

No. 725,392.

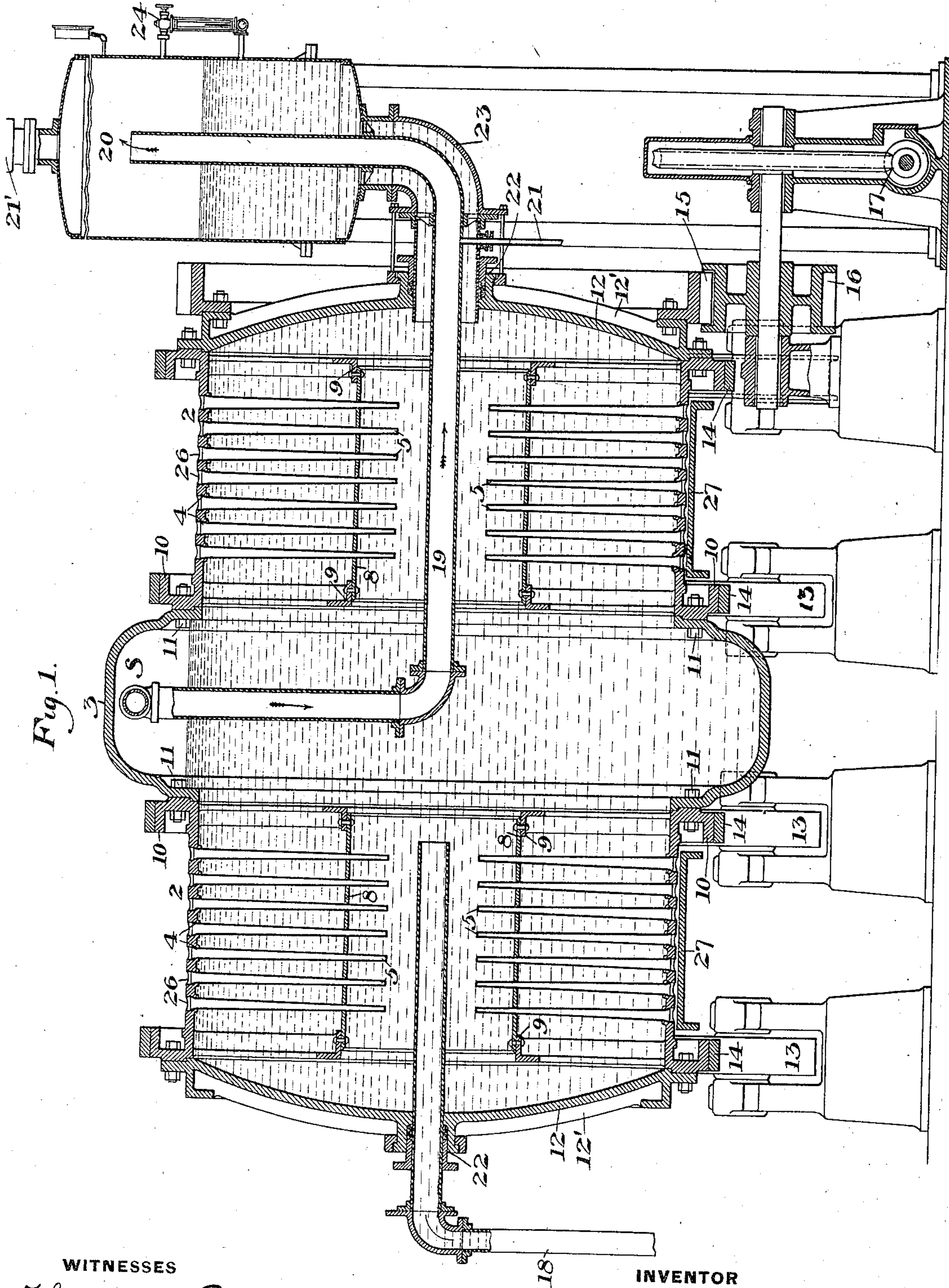
PATENTED APR. 14, 1903.

R. BAGGALEY.
BOILER.

APPLICATION FILED NOV. 20, 1902.

NO MODEL.

3 SHEETS—SHEET 1.



WITNESSES

Thomas W. Baxendell
Warren W. Swartz

INVENTOR

Ralph Baggageley

No. 725,392.

PATENTED APR. 14, 1903.

R. BAGGALEY.
BOILER.

APPLICATION FILED NOV. 20, 1902.

