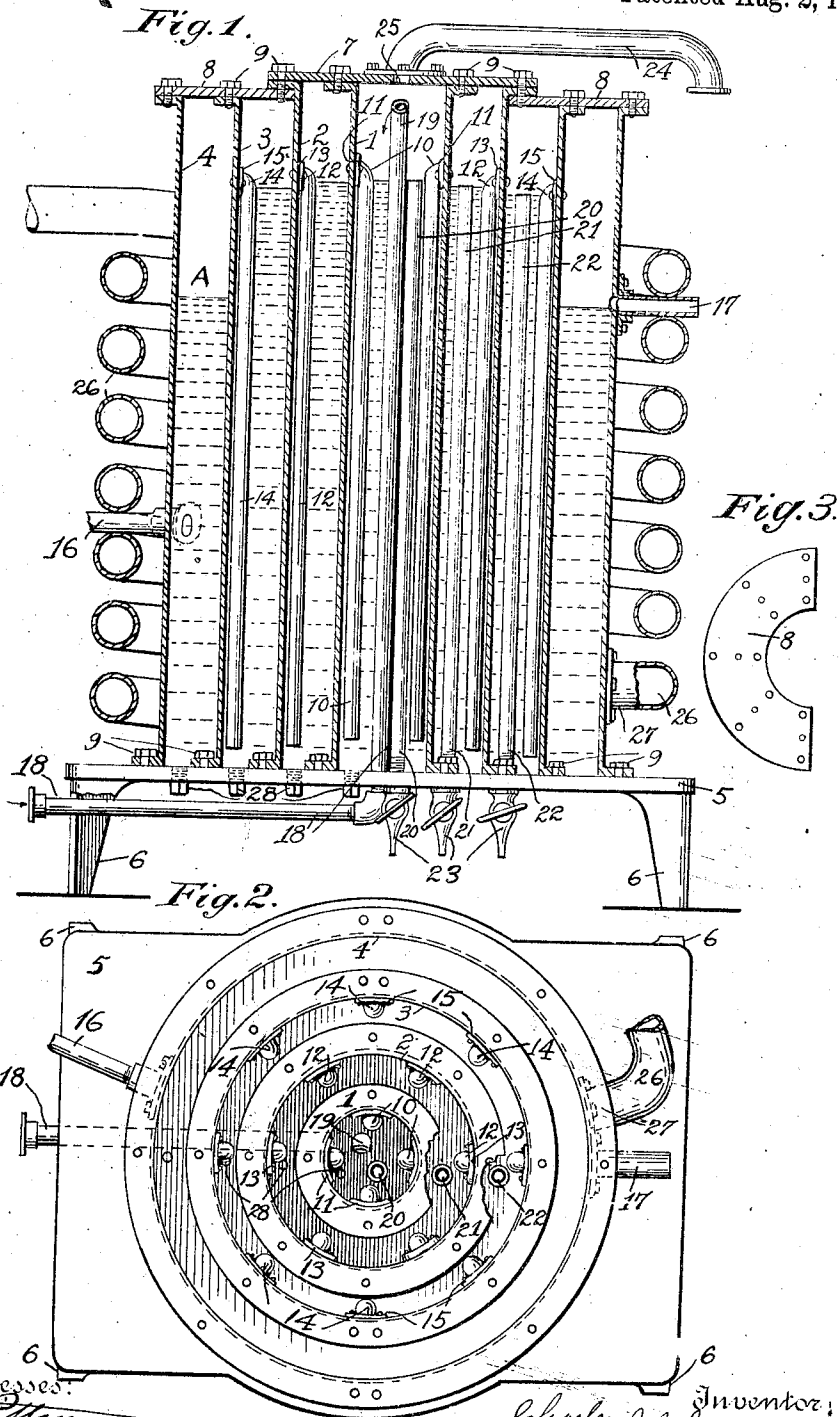


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 COMBINED FEED WATER HEATER AND GREASE AND OIL SEPARATOR.
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UNITED STATES PATENT OFFICE.

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COMBINED FEED-WATER HEATER AND GREASE AND OIL SEPARATOR.

966,022.

Specification of Letters Patent. Patented Aug. 2, 1910.

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To all whom it may concern:

Be it known that I, CHARLES J. JOHNSON, a citizen of the United States, residing in the borough of Manhattan, city, county, and State of New York, have invented certain new and useful Improvements in Combined Feed-Water Heaters and Grease and Oil Separators, of which the following is a specification.

