

(No Model.)

J. McFARLANE.  
BOILER CLEANER.

No. 559,594.

Patented May 5, 1896.

Fig. 1.

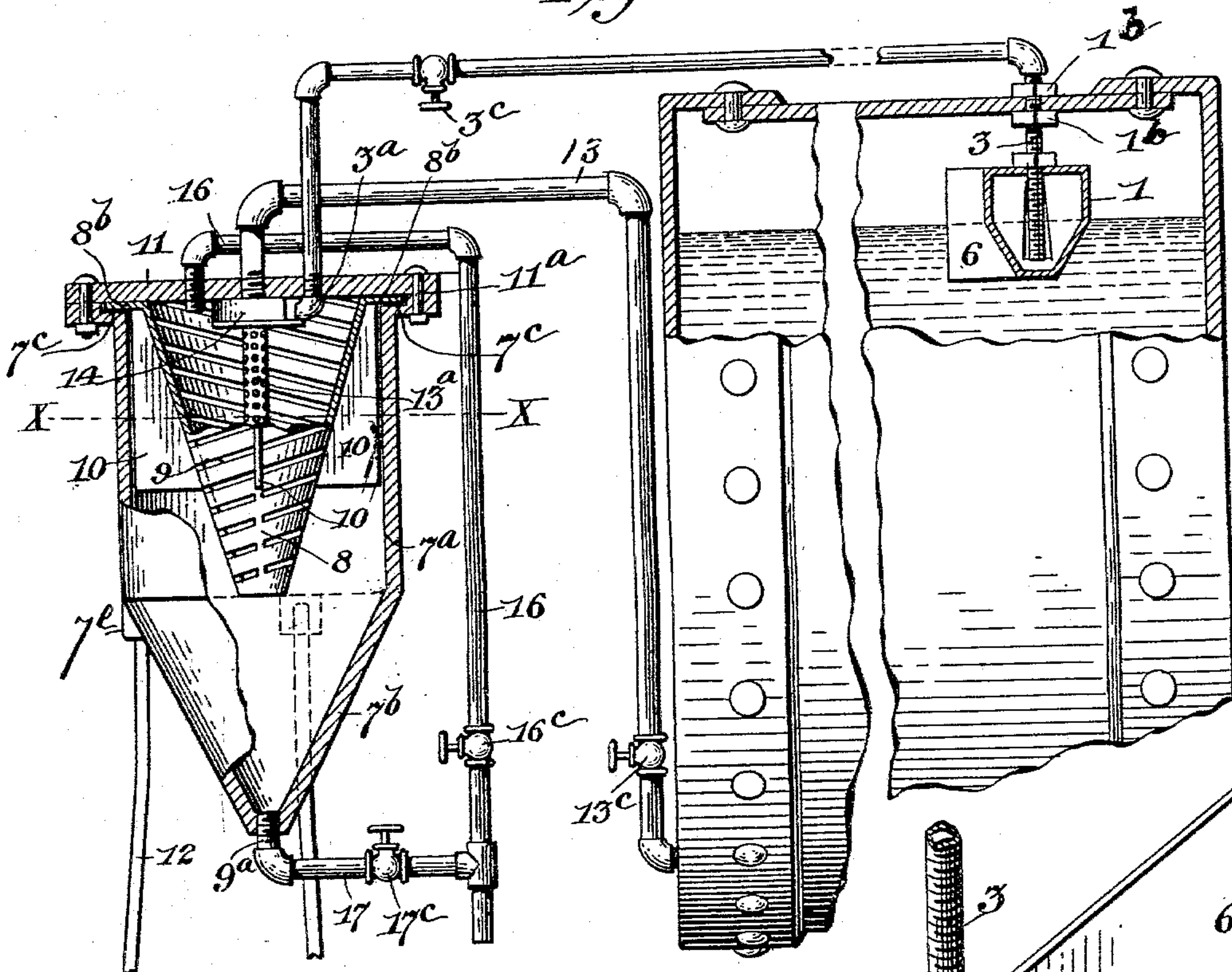


Fig. 2.