NO MODEL.

3 SHEETS--SHEET 2.

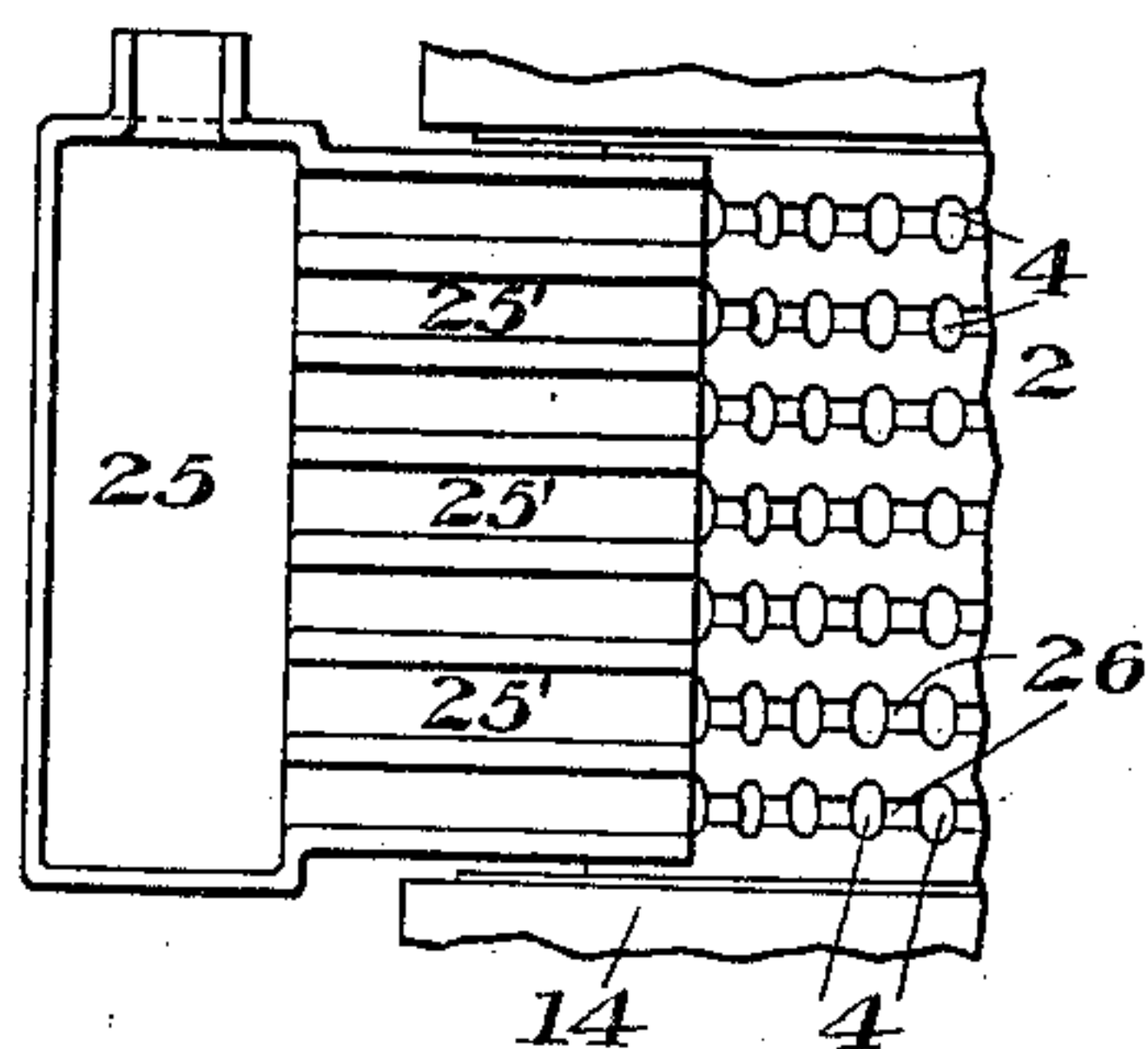


Fig. 3.

