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L. A. RHODES

2,218,097

HEAT EXCHANGER

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Fig. 1.

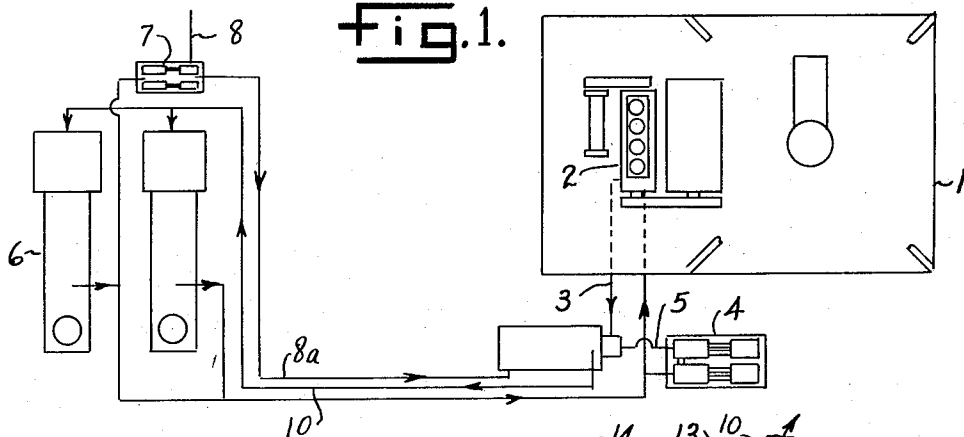


Fig. 2.

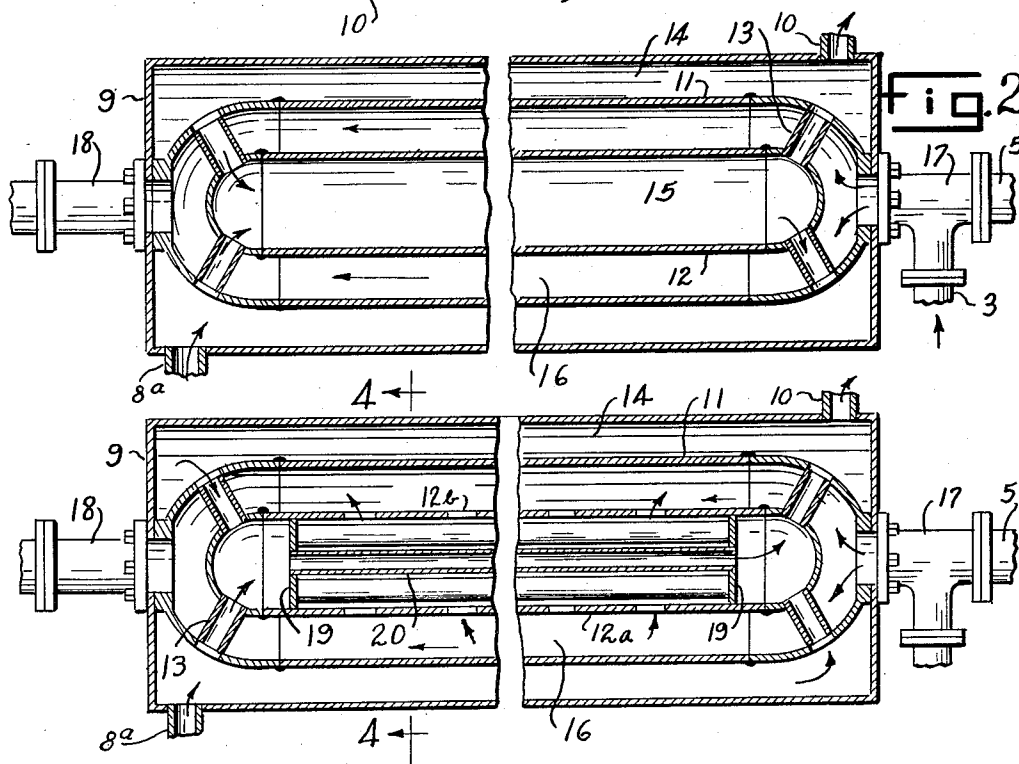
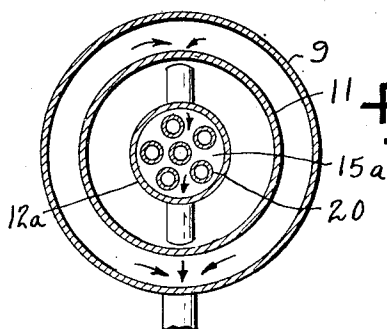


Fig. 3.

Fig. 4.



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HEAT EXCHANGER

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Application March 22, 1939, Serial No. 263,315

1 Claim. (Cl. 257—236)

This invention relates to a heat exchanger.

