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THERMAL REGENERATOR

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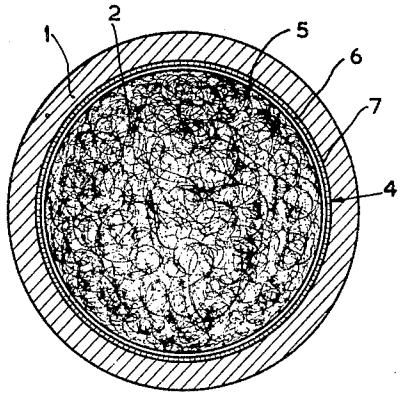


FIG.1

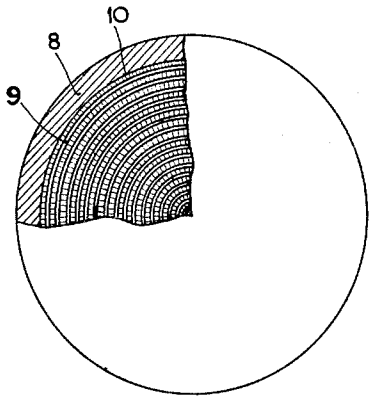


FIG.2

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THERMAL REGENERATOR

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3 Claims. (Cl. 257—270)

A regenerator is known, which is particularly intended for use in a cold gas refrigerator operating on the reversed Sterling cycle principle. This known regenerator consists of a housing containing a filler comprising a plurality of narrow ducts for the working medium flowing through it. As is well known, in such apparatus the regenerator must cool the working medium flowing from the relatively hot part of the apparatus through the regenerator to the cold part of the apparatus and subsequently must give up the absorbed thermal energy again to the working medium when this flows through the regenerator on its way from the cold side of the machine to the relatively hot part thereof. In order to obtain the maximum efficiency of the apparatus care must be taken to avoid as far as possible leakages of the medium by passing the regenerator filler along the wall of the regenerator housing.

It is an object of the present invention to provide a solution of this difficulty. According to the invention the regenerator is characterized in that for joining the regenerator filler to the walls of the regenerator housing, which extend in the main direction of flow of the working medium through the regenerator, use is made of a material comprising a foundation layer and a plurality of thin filamentary elements supported by this layer and extending at right angles to it. For this purpose the regenerator filler may be wrapped in a strip of material consisting of a so-called pile fabric, such as velvet. Thus the pile-threads of this material will be compressed and flattened; any remaining interstices can again serve as a regenerator ducts for the medium flowing through. Thus a simple and effective joining of the regenerator filler to the walls of the regenerator housing is achieved. In this form the free ends of the filamentary elements engage the wall of the regenerator housing; as an alternative the foundation layer may engage this wall with its side not provided with a pile.

According to a further embodiment of the regenerator in accordance with the invention the filler in the regenerator comprises a folded and rolled length of material which here also consists of a foundation layer and a plurality of fine filamentary elements provided thereon and extending at right angles thereto. Consequently, in this latter embodiment the outer side of the filler itself acts to join the filler to the wall of the regenerator housing.

In order that the invention may readily be carried out two embodiments thereof will now be described, by way of example, with reference to the accompanying drawing, both figures of which are cross-sectional views of a regenerator taken at right angles to the main direction of flow of the working medium through the regenerator filler.

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In the embodiment shown in FIG. 1, reference numeral 1 denotes the wall of the regenerator housing. Within this housing there is provided a regenerator filler pad 2 consisting of a supply of nickel chromium wire having a thickness of, say, 20 microns. This filler pad is wrapped in a strip of material 4 which is not shown to scale and comprises a foundation layer 5 and a plurality of thin filamentary elements supported by this layer and extending at right angles thereto. In this embodiment the strip of material 4 consists of velvet so that not only the foundation layer 5 but also the pile threads 6 are made up of textile fibres. For the sake of clarity the threads 6 are shown projecting radially outwards; in actual fact the regenerator filler 2 will exert a pressure on the strip 4 such that the threads 6 will be substantially flattened against the inner side 7 of the wall 1 of the regenerator housing. Alternatively this strip of material may entirely or in part consist of metal.

In the embodiment shown in FIGURE 2, a rolled up strip of material 9 likewise consisting of velvet is disposed within the wall 8 of the regenerator housing; hence the outer layer of the strip of material 9 acts itself to join the filler to the inner side 10 of the wall 8 of the regenerator housing.

What is claimed is:

1. A regenerator of the type suitable for use with a cold gas refrigerator having a gaseous medium therein comprising; a regenerator housing, a porous regenerator filling of textile fabric through which said gaseous medium traverses, and means for joining said filling to the wall of said regenerator housing comprising a foundation layer of textile fabric having a plurality of thin filamentary elements secured to the surface of the foundation layer adjacent to the regenerator wall and having their free ends bent into firm engagement with said regenerator wall, the greater part of the length of each filamentary element being substantially parallel to the regenerator wall.

2. A regenerator of the type suitable for use with a cold gas refrigerator having a gaseous medium therein comprising a regenerator housing, a regenerator material in said housing being in the form of a rolled strip of textile fabric comprising a fabric foundation layer, a plurality of thin filamentary elements secured to the surface of the foundation layer adjacent to the regenerator wall and having their free ends bent into firm engagement with said regenerator wall, the greater part of the length of each filamentary element being substantially parallel to the regenerator wall.

3. A regenerator as claimed in claim 2 wherein said regenerator filling is a velvet fabric.

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