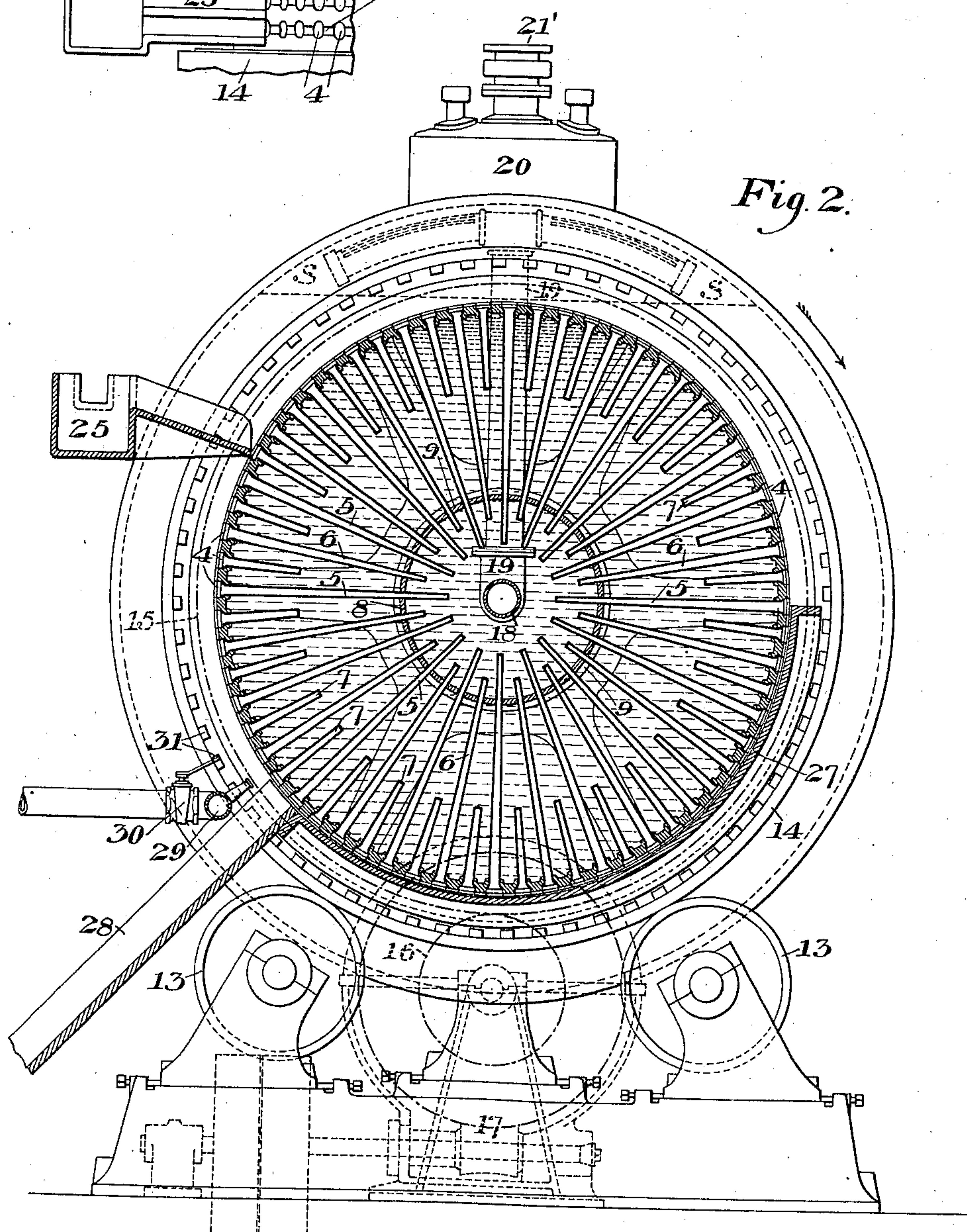


Fig. 2.

WITNESSES

Thomas W. Baxendell
Warren W. Swartz

INVENTOR

Capl. Bagdaley.

No. 725,392.

PATENTED APR. 14, 1903.