10 This invention relates to apparatus for separating oil, grease, etc., from the waters of condensation received from the condenser operating in conjunction with a steam engine, and to also act as a feed water heater for the boiler, and it is the object of the invention to provide an apparatus of this character which is compact and cheap in construction.

15 In carrying out the invention I provide a series of nested tanks, communications being provided from the inner tanks to their adjacent outer tanks. Means are provided for filling all of said tanks with water to a predetermined height, and the waters of condensation are fed to the innermost tank, the connection for the feed water for the boiler being to the outer tank. Means are also provided for drawing off the oil, grease, etc., from the top of the water. A heating coil extends around and is connected to the outer tank for the purpose of heating the water before it is fed to the boiler. It is sometimes desirable to draw off the water from the tanks for the purpose of making repairs or cleaning the apparatus and means for this purpose are provided in the bottom of each tank. For the purpose of relieving the tanks of any undue pressure, which may be caused by steam conveyed by the waters of condensation or otherwise, I provide a vapor outlet at the top of the innermost tank.

20 In the drawings accompanying and forming a part of this specification Figure 1 is a sectional side elevation of my improved apparatus. Fig. 2 is a plan view with the covers removed, and Fig. 3 is a plan view of one of the sections of the cover for the two outer tanks.

25 The invention consists of a series of nested tanks 1, 2, 3 and 4 having a base 5 provided with standards 6. The tops of the tanks 1 and 2 are provided with a cover or head 7, and the tanks 3 and 4 with a head or cover in the form of segmental plates 8.

The sides of the tanks are secured to the base 5 and the heads 7 and 8 in any suitable manner, as bolts 9.

Communication from the innermost tank 1 to the next adjacent outer tank 2 is by means of a plurality of pipes 10 which extend up from near the bottom of the inner tank 1 and connected to the tank 2 near the top thereof, as at 11. Communication from the tank 2 to the next adjacent tank 3 is by means of pipes 12, similar to pipes 10, extending up from the bottom of tank 2 and connected to tank 3 near the top thereof, as at 13. Communication from the tank 3 to the next adjacent or outside tank 4 is by means of pipes 14, similar to pipes 10 and 12, extending up from near the bottom of tank 3 and connected to the tank 4 near the top thereof, as at 15. It will be noted that the pipes 10 do not extend down into the tank 1 as far as the pipes 12 extend into tank 2; nor do the pipes 12 extend down into the tank 2 as far as the pipes 14 extend into tank 3. However, the connections of the pipes 10 with the tank 2 are higher than the connections of the pipes 12 with tank 3, and the connections of the pipes 12 with the tank 3 are higher than the connections of the pipes 14 with tank 4, so as to facilitate the flowing of the water from one tank to another. The connection of the feed water to the boiler is by means of a pipe 16 connected to the outer tank 4. The outer tank 4 is also provided with an overflow outlet 17.

30 The apparatus is connected to the condenser of a steam engine, or other source of supply of water from which it is desired to separate oil, grease and the like by a pipe 18 extending up through the bottom of the innermost tank 1 to a point near the top of the tank, as at 19. Pipes 20, 21, and 22 extend up through the bottom of each tank 1, 2 and 3, respectively, to a point just below the normal level of the water in each of said tanks, and are provided at their lower ends with valves or pet cocks 23 to draw off any grease, oil or the like which accumulates on the top of the water, and to be more fully described hereinafter.

35 The operation of the apparatus is substantially as follows: The tanks 1, 2, 3 and 4 are first filled with pure cold water (indicated in a general way by A) passing through pipe 24 connected to any suitable source of

