

(No Model.)

A. L. BLADHOLM.  
STEAM BOILER.

No. 475,288.

Patented May 24, 1892.

Fig-3.

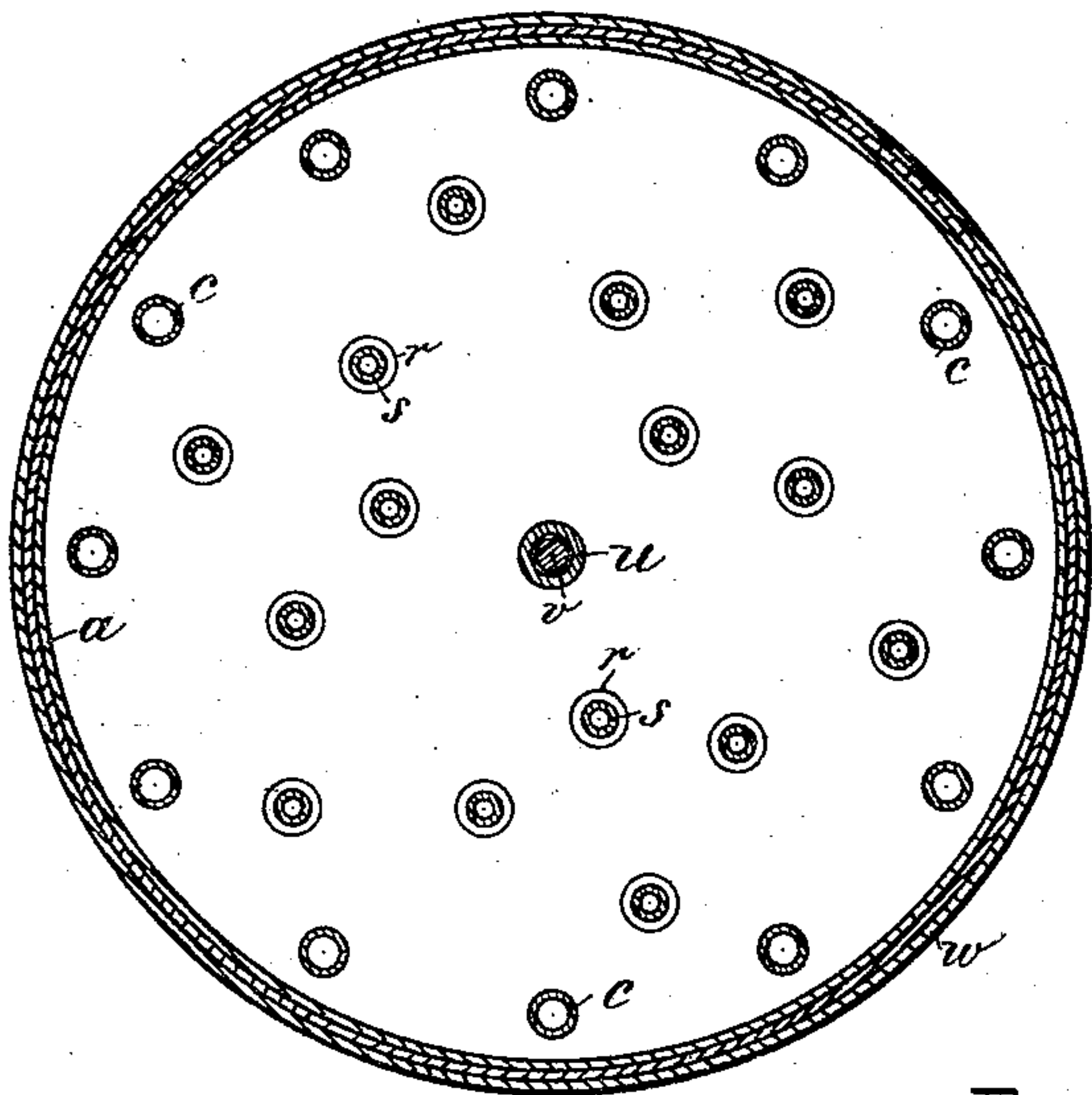


Fig-4.

