

No. 672,360.

Patented Apr. 16. 1901.

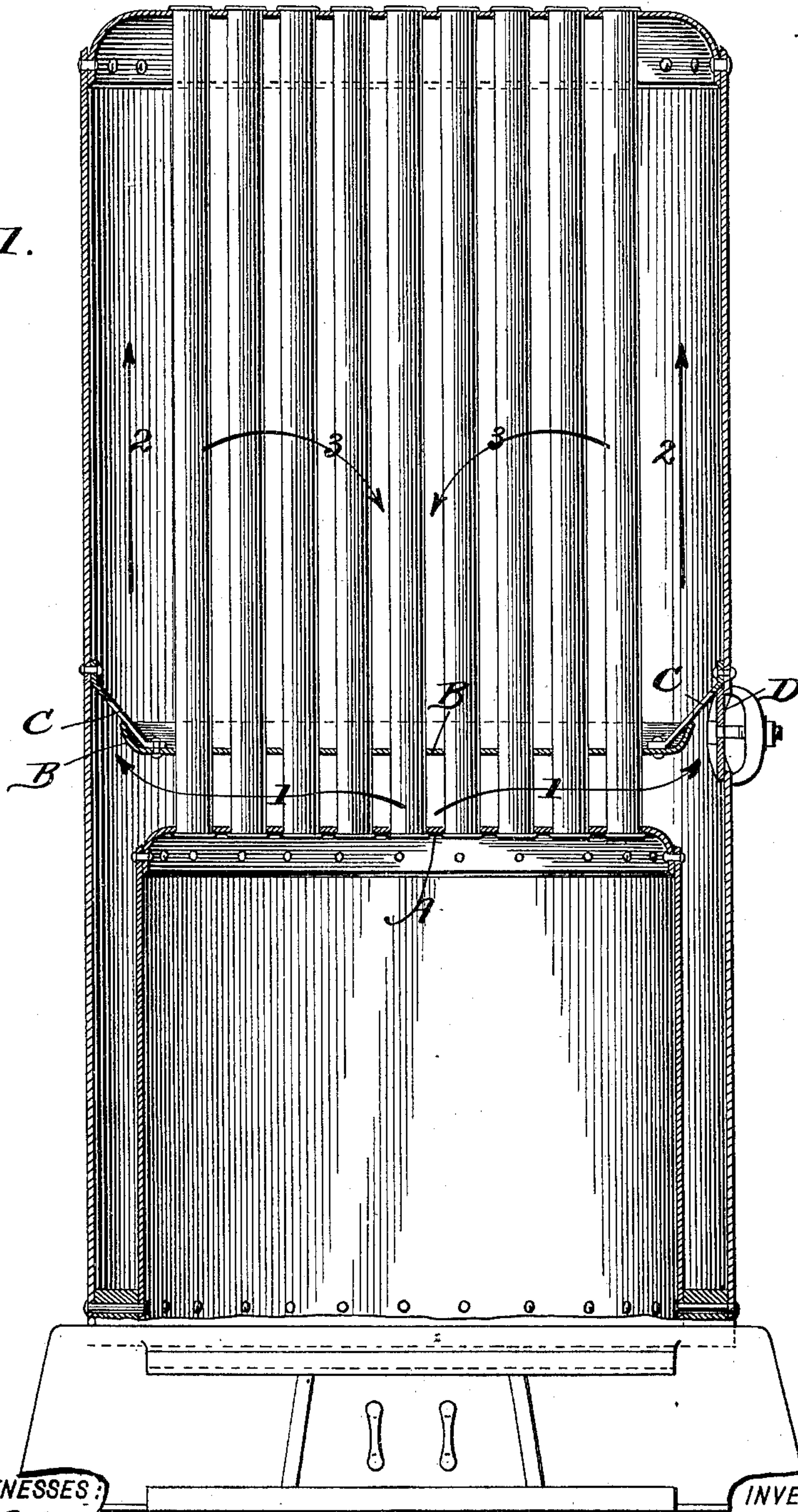
C. EDGERTON.  
STEAM BOILER.

(Application filed Feb. 5, 1901.)

(No Model.)