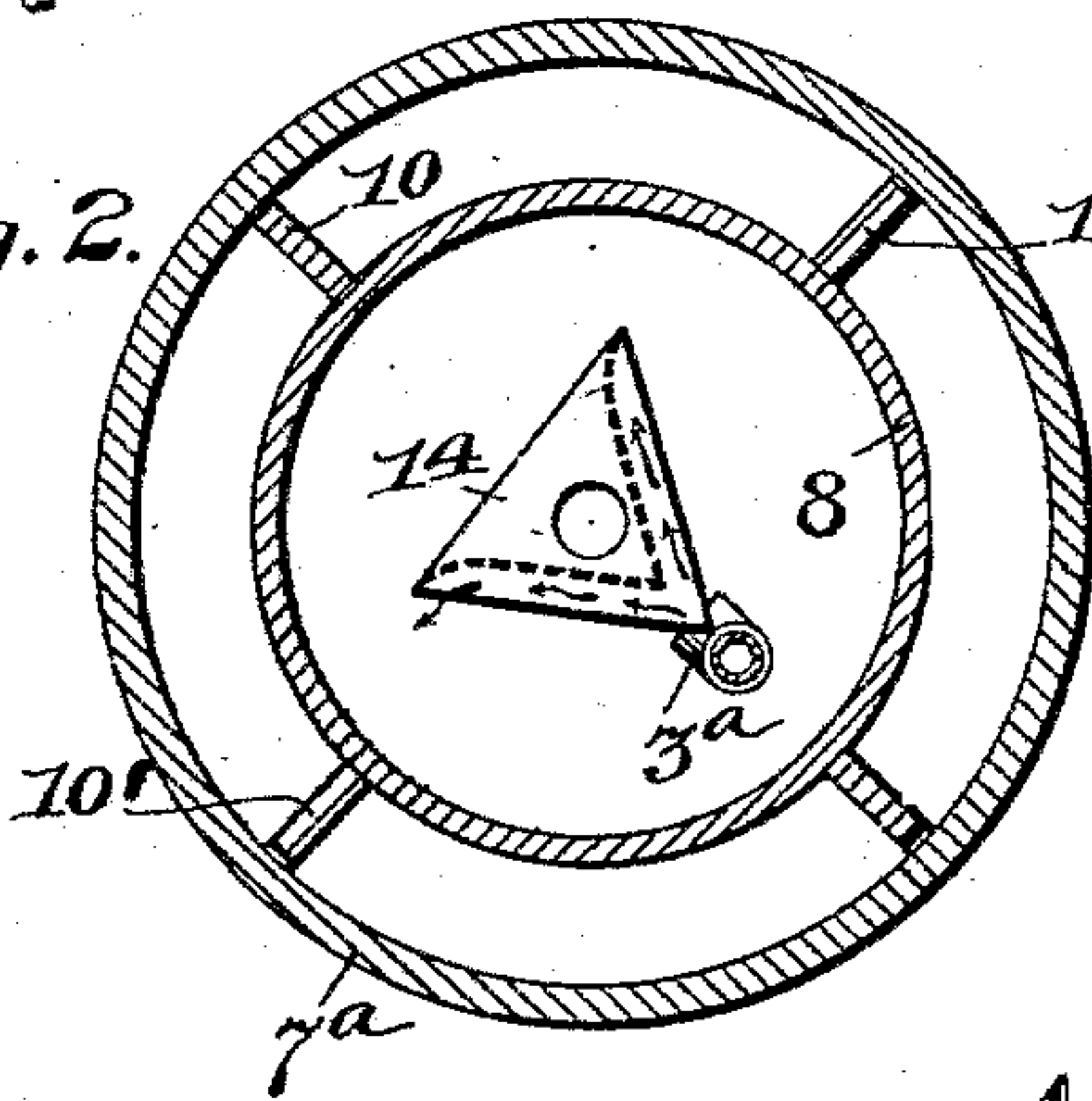


Fig. 3.

