

No. 690,701.

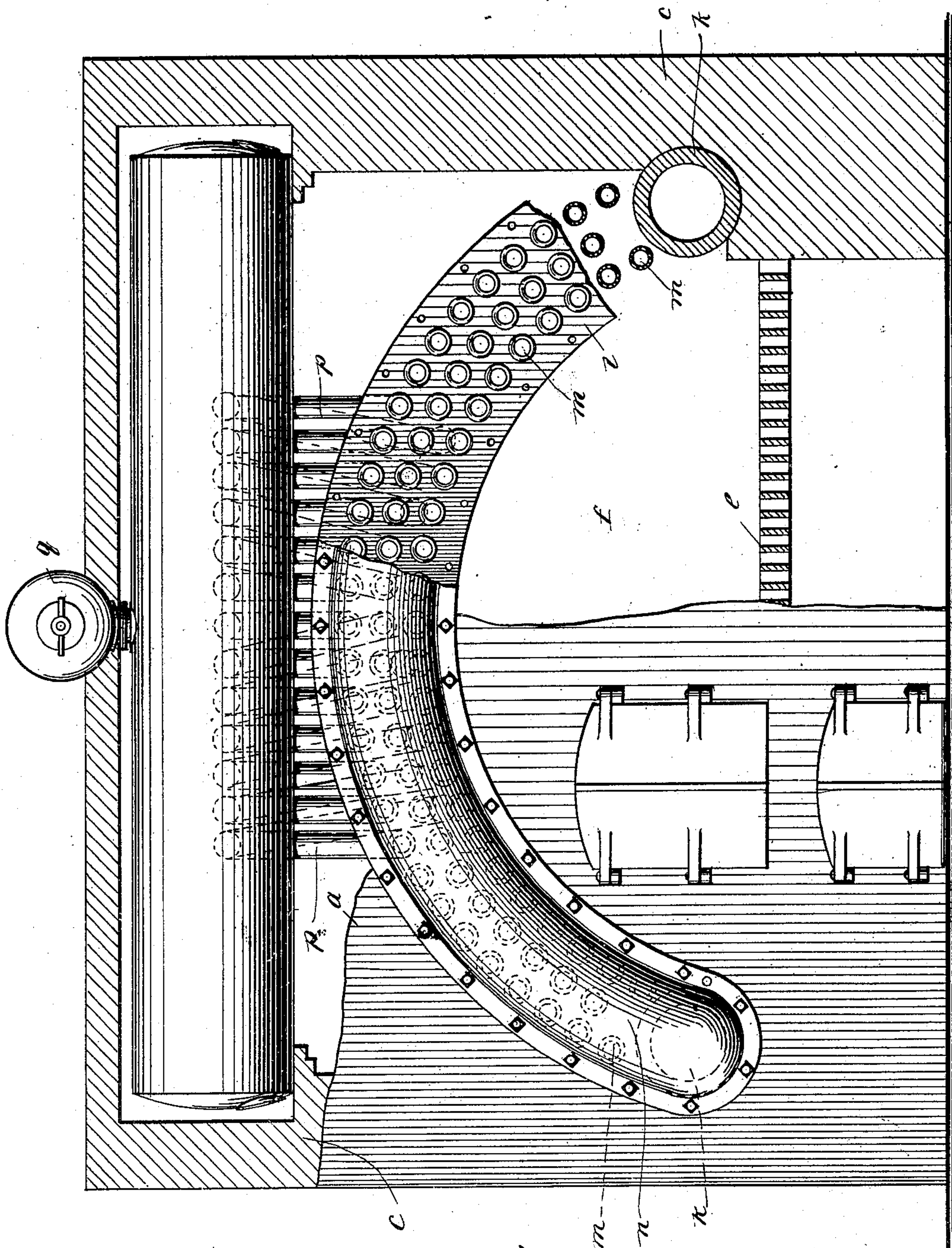
Patented Jan. 7, 1902.

C. J. CRONIN.
BOILER.

(Application filed Aug. 31, 1901.)

(No Model.)

2 Sheets—Sheet 1.



WITNESSES:

