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H. W. FISHER

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HEAT EXCHANGER APPARATUS

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FIG. 1

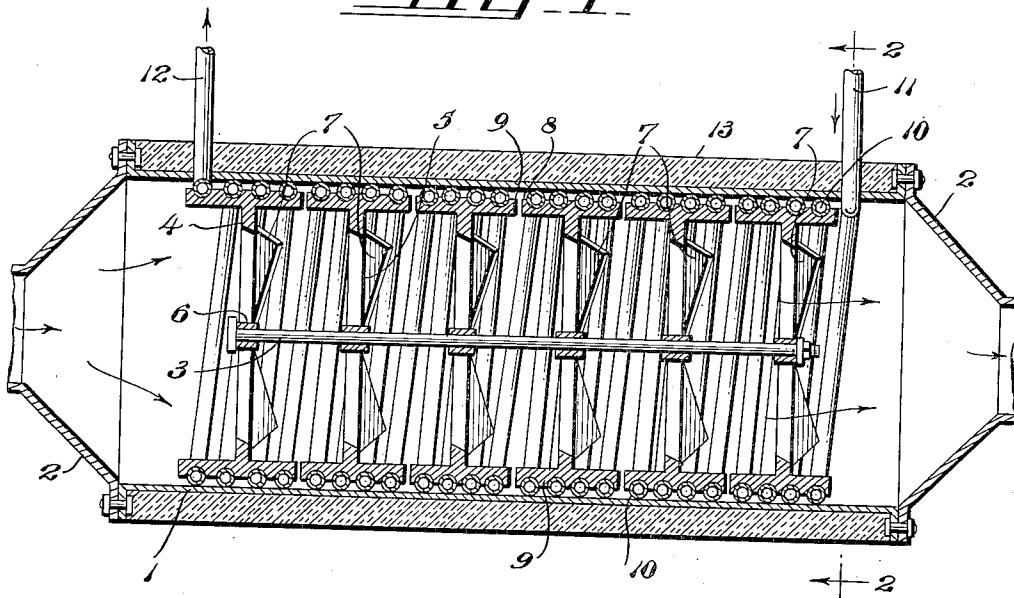
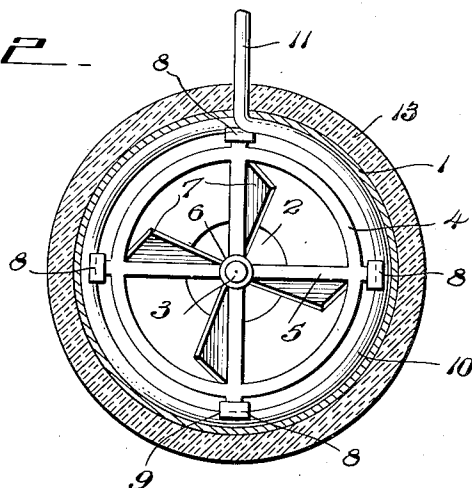


FIG. 2



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HEAT EXCHANGER APPARATUS

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2 Claims. (Cl. 257—235)

The present invention relates to a heat exchange apparatus, and more particularly, it relates to a device in which provision is made for a high quantity of flow of a hot fluid with a minimum imposition of back pressure on the source of said fluid. Specifically, the apparatus provides for the heating of a cool or cold fluid material by means of hot exhaust gases, as from an internal combustion engine under the initial pressure of said gases.

It is an object of the present invention to provide a means for boiling a liquid for use as in the generator of an absorption type refrigeration system. It is also an object of the invention to provide a combined heat exchanger device and exhaust muffler for use with internal combustion engines. These and other objects of the invention may be fully understood from the following description, when it is read in conjunction with the accompanying drawing, in which

Fig. 1 is a vertical section through a device of the character set forth; and

Fig. 2 is a sectional view of the apparatus taken along the line II—II of Fig. 1.

