

Nov. 17, 1931.

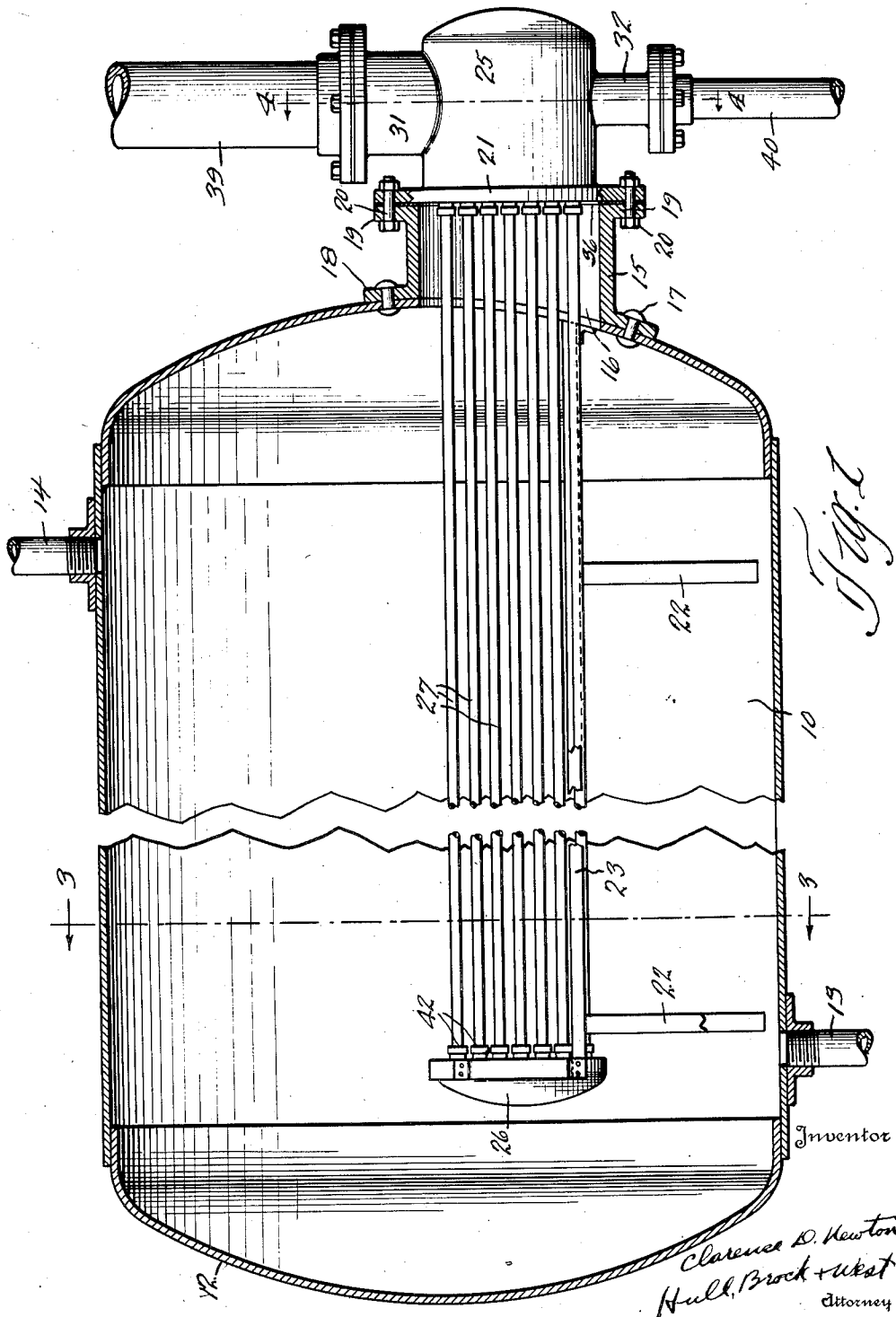
C. D. NEWTON

1,832,412

HEAT EXCHANGE APPARATUS

Filed April 15, 1930

3 Sheets-Sheet 1



Nov. 17, 1931.