R. BAGGALEY.

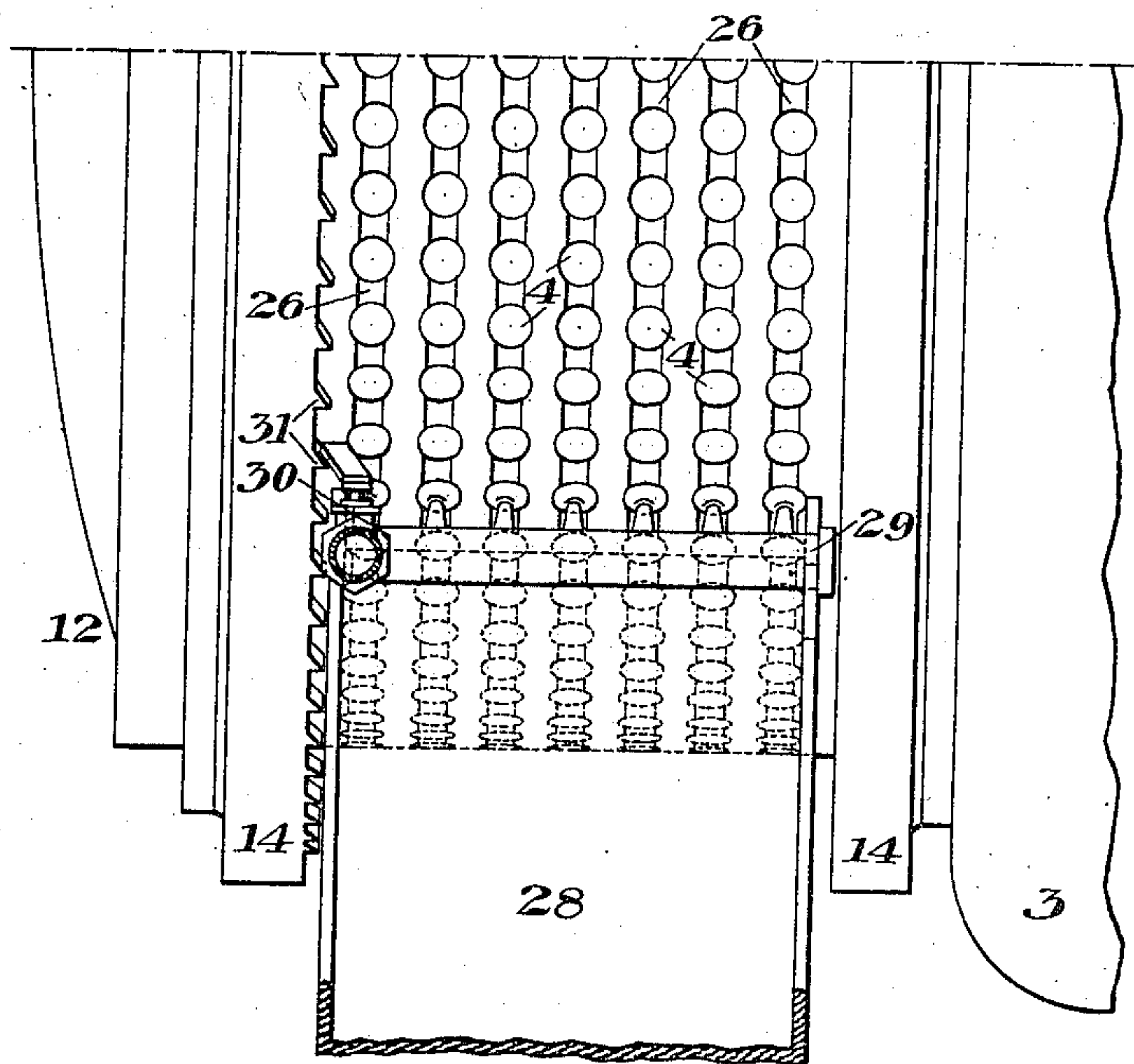
BOILER.

APPLICATION FILED NOV. 20, 1902.

NO MODEL.

3 SHEETS—SHEET 3.

Fig. 4.



WITNESSES

Thomas W. Baxwell
Warren U. Swartz

INVENTOR

Ralph Baggage

UNITED STATES PATENT OFFICE.

RALPH BAGGALEY, OF PITTSBURG, PENNSYLVANIA.

BOILER.

SPECIFICATION forming part of Letters Patent No. 725,392, dated April 14, 1903.

Application filed November 20, 1902. Serial No. 132,131. (No model.)

To all whom it may concern:

Be it known that I, RALPH BAGGALEY, of Pittsburgh, Allegheny county, Pennsylvania, have invented a new and useful Boiler, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, in which—

Figure 1 is a longitudinal section of a boiler embodying my invention. Fig. 2 is a cross-section thereof. Fig. 3 is a partial plan view showing the slag-feeding spout and a portion of the boiler-shell. Fig. 4 is a detail sectional side elevation, on a larger scale, showing the means I employ to effect the discharge of the slag.