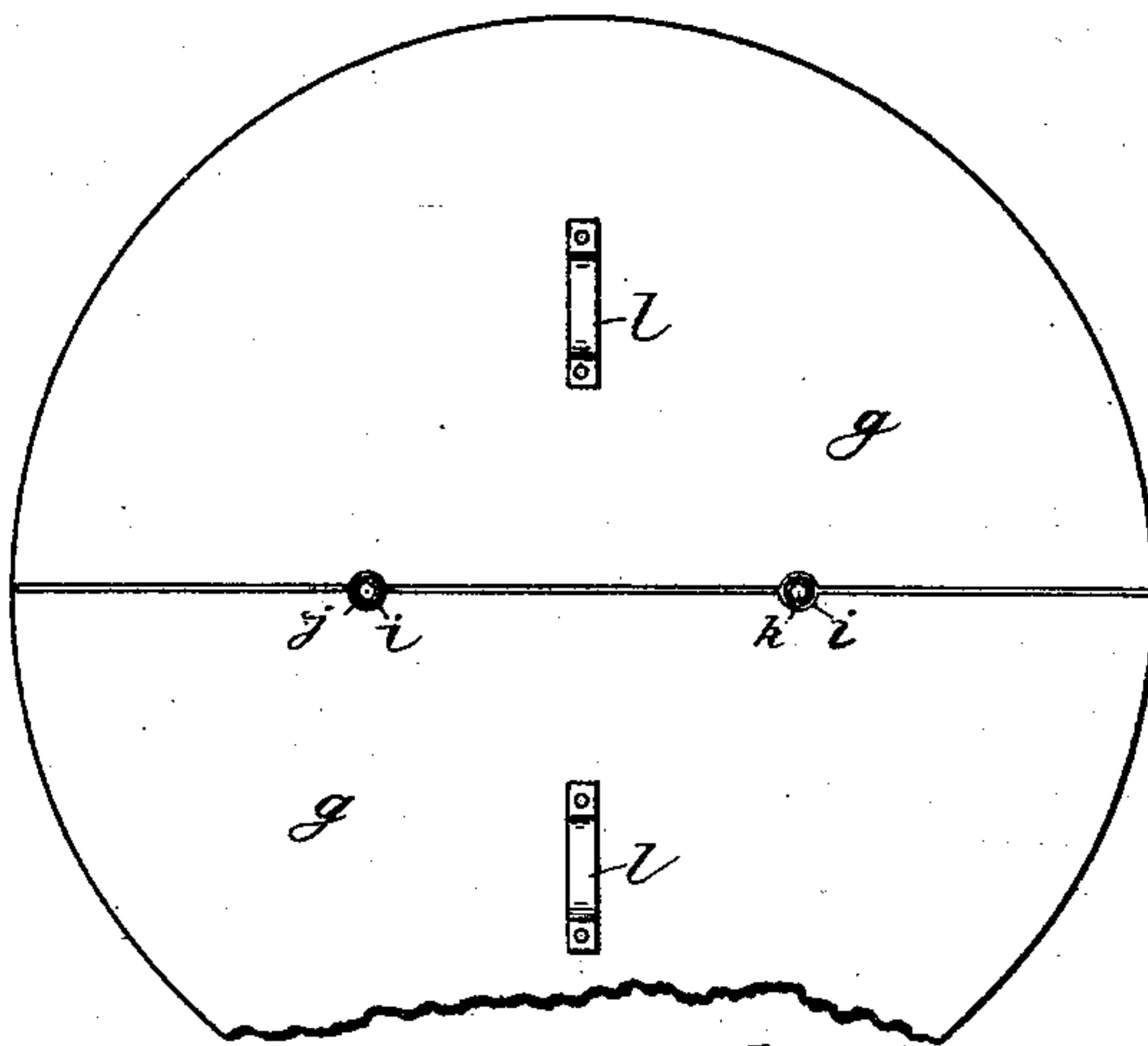


Fig-1.

