(No Model.) 2 Sheets—Sheet 1.

C. H. ROSS.

HOT WATER OR STEAM BOILER.

No. 457,522. Patented Aug. 11, 1891.

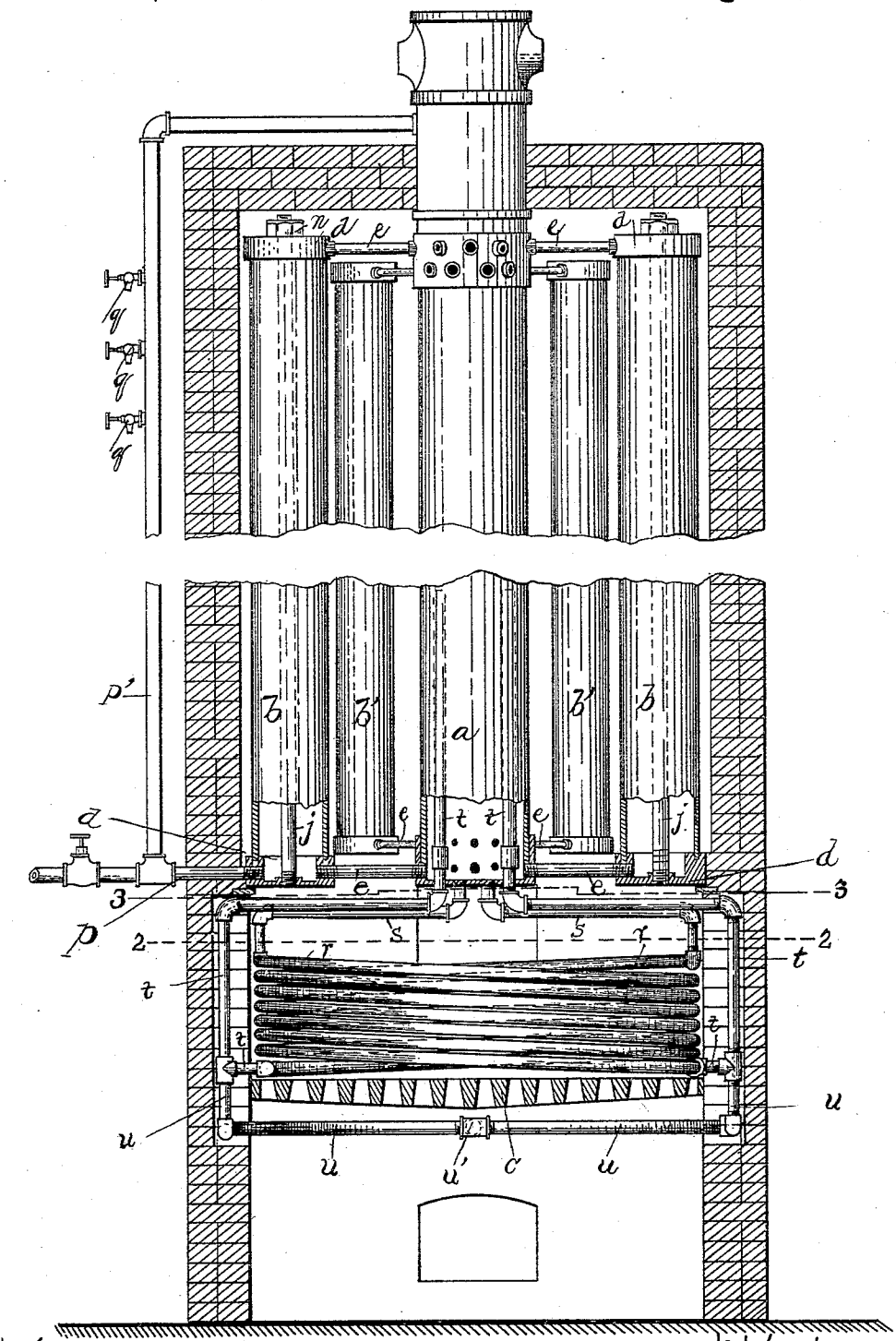


Fig. 1.

WITNESSES:
C. B. Bartlett
L. C. Brown

INVENTOR:
C. H. Ross
by Wright Brown Quinby & Atty.

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

(No Model.) 2 Sheets—Sheet 2.