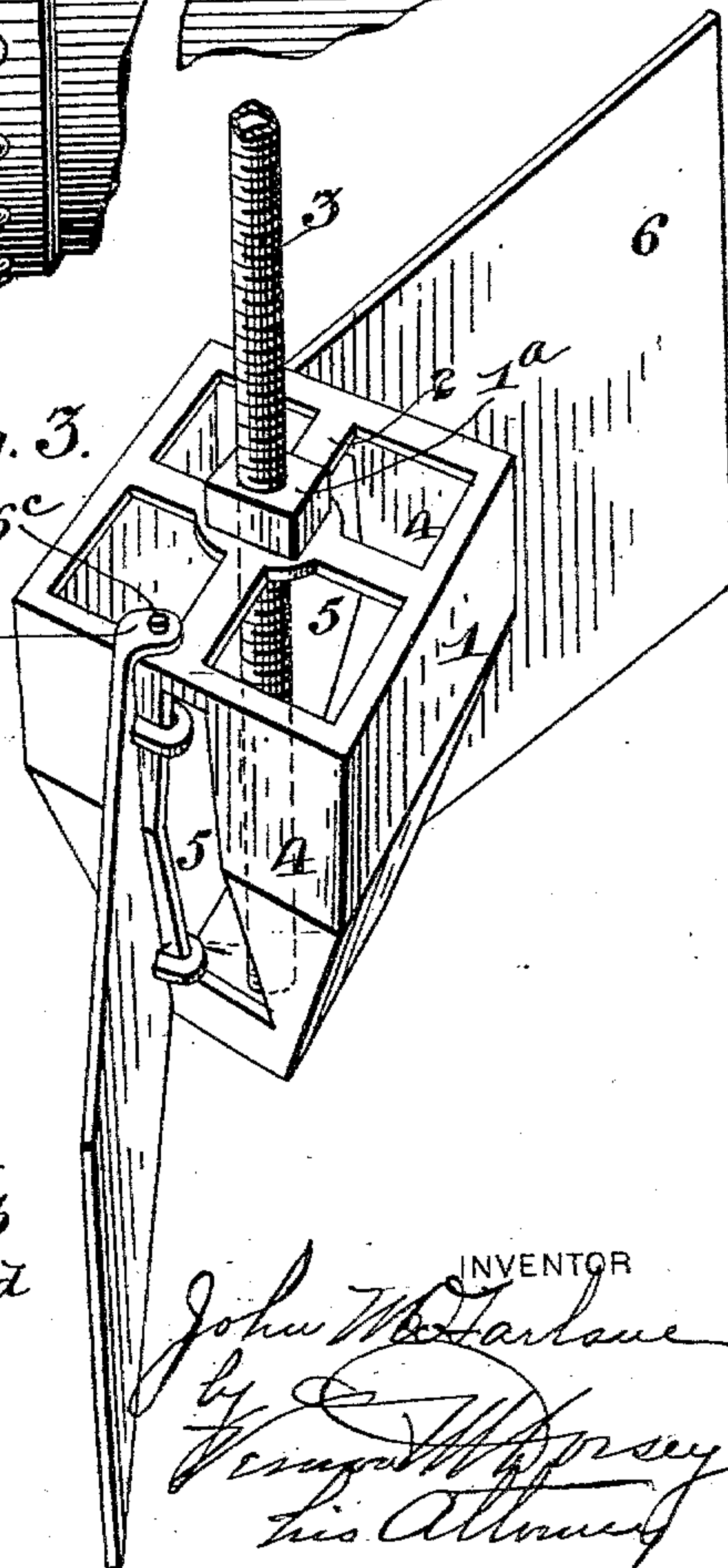
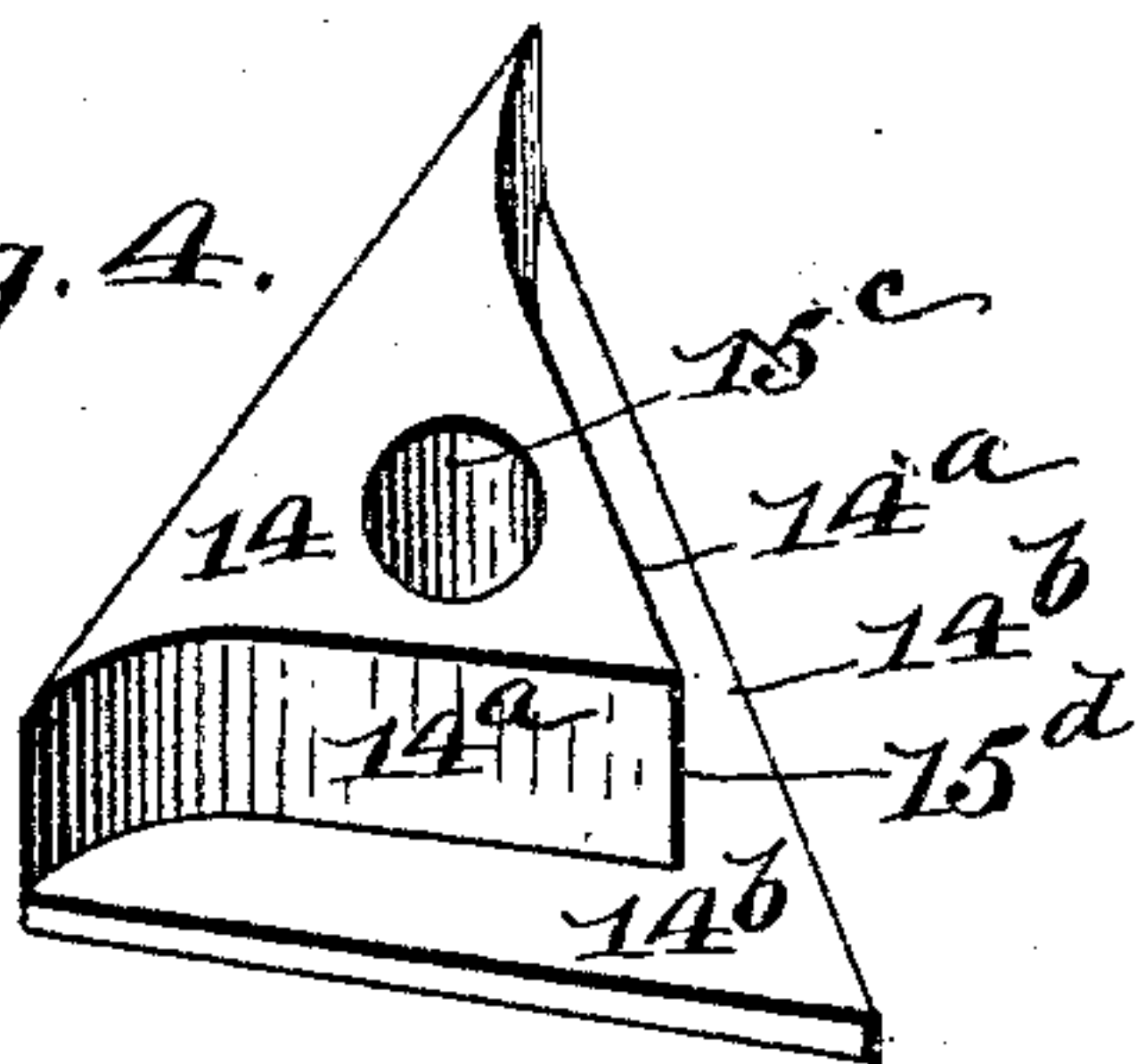