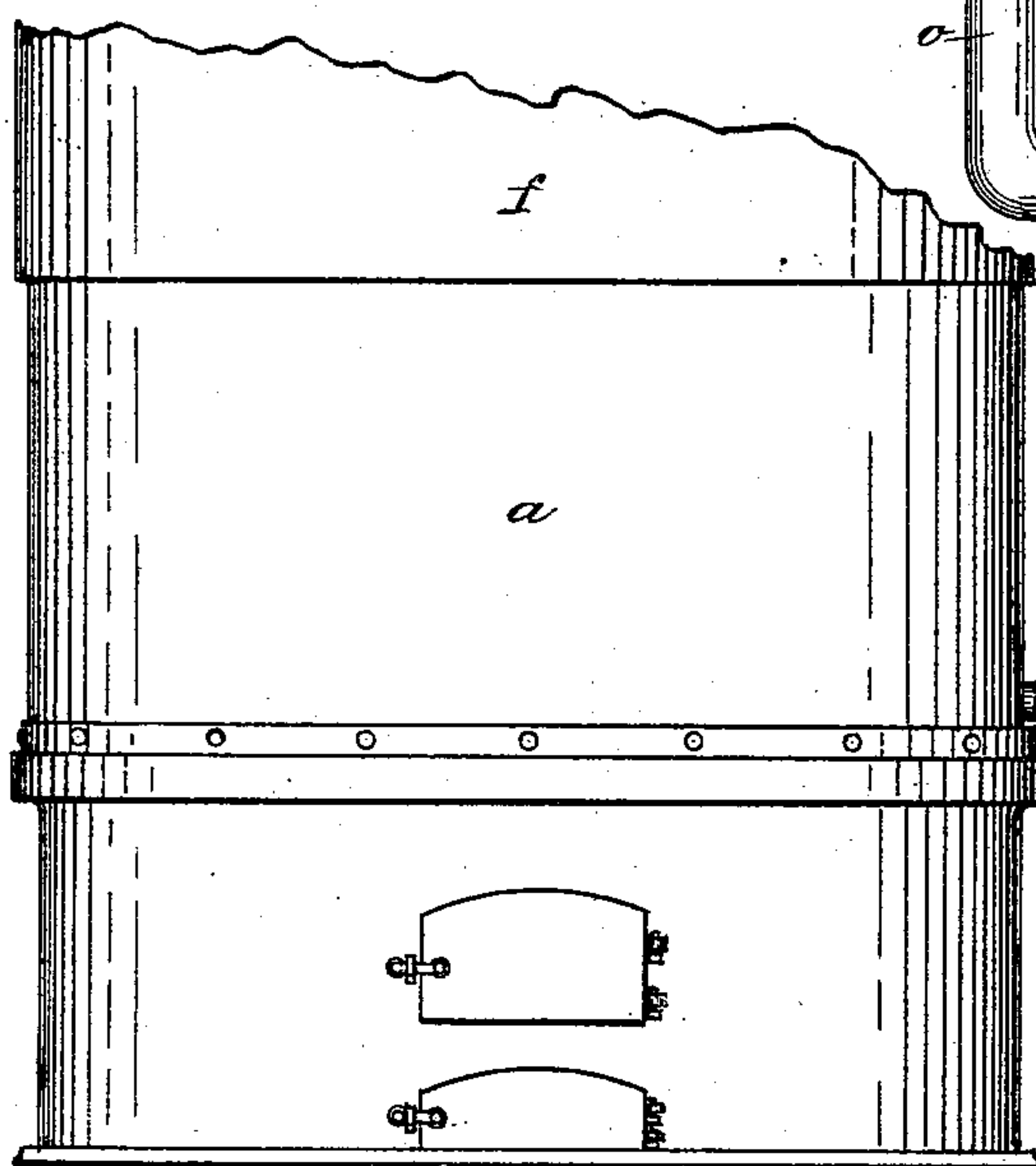
