Nov. 6, 1934. P. MANISCALCO 1,979,975

HEAT EXCHANGING DEVICE

Filed April 19, 1933

Fig. 1.

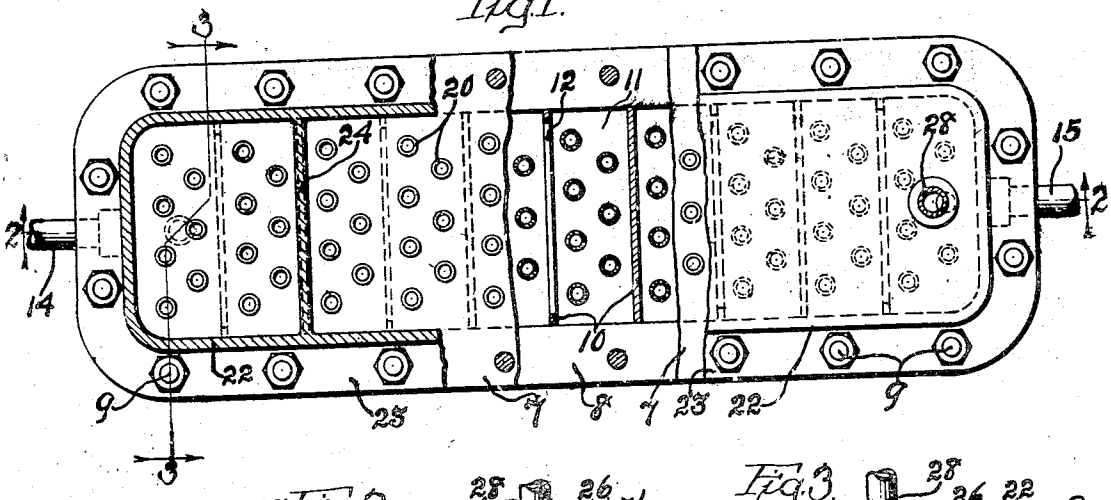


Fig. 2.

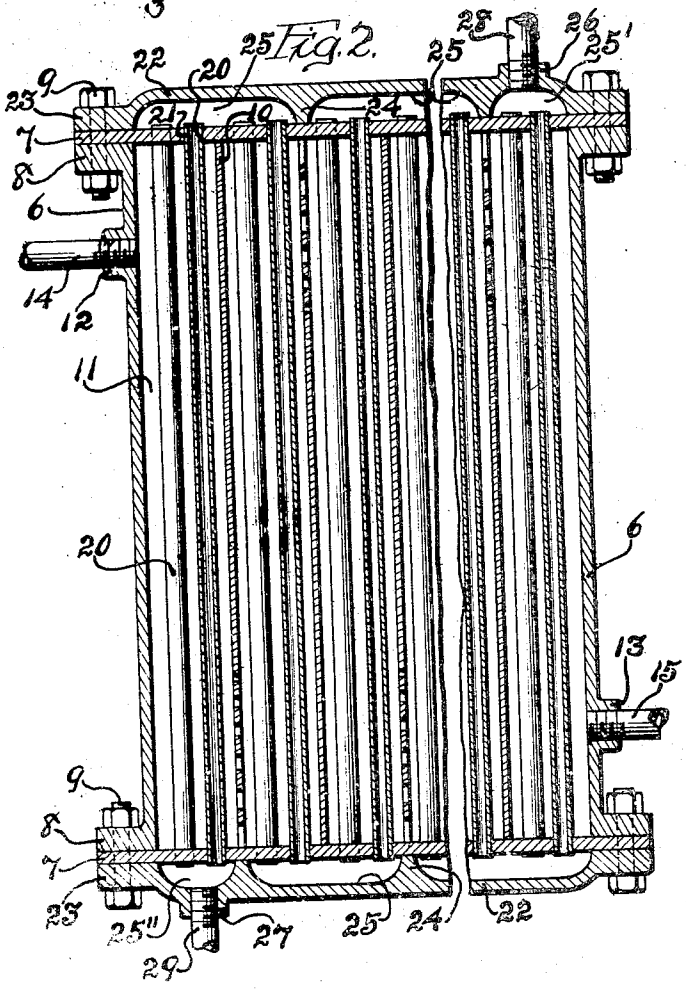
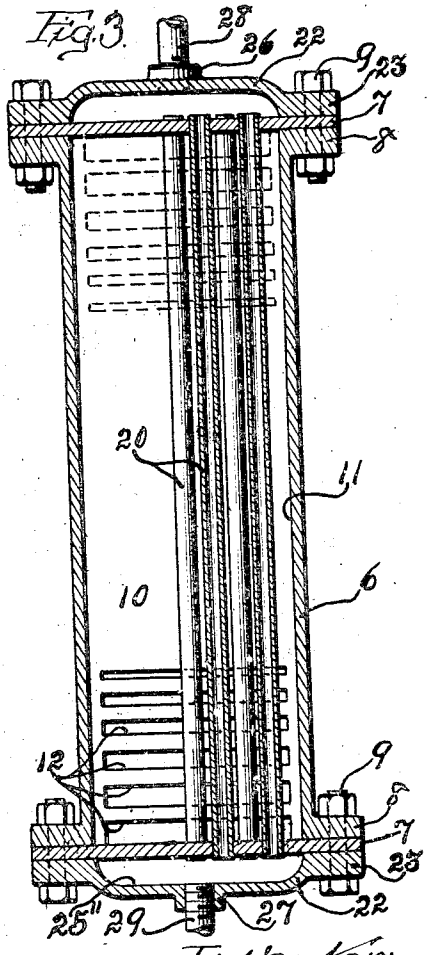


Fig. 3.



