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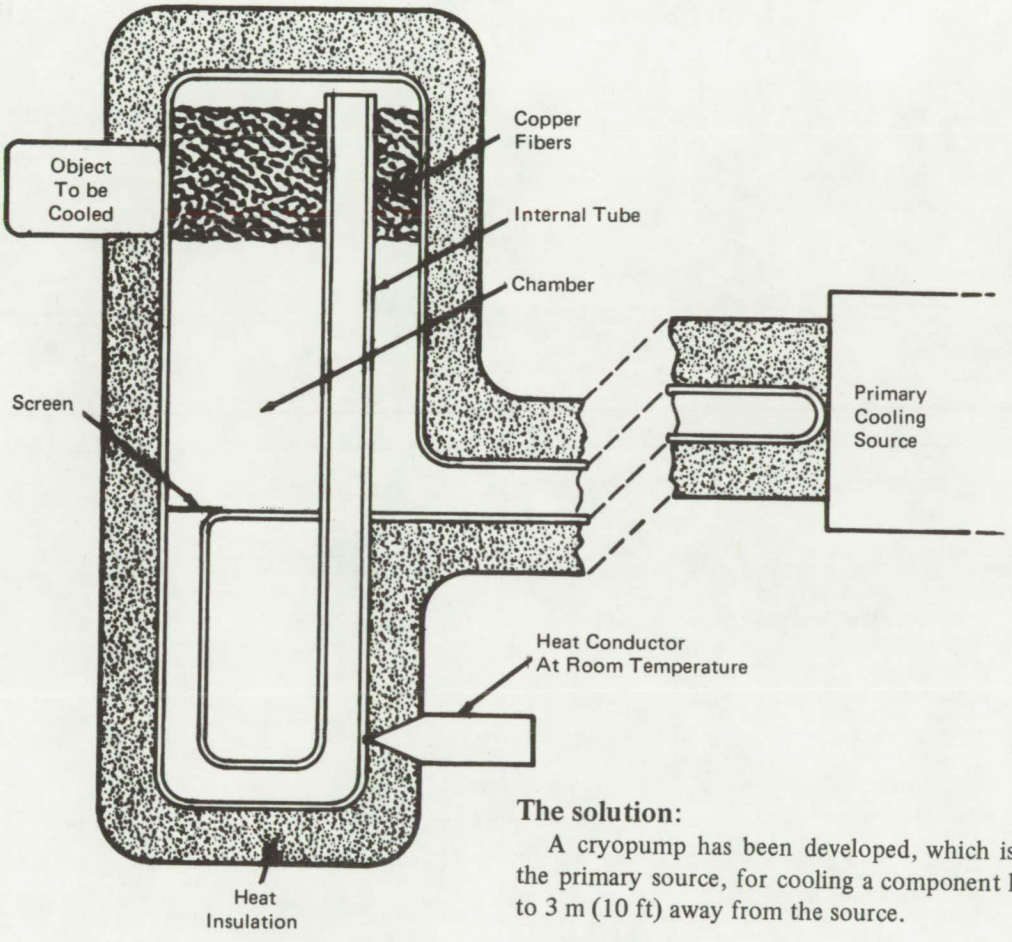
AEC-NASA TECH BRIEF

Lawrence Berkeley Laboratory

A Cryopump for Cooling Objects at a Distance



The problem:

In cryogenic applications, there is a frequent requirement for cooling components that are not in the proximity of the primary cooling source. An example of such a requirement includes superconducting magnet coils which are to be cooled simultaneously.

The solution:

A cryopump has been developed, which is fed from the primary source, for cooling a component located up to 3 m (10 ft) away from the source.

How it's done:

The cryopump, as shown in the figure, receives liquid gas from the primary source through the insulated tubing. The gas is gravity fed into the cryopump chamber until it breaks through the surface tension in a screen and enters the internal tube. This tube is a loop connected to the heat conductor which is located about 2.5 cm from

(continued overleaf)

the bottom. The conductor is at room temperature and conveys approximately 1 W to the liquid gas, causing it to boil. As a result of boiling, a geyser-like effect is created which forces the liquid out of the top outlet and into the fibers. These fibers are made of very thin strands of copper wire which are connected to the object. Liquid gas boiling through these fibers removes the heat from the object and vaporizes. The vaporized gas returns to the primary source through the same tube for recycling.

The developed pump uses liquid oxygen or nitrogen and will operate in the temperature range