Fig. 4.



WITNESSES

Cleverance.  
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by  
Vernon W. Muzzy  
his Attorney



# UNITED STATES PATENT OFFICE.

JOHN MCFARLANE, OF WASHINGTON, DISTRICT OF COLUMBIA, ASSIGNOR  
TO GEORGE J. BESSLER, OF SAME PLACE.

## BOILER-CLEANER.

SPECIFICATION forming part of Letters Patent No. 559,594, dated May 5, 1896.

Application filed February 19, 1896. Serial No. 579,879. (No model.)

*To all whom it may concern:*

Be it known that I, JOHN MCFARLANE, a citizen of the United States, residing at Washington, in the District of Columbia, have invented certain new and useful Improvements in Boiler-Cleaners; 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.

This invention has for its object to provide an efficient device whereby the impurities left in boilers by the conversion of impure feed-water into steam, and which often floats in the form of a scum upon the level of the hot boiler-water, (it being sustained by the ebullition thereof and falling, owing to its superior weight, to the bottom of the boiler, when cooled, where it forms a scale,) may be removed from the boiler without necessitating the drawing off of a large body of heated water, as by the construction which I have invented and hereinafter describe the impurities are separated so effectually from the water associated therewith as to be discharged in such a concentrated condition that but little energy is wasted by the loss of the heated water, and as such purification is a continuous process the purity of the boiler-water is constantly maintained, thus obviating the necessity of blowing out the boiler to remove the impure water contained therein and to permit the removal of the scale deposited thereby.