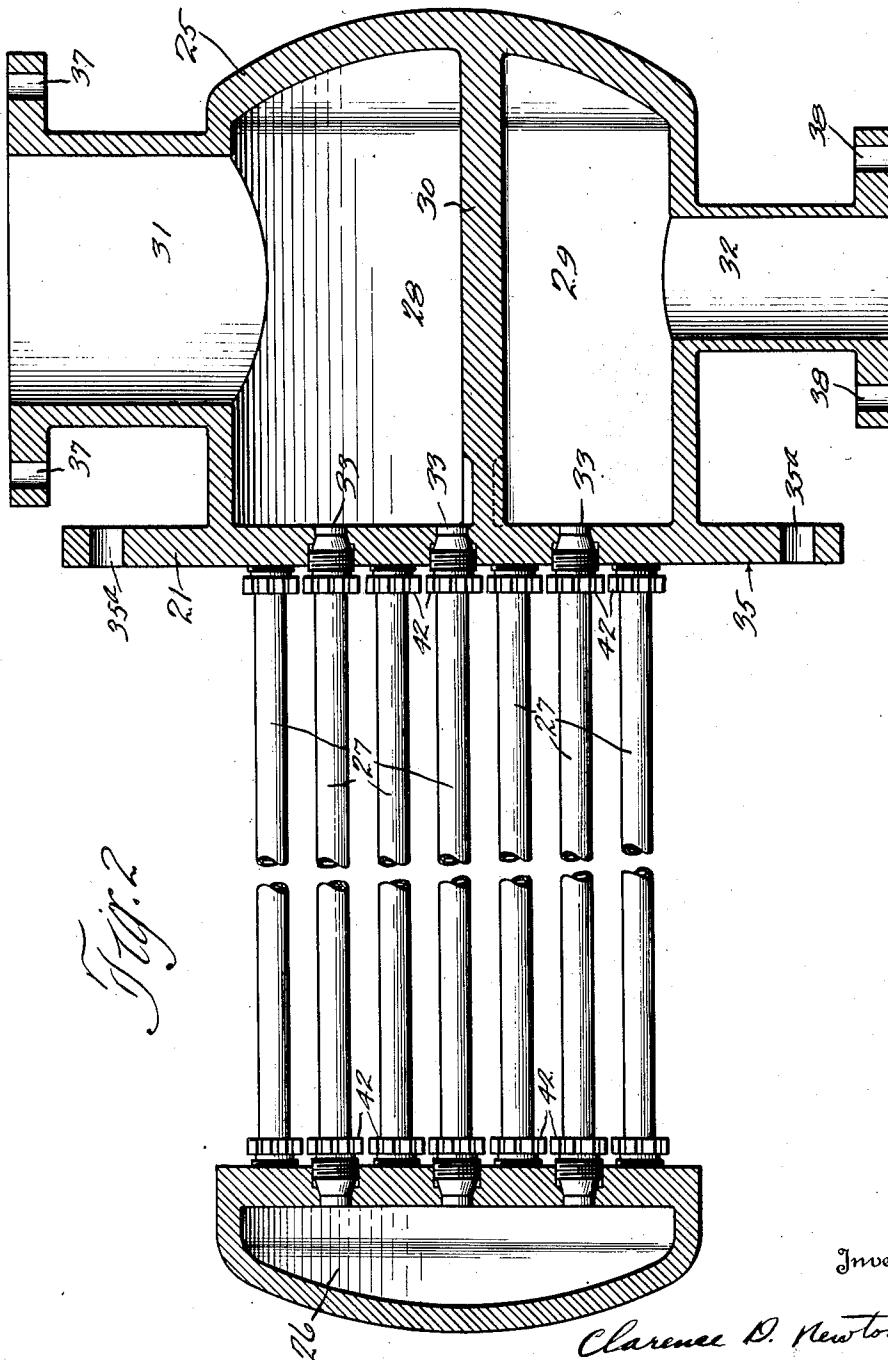
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3 Sheets-Sheet 2