John A. Bingham

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Fig. 1

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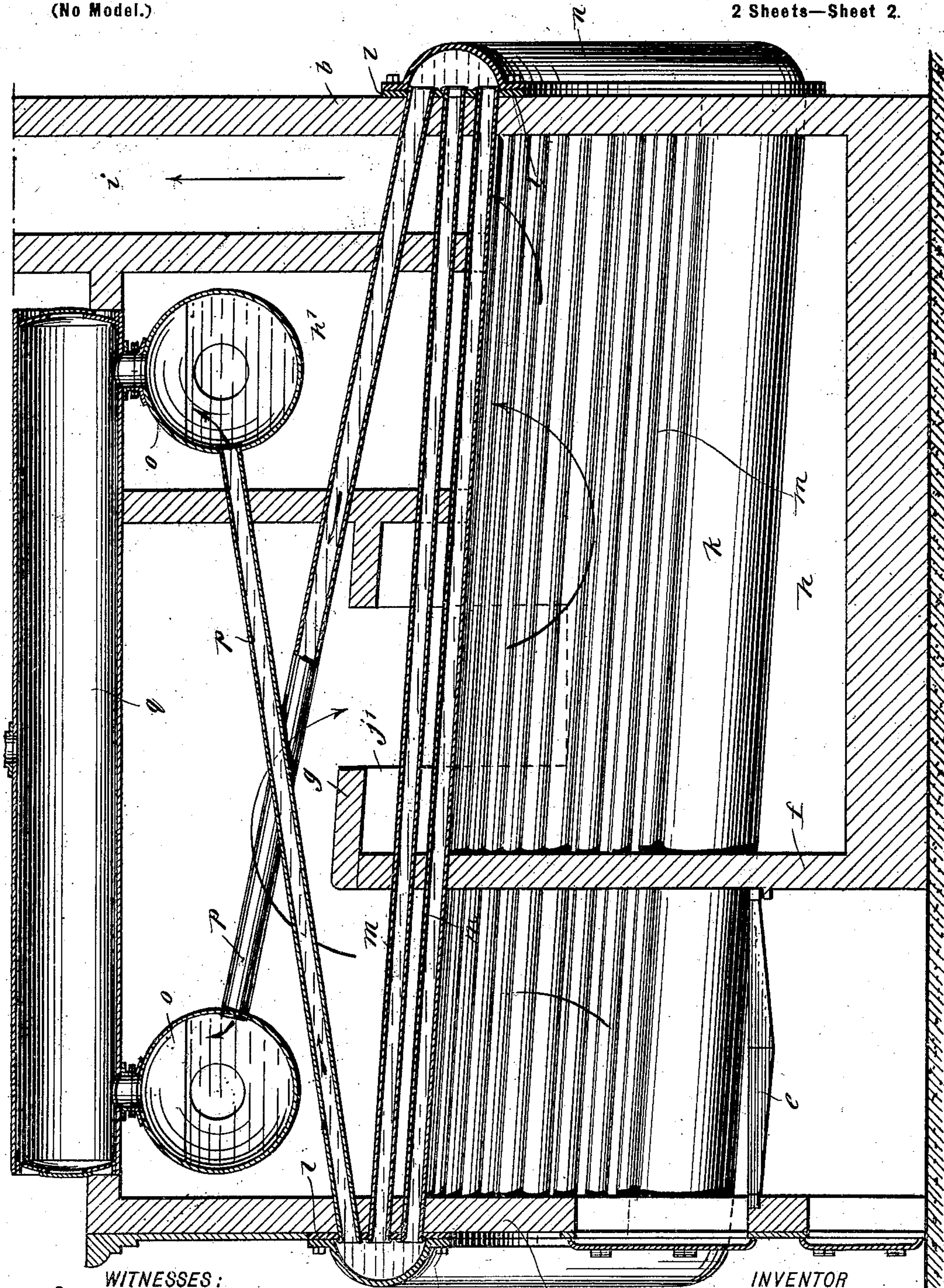
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WITNESSES:

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J. B. Owens

INVENTOR

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Fig. 2

UNITED STATES PATENT OFFICE.

CORNELIUS J. CRONIN, OF YOUNGSTOWN, OHIO.

BOILER.

SPECIFICATION forming part of Letters Patent No. 690,701, dated January 7, 1902.

Application filed August 31, 1901. Serial No. 73,921. (No model.)

To all whom it may concern:

Be it known that I, CORNELIUS J. CRONIN, a citizen of the United States, and a resident of Youngstown, in the county of Mahoning and State of Ohio, have invented a new and Improved Boiler, of which the following is a full, clear, and exact description.

This invention relates to a water-tube boiler; and the object is to so dispose the water-carrying pipes that they will be more effectively subjected to the action of the furnace fire, and thus increase the efficiency of the boiler.

It is also an object of my invention to provide means by which the capacity of the boiler may be increased, which end I attain by supplying additional tubes arranged in layers.

A further object is to provide easy and convenient means for cleaning the tubes and removing defective tubes and substituting new ones in their place.

This specification is a specific description of one form of the invention, while the claims are definitions of the actual scope thereof.

Reference is to be had to the accompanying drawings, forming a part of this specification, in which similar characters of reference indicate corresponding parts in both views.

Figure 1 is a front view of a boiler with parts broken away on irregular lines to show the interior construction thereof, and Fig. 2 is a longitudinal section of the boiler.

a indicates the front wall of the boiler masonry or casing, and *b* the back wall.

c indicates the side walls.

e indicates the grate in the fire-box, and *f* indicates a bridge-wall, which is arranged back of the fire-box. This bridge-wall has an arc-shaped upper edge on which is arranged a correspondingly shaped partition *g*. The partition *g* and bridge-wall *f* form the combustion-chamber *h*. At the top of the combustion-chamber *h* is an auxiliary combustion-chamber *h'*, and from the rear end of the combustion-chamber leads the stack *i*.

j indicates an opening in the partition *g*, through which the burning gases pass from the fire-box downward into the combustion-chamber.

k indicates two mud-drums which extend throughout the length of the boiler and are located one at each side thereof, these drums

being seated in the masonry of the boiler and extending from the front wall *a* to the rear wall *b* and through said walls. At the outer side of each wall *a* and *b* is an arc-shaped tube-sheet *l*, the front tube-sheet being arranged at a higher elevation than the rear tube-sheet. The mud-drums *k* are also inclined, as shown in Fig. 2.