2 Sheets—Sheet 1.

*Fig. 1.*



WITNESSES:  
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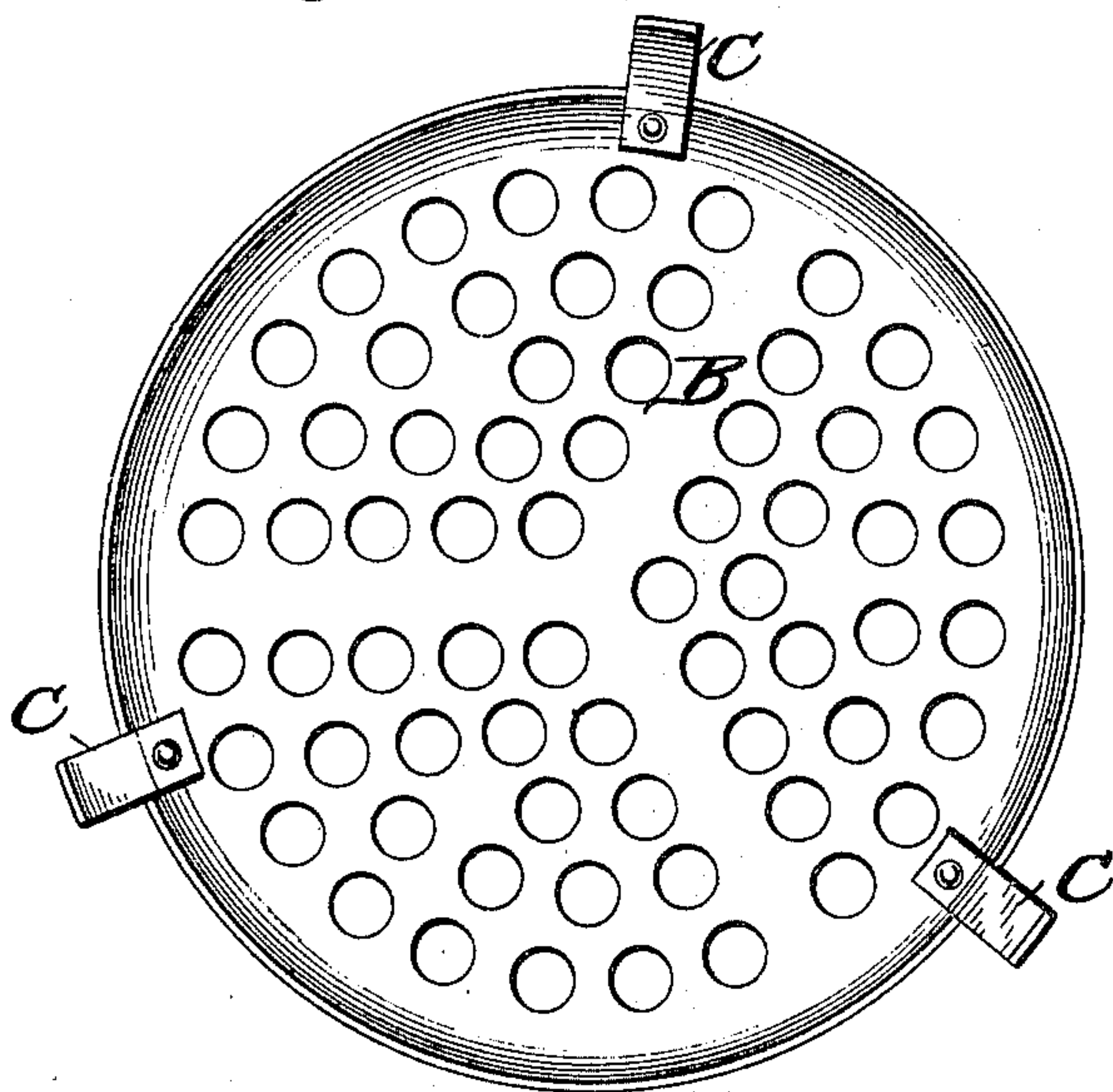
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(Application filed Feb. 5, 1901.)

(No Model.)

2 Sheets—Sheet 2.

*Fig. 2.*



WITNESSES:

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# UNITED STATES PATENT OFFICE.

CHARLES EDGERTON, OF PHILADELPHIA, PENNSYLVANIA.

## STEAM-BOILER.

SPECIFICATION forming part of Letters Patent No. 672,360, dated April 16, 1901.

Application filed February 5, 1901. Serial No. 46,052. (No model.)

*To all whom it may concern:*

Be it known that I, CHARLES EDGERTON, of Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented a new and useful Improvement in Steam-Boilers, of which the following is a specification.

The object of my invention is to secure the better protection of and a greater longevity for the crown-sheet of the vertical tubular boiler. This is a cheap, handy, and popular form of boiler; but it is subject to one serious defect. The tubes being in a vertical position and quite close together, it is practically impossible to keep the top surface of the fire-box, commonly known as the "crown-sheet" or "tube-sheet," clean. If there are any scale-producing properties in the water, they form a scale on the tubes at or near the disengaging surfaces, and when this scale becomes dry from heat it gets very hard, the character of the scale varying with the quality of the water or the mineral matter which the water contains. This scale at various thicknesses gets loose from various causes or is cracked loose by the action of the heat or the water and falls straight down between the tubes upon the crown-sheet, in which the lower ends of the tubes are seated. This, of course, soon collects in this position and keeps the water away from immediate contact with the crown-sheet, which is exposed to the fire below. The result is that the crown-sheet becomes very hot, so that its tensile strength is so impaired that under the boiler-pressure it is bent so as to produce cracks or leaks around the tubes or possibly an explosion. This condition is dangerous both to the life of the boiler and to those who have to use it. My invention is designed to provide means for preventing this damage and for maintaining the full steaming efficiency of the boiler, which I will now proceed to describe, reference being had to the accompanying drawings, in which—

Figure 1 is a vertical section of an upright boiler with my invention applied to the same, and Fig. 2 is a plan view of the projecting pan.