My invention relates to an improvement on the boiler claimed in an application of Oliver S. Garretson, filed November 20, 1902, Serial No. 132,109. That application shows a rotary steam-boiler having tubes or receptacles extending into the water-space and adapted to receive molten slag, the heat of which is communicated to the water through the tubes. As the boiler rotates and the slag-tubes are inverted the congealed slag is discharged.

My invention consists, first, in providing such boiler with gutters which connect the tubes of each row with the corresponding tubes of the adjacent row. These gutters serve to direct the molten slag into the tubes when it is poured upon the surface of the boiler and cause the slag which fails to run into or which overflows from any tube to flow into the next succeeding tube.

The second feature of my invention consists in the use of means for insuring the free discharge of the slag from the inverted tubes.

My investigations have shown, particularly with silicate-of-lime slags, that the slag is apt to cool in concentric layers, and thus has a tendency to bind in the tubes, so that means other than gravity alone must be employed in order to insure its certain discharge. I therefore provide opposite to the place of discharge a row of pipes or nozzles adapted to direct into the tubes jets, under pressure, of air, steam, or water, preferably the latter, which striking the congealed but still hot slag, will cause it to shrink or disintegrate and to drop in pieces from the tubes. The pressure at which the jets are applied may, if necessary, be high enough to wash the fractured or dis-

integrated slag mechanically from the tubes irrespective of the action of gravity, the purpose being to clean the tubes of congealed slag and to leave them free to be recharged when they next come opposite to the spout or runner from which the molten slag is poured.

A third feature of my invention consists in applying to a rotary steam-boiler a steam and water column, which communicates with the water-space and also communicates through the trunnions with the steam-space of the boiler. A water-gage is applied to this column and affords reliable means for watching the level of the water in order to prevent it at any time from falling so low as to expose any part of the slag-tubes without water protection to the corrosive action of the hot slag.

These features of my invention are of practical importance and obviate difficulties which otherwise might at times cause serious trouble. They contribute greatly to the success of the boiler, especially when used with certain slags.

Referring now to the drawings, the boiler is preferably composed of sections 2 2 and 3, which may be steel castings or plate metal, having openings 4, in which the tapering slag-tubes 5, 6, and 7 are inserted and secured by expanding their outer ends. These slag-tubes taper and are closed at their inner smaller ends, being inserted radially in the boiler. I prefer to employ several sets of tubes of different lengths, so that a large number of them can be arranged in the boiler; and for the purpose of bracing the longer tubes 5 6 laterally I prefer to employ annular bracing-shells 8, concentric with the sections 2 2 and held therein by annular brackets or flanges 9. The tubes project through these shells and are braced thereby, but are free to expand and contract longitudinally. The steam-section 3 is of greater diameter than the sections 2 2 and may be clamped thereto by flanges 10 and bolts 11, and the ends or heads 12 of the boiler may be similarly secured to the ends of the sections 2 2 and may be formed with strengthening-flanges 12'. The boiler thus constituted is supported on a cradle composed of rollers or wheels 13, bearing upon annular rims or tires 14, which may be applied to the boiler-shell, preferably to the flanges thereof, or the rollers may be caused

to bear directly upon suitable portions of the boiler-shell itself. These rollers render the boiler rotary on its longitudinal axis, and for the purpose of rotating it or controlling its speed of rotation the boiler-shell is provided with an annular series of gear-teeth 15, meshing with a pinion 16, connected by worm-gearing 17 with a suitable motor. The roller at one end of the boiler is flanged to serve as a guiding-roller, which is preferably at the end of the boiler having the gearing; but the other rollers are unflanged and permit free longitudinal expansion and contraction of the shell.

By supporting the boiler upon rotary surfaces instead of supporting it on trunnions the difficulties incident to heating of the bearings and destruction of lubricant are avoided and many other advantages are obtained. 18 is the feed-water pipe, and 19 is the steam-education pipe, which extends from the steam-space S in the section 3 into the steam-space of a steam and water column 20 and has a drain-pipe 21 for removing water of condensation. The water-space of the column 20 is connected with the boiler by a pipe 23, through which the pipe 19 passes. The pipes 18 and 19 do not rotate with the boiler, but are fixed and pass through stuffing-boxes 22, located in the axial line of the boiler. The column 20 has a steam-education pipe 21' and is provided with a water-gage 24, at which the level of water in the boiler may be observed. In regulating the water-level it is important that it should be high enough to fill the boiler-sections 2 2 and to keep the slag-tubes 5, 6, and 7 submerged throughout their length. The use of the section 3, of larger diameter, enables me to maintain such water-level and at the same time to afford a sufficient steam-space S in the upper portion of the boiler.