An object of the invention is to provide a heat exchanger of the character described specially designed to adapt it for connection into a water line leading to a boiler and the exhaust steam lines from the steam engine and slush pump of a well drilling rig whereby the exhaust steam from the pump and engine may be utilized for preheating the water entering the boiler; however, it is to be understood that while the device has been primarily designed for use in connection with a well drilling rig it is adapted for use for analogous purposes.

Another object of the invention is to provide outer and inner enclosed water chambers connected into the water line with an intermediate steam chamber connected into the exhaust steam lines so constructed as to facilitate heat exchange between the steam and the water whereby the temperature of the latter will be raised and the heat from the exhaust steam thus utilized.

In one embodiment of the invention the water in the inner water chamber may be circulated through tubes, provision being made for circulating the steam from the steam chamber about said tubes. In both forms of the invention provision is made allowing the free circulation of water between the water chambers.

With the above and other objects in view the invention has particular relation to certain novel features of construction, operation and arrangement of parts, examples of which are given in this specification and illustrated in the accompanying drawing, wherein:

Figure 1 shows a diagrammatic plan view of a well drilling rig embodying the invention.

Figure 2 shows a longitudinal, sectional view of the heat exchanger.

Figure 3 shows a longitudinal, sectional view of another embodiment, and

Figure 4 shows a cross-sectional view taken on the line 4—4 of Figure 3.

Referring now more particularly to the drawing wherein like numerals of reference designate the same parts in each of the figures, the numeral 1 designates the derrick as a whole, of a well drilling rig, and mounted on the floor of the derrick is the steam engine 2 having the exhaust steam pipe 3 leading therefrom. The numeral 4 designates the slush pump whereby the drilling fluid used in well drilling is forced downwardly into the drill in the well in the usual way, said slush pump being steam driven and having the exhaust steam line 5.

The numeral 6 designates a battery of boilers

for generating the required steam associated with which is the feed water pump 7 which takes water through the supply line 8 from a suitable source.

The numeral 9 designates the outer jacket of the heat exchanger and entering one end of this jacket is the water delivery line 8a leading from the pump 7 and the return water line 10 leads from the other end of the jacket and delivers the water to the boiler chambers so that the water from the supply line circulates through the jacket on its way to the chambers of the boilers. Within the jacket and spaced from the walls thereof there is an outer cylinder 11 whose ends are bolted to the ends of the jacket as shown in Figures 2 and 3 and within, and spaced from, the outer cylinder 11, all the way around there is the inner cylinder 12 as shown in Figure 2 or 12a as shown in Figure 3. The inner cylinder is anchored to and maintained in spaced relation relative to the outer cylinder by means of the tubular stays, or anchors, 13 which, being tubular afford communication between the outer water chamber 14 around the outer cylinder and the inner chamber 15 of Figure 2, or 15a of Figures 3 and 4. The exhaust steam from the engine 2 enters the steam chamber 16 between the outer and inner cylinders through the T-connection 17, at one end of the jacket and circulates through said chamber 16 and is discharged through the outlet connection 18 at the other end of the heat exchanger.

The exhaust steam from the slush pump 4 will enter the steam chamber through the exhaust steam line 5. The steam circulating through the chamber 16 will be surrounded by a portion of the water to be heated in the chamber 14 and will surround a portion of the water to be heated in the chamber 15 so that a maximum area of the water passing through the jacket will be exposed to the surfaces of the cylinders 11, 12, or 12a, heated by the steam. In the embodiment shown in Figure 3 the inner cylinder 12a is provided with transverse partition plates 19, 19 spaced inwardly from the ends thereof and a series of tubes 20 have their ends anchored to said plates so that the water may circulate through said tubes. In this embodiment the inner cylinder 12a is provided with a plurality of openings 12b to permit steam from the chamber 16 to circulate about the tubes 20 to provide additional heating surfaces for the water flowing through the inner cylinder.

The drawing and description disclose what are now considered to be preferred forms of the in-

vention by way of illustration only, while the broad principle of the invention will be defined by the appended claim.

What I claim is:

- 5 A heat exchanger comprising a closed elongated cylindrical outer sheet metal jacket having an inlet at one end and an outlet at the other end, an outer cylinder arranged concentrically within the jacket and extending approximately
10 to the ends thereof forming an outer chamber between the jacket and outer cylinder, said outer cylinder having an outlet at one end and an inlet at the other end, an inner cylinder within the

outer cylinder, partition plates in the ends of the inner cylinder, longitudinally positioned parallel straight tubes in the inner cylinder and connected to the plates, means for conducting fluid between the outer chamber and the ends 5 of the inner cylinder for circulation through the tubes, said inner cylinder being perforated adjacent the tubes so that fluid within the outer cylinder may circulate about the tubes as it travels from the outer cylinder inlet to the outer cylinder 10 outlet.

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