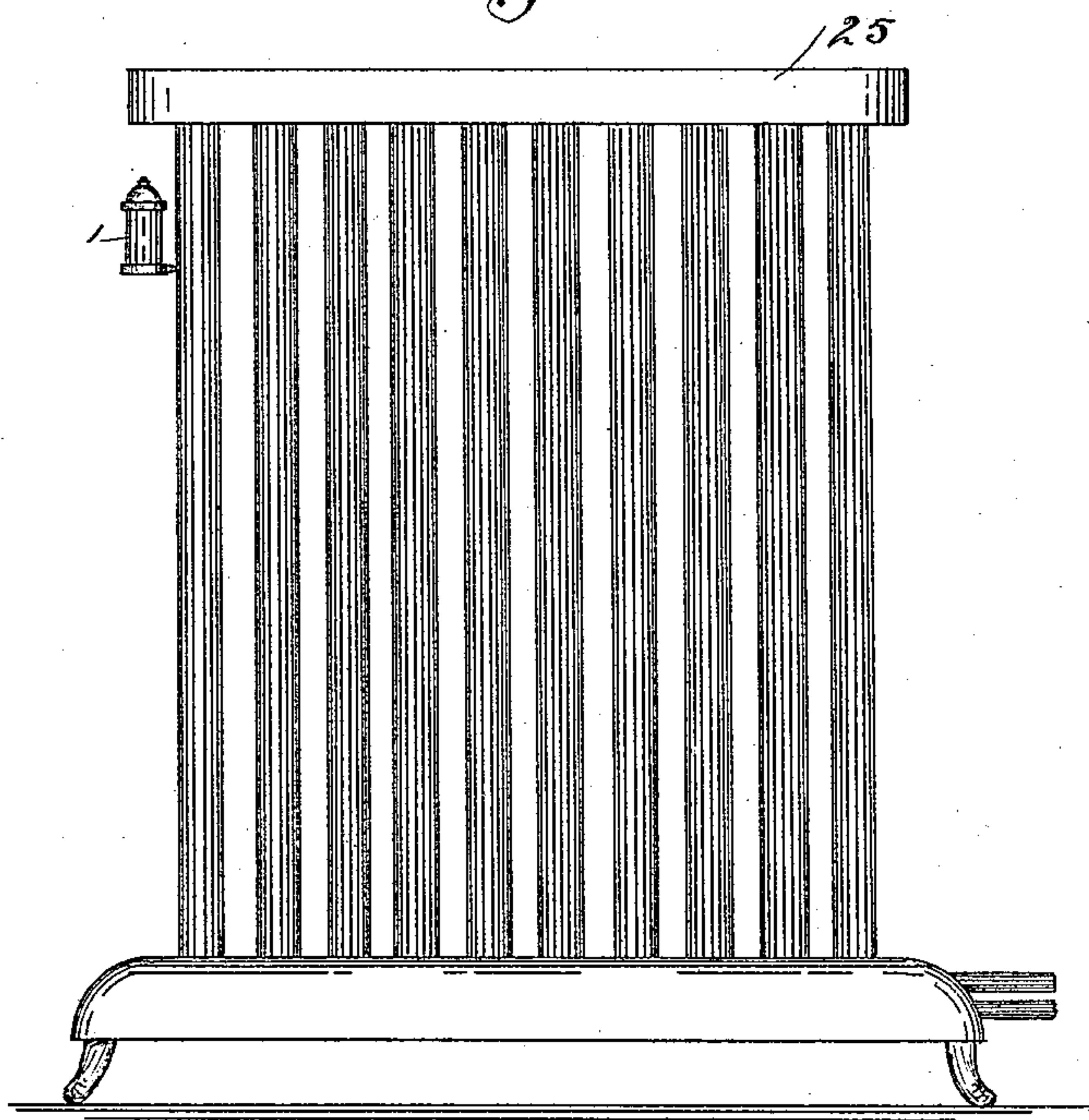
3 Sheets—Sheet 3.