C. H. ROSS.

HOT WATER OR STEAM BOILER.

No. 457,522. Patented Aug. 11, 1891.

Fig. 2.

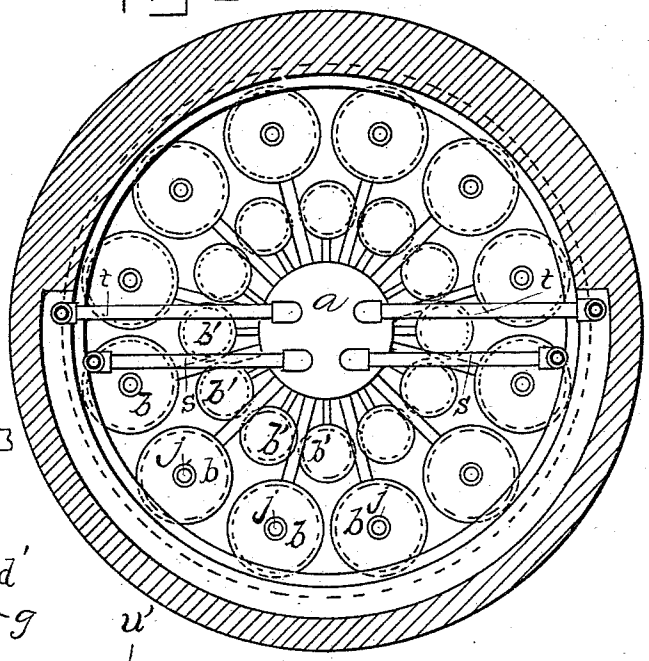


Fig. 4.

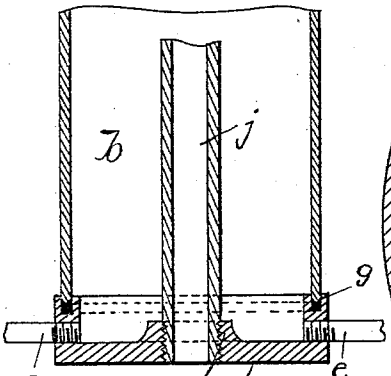


Fig. 5.

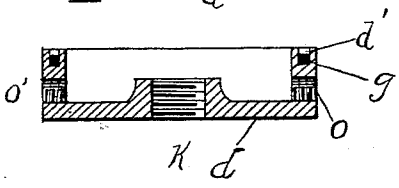
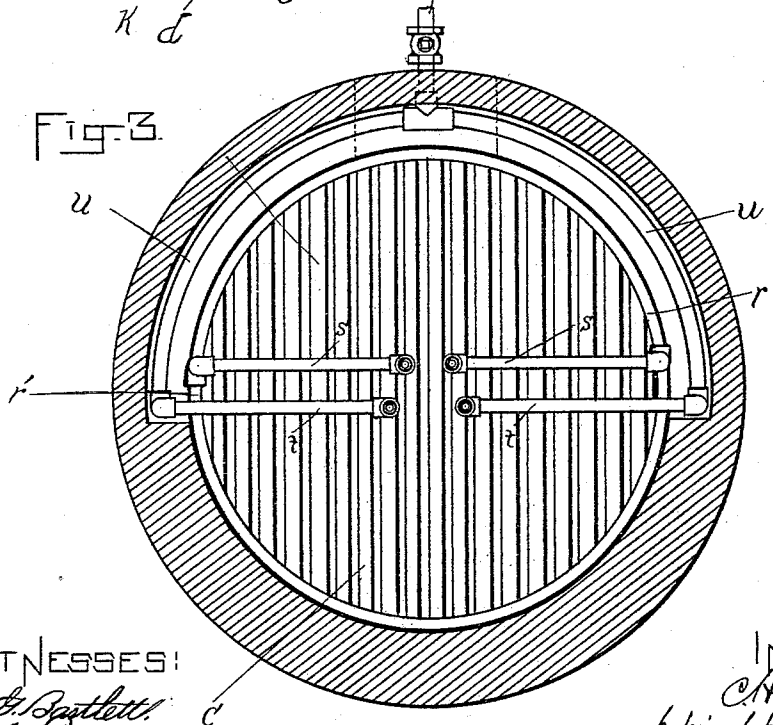


Fig. 3.