In the drawings, A represents the crown-sheet or tube-sheet of an ordinary vertical tubular boiler. This sheet, as before described, is especially liable to be fouled on the upper side by the accumulation of scale and sediment, which in excluding the direct contact

and free circulation of water allows it to become intensely hot from contact with the fire below and its tensile strength so impaired that it is less able to stand the pressure within and in bending forms cracks and leaks about the tubes where they are seated therein.

B is a circular pan, which is formed with holes that are of the exact size of the tubes and give passage thereto and when so fitted upon the tubes forms a tight or closed diaphragm, through which all of the tubes pass. This pan is turned up at its outer edges and is made smaller than the outer shell of the boiler, so as to leave an annular space between the outer periphery of the pan and the inner wall of the shell for the circulation of water. This pan is supported a few inches above the crown-sheet by suitable hangers or brackets C, which are riveted to the edges of the pan and also to the boiler-shell. Just opposite the level of the pan B there is formed in the shell of the boiler one or more hand-holes D with covers, through which the accumulations of scale and other deposits may be removed from the interior of the pan B from time to time. The action of this pan B is as follows: First, it forms a receptacle which catches and retains all the scale that drops down from the tubes and prevents it from accumulating on the crown-sheet A. The result is that the crown-sheet A is kept perfectly clean and bare on the upper side, and the water coming in direct contact with the crown-sheet keeps down its temperature, so that, although next to the fire, it does not become heated to the danger-point. In the second place, the pan B acts as a diaphragm, which deflects the water-currents to a lateral path between the tubes below the diaphragm, as shown by the arrows 1, which scours the top of the crown-sheet and the lower ends of the tubes, so that they are kept constantly clean of sediment and deposits of all kinds. This diaphragm-pan also forms a peculiar circulation directed to the collection of the scale and sediment into the pan and its retention there, for as the water-currents arise, as shown by the arrows 2, the heavier sedimentary matter takes the inward and downward course of the arrows 3, which causes it to be retained upon the pan, in contradistinction to allowing it to be deposited in the water-



legs beside the fire-box. By collecting the sediment or scale in the pan B and holding it there it is kept entirely out of all contact with the fire-box sheets, where it may do  
 5 serious damage, as before drescribed, and is retained in the middle of the body of the water, where it can do no harm in the intervals between its removal through the hand-holes D.

10 I am aware that a deflector-plate has been arranged above the crown-sheet of a vertical tubular boiler designed to keep the scale off the crown-sheet; but in such case the deflector-plate was conical, so as to discharge the  
 15 scale into the water-leg, and such deflector also had at the apex of its cone a central opening through it to permit the upward circulation of water through it. It is obvious that this circulation-opening would defeat the  
 20 downward trend of the sedimentary matters, as indicated by arrows 3, while the conical slant of the deflector in discharging the scale and sediment into the water-legs would produce thereon fire-heated surfaces, the very  
 25 objections that I desire to avoid. I wish to point out, therefore, as distinguishing features of my invention that the part B is a pan or receptacle with upturned outer edges, inside of which upturned edges and through  
 30 the body of which pan all the tubes pass, said pan being designed with reference to holding or retaining the scale without discharging any of it over the edges into the water-leg, and there is, furthermore, no circulation-pas-  
 35 sage through this pan whatever, so that the upward circulation is confined entirely to the annular space surrounding the pan, which insures the precipitation of the sedimentary matters toward the center, as indicated by  
 40 arrows 3.

In further defining my invention I would state that I am aware that a pan has been suspended in an upright boiler between two

groups of tubes, but without any of the tubes passing through the pan. With such con- 45  
 struction it is obvious that none of the scale from the tubes would fall into the pan, but would drop straight down to the lower end of the boiler and involve the very objection which I seek to avoid, and I do not claim any 50  
 such arrangement.

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

1. An upright tubular boiler having a short 55  
 distance above its crown-sheet a receptacle for catching and retaining scale, &c., said receptacle being made of less diameter than the shell of the boiler and connected thereto  
 by supporting hangers or brackets and said 60  
 receptacle being perforated and having all the tubes passing through the same and being closely fitted about the tubes without any water-circulating opening through it, and a  
 hand-hole and cover for clearing out the re- 65  
 ceptacle, said hand-hole being arranged in the shell at or near the level of the receptacle substantially as described.

2. An upright tubular boiler having a short 70  
 distance above its crown-sheet a receptacle for catching and retaining scale, &c., said receptacle having upturned outer edges made of less diameter than the shell of the boiler and connected to the sides thereof by sup-  
 porting hangers or brackets said receptacle 75  
 being perforated and having all the tubes passing through the same and being closely fitted about the tubes without any water-circulating opening through it, and a hand-hole and cover arranged in the shell of the boiler 80  
 at or near the level of the said receptacle substantially as described.

CHARLES EDGERTON.

Witnesses:

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 C. PFEIFFER, Jr.