

R. R. ROW.

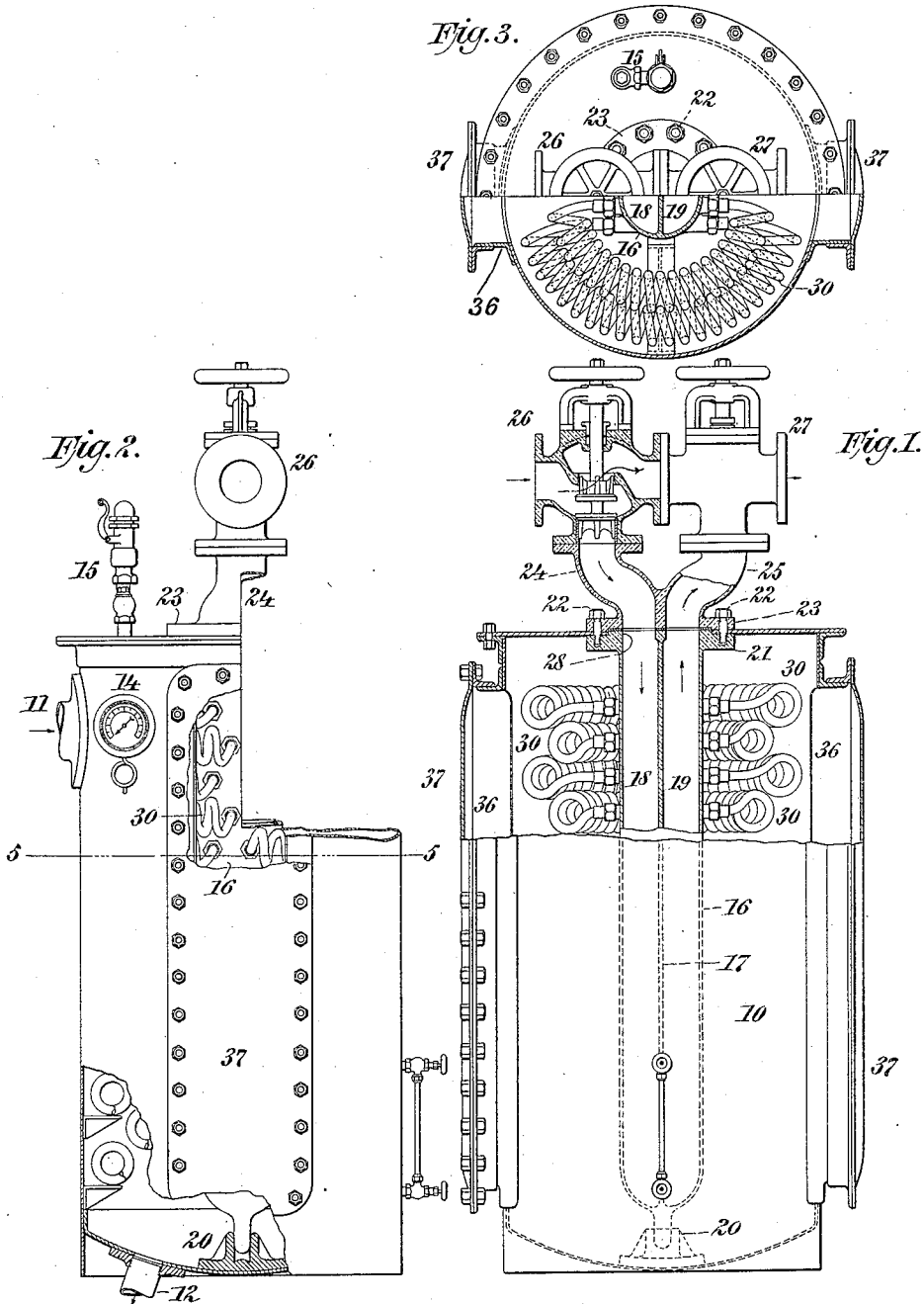
HEAT TRANSFERRING APPARATUS.

APPLICATION FILED OCT. 29, 1907. RENEWED DEC. 30, 1911.

1,064,775.

Patented June 17, 1913.

2 SHEETS—SHEET 1.



WITNESSES:

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2 SHEETS—SHEET 2.

Fig. 4.