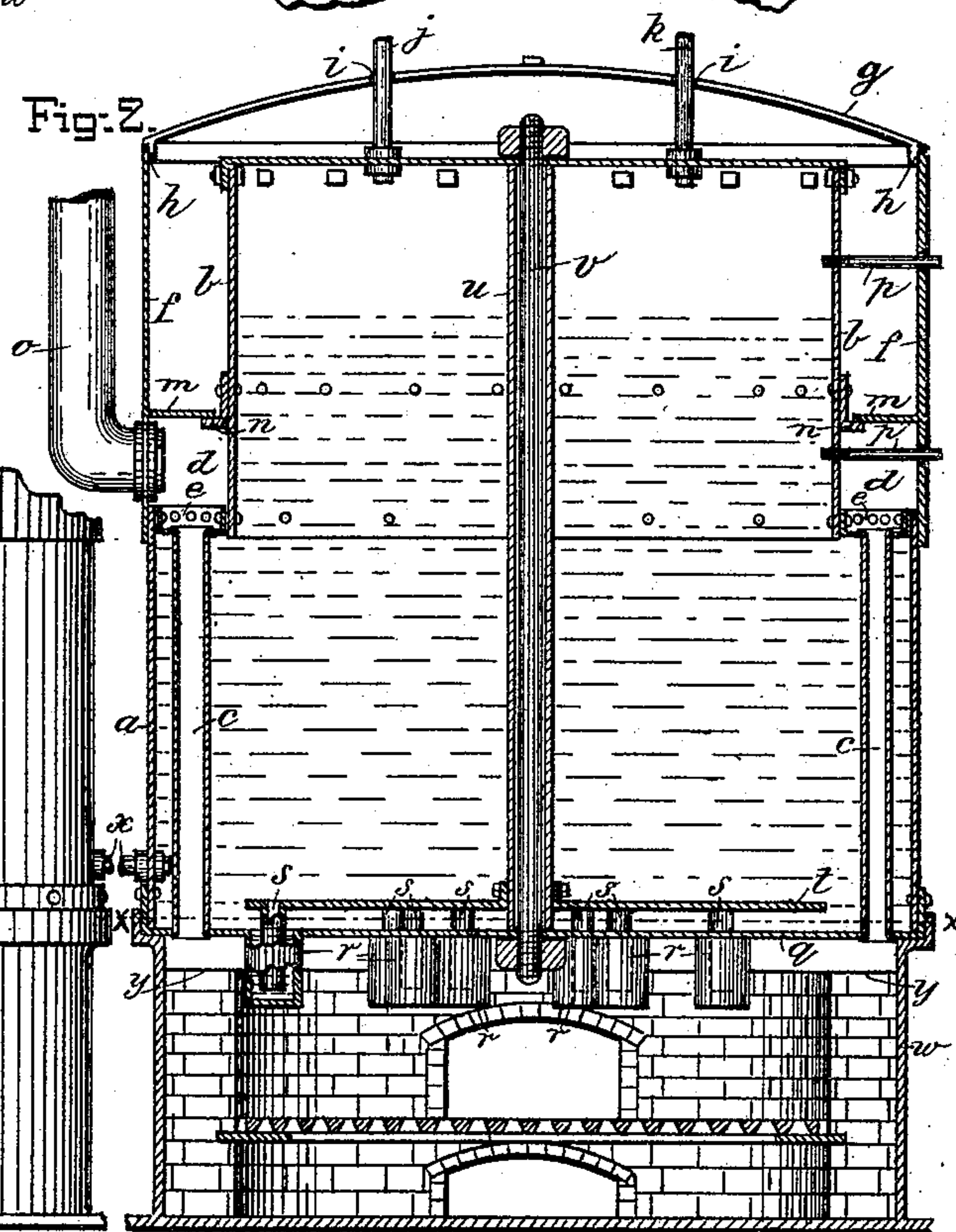