WITNESSES:
C. E. Bartlett.
K. E. Brown.

INVENTOR:
C. H. Ross
by Wright Brown Quinby & Otty.

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

CHARLES H. ROSS, OF READING, MASSACHUSETTS.

HOT-WATER OR STEAM BOILER.

SPECIFICATION forming part of Letters Patent No. 457,522, dated August 11, 1891.

Application filed September 3, 1890. Serial No. 363,867. (No model.)

To all whom it may concern:

Be it known that I, CHARLES H. ROSS, of Reading, in the county of Middlesex and State of Massachusetts, have invented certain new and useful Improvements in Hot-Water or Steam Boilers, of which the following is a specification.

This invention relates to a boiler of the kind shown in Letters Patent of the United States, granted to me February 11, 1890, said boiler being composed of a series of tubes of different sizes, one being larger than the others and arranged at the center of a circular series composed of smaller tubes, the central tube being connected with the surrounding tubes by horizontal pipes radiating from the central tube and connected with the upper and lower ends of the surrounding tubes.

My invention has for its object, first, to provide certain improvements in the construction of the smaller tubes or drums, and, secondly, to provide improved means co-operating with said drums for circulating and heating the water.

The invention consists in the improvements which I will now proceed to describe and claim.

Of the accompanying drawings, forming a part of this specification, Figure 1 represents a vertical section of my improved boiler and its casing or setting. Fig. 2 represents a horizontal section on line 2 2, Fig. 1, looking upwardly. Fig. 3 represents a section on line 3 3, Fig. 1, looking downwardly. Fig. 4 represents an enlarged sectional view of the lower end of one of the smaller drums. Fig. 5 represents a sectional view of one of the end caps or heads of one of the drums.

The same letters of reference indicate the same parts in all of the figures.

In the drawings, *a* represents the central drum, and *b b'* represent the smaller drums, which are arranged in a circular series around the central drum. The lower ends of all the drums are at substantially the same height and are located above the grate *c*, so that the heated products of combustion will circulate uniformly between the drums. The drums *b'* are preferably smaller than the drums *b*, in order that a suitable number of them may be placed between the central drum and the outer drums *b;* but my invention is not limited to this arrangement, and I may, if preferred, use only the central drum and the outer drums *b*. The drums *b* are of smaller diameter than the central drum, so that each of the drums *b* will contain a smaller volume of water, which will therefore be more quickly heated than the water in the central drum, thus causing an upward current in the drums *b* and a downward current in the central drum *a*, as described in my patent above mentioned. The drums *b* are provided at their ends with caps *d*, which receive the horizontal radiating pipes *e*, which connect the central drum with the drums *b*. In my former patent I have shown the caps *d* as having flanges which inclose the ends of the drums *b*, the latter being inserted in the caps until their ends come in contact with the inner surfaces of the heads of the caps.

In carrying out my present invention I make the caps *d* with thicker flanges than those shown in my former patent, so that the ends of the drums *b* will bear upon the edges of the said flanges. In the edge of each cap-flange I form an annular groove *d'*, as shown in Fig. 5, and in said groove I insert a ring *g*, of copper or other comparatively soft metal, which serves as a seat and packing for the adjacent ends of the drum *b*, said ring being of the same diameter as that of the drum, so that the entire end of the drum comes to a bearing on the ring. The ends of the drums are beveled, and thus brought to a comparatively sharp edge, as shown in Fig. 4, so that they may enter or indent the bearing-rings *g*, and thus form a water-tight joint.

j represents a tubular rod which extends through each drum *b*, the lower ends of said rods being externally screw-threaded and screwed into screw-threaded sockets *k*, Fig. 5, in the central portions of the caps *d* at the lower ends of the drums, while their upper ends extend through the caps *d* on the upper ends of the drums and are provided with nuts *n*, bearing on said caps, as shown in Fig. 1. It will be seen that the tubular rods *j*, extending through the drums *b* and engaged with the caps, as described, constitute not only a means for securing said caps to the drums, but also constitute small flues through which the heated products of combustion may pass through the drums *b*, said rods be-

ing open at both ends, so that the heating of the water will be made more rapid than it would be if the heat had access only to the external surfaces of the drums, as in the construction shown in my former patent.