To supply the slag-tubes with slag for the purpose of heating the water, I employ a spout 25, through which molten slag may be poured from a ladle or discharged from the furnaces. Its delivery is somewhat above the horizontal axis of the boiler, and it has a series of gutters 25', one for each of the rows of tubes, situated directly above short gutters 26, which are formed on the boiler-shell between the openings of the tubes, so that the slag which fails to run into or overflows from one tube will flow into the next succeeding one. These gutters, as above stated, are of my invention.

The operation is as follows: The boiler having been filled with water to the normal water-level is rotated slowly in the direction of the arrow—say at the rate of one revolution per hour, more or less—and slag is charged into the spout 25 and flows from the gutters 25' into the open ends of the tubes. Each line of tubes as it comes opposite to the slag-spout receives a charge of slag, which communicates its heat to the water through the

walls of the tubes and solidifies and shrinks therein, so that the congealed body is of less cross-section than the bore of its tube. As the tubes reach the level of the axis of the boiler on the opposite side from the slag-spout they come opposite to a shield 27, which extends concentrically with the periphery of the boiler to a slag-discharge chute 28, at which it terminates. This shield prevents the solidified blocks of slag from dropping prematurely; but when they reach the discharge 28 they drop from the tubes and fall into a suitable receptacle or conveyer. When certain kinds of slag are used, it is necessary to facilitate its discharge and dislodge it forcibly from the tubes. For this purpose I set opposite to each circular line of tubes a jet-pipe 29, connected with a source of air, water, or steam, preferably water. Such pipe has a valve 30, which as the tubes come in succession opposite to the pipe is engaged by a projection 31 on the boiler or is otherwise opened automatically and discharges a cooling jet into the mouth of the tube against the slag. The rapid contraction of the slag which this occasions causes it to drop in pieces from the tube into the chute, and its discharge is aided where water is used both by its cooling effect and its weight. As the tube moves on it is closed automatically by a spring or otherwise and shuts off the jet; but, if desired, the valves may be dispensed with and the jets rendered continuous.

The motor for rotating the boiler need only be used as a driving-motor at the beginning of the operation when the tubes are empty, for when the tubes are filled with slag, there being more charged tubes on one side of the boiler than on the other or slag-discharge side, the boiler will be rotated by the weight of the slag and the engine need only be employed to regulate the speed of rotation.

Within the scope of my invention as defined in the claims the skilled mechanic may vary the construction in many ways, since

What I claim is—

1. A steam-boiler having a rotary boiler-shell, slag tubes or receptacles extending thereinto and adapted to receive molten slag, and gutters connecting the mouths of succeeding tubes and adapted to conduct slag which overflows from or fails to enter one tube and to cause it to enter the next; substantially as described.

2. A steam-boiler having a rotary boiler-shell, slag tubes or receptacles extending thereinto and adapted to receive molten slag, gutters connecting the mouths of the tubes, and a spout adapted to deliver the slag to the tubes; substantially as described.

3. A steam-boiler having slag receptacles or tubes adapted to be inverted for discharge of the slag, and means for dislodging the slag from the receptacles or tubes; substantially as described.

4. A steam-boiler having slag receptacles

or tubes adapted to be inverted for discharge of the slag, and pipes adapted to deliver jets of fluid into the tubes to dislodge the slag therefrom; substantially as described.

5 5. A steam-boiler having slag receptacles or tubes adapted to be inverted for discharge of the slag, pipes adapted to deliver jets of fluid into the tubes to dislodge the slag therefrom, and means for automatically causing a
10 discharge from said jets when the tubes reach the proper position; substantially as described.

15 6. A rotary steam-boiler having slag receptacles or tubes and having a steam and water column communicating with the water-space, and also communicating with the steam-

space through the axis of the boiler; substantially as described.

7. A rotary steam-boiler having slag receptacles or tubes and having a steam and water 20 column, communicating with the water-space, and also communicating with the steam-space through the axis of the boiler, and a water-gage applied to the steam and water column; substantially as described. 25

In testimony whereof I have hereunto set my hand.

RALPH BAGGALEY.

Witnesses:

GEO. B. BLEMING,
JOHN MILLER.