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Fig. 7



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CLARENCE E. VAN AUKEN, OF DENVER, COLORADO.

VALVE.

SPECIFICATION forming part of Letters Patent No. 442,595, dated December 9, 1890.

Application filed November 29, 1889. Serial No. 332,029. (No model.)

To all whom it may concern:

Be it known that I, CLARENCE E. VAN AUKEN, a citizen of the United States, residing at Denver, in the county of Arapahoe and State of Colorado, have invented certain new and useful Improvements in Valves; and I do 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 figures of reference marked thereon, which form a part of this specification.

My invention relates to an improved duplex automatic air-valve for use in the radiators in steam-heating systems; and the object of my invention is to provide a valve, which after allowing the air to escape, automatically closes and retains the steam and also the water of condensation, obviating the necessity of the drip-pipes now in common use for the escape of the water, a device of simple construction, economical in cost, durable, not liable to get out of repair, efficient and reliable in operation; to which ends my invention consists of the features, arrangements, and combinations hereinafter described and claimed.

In the drawings is illustrated an embodiment of my invention, in which—

Figure 1 is an elevation of my improvement. Fig. 2 is a longitudinal vertical section taken on the line *y y*, Fig. 3. Fig. 3 is a cross-section taken on the line *x x*, Fig. 2. Fig. 4 is an end view of the threaded projection connecting the device with the radiator. Fig. 5 is a vertical section taken through the center of the device and one of the pipes of the radiator to which it is attached. Fig. 6 is a transverse section taken on the line *z z*, Fig. 5. Fig. 7 is an elevation of a steam radiator provided with my improvement.

In these views let the reference-numeral 1 indicate a shell constructed of any suitable material, preferably brass. This shell is composed of parts 2, 3, and 4. Part 2 is a cylindrical tube of uniform diameter, threaded at its upper extremity for the reception of the oval part 3, which is screwed thereon. Part 4 is secured in any suitable manner, as by brazing, to the lower part of the tube 2, and provided with the threaded extension 5, which is adapted to be screwed into the radi-

ator 25. This extension is provided with openings or passage-ways 6 and 7, communicating with the interior of the radiator.

To the top of oval part 3, which is threaded for the purpose, is secured a suitable cap 8, provided with vent-openings 9 9.

Within the shell, and normally resting on a plural number of lugs or projections 10 upon the bottom thereof, is a float consisting of an inverted cup 11, provided with the neck or stem 12 integral therewith and extending upward therefrom. This float is constructed of some material possessing the quality of expansibility to a greater extent than the metal composing the surrounding shell. Vulcanite or some composition of which india-rubber is the principal ingredient will probably be found preferable for use in the manufacture of this portion of the device.

To the top of stem 12 is secured a metal cap 13, into which is screwed the valve 14, which is provided with a threaded extremity 15 for this purpose. The top of the valve is provided with a slot 16 for the insertion of a screw-driver when the same is necessary in the adjustment of the valve in stem 12. Connecting this slotted top with the valve proper is a short neck 17, extending through the opening in the top of the oval part 3 of the shell. The float 11 is designed to fit loosely within the shell, as shown. The cup-shaped portion of the float is provided with a slot or groove 18 in its periphery for the reception of a tube 19, communicating at its lower extremity with opening 6, its upper extremity opening into the chamber 20, inclosed by shell 1. Pipe 19 is made fast at the bottom to projection 5 of the base of the shell. The opening in this pipe is continuous with passage-way 6, and rises in chamber 20 to such a height that its upper extremity shall always be above the level to which the water will rise within the chamber. By this means, while the water of condensation is running out of the chamber through passage-way 7, the steam is allowed to enter the upper portion of the chamber through pipe 19. This pipe also forms a sort of key within recess 18, preventing the float from turning when the valve is adjusted in the top of stem 12.