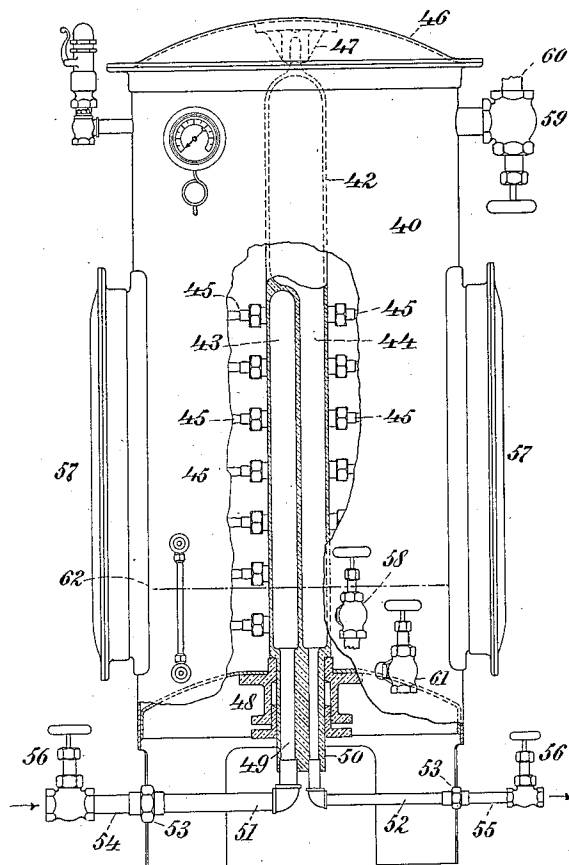
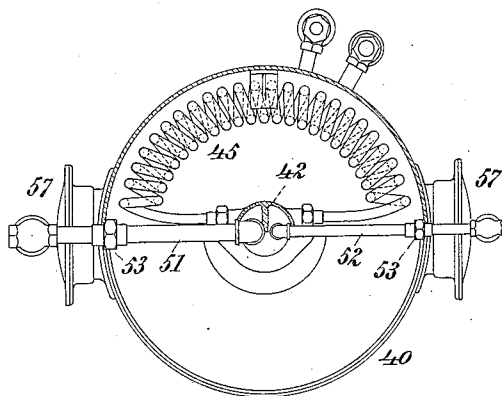


Fig. 5.



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UNITED STATES PATENT OFFICE.

REUBEN R. ROW, OF JERSEY CITY, NEW JERSEY.

HEAT-TRANSFERRING APPARATUS.

1,064,775.

Specification of Letters Patent.

Patented June 17, 1913.

Application filed October 29, 1907, Serial No. 399,735. Renewed December 30, 1911. Serial No. 668,763.

To all whom it may concern:

Be it known that I, REUBEN R. ROW, a citizen of the United States, and a resident of Jersey City, in the county of Hudson and State of New Jersey, have invented certain new and useful Improvements in Heat-Transferring Apparatus, of which the following is a specification.

The invention relates to improvements in heat transferring apparatus, and it consists in the novel features hereinafter described and particularly pointed out in the claims.

The object of the invention is to provide a novel, compact and highly efficient heat transferring apparatus, possessing maximum heating or effective surfaces.

A further object is to so arrange the coils that they may be readily gotten at by a workman when necessary.

The invention will be fully understood from the detailed description hereinafter presented, reference being had to the accompanying drawings, in which:

Figure 1 is a side elevation, partly in central vertical section, of a feed water-heater or condenser embodying the invention; Fig. 2 is an elevation, partly broken away and partly in section, taken from the left hand side of Fig. 1; Fig. 3 is a top view, with one-half in horizontal section; Fig. 4 is a side elevation of an evaporator embodying my invention, and Fig. 5 is a bottom view, partly broken away and partly in section, of the same.

In the drawings, referring to Figs. 1 to 3 inclusive, which show the preferred form, 10 designates the exterior shell or casing of the apparatus shown as provided with an inlet 11 and an outlet or drain 12. The shell or casing 10 is also provided with a customary pressure gage 14 and vacuum breaking valve and signal 15.

Vertically within the shell or casing 10 is mounted a frame 16 preferably in one integral casting and subdivided by a vertical partition 17 into two chambers or conduits 18, 19, respectively. The lower end of the frame 16 is pivotally mounted in a suitable step 20 and the upper end of said frame is formed with a horizontal flange 21 by which the frame may be secured at its upper end, by means of bolts 22, to the upper head of the shell 10 and to a substantially corresponding flange 23 formed on the connected inlet pipe 24 and outlet pipe 25, upon which pipes by means of suitable

flanges are mounted the valve casings 26, 27 containing vertically movable valves and connected together so that at the proper time a passage may be formed directly through said casings, the pipes 24, 25 at such time being cut off by means of the valves contained in said valve casings and this being the position of the parts illustrated in Fig. 1, both valves being in their lower position and a passage for water being formed through the valve-casings. The upper surface of the flange 21 of the frame 16 is formed with a circular raised central portion 28, which extends upwardly through a corresponding hole in the upper head of the shell 10, this construction serving to center the frame 16 within the shell and permit said frame, upon the removal of the bolts 22, to be turned axially on its lower end as a pivot whenever desired.