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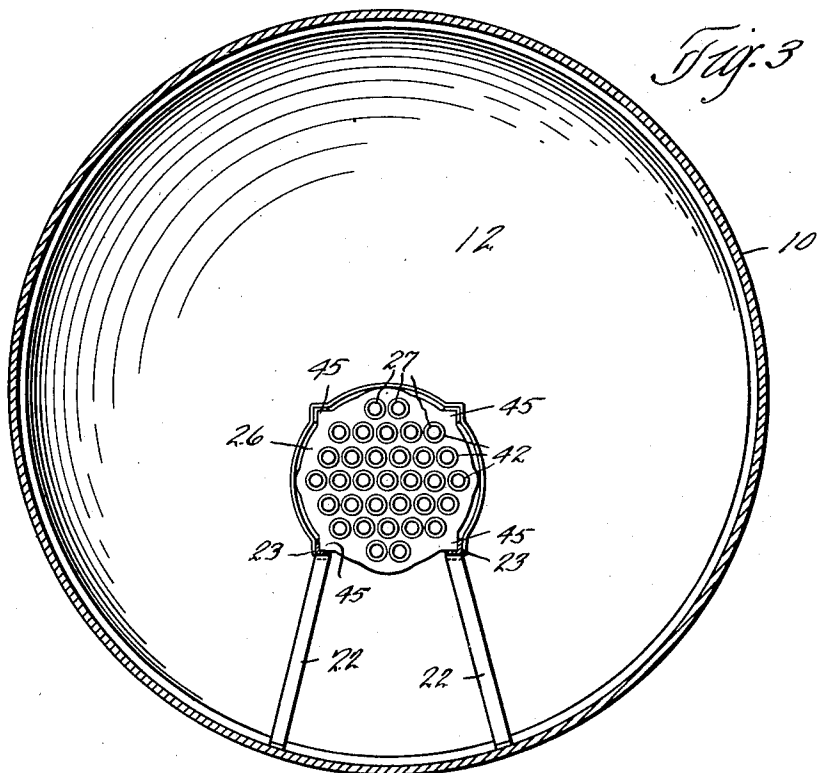
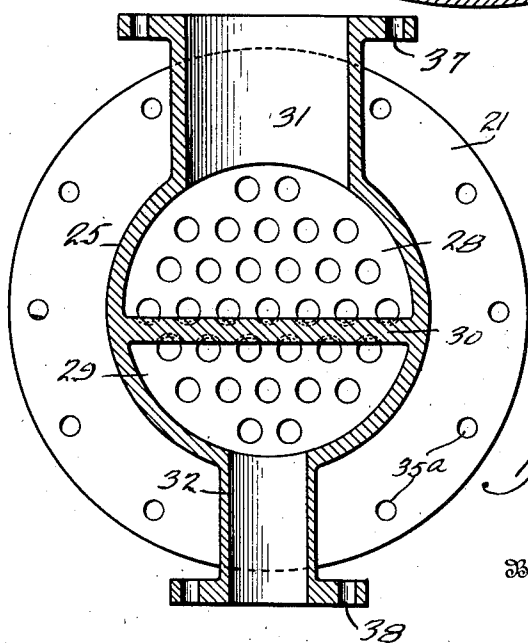
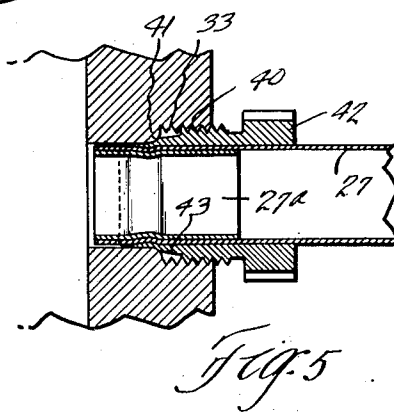


Fig. 4

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UNITED STATES PATENT OFFICE

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HEAT EXCHANGE APPARATUS

Application filed April 15, 1930. Serial No. 444,402.

This invention relates to a heating apparatus and has for its object to produce such an apparatus of superior construction, with the fewest possible number of parts consistent with the most efficient operation and to provide for manufacturing and assembling economy.

With the above and other objects in view the invention consists in the details of construction and arrangement of parts herein-after described and claimed.

Fig. 1 is a part sectional view taken longitudinally through one embodiment of my invention; Fig. 2 is a similar section showing the heating unit drawn to a larger scale; Fig. 3 is a sectional view corresponding substantially to the line 3—3 of Fig. 1 with the heating tubes removed; Fig. 4 is a section on the line 4—4 of Fig. 1; and Fig. 5 is a detail section showing the union used to connect the tubes with the headers.

The embodiment illustrated consists essentially in a tank having inlet and outlet means and a heater receiving opening together with the heater which is sealed through such opening.

The tank comprises a cylindrical portion 10 with end portions 11 and 12 connected therewith by any suitable means together with the inlet means 13 and the outlet means 14 and having a cylindrical member 15 secured to an opening 16 in the end member 11 as by rivets 17. The member 15 is provided with flanges 18 and 19. Suitable bolts 20 are employed for securing the flange 21 of the heating element to the flange 19 on the tank. Suitable upright members 22 rest on the bottom of the tank member 10 and support angle irons 23 upon which the portion of the heater unit which extends into the tank is supported as it is slid into the tank 10 and while it remains therein.

