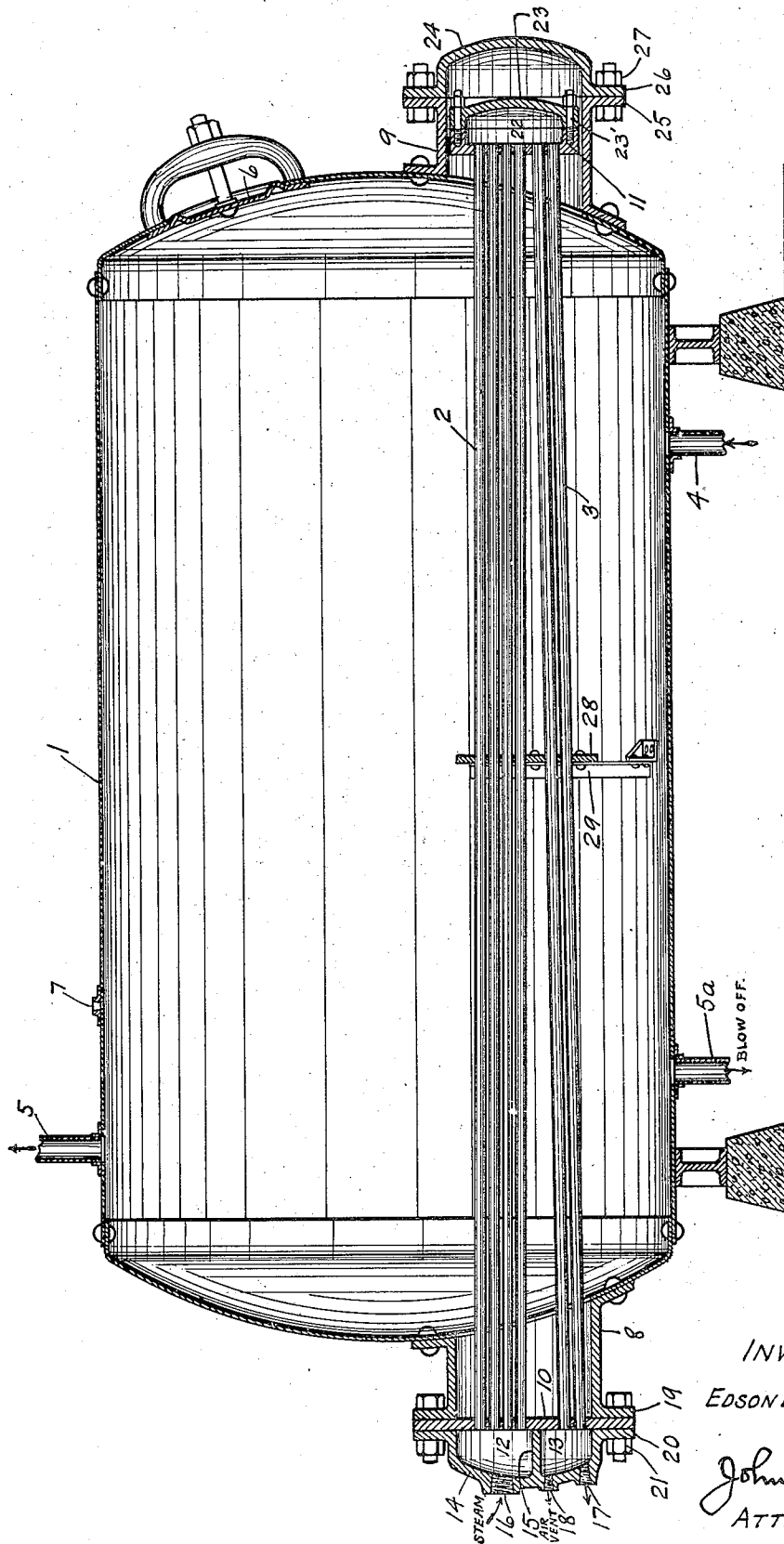


E. L. WORBOIS.
STORAGE HEATER.
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STORAGE HEATER.

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To all whom it may concern:

Be it known that I, EDSON L. WORBOIS, a citizen of the United States, residing at Tonawanda, in the county of Erie and State of New York, have invented certain new and useful Improvements in Storage Heaters, of which the following is a specification.