One feature of my invention resides in providing a construction in which the vertical frame 16 may be axially rotated to bring the different parts before the door for facility in cleaning.

The inlet pipe 24 leads from the valve-casing 26 to the conduit or chamber 18 of the frame 16 and the outlet pipe 25 leads from the conduit or chamber 19 of said frame to the valve-casing 27.

The frame 16 has connected to it a series of horizontal coils 30, which are arranged in sets at opposite sides of the frame 16 and of segmental outline. Each coil 30 is independent of the other coils and has its ends connected to opposite sides of the frame 16 so that one end of the coil will be in constant communication with the conduit or chamber 18 of said frame and the other end of the coil in constant communication with the conduit or chamber 19 of said frame. The coils are arranged close together, one below another, and form a vertical bank of horizontal segmental coils at each side of the frame 16 extending from a point near the top to a point suitably near the bottom of the shell or casing 10, and in order to accommodate as many of the coils as possible within the shell 10, each alternate coil in vertical series is brought nearer to the frame 16 than the other coils. The doorways 35 are formed directly in the shell 10 and are surrounded by frames 36 to which doors 37 of usual character are bolted. The shell 10 is entirely closed when in use, except at the inlet 11 and outlet 12, and when it is de-

sired to give attention to any of the coils 30 it will be necessary to remove one or the other of the doors 37.

In the employment of the apparatus presented in Figs. 1 to 3 inclusive as a feed-water heater, the steam will be admitted at the inlet 11 and exhaust at the outlet 12, and the water to be heated will pass through the valve-casing 26 and inlet pipe 24 to the chamber or conduit 18 the valves being raised, whence the water will pass into all of the coils 30 and, circulating through the same, will escape therefrom into the conduit or chamber 19 and pass thence through the outlet pipe 25 and valve-casing 27, the flow of the water from the valve-casing 27 being continuous and the water becoming heated by its travel through the conduit 18, coils 30, and conduit 19. It may be used in the same way as a condenser, the condensation being withdrawn from the outlet 12.

In Figs. 4 and 5 I illustrate my invention as embodied in an evaporator, 40 denoting the shell or casing of the same, 42 a vertical frame having an inlet chamber or conduit 43 and an outlet chamber or conduit 44, and 45 a series of segmental coils connected at their opposite ends with said conduits 43, 44 and corresponding in all substantial respects with the coils 30 hereinbefore described with respect to Figs. 1 to 3 inclusive. The shell 40 is provided with a head 46 containing a bearing 47 for the upper reduced end of the frame 42, and the lower end of the frame 42 is held in a suitable gland 48 and formed with an inlet port 49 leading to the conduit or chamber 43 and with an outlet port 50 leading from the conduit or chamber 44. The frame 42 is mounted so as to be capable of being given a rotary or axial motion, when required, and in this respect corresponds with the frame 16 shown in Fig. 1. The inlet port 49 at the lower end of the frame 42 has connected with it a pipe 51, and the outlet 50 in said frame has connected with it a pipe 52. The pipes 51, 52 are respectively connected by couplings 53 with pipes 54, 55 constituting portions of the supply and delivery pipes and equipped with suitable valves 56. When it is desired to rotate the frame 42 the couplings 53 will be removed or loosened and the pipes 51, 52 left connected with said frame. The pipe 54 is for the supply of steam to the conduit or chamber 43 and the pipe 55 is for the exhaust or discharge from the conduit or chamber 44.

The shell or casing 40 is provided with one or more doors 57 corresponding with the doors 37 shown in Fig. 3 and also with a valved inlet 58 for the water to be evaporated, this inlet being adjacent to the lower portion of the shell 40 but suitably above the bottom of the same. Near the upper end of the shell 40 the latter is provided with an

outlet 59 for the vapor which by a suitable pipe 60 will be led to a condenser. Close to the bottom of the shell 40 is provided a blow-off 61 for use in cleaning out the shell.

In the employment of the apparatus shown in Figs. 4 and 5 the water to be evaporated will be fed through the inlet 58 and kept at a substantially uniform level, denoted by the dotted line 62, and the steam will be admitted to the conduit 43 and pass thence through all of the coils 45 and into the conduit 44 from which it will escape through the outlet or discharge pipes 52, 55. The steam circulating through all of the coils 45, both below and above the level of the water within the shell 40 creates extended heating surfaces and renders the operation of the apparatus entirely efficient. In the construction shown in Fig. 4 the coils 45 do not extend to the top of the shell 40, as in the construction shown in Fig. 1, and hence a vapor chamber is formed within the upper portion of the shell 40 above said coils. The frame 42 however extends upwardly to the top of the shell 40 and contains in its upper portion an extension of the conduit 44, thereby forming a supplemental heating chamber in the upper vapor chamber of the apparatus.