Fig-2.



WITNESSES:

*C. J. Morgan*  
*C. E. Whitney*

INVENTOR:

*Axel L. Bladholm*  
*By A. P. Thayer*  
*att'y*



# UNITED STATES PATENT OFFICE.

AXEL LEONARD BLADHOLM, OF CHICAGO, ILLINOIS.

## STEAM-BOILER.

SPECIFICATION forming part of Letters Patent No. 475,288, dated May 24, 1892.

Application filed April 28, 1891. Serial No. 390,726. (No model.)

To all whom it may concern:

Be it known that I, AXEL LEONARD BLADHOLM, a citizen of Sweden, and a resident of Chicago, in the county of Cook and State of Illinois, have invented new and useful Improvements in Steam-Boilers, of which the following is a specification.

The object of my invention is to provide a simple and cheap, and at the same time an efficient, upright boiler for steam-heating and for power purposes, the construction of which is hereinafter described and claimed, reference being made to the accompanying drawings, in which—

Figure 1 is a front elevation of a portion of my improved boiler. Fig. 2 is a central sectional elevation of the same. Fig. 3 is a horizontal section on line  $x x$ , Fig. 2; and Fig. 4 is a top view.

I make the shell in two sections  $a$  and  $b$ , of about equal length, but sufficiently different in diameter to permit a circle of vertical fire-tubes  $c$  in the outer portion of part  $a$ , which is the lower section of the shell, to discharge into an annular smoke-space  $d$  outside of the lower end of section  $b$ , where the two sections are joined by the ring-head or tube-sheet  $e$ , forming the offset for the outlet of said fire-tubes, over which there is a cover consisting of the cylinder  $f$ , of about the same size as shell  $a$  and joining the upper end of it and extending upward the height of section  $b$  or a little more and closed at the upper end by the top  $g$ , consisting of two parts divided through the middle and flanged at  $h$  to be confined on the top of cylinder  $f$ , said parts being notched in the uniting edges, as at  $i$ , to close on the pipes  $j$  and  $k$ , one of which may be for the safety-valve and the other for the steam. Said parts  $g$  of the top are each provided with a handle  $l$  for convenience in lifting them off when required.

At a suitable distance above the tube-sheet  $e$  for ample smoke-space an inwardly-projecting flange  $m$  is attached to cylinder  $f$  and rests on another like flange  $n$ , projecting from shell  $b$  to support cylinder  $f$  and to prevent the hot gases from rising higher along shell  $b$  than the water-level, for the protection of said shell above the water from too much heat. The smoke-pipe  $o$  is connected to cylinder  $f$  below the flange  $m$ .

$p$  indicates pipe attachments for the glass gage or try cocks.

In the lower head  $q$  I have provided short drop-tubes  $r$ , in which I provide for effective circulation by the smaller tubes  $s$ , suspended centrally in them from the disk  $t$ , suspended a short distance above said lower head, so that the water descending through tubes  $s$  will rise outside of them and flow to the outer edge of the disk and thence upward, while the cooler water will descend in the middle field to and through the circulating-tubes in a manner calculated to promote effective circulation. This circulating-tube-supporting disk may be suspended in any approved way, as by short legs which may rest on the head  $q$ ; but in this example of my invention I have represented it as connected at the center to a strut-tube  $u$ , which I fit between the two heads at the center for a stay to protect the heads against inward pressure, as when a vacuum may occur through condensation of the steam, and also for incasing a tension-rod  $v$ , which I insert through the heads for their protection against steam-pressure. The feed-water may be introduced at  $x$ .

I employ the usual metallic base  $w$  for the support of the boiler and to contain the fire-box, and inside of it I arrange the bridge-wall  $y$ , preferably of brick, to concentrate the hot gases on the drop-tubes for better effect by preventing them from rising directly into the fire-tubes  $c$  outside of the drop-tubes, as they otherwise would to a considerable extent.

It will be seen that by removing top  $g$  and detaching the try-cock tubes  $p$  and removing cylinder  $f$ , access can be had to the fire-tubes for cleaning them out.

I claim—

1. An upright boiler constructed in two sections, as  $a b$ , of different diameters, joined by the intermediate annular tube-sheet and having a circle of fire-tubes in the larger lower portion discharging into an annular space  $d$  above said tubes connected with the smoke-pipe, also having drop-tubes in the bottom, substantially as described.

2. The combination, with an upright boiler constructed in two sections, as  $a b$ , of different diameters, joined by the intermediate annular tube-sheet and having a circle of fire-tubes in the larger lower portion discharging



through said tube-sheet, of the cylinder *f*, joining the lower section and extending upward about the height of section *b*, the flanges separating the smoke-receiving space *d* from the space above, the cover seated on the top of said cylinder, and the smoke-pipe connected with said space *d*, substantially as described.

3. The combination, with the boiler having the drop-tubes in the lower head over the fire-box, of the circulating disks and tubes thereof suspended above said head, with the circulating-tubes extended into the drop-tubes for the downflow of the water and with open space at the outer portion of the disk for the upflow of the water, substantially as described.

4. The combination, with the boiler having the drop-tubes in the lower head over the fire-box, of the circulating disk and tubes thereof

suspended above said head, with the circulating-tubes extended into the drop-tubes and the central strut-tube extended to and connected with the heads of the boiler, said disk supported on said tube, substantially as described.

5. The combination, with the boiler having the drop-tubes in the lower head and the circle of fire-tubes in the outer portion, of the bridge-wall under said fire-tubes and confining the heat on the drop-tubes, substantially as described.

In testimony that I claim the foregoing as my invention I have signed my name, in presence of two witnesses, this 16th day of December, 1890.

AXEL LEONARD BLADHOLM.

Witnesses:

C. JOHNSON,  
J. E. WALDEN.