This invention relates to improvements in storage heaters of the general type in which the heating medium, i. e., steam, circulates through tubes arranged longitudinally within a tank having an inlet and an outlet for the liquid to be heated and in which the tubes are connected at one end to a floating head. In storage heaters as heretofore constructed the floating head rests on a saddle which is riveted to the inside of the tank and in order to repair or renew a tube the floating head and the nest of tubes must be removed from the tank. Such removal of the floating head is a very laborious and expensive operation. Thus it is necessary for an operator to enter the tank through a man-hole to release the floating head from its saddle after which the head must be held up by some means while it is being removed from the tank and great care must be exercised to prevent the bending of the tubes or the dropping of the floating head since in the latter event the tubes will be destroyed. It will be apparent that aside from the risk of bending or destroying the tubes the removal of the floating head will require considerable time and the labor of several operators.

A further objection to this prior construction is that sufficient space must be left between the floating head and the adjacent end of the tank in which an operator may stand and work when releasing the floating head from the saddle and when assisting in the removal of the floating head and the tubes from the tank. The necessary provision of this space results in the reduction of the heat transmission area and of the heat transmission zone and the consequent reduction in the transmission rate.

The principal objects of the present invention are to provide a construction wherein the tubes included in the heating element are accessible for removal or renewal externally of the tank and wherein the removal or insertion of one or more of the tubes does not require the removal of the tube nest or of the floating head, and further

to provide a construction which, as compared with the prior construction referred to, obtains a higher rate of heat transmission due to the facts that the heat transmission area is increased and none of the liquid in the tank is located beyond the heating element while all of the liquid is uniformly influenced by the normal circulation.

A further object of the invention is to provide a storage heater wherein the floating head at one end of the heating element and the heating medium inlet and outlet at the other end of said element may be interchangeably arranged at either end of the tank, thereby to promote facility in the location of said inlet and outlet adjacent one end of the tank or the other as circumstances of use may require.

With the above objects in view the invention consists in certain novel features of structure and combination pertaining to the tank, the heating element composed of the floating head and the tubes, and the inlet and outlet connections of said tubes, all of which will be set forth in detail as the description proceeds.

An embodiment of the invention is illustrated in the accompanying drawing, the single figure of which is a vertical longitudinal sectional view.

The essential parts of the heater are the tank 1 and the heating element which includes the tubes 2 for the heating medium and the tubes 3 for the condensation of said medium. The tank 1 is horizontally arranged and has an inlet 4 and an outlet 5 for the liquid to be heated; said tank also has a suitably located blow off connection 5^a, a man-hole cover 6 and a thermometer nipple 7.

According to the invention the tank has at its ends reduced axially projecting extension sleeves 8 and 9 which are of the same proportions. One of said sleeves, for example the sleeve 8, serves for the attachment and support of the fixed plate 10 in which the ends of the tubes 2 and 3 are fitted and the other sleeve 9 serves for the support of the floating head 11. The plate 10 forms a common wall of the inlet chamber 12 for the heating medium and of the outlet chamber 13 for the condensation of said medium. The chambers 12 and 13 are formed in a cover 14 and are separated

from one another by a baffle 15 which extends to the plate 10. The chamber 12 has an inlet opening 16 and the chamber 13 has an outlet opening 17 and an air vent 18.

5 The sleeve 8 is provided with a circumscribing marginal flange 19 and the cover 14 is provided with a similar flange 20. The plate 10 projects between the flanges 19 and 20 and said plate and cover are secured to the flange 19 by bolt and nut fastenings 21.

10 The floating head 11 has a return chamber 22 incorporated therewith and to which the tubes 2 and 3 are open. The ends of said tubes remote from the plate 10 are secured in the inner wall of the head 11, the movements of which are responsive to the contraction and expansion of the tubes under variations of temperature. The tubes 20 2 are preferably inclined from the inlet chamber 12 to the floating head and the tubes 3 are preferably inclined from said head to the outlet chamber 13, such arrangement of the tubes enabling the heating element to be completely drained of the liquid of condensation. The floating head 11 includes a cover 23 which is secured in position by fastening screws 24 and which may be removed to provide for access to the ends of the tubes. The head 11 has a relatively loose sliding fit in the sleeve 9 which sleeve is normally closed by a cover 24, the sleeve 9 and cover 24 having circumscribing marginal flanges 25 and 26 35 which are secured together by bolt and nut fastenings 27. As shown and preferred the tubes 2 and 3 are supported at an intermediate point within the tank by a transverse plate 28 having openings through which said tubes extend, said plate being supported by angle iron standards 29 which are suitably secured at their lower ends to the tank 1. The plate 28 is desirable for the longer tanks but may be 40 omitted from the shorter ones.