The shell 40 may be provided with only one door 57, but I prefer to employ two of said doors.

In the drawings I have illustrated the apparatus as standing vertically, but in practice the apparatus whether used as a feed-water heater, a condenser or an evaporator may be arranged either vertically or horizontally as may be preferred or the occasion require.

The invention is not limited to the details of form and construction hereinbefore described, nor to the formation of the inlet and outlet conduits or chambers 18, 19 by an integral frame.

What I claim as my invention and desire to secure by Letters-Patent, is:

1. An exterior casing having a door in its side and an inlet and an outlet, longitudinal inlet and outlet conduits centrally within said casing, and transverse parallel segmental coils within said casing and connecting said conduits; substantially as set forth.

2. An exterior casing having a door in its side and an inlet and an outlet, longitudinal inlet and outlet conduits centrally within said casing, and transverse parallel segmental coils at opposite sides of and connecting said conduits; substantially as set forth.

3. An exterior casing having a door in its side and an inlet and an outlet, longitudinal inlet and outlet conduits centrally within said casing, and banks of transverse parallel segmental coils at opposite sides of and con-

necting said conduits, the alternate coils describing smaller arcs than the other coils; substantially as set forth.

4. An exterior casing having an inlet and an outlet, longitudinal inlet and outlet conduits extending lengthwise of and rotatably mounted within said casing, and a series of transverse parallel segmental coils connecting said conduits, said casing having a door in its side; substantially as set forth.

5. An exterior casing having an inlet and an outlet, longitudinal inlet and outlet conduits extending lengthwise of and rotatably mounted within said casing, and a series of transverse parallel segmental coils at opposite sides of and connecting said conduits, said casing having a door in its side; substantially as set forth.

6. An exterior casing having an inlet and an outlet, longitudinal inlet and outlet conduits extending lengthwise of and rotatably mounted within said casing, and a series of transverse parallel segmental coils arranged in banks at opposite sides of and connecting said conduits, the alternate coils describing smaller arcs than the other coils, and said casing having a door in its side; substantially as set forth.

7. An exterior casing having a door in its side and an inlet and an outlet, a frame centrally within said casing subdivided into longitudinal parallel inlet and outlet conduits, exterior valved pipe connections in communication with said conduits, and segmental coils within said casing and connecting said conduits; substantially as set forth.

8. An exterior casing having a door in its side and an inlet and an outlet, a frame centrally within said casing subdivided into longitudinal parallel inlet and outlet conduits, exterior valved pipe connections in communication with said conduits, and banks of transverse segmental coils at opposite sides of said frame and connecting said conduits; substantially as set forth.

9. An exterior casing having a door in its side and an inlet and an outlet, a frame centrally within said casing subdivided into longitudinal parallel inlet and outlet conduits, exterior valved pipe connections in communication with said conduits, and banks of transverse segmental coils at opposite sides of and connecting said conduits, the alternate coils describing smaller arcs than the other coils; substantially as set forth.

10. An exterior casing having an inlet and an outlet and provided in its side with a door, vertically disposed inlet and outlet

conduits arranged centrally within said casing and leading through the end thereof, exterior valved pipe connections in communication with said conduits, and horizontal segmental coils at opposite sides of and connecting said conduits; substantially as set forth.

11. An exterior casing having an inlet and an outlet and provided in its side with a door, a vertically disposed integral rotatable frame affording inlet and outlet conduits arranged centrally within said casing and leading through the end thereof, exterior valved pipe connections in communication with said conduits, and horizontal segmental coils at opposite sides of said frame and connecting said conduits; substantially as set forth.

12. In an apparatus of the character described, an exterior casing provided in its side with a door, a frame within said casing comprising a series of coils and conduits to which the opposite ends of said coils are connected, and means rotatably mounting said frame whereby the coils and their connections may be rendered accessible through the doorway.

13. In an apparatus of the character described, an exterior casing having an inlet and an outlet, inlet and outlet conduits longitudinally disposed side by side centrally within said casing, and banks of segmental pipes within said casing and at opposite sides of and connecting said conduits.

14. In an apparatus of the character described, an exterior casing having an inlet and an outlet, longitudinal inlet and outlet conduits rotatably mounted within said casing, and a series of transverse parallel segmental pipes at opposite sides of and connecting said conduits, said casing having a door in its side.

15. In an apparatus of the character described, an exterior casing having an inlet and an outlet, a frame within said casing affording longitudinal inlet and outlet conduits, exterior valved pipe connections in communication with said conduits, and a series of transverse parallel segmental pipes within said casing and connecting said conduits.

Signed at New York city, in the county of New York and State of New York, this 28th day of October A. D. 1907.

REUBEN R. ROW.

Witnesses:

ARTHUR MARION,
CHAS. C. GILL.