My invention therefore consists in the several features of which it is composed and in the construction, arrangement, and combination thereof, as will be hereinafter more fully described and claimed.

Referring to the accompanying drawings, in which corresponding parts are designated by corresponding marks of reference, Figure 1 is a view, partly in section and partly in elevation, of a boiler-cleaner constructed in accordance with my present invention, it being shown as connected up with a boiler. Fig. 2 is an inverted horizontal section on line X X of Fig. 1. Fig. 3 is a perspective view of the skimmer. Fig. 4 is a perspective view of the deflecting-block within the separator.

For the purpose of gathering the scum from the surface of the boiler-water a skimmer-box 1 is to be placed within the boiler and at the normal water-level thereof. This box has a base in the form of an inverted truncated pyramid, united to an upper portion of the shape of a parallelopipedon, as is shown in Fig. 3, the top of the box being removed and replaced by a spider 2, through which the pipe 3 projects. Each of the longitudinal side walls 4 of this box has a slot 5 therein, extending from near its upper edge to near the upper surface of the bottom, the slot having its greatest breadth at its base and its narrowest portion at the top, and by this shape I cause the area for the passage into the box of the scum to increase more slowly than the rise of level of the water, which is not the case if a slot of uniform effective area be used. Wings 6 project from the walls 4 of the box, forwardly and sidewise, and as by preference the box should be mounted in the rear portion of the boiler these wings will catch the floating scum which moves slowly toward the rear and guide it to the box, through the slots of which it will flow into the interior thereof. In order to hang the wings from the box, each of the former has upon that edge which adjoins the latter projections 6<sup>a</sup>, provided with hooked ends, which can be engaged with the rear edge of a slot 5, while an ear 6<sup>b</sup> upon the top of the wing extends over and rests upon the upper edge of the box, thus supporting the wing, the ear having a pin 6<sup>c</sup> upon the under surface engaging the inside of the top of the box. The ease with which such wings can be mounted upon the box by which they are supported facilitates the assembling of the parts within the boiler.

The threaded pipe 3 extends through the spider 2, to which it is locked by the lock-nut 1<sup>a</sup>, and downwardly within the box to about the level of the bottom of the slots 5, in order that it may draw up the contents of the lower portion thereof, for I have found that, owing to the angular cross-section of the box, by which circulating currents therein are prevented, whereby the impurities of the liquid flowing therein are more or less separated from the water and settle to the bottom, and



to the inclined side walls, by which such deposit is thrown immediately toward the open end of the pipe 3, the liquid drawn from the boiler contains a larger percentage of impurities than would otherwise be the case. The pipe 3 passes through the upper sheet of the boiler, to which it is secured by the lock-nuts 1<sup>b</sup>, and leads into the separator, wherein the heated water drawn up through the pipe is freed from the impurities caused thereby prior to its return to the boiler. This separator consists of an outer vessel 7 and an inner perforated vessel 8, together with the necessary pipes, valves, &c. As shown, the outer vessel consists, by preference, of a cylindrical body portion 7<sup>a</sup> and a tapering base 7<sup>b</sup>, the sloping walls of the latter serving to guide the deposit to the discharge-port 9<sup>a</sup> in the latter.

The inner vessel has downwardly-converging sides, and in the accompanying drawings I have shown it in the form of an inverted cone.

For the purpose of supporting the cone within the upper portion of the containing vessel 7 an annular flange 8<sup>b</sup> is by preference formed around the upper edge of the former, which rests within a seat 7<sup>c</sup> in the upper edge of the top portion 7<sup>a</sup> of the latter, the said cone having, by preference, its downwardly-directed part removed, whereby the inner vessel is given the form of an inverted truncated cone, the flat bottom thus formed being, by preference, left open; but it is seen that, if desired, it may be closed and provided with perforations. In any case the side walls of the cone are perforated, and by preference I make these perforations in the form of spiral slots 9. To prevent any circulating motion of the liquid upon the outside of the cone, (which would retard the settling of the impurities,) walls 10 may project radially outwardly from the cone to near the inner surface of the containing vessel 7.