Inventor:
Pietro Maniscalco

By J. Daniel Stawe Atty.

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HEAT EXCHANGING DEVICE

Pietro Maniscalco, Chicago, Ill.

Application April 19, 1933, Serial No. 666,840

1 Claim. (Cl. 257—223)

This invention relates to improvements in a heat exchanging device.

The main object of this invention is to provide an improved heat exchanging device, and more particularly a device for heating a fluid, such as air, by utilizing a hot fluid which is normally wasted, such as the exhaust gases from an internal combustion engine, or the exhaust steam from a steam engine.

Another object is to provide such a device which is especially adapted for service with compressed air, and whereby the air is highly heated, to considerably increase the pressure and working force in such heated and compressed air.

A further object is to provide such a device which is simple and durable in construction, and wherein the various parts are adapted to be separated, for inspection, cleaning and the like.

These and various other objects and advantages will become apparent from the following description, taken in connection with the accompanying drawing, in which the invention is shown in its preferred form, it being understood that various other arrangements and forms of construction may be resorted to for carrying out the objects and purposes of this invention.

In the drawing:

Fig. 1 is a view, partly in plan and partly in section, with parts broken away, illustrating my invention in its preferred form of construction.

Fig. 2 is a vertical, longitudinal sectional view thereof, taken on line 2—2 of Fig. 1.

Fig. 3 is a vertical cross-sectional view, taken on line 3—3 of Fig. 1.

The drawing illustrates my invention in its preferred form of construction comprising a casing which includes a tubular shell or side wall means 6, oblong in cross-section, and having end plates 7 removably mounted on the ends thereof, preferably by the use of laterally extending or offset flanges 8 provided at the two ends of side wall means 6, and suitable bolts or securing elements 9 extending through openings provided in said flanges and in the end-plates. Partition walls or baffle plates 10 extend parallel across the casing, from end-plate to end-plate thereon, to form a plurality of chambers 11 therein; and slots 12 are provided in said plates, alternately in the opposite ends thereof, whereby to form a series of connected chambers adapted for conducting a heating fluid therethrough, to and fro through the casing. These slots extend crosswise of the plates and are graduated, so as to diminish in size from the end toward the middle part of the plate, substantially as indicated in the drawing, in order that the hot fluid, as exhaust gases, will gradually pass through the series of chambers, to and fro, from end to end of the casing. Inlet and outlet ports 12 and 13 are provided on the opposite parts of the side wall means 6 of the casing, for the connection thereto of suitable inlet and outlet conduits 14 and 15.

Pipes or tubes 20 are mounted in these chambers 11, preferably by mounting the ends of the tubes with a tight or driving fit in bores or perforations 21 provided in end plates 7, so that the open ends of the tubes will communicate with and discharge into the space at the outer sides of said plates. Caps or end members 22 are mounted outward of the end plates, as by means of peripheral flanges 23 tightly secured on said plates by the use of said bolts 9, and ribs 24 extend inwardly from the caps so as to provide arched inner chambers 25 therebetween, whereby two sets of tubes in two adjacent chambers 11 have their adjoining open ends operatively connected, so as to provide a continuous passage through said tubes and arched chambers to and fro through the casing, from one end to the other thereof. Inlet and outlet ports 26 and 27 are provided on said caps for mounting inlet and outlet conduits 28 and 29 therein, to convey the fluid through the arched inlet chamber 25' and the sets of tubes, and to discharge it from the exit chamber 25'' at the opposite end. These tubes are arranged in sets, as indicated in the drawing, so that the cross-sectional area of a set of tubes and of an arched chamber is greater than the cross-sectional area of inlet port 26 and inlet conduit 28, in view whereof the air or fluid entering through said conduit into the casing and coming into indirect contact with a hot fluid surrounding the set of tubes, is considerably heated in its passage through the several sets of tubes which are located in the heating fluid as it flows through the heating chambers in the casing. Herein the heating fluid flows through chambers 11, around tubes 20, in a direction reverse to that of the air through said tubes, and consequently the air is provided with increased pressure and working force in its passage through the device to the outlet conduit 29 to be delivered thereby for use in the desired machine or mechanism for doing work.

The caps 23 are readily removable from the shell, by removing the nuts from bolts 9, whereupon the tubes 20 and arched chambers 25 may

be readily inspected and repaired; and one of the end plates 7 may then also be removed, by driving the tubes therefrom, so that the chambers 11 may also be inspected and repaired, if necessary.

I claim:

A heat exchanging device comprising a casing including a tubular shell constituting side walls having laterally extending end flanges, perforated end plates removably mounted on said flanges to provide end walls for the casing, baffle plates mounted in said casing from end wall to end wall and having graduated slots provided alternately adjacent the opposite ends, to form a series of connected heat exchanging chambers, said slots diminishing in size from the end toward the center of the baffle plate to provide for a gradual and continuous passage of heated fluid to and fro through the casing, a set of tubes in each chamber mounted in said perforations in the end plates and having their ends open therebeyond, and cap means removably mounted outwardly of said end plates and having inner ribs forming arched chambers therebetween to connect two adjacent sets of tubes, inlet and outlet conduits for said heating chambers and for said arched chambers, the area of each set of tubes and of an arched chamber being greater than that of the inlet conduit, whereby the air is adapted to pass through the device in a direction reverse to that of the heating fluid and to be heated in its passage through the device.

PIETRO MANISCALCO.