Referring to the drawing, the numeral 1 designates the shell of an enlarged chamber in an exhaust manifold line, or the like, connected in the line by means of the reducer portions 2. Within the chamber is disposed a core member, which as shown, is composed of a plurality of sections joined as a unit by a tie rod 3. As more clearly illustrated by Fig. 2, each section is composed of a rim element 4, having inwardly extending radial arms 5 and a hub portion 6. Substantially triangular vanes 7 are disposed co-extensively with an edge of each arm, with the apex portion adjacent the hub. The vanes may be inclined slightly in a clockwise or counter-clockwise direction, to impart a turbulent or swirling motion to the fluid moving through the manifold. At times it may be desirable to alternate the inclination of the vanes on successive sections so that a better baffling action is obtained. Also, although it is preferred that the vanes 7 be disposed in substantially the manner shown, in order to partially direct the fluid stream toward the wall of the chamber, a suitable turbulence may be obtained with the vanes pointed toward the walls, their apexes adjacent the rim 4.

At spaced points about the periphery of the rim 4, and at right angles to the rim surface are secured separator fins 8, each fin being serrated by helically related grooves 9 in its outer edge, the fin grooves in one section being conformable

to those of the next section in such fashion as to provide a series of open receptacles disposed in alignment along a helically curved path. The maximum diameter of each section or of the core is so adjusted as to provide for a space between the bottom of the grooves or receptacles 9 and the inner wall of the manifold 1 in which may be disposed a conduit 10 helically wound about the separator fins 8 of each core section.

As illustrated, the outer diameter of the core is such that when the conduit 10 is wound about the fin portions 8, the entire assembly may be snugly inserted within the manifold or chamber 1, with the conduit in surface contact with the chamber walls. Suitable inlet and outlet connections with this conduit are provided in the manifold wall as at 11 and 12 respectively. An insulating cover 13 is provided for the manifold in order to reduce heat loss through the manifold.

In the apparatus as shown in Fig. 1, a stream of exhaust gases may be passed through the manifold 1 from left to right, while a stream of low boiling refrigerant liquid is led through the conduit 10 from right to left. The exhaust gases striking the vanes 7 are set into turbulent motion swirling outwardly against the fins 8 and with a wiping action over the conduit 10, providing an intimate contact with all of the elements disposed in the manifold. The heat from the exhaust gases is indirectly transferred to the liquid not only by conduction through the direct contact of gases with the surface of the conduit, but also indirectly through the core sections and fin members in contact with said conduit.

Although as described, emphasis has been placed on the utility of the device as a heat exchanger, it should be apparent that by properly proportioning the size of the vanes 7 and by suitable adjustment of the angle of their inclination, the structure set forth may function simultaneously as a muffler for explosion motors of whatever type desired. Likewise, while described in connection with its possible suitability for use in conjunction with a refrigerating unit, it should be obvious that the structure is adaptable for use in any structural combination in which it is desired to utilize a fluid heat exchanger in which it is desired that the flow of the heated medium be not too greatly restricted.

Obviously the apparatus and its utilization may be varied within wide limits without departing from the inventive concept disclosed, and it is not intended that the invention shall be limited

by any disclosure set forth for the purpose of illustration, but only by the appended claims.

I claim:

1. A heat exchanger device of the character described, comprising a tubular chamber in a fluid conduit system, and an exchanger assembly for said chamber consisting of a core of a plurality of substantially annular baffle elements each having a rim, a hub, a plurality of spaced, vaned arms radially between the hub and rim, and a plurality of narrow, elongated fin elements disposed in right angular relation to the edge of said rim and spaced peripherally thereof, a tie rod extending centrally of said baffle elements holding them in substantially rigid, spaced relation, the ends of the fins on one element abutting against those of the next adjacent elements, a series of grooves in the edge portion of each fin element, and a helically wound conduit member disposed in said grooves in surface contact with said fins and the chamber wall, said conduit having inlet and outlet connections through the chamber wall.

2. A heat exchanger device of the character described, comprising a tubular chamber in a fluid conduit system, and an exchanger assembly for said chamber consisting of a core of a plurality of substantially annular baffle elements each having a rim, a hub, a plurality of spaced, vaned arms radially between the hub and rim, the vanes being inclined to impart turbulent motion to fluid moving through the chamber, and a plurality of narrow, elongated fin elements disposed in right angular relation to the edge of said rim and spaced peripherally thereof, a tie rod extending centrally of said baffle elements holding them in substantially rigid, spaced relation, the ends of the fins on one element abutting against those of the next adjacent elements, a series of grooves in the edge portion of each fin element, and a helically wound conduit member disposed in said grooves, said conduit having inlet and outlet connections through the chamber wall.

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