supply, entering the tank 1 at the top through port 25, the water flowing from the tank 1 from near the bottom thereof through pipes 10 into the top of tank 2, through pipes 12 from near the bottom of tank 2 into the top of tank 3, and through the pipes 14 from near the bottom of tank 3 into the top of tank 4. When the tanks are filled it will be indicated by the overflow from the outlet 17. The waters of condensation or steam containing oil, grease and other foreign substance from the condenser of the steam engine, for instance, is introduced into the apparatus by pipe 18 passing up through the bottom of tank 1 to a point near the top thereof, the waters of condensation being quite hot, and the pipe passing up through the cold water in tank 1, materially cools said waters of condensation. As the water in the tank 1 reaches a certain level it is drawn off from the bottom of said tank 1 by passing up through the pipes 10 into the top of tank 2, the oil, grease and the like being of less specific gravity than water rising and floating on the top of the water. After the water reaches a certain level in tank 2 it is drawn off from the bottom thereof by pipes 12 into the top of tank 3, and should any oil or grease have been drawn off from tank 1 it will rise and accumulate on the top of the water in said tank 2. When the water reaches a certain level in tank 3 it is drawn off in the same manner as from tanks 1 and 2 and into the top of tank 4 in a pure and thoroughly cleansed condition, from which tank 4 it is fed to the boiler or storage tank by pipe 16. Any undue pressure in the tanks from the steam from the waters of condensation or otherwise is relieved by means of the port 25 into the pipe 24. The oil, grease and the like which has accumulated and is floating on the top of the water in tanks 1, 2 and 3 is drawn off by means of valves or pet cocks 23 connected to the pipes 20, 21 and 22 extending up through the base 5 into said tanks to a distance somewhat below the normal level of the water. It is desirable that the water be heated before it is fed to the boiler, and for this purpose I provide around the tank 4 a coil of pipe 26 and connected to said tank 4 at 27, and connected at its other end with any suitable source of steam supply. After the apparatus has been in operation for some time, owing to the oil, grease, etc., adhering to the walls of the tanks and pipes, and it is desired to cleanse the same the top plates or heads are removed, the head 8 preferably being made in sections (Fig. 3) to facilitate the removal of the same. The plugs 28 in the bottom of the tanks are then removed and the water drawn off, when the tanks and pipe may be readily and thoroughly flushed by means of a hose connected to a hot water supply.

Variations may be resorted to within the scope of the invention, and portions of the invention may be used without others.

Having described my invention, I claim:

1. In an apparatus of the class specified, the combination of a series of nested tanks, a plurality of pipes extending up from near the bottom of the inner tanks and near the top of the adjacent outer tanks, an inlet pipe for the waters of condensation extending up through the bottom of the innermost tank to near the top thereof, an outlet for the outer tank; and plug cocks for drawing off the water from the bottom of either of said tanks.

2. In an apparatus of the class specified, the combination of a series of nested tanks, a water inlet in the form of a pipe connected to the top of the innermost tank for filling the tanks with water, a plurality of pipes extending up from near the bottom of the inner tanks to the upper ends of the adjacent outer tanks just above the water level, an inlet pipe for the waters of condensation extending up through the bottom of the innermost tank to near the top thereof, an outlet pipe connected to the outer tank, and a pipe extending up through the bottom of each tank to a point just below the mean water level for drawing off the grease and oil, said pipes provided with valves at their lower ends outside of the tank.

3. In an apparatus of the class specified, the combination of a series of nested tanks, a water inlet at the top of the innermost tank, pipes extending up from near the bottom of the inner tanks to near the top of their adjacent outer tanks, an inlet pipe for the waters of condensation extending up through the bottom of the innermost tank to near the top thereof, an outlet pipe for drawing off the water from the outer tank, pipes provided with valves extending up through the bottom of the tanks to just below the surface of the water to draw off the grease and oil from the surface, an overflow outlet for the outer tank, and a heating coil connected to and extending around the outer tank to heat the water in said outer tank.

4. In an apparatus of the class specified, the combination of a series of nested tanks, a water inlet at the top of the innermost tank, pipes extending up from near the bottom of the inner tanks to near the top of their adjacent outer tanks, an inlet pipe for the waters of condensation extending up through the bottom of the innermost tank to near the top thereof, an outlet pipe for drawing off the water from the outer tank, pipes provided with valves extending up through the bottom of each tank to just below the surface of the water to draw off the grease and oil from the surface, an over-

flow outlet for the outer tank, a heating coil connected to and extending around the outer tank to heat the water in said tank, and a plug cock provided in the bottom of each tank for drawing off all of the water from the tanks.

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5. In an apparatus of the class specified, the combination of a series of nested tanks, a water inlet at the top of the innermost tank, a plurality of pipes extending up from near the bottom of the inner tanks to near the top above the water level of its adjacent outer tank, an inlet pipe for the waters of condensation extending up through the bottom to near the top above the water level in the innermost tank, an outlet for the outer tank to draw off the water therefrom,

plugs in the bottom of each tank for drawing off all of the water from the tanks, a pipe extending up through the bottom of each tank to a point just below the mean water level and provided with valves at the bottom outside of the tanks for drawing off the oil and grease from the surface of the water, and a heating coil connected to and extending around the outer tank to heat the water therein; the water inlet at the top of the innermost tank also serving as an outlet for any vapors from the waters of condensation introduced into the innermost tank.

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