In describing the operation of my improved device I will suppose that it is attached to a

radiator near its top in an upright or vertical position, as shown in the drawings, the threaded portion 5 being screwed thereinto. I will also suppose that the valve is open, as shown in Fig. 2, there being cold air in the radiator. In this case the expansion of the steam in the pipes has a tendency to drive the air out through the vents 9. As soon as this air is all out the steam rises in chamber 20 and expands the float sufficiently to close valve 14, thereby preventing the escape of steam. The valve will remain closed until the mechanism becomes cold again, when the valve will open by virtue of the contraction of the float, after which the air will again escape and the automatic process of closing the valve will be repeated.

My improved device, besides providing an automatic means of escape for the air within the pipes, also provides a means of retaining the water of condensation within the pipes, as before stated. In describing the operation of the mechanism for this purpose, I will suppose the valve to be open, as shown. The water of condensation, when present in the pipes, will rise in chamber 20 under pressure of the steam, lift the float, and close the valve before any of the liquid escapes through the vents 9. It will be seen from Fig. 7 that the air-valve is located near the top of the radiator and on the end opposite the steam-inlet valve. Suppose now the air-valve to be open, as shown in Fig. 2. As soon as steam is turned on at the inlet-valve, the steam, air, and water all rush toward the opening in the air-valve. If water enters, the air-valve closes by flotation, as described. Immediately after this action takes place, the upward movement of the water in chamber 20 ceases, and what water there is in the upper portion of the radiator will then fall to the bottom by gravity, and the air that is left in the radiator-tubes will rise to the top, because it is lighter than the water. At this moment we have air-pressure both above and below the water that is in the air-valve, the air entering through the openings 6 and 7. Hence the water will flow back through opening 7 into the radiator by its own gravity, the air passing into chamber 20 at the same time through opening 6. The water having passed out of chamber 20 into the radiator-cup 11 will descend and open the valve, allowing more air to escape. If the water rushes up again, the same action will take place, and so on until the air is all out, when steam will enter, expand the float, and close the valve. The water of condensation that is in the bottom of the radiator will

flow back into the steam return-pipe, which is connected to the bottom thereof.

It will be seen that my improved device is perfectly self-regulating; also, that it performs the double office of ridding the radiator of cold air and at the same time preventing the escape through the vents of the water of condensation, causing the same to be retained in the pipes and returned to the boiler; hence the term "duplex."

Having thus described my invention, what I claim is—

1. The combination, with a shell provided with an opening in the top and a threaded projection 5 secured to the bottom thereof, said projection having two distinct passage-ways 6 and 7 leading from the shell 1 and the radiator, of a float composed of an inverted cup 11 and a stem 12, a valve secured to the top of the stem and adapted to close the openings in the top of the shell, and a vertical pipe 19, communicating at its lower extremity with passage-way 6, its upper extremity opening into the chamber of the shell above the level of the water of condensation therein at any time, substantially as described.

2. The combination, with the shell having an opening in the top for the escape of air, and a threaded projection at the bottom, said projection being provided with passage-ways 6 and 7 leading from the interior of the shell into the radiator, of an expansible float resting upon lugs in the bottom of the shell, a valve secured to the top of the float and adapted to close the openings in the top of the shell, and a pipe 19, opening into the passage-way 6 at its lower extremity and at its upper extremity into the chamber of the shell above the level of the water of condensation at any time, substantially as described.

3. The combination, with a shell having an opening in the top for the escape of cold air, and two distinct passage-ways 6 and 7, leading from the interior of the shell into the radiator, of a float consisting of an inverted cup 11 and a stem 12, an adjustable valve secured to the top of the stem and adapted to close the opening in the top of the shell, and a vertical pipe 19, leading from opening 6 upwardly into the shell, said pipe engaging a recess 18 in cup 11, substantially as described.

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

CLARENCE E. VAN AUKEN.

Witnesses:

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FRED. W. FELDWISCH.