The heating unit comprises essentially two header members 25 and 26 together with a plurality of connecting pipes or tubes 27. The header member 25 comprises a single casting having a large compartment 28 and a small compartment 29 formed by a dividing partition 30. These compartments are closed with the exception of the inlet 31, the

outlet 32 and a plurality of tube connecting openings 33. Both the openings 31 and 32 and the front face 35 of the header 25 are provided with flanges having suitable openings therein to receive clamping bolts. The openings 35^a cooperate with the bolts 20 and a suitable gasket member 36 for attachment to the flange 19 of the tank member 15. The openings 37 and 38 are adapted for connection with inlet pipes 39 and 40 respectively. As best seen in Fig. 5 the openings 33 comprise threaded portions 40 with shoulders 41 formed, due to a smaller diameter of the opening 40, at the side opposite the threads.

The header member 26 comprises a single integral casting having one compartment therein with which all the tubes 27 communicate. The openings for connection with the pipes 27 are identical with those in the header 25 except that the threads run in reverse directions whereby the pipes 27 together with the clamping nuts 42 may be rotated in the same direction whereby the tube may be tightened without danger of twisting even though it is of light gauge material. Each pipe may be made of light copper with a ferrule 27^a at each end to give additional strength. From Fig. 5 it will be evident that when the member 42 is rotated, the wedge-like portion 43 thereof will be forced between the ferrule 27^a and the shoulder 21 which will result in a slight deformation of the pipe 27 and ferrule 27^a thereby giving a perfect seal. The header 26 may be provided with angle projections 45 designed for cooperating with the angle irons 23 for supporting the heating element. As best seen in Fig. 4, a larger number of the tubes 27 communicate with the large chamber 28 than with the smaller chamber 29. The purpose of this as well as the difference in size between the chambers and the openings 31, 32 is to compensate for the condensing effect on steam admitted through the opening 31 which occurs due to heat being removed therefrom in raising the temperature of a fluid in the tank 10. A certain amount of the steam will be condensed or the steam pressure will be reduced due to change in temperature both of which will result in

the occupation of a smaller space by the outgoing steam than is occupied by the incoming steam.

It will be evident that steam or other heating agent entering the compartment 28 will flow away from such compartment in those tubes which communicate therewith and will return to a header 25 through the tubes communicating with the compartment 29.

From the foregoing it will be evident that I have provided a heating device which is well adapted for its intended purpose and while I have described the same in connection with a means for heating a liquid in the tank 10 by means of steam passing through the tubes 27, I wish it understood that my invention is capable of other uses and may be employed for transferring heat from any desired fluid to any other material in the tank. I also do not wish to be limited to the particular structures described and illustrated but only in accordance with the appended claims.

Having thus described my invention, what I claim is:

1. A heating unit adapted to be inserted into a fluid containing receptacle and including a pair of headers and a plurality of tubes communicating with the interiors of said headers and extending therebetween, one of said headers having a pair of openings and a partition dividing the same into two compartments, said partition cutting off communication between said openings except through said tubes, said last mentioned header being a single integral casting, said headers being connected to the ends of each of said tubes by a pair of threaded unions, the same being reversely threaded at the two ends of the tube whereby they may be rotated in the same direction for sealing.

2. A heat exchange apparatus comprising a tank having inlet and outlet means and a heater receiving opening, a heating unit having a portion extending into said tank and sealed through said heater receiving opening, said heater including a pair of headers and a plurality of tubes communicating with the interiors of said headers and extending therebetween, one of said headers having a pair of openings and a partition dividing the same into two compartments, said partition cutting off communication between said openings except through said tubes, said last mentioned header being a single integral casting, said headers being connected to the ends of each of said tubes by a pair of threaded unions, the same being reversely threaded at the two ends of the tube whereby they may be rotated in the same direction for sealing.

3. A heat exchange apparatus comprising a tank having inlet and outlet means and a heater receiving opening, a heating unit having a portion extending into said tank and

sealed through said heater receiving opening, said heater including a pair of headers and a plurality of tubes communicating with the interiors of said headers and extending therebetween, one of said headers having a pair of openings and a partition dividing the same into two compartments, said partition cutting off communication between said openings except through said tubes, said last mentioned header being a single integral casting, said tank having means therein for supporting said heating unit, said last means including a pair of parallel angle irons supported upon said tank bottom.

In testimony whereof, I hereunto affix my signature.

CLARENCE D. NEWTON.