45 Since the floating head 11 is located beyond the tank the tubes 2 extend the entire length of the tank and all of the water in the tank is uniformly subject to the normal circulating influence.

50 With a storage heater construction as above described there will be no occasion for the removal of the heating element or of the floating head. In the event that it is necessary to remove a tube for the purpose of repair or substitution the covers 14 and 24 are removed from the sleeves 8 and 9 and the cover 23 is removed from the floating head. Thereupon the tubes are accessible externally at both ends of the tank, while at the same time the tube nest is firmly supported by the sleeves 8 and 9, the sleeve 8 and the bolts of the fastenings 21 supporting the plate 10 and the 65 sleeve 9 supporting the floating head 11.

In this way the operation of removing a tube is greatly simplified and facilitated with resultant economy of time and labor, and all risk of bending or destruction of the tubes is eliminated.

70 Since the sleeves 8 and 9 are of the same proportions they may be interchangeably used for the support of the plate 10 and of the floating head, that is to say the plate 10 and the cover 14 may be secured to the sleeve 9 instead of to the sleeve 8 as shown and the floating head 11 may be supported by the sleeve 8 instead of by the sleeve 9 as shown. This interchangeability of the floating head and the connections for the heating medium with relation to the sleeves 8 and 9 is of advantage in enabling the connections for the heating medium to be arranged at either end of the tank, as the circumstances of use may require, and 85 eliminates the necessity for shifting the tank 1, which is quite heavy, so as to effect a desired location of the connections of the heating medium.

While I have described the invention as a storage heater it will be understood that its features may be incorporated in constructions analogous to storage heaters wherein the expansion and contraction of the tubes requires the use of a floating head at one end of the tube nest. 95

Having fully described my invention, I claim:

1. In a storage heater, in combination, a tank having axially projecting extension sleeves at its ends, a fixed plate and a removable cover secured to the end of one of said sleeves and providing an inlet chamber for the heating medium and an outlet chamber for the liquid of condensation, heating and condensation return tubes secured to said plate and extending longitudinally through the tank, the heating tubes being open to said inlet chamber and the return tubes being open to said outlet chamber, a floating head supported within the other of said sleeves and having a return chamber and a removable cover, said tubes being secured to said head and open to said return chamber, and a removable cover for the sleeve in which said floating head is supported. 100

2. In a storage heater, in combination, a tank, heating and condensation return tubes extending longitudinally through said tank, a fixed plate in which said tubes are supported adjacent one end of said tank and a removable cover co-acting with said plate to provide an inlet chamber for the heating medium and an outlet chamber for the liquid of condensation, the heating tubes being open to said inlet chambers and the return tubes open to said outlet chamber, said tank having an axially projecting extension sleeve at its end remote from said plate, a floating 130

head supported within said sleeve and having a return chamber and a removable cover, said tubes being secured to said head and open to said return chamber, and a removable cover for said sleeve.

3. In a storage heater, in combination, a tank having axially projecting extension sleeves at its ends, said sleeves being of the same proportions, a fixed plate and a removable cover secured to the end of one of said sleeves and providing an inlet chamber for the heating medium and an outlet chamber for the liquid of condensation, heating and condensation return tubes secured to said plate and extending longitudinally through the tank, the heating tubes being open to said inlet chamber and the return tubes being open to said outlet chamber, a floating head supported within the other of said sleeves and having a removable cover,

said tubes being secured to said head and open to said return chamber, and a removable cover for the sleeve in which said floating head is supported, said floating head and the cover and plate which provide said inlet and outlet chambers being interchangeable with respect to the sleeves by which they are supported.

4. In a storage heater, in combination, a tank, tubes therein for the heating medium and the liquid of condensation, a floating head in which the ends of the tubes are secured, said floating head having a return chamber and a removable cover, said tank having an axial sleeve projecting beyond one end thereof and in which said head is supported, and a removable cover for said sleeve.

In testimony whereof I affix my signature.
EDSON L. WORBOIS.