The containing vessel is shown as having an annular flange 7<sup>c</sup> around its upper end, to which the head 11 is secured by bolts 11<sup>a</sup>, and as having upon its periphery, at the upper end of its tapered portion 7<sup>b</sup>, lugs 7<sup>e</sup>, in which the upper ends of the legs 12 are contained, the latter supporting the containing vessel and parts contained therein; but it is obvious that these features may be varied.

The induction-pipe 3 from the boiler to the separator enters the head 11 to one side of the center thereof, and is continued horizontally by means of an L 3<sup>a</sup>, while the eduction or return pipe 13 also passes through the center of the head and is led into the boiler below the level of the skimmer therein, and preferably near the bottom of the front of the boiler. The pipe 13 by preference terminates within the cone in a vertical perforated cylinder 13<sup>a</sup>, having a closed lower end and being in the vertical axis of the cone. A deflector-block 14 may be mounted on the head of the cylinder 13<sup>a</sup>, the said block hav-

ing two converging curved faces 14<sup>a</sup>, provided with projecting flanges 14<sup>b</sup> at their lower edges, the block having a perforation 15<sup>c</sup> therein, through which the cylinder 13<sup>a</sup> projects, the block being so mounted thereon that its vertical edge 15<sup>d</sup>, formed by the two converging faces 14<sup>a</sup>, will be presented to the nozzle 3<sup>a</sup> of the induction-pipe; but it is obvious that, if desired, such a deflector-block may be cast with the head instead of separate.

In a device of this construction there will be a constant circulation from the upper level of the boiler through the pipe 3, separator, and return-pipe 13, back to the boiler, and in this circulation the matter, which, as hereinbefore described, will be drawn from the skimmer, will flow through the pipe 3 into the inner vessel, and will then be deflected to each side of the cylinder 13<sup>a</sup> by the deflecting-block 14, the flanges 14<sup>b</sup> of which will support it while the curved walls 14<sup>a</sup> will spread it and throw it against the sides of the cone down, which it will flow, the heavier part thereof (impurities) with some water falling through the perforations therein, while the remainder of the water will flow to the center of the cone and be drawn through the perforations in the cylinder 13<sup>a</sup>, whence it will be returned through the pipe 13. The matter which may pass through the perforations 10 being protected from agitation or motion settles, the impurer parts sinking to the bottom of the tapered portion 7<sup>b</sup> of the containing vessel, (whence they may be removed through the discharge-port 9 from time to time,) while the purer parts float upon the surface thereof, and through the lower end of the cone pass back into the interior thereof to be returned to the boiler through the pipe 13. By this construction I am enabled to separate the impurities (organic and inorganic salts, &c., from the feed-water and oil, which may have reached the boiler in any manner) from the water and to discharge them in a highly-concentrated condition, accompanied by a minimum quantity of water, and it is to be noted that I do not limit my claims of invention to the joint use of a skimmer and a separator of the characters described, as each can be used with any known form of the other; nor do I limit my claims to the above-described manner of introducing and withdrawing the water into and from the cone, as other devices therefor can be used in connection with a perforated vessel provided with downwardly-converging side walls.

In the drawings I have shown a pipe 16 as entering the head of the separator diametrically opposite the pipe 3, and as extending downwardly upon the outside of the outer vessel 7 and connected with a pipe 17, entering the discharge-port 9<sup>a</sup>, the said pipes 16 and 17 (as well as the pipes 3 and 13) being provided with valves 16<sup>c</sup> and 17<sup>c</sup>, (as well as 3<sup>c</sup> and 13<sup>c</sup>), respectively, by which they may be closed. By means of the pipe 16 and valve



therein air that may from time to time accumulate in the top of the separator may be discharged, while by the pipe 17 and valve therein the sediment from the base of the separator may be blown out.

In another application filed by me in the United States Patent Office on the 29th day of November, 1895, Serial No. 570,404, I have broadly claimed an outer vessel and an inner vessel therein provided with perforated side walls in combination with an induction-pipe and a central perforated vertical eduction-pipe connected with the interior of the inner vessel, and with means for removing the deposit from the lower portion of the outer vessel, and I do not therefore make such a claim herein; but whereas in my said prior application I have shown an inner cylindrical vessel, and as a modified form thereof a vessel with downwardly-converging side walls, such as claimed herein, I herein claim a vessel of the latter shape specifically in contradistinction to the generic claim of my said prior application.