I do not limit myself to making the rod *j* tubular in all cases, because said rod if made solid would serve the same purpose in securing the caps *d* of the drums; but I prefer the tubular form for the reason above indicated.

It will be seen that by providing the caps with soft-metal seats or packings and securing them to the drums by means of the rods *j*, extending through the drums, the parts of each drum *b* can be readily assembled and that the expense of constructing each drum *b* will be comparatively small, the construction being at the same time made sufficiently durable and reliable for all cases where only low pressure is required, as in boilers for hot-water heating.

The flanges of the caps *d* are provided with screw-threaded holes *o* to receive the connecting-pipes *e*, and the flange of one of said caps has a hole *o'* to receive the pipe *p*, which extends from the lower end of one of the drums *b* to the vertical pipe *p'*, the latter being connected at its upper end to the upper portion of the central drum *a* and provided with suitable gage-cocks *q* when the apparatus is used to generate steam. The said screw-threaded holes *o'* are wholly independent of the grooves *d'* that receive the packings *g* and the ends of the drums, and constitute ready means for connecting the drums *b* with the central drum by the pipes *e*. The holes *o*, being independent of the drums *b*, can be made in the caps before the latter are applied to the drums.

Water may be supplied through the coil to the drums through the pipe *u*, which may be connected to the return-pipes of the radiators or to an independent water-supply.

To facilitate the heating of the water, I provide one or more coils of pipe, arranged to form tubulous lining for the fire-pot, immediately over the grate. I prefer, and have here shown, two coils *r r'*, the convolutions of one coil alternating with those of the other, so that both coils form an inclosure which is adapted to contain a mass of burning coal. The upper portion of each coil is connected by a pipe *s* with the central drum *a*, and the lower portion of each coil is connected with said drum by a pipe *t*, so that the water that is heated in the coils passes upwardly into the central drum through the pipes *s s*, and a like volume of water is drawn through the pipes *t t* to the lower portions of the coils, a continual circulation of water being thus maintained through the coils. The pipes *t t* communicate with the drum *a* at a higher point than the pipes *s s*, so that the water entering the drum by the pipes *s s* rises in the drum *a* and does not pass directly back through the pipes *t t*.

u u represent pipes which extend from the lower portions of the coils *r r'* to an outlet-pipe *u'*, so that water may be drawn off from the coils when desired.

The water from the pipes *s s* enters the outer pipes *b b' b' b* through the connecting-pipes *e*, and the tendency is to rise and enter the central pipe *a* at its upper end. Said pipe being the larger is cooler, and the tendency of the water is to fall and to enter the pipes *f f* at the top thereof, passing again into the coil at the bottom of the same, and thus the circulation is continued.

I claim—

1. In a hot-water heater or boiler, the combination, with the central drum, of the series of small drums *b*, surrounding the central drum, each drum *b* being composed of a tube, and caps *d d*, having flanges bearing against the ends of said tube, and tubular rods *j*, secured at their ends to said caps and extending longitudinally through the tubes, as set forth.

2. The end caps *d*, having thickened flanges to engage with the ends of the drums and provided with independent screw-threaded holes or sockets for the reception of the connecting-pipes *e*, as set forth.

3. The end caps *d*, having thickened flanges provided with grooves to receive the ends of the drums, and independent screw-threaded holes or sockets for the reception of the connecting-pipes *e*, as set forth.

4. The combination of a furnace or fire-box, a receptacle, as the drum *a*, over the same, coils *r r'*, arranged with their convolutions alternating and forming a tubulous lining for the fire-box, pipes *s s*, connecting the upper portions of the coils with the receptacle, and pipes *t t*, connecting the lower portions of the coils with the receptacle, as set forth.

5. The combination of a furnace or fire-box, a receptacle, as the drum *a*, over the same, coils *r r'*, arranged with their convolutions alternating and forming a tubulous lining for the fire-box, pipes *s s*, connecting the upper portions of the coils with the receptacle, pipes *t t*, connecting the lower portions of the coils with the receptacle, and the outlet-pipes *u u u'*, connected with the lower portions of said coils, as set forth.

In testimony whereof I have signed my name to this specification, in the presence of two subscribing witnesses, this 31st day of July, A. D. 1890.

C. H. ROSS.

Witnesses:
C. F. BROWN,
ARTHUR W. CROSSLEY.