Passing through the front and rear walls of the boiler and through the tube-sheets *l* are the water-tubes *m*. These tubes also extend through the bridge-wall *f* and form an arch over the fire-box and combustion-chamber, the tubes covering the entire area of each tube-sheet from one mud-drum to the other.

n indicates arc-shaped heads, which are bolted or otherwise fastened to the tube-sheets *l* at the outer sides thereof. These parts *l* and *n* form arc-shaped water-passages with which the tubes *m* communicate. The mud-drums *k* also communicate with these passages. Now by reference to the drawings it will be seen that the peculiar arrangement of the tubes insures that all of the heat generated in the fire-box and combustion-chamber will be applied directly to the water-tubes. These tubes are not merely at the top of the water-space, but are at the top and side thereof, so that the fire of the furnace instead of being wasted against the brick walls, as heretofore, acts not only at the top but at the sides on water-tubes forming active circulating parts of the boiler.

o indicates two drums, which extend transversely of the boiler above the tubes, one being located just over the fire-box and the other being located in the auxiliary combustion-chamber *h'*. These drums *o* are connected by a number of tubes *p* with the tube-sheets *l*. The front drum *o* is connected with the rear tube-sheet, and the rear drum is connected with the front tube-sheet, the tubes *p* crossing each other alternately, as indicated. These tubes *p* communicate with the water-space between the parts *l* and *n* the same as the tubes *m*.

q indicates a steam drum or dome communicating with and extending between the drums *o*.

A boiler thus constructed insures a more intimate contact between the fire and the

water-carrying pipes than heretofore, and consequently a more efficient generation of steam is assured.

It will be observed that by removing the
5 oval heads *n* access may be had to the tubes, which may then be readily cleaned by passing a swab through them. Also if it becomes necessary to remove a tube it can be done by simply cutting away the upset end at the
10 outer surface and then the tube can be forced out through the opposite tube-sheet and without being obliged to go into the boiler.

Various changes in the form, proportions, and minor details of my invention may be re-
15 sorted to without departing from the spirit and scope of my invention. Hence I consider myself entitled to all such variations as may lie within the scope of my claims.

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

1. In a steam-boiler, the combination of a number of water-tubes arranged in arched form over and around the fire-box and ex-
25 tending down into the vicinity of the grate at the sides thereof, the arched tube-sheet securing said tubes in place, the arch-shaped heads of oval cross-sectional form fastened to the tube-sheets to form the water-passages
30 with which said tubes communicate, and the mud-drums communicating with said water-passages and extending longitudinally along each side of the boiler substantially parallel with and the full length of the water-tubes.

2. A boiler having a fire-box, a number of water-tubes arranged in arc-shaped form over the fire-box to surround the top and sides thereof, means forming arc-shaped water-pas-
35 sages with which the ends of the tubes communicate, and a mud-drum extending longitudinally along each side of the fire-box essentially parallel with the water-tubes and communicating with said water-passages.

3. A boiler having a fire-box, a number of
45 water-tubes arranged in arc-shaped form over the fire-box to surround the top and sides thereof, means forming arc-shaped water-passages with which the ends of the tubes com-

municate, a mud-drum extending longitudi- 50
nally along each side of the fire-box essentially parallel with the water-tubes and communicating with said water-passages, trans-
verse drums located above the water-tubes, and tubes passing from the said arc-shaped
55 water-passages to the said transverse drums.

4. A boiler having a fire-box, a number of water-tubes arranged in arc-shaped form over the fire-box to surround the top and sides thereof, means forming arc-shaped water-pas-
60 sages with which the ends of the tubes communicate, a mud-drum extending longitudinally along each side of the fire-box essentially parallel with the water-tubes and communicating with said water-passages, trans-
65 verse drums located above the water-tubes, tubes passing from the said arc-shaped water-passages to the said transverse drums, and a steam-dome extending longitudinally of the boiler and communicating at its ends with said
70 transverse drums.

5. A boiler having a casing comprising op-
posite walls, water-tubes extending through the casing from one of said walls to the other, a tube-sheet lying against the outer surface
75 of each wall, through which tube-sheets all of said tubes are passed, and an outwardly-bulged head fastened over each tube-sheet to form on each of said opposite walls of the cas-
80 ing a water-passage with which the tubes communicate.

6. A boiler having means forming water-passages, water-tubes extending between said
85 passages, drums located above the tubes respectively adjacent to the passages, and additional tubes connecting the drums with the water-passages, the said additional tubes extending alternately across each other to connect together in pairs the distant drums and water-passages.

In testimony whereof I have signed my
90 name to this specification in the presence of two subscribing witnesses.

CORNELIUS J. CRONIN.

Witnesses:

J. EDGAR RUDGE,
KATHERINE CONNOR.