Having thus described my invention, what I claim is—

1. In a separator for boiler-water, the combination, with an outer vessel, of an inner vessel therein having downwardly-converging perforated side walls, induction and eduction pipes connected with the interior of the said inner vessel, and means for removing the deposit from the exterior thereof, substantially as described.

2. In a separator for boiler-water, the combination, with an outer vessel, of an inner vessel in the upper portion thereof, having downwardly-converging perforated side walls and its lower end open, an induction-pipe connected with the interior of the said inner vessel, a central vertical perforated eduction-pipe contained within the inner vessel, and means for removing the deposit from the exterior of the inner vessel, substantially as described.

3. In a separator for boiler-water, the combination, with an outer vessel, of an inverted conical vessel therein having perforated side walls, and having wings projecting outwardly therefrom, induction and eduction pipes connected with the interior of the said inner vessel, and means for removing the deposit from the exterior thereof, substantially as described.

4. In a separator for boiler-water, the combination, with an outer vessel, of an inverted conical vessel therein having spiral slots in its side walls, induction and eduction pipes connected with the interior of the said inner vessel, and means for removing the deposit from the exterior thereof, substantially as described.

5. In a separator for boiler-water, the combination, with an outer vessel, of an inverted conical vessel therein having spiral slots in its side walls and having wings projecting outwardly therefrom, the lower end of the

conical vessel being removed and open, an induction-pipe connected with the interior of the said conical vessel, a vertical central perforated eduction-pipe within the said conical vessel, and means for removing the deposit from the exterior of the last-named vessel, substantially as described.

6. In a separator for boiler-water, the combination, with an outer vessel, of an inner vessel therein having perforated side walls, an induction-pipe discharging into the said inner vessel, a deflector-block having two converging faces with their apexes opposite the mouth of the said induction-pipe, an eduction-pipe connected with the interior of the inner vessel, and means for removing the deposit from the exterior of the said last-named vessel, substantially as described.

7. In a separator for boiler-water, the combination, with an outer vessel, of an inner vessel therein having perforated side walls, an induction-pipe discharging into the inner vessel, a deflector-block having two converging faces with their apexes opposite the mouth of the said pipe, and having flanges upon the lower edges of the said faces, an eduction-pipe connected with the interior of the said inner vessel, and means for removing the deposit from the exterior of the said last-named vessel, substantially as described.

8. In a separator for boiler-water the combination, with an outer vessel, of an inner vessel therein having perforated downwardly-converging side walls, an induction-pipe discharging into the inner vessel, a central perforated vertical eduction-pipe in the inner vessel, and means for removing the deposit from the exterior of the said vessel, substantially as described.

9. In a separator for boiler-water, the combination, with an outer vessel, of an inner vessel therein having perforated downwardly-converging side walls, an induction-pipe discharging into the inner vessel, a central perforated eduction-pipe in the inner vessel, a deflector-block having two converging faces, with their apexes opposite the mouth of the induction-pipe, mounted on the eduction-pipe, and means for removing the deposit from the exterior of the inner vessel, substantially as described.

10. The combination, with a skimmer, of a body having slots in the side walls thereof of removable wings, provided with hooked projections adapted to engage within the slots, substantially as described.

11. The combination, with a skimmer, consisting of a body having slots in the side walls thereof, of removable wings, provided with hooked projections adapted to engage within the slots and having an ear provided with a pin to engage the top of the box, substantially as described.

12. In a boiler-cleaner, the combination, with an angular slotted skimmer within the boiler, of an outer vessel, an inner vessel



therein having downwardly-converging per-  
forated side walls, a pipe connecting the said  
skimmer to the interior of the inner vessel, a  
pipe connecting the interior of the inner ves-  
5 sel to the boiler and means for removing the  
deposit from the exterior of the inner vessel,  
substantially as described.

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

JOHN McFARLANE.

Witnesses:

A. E. L. KEESE,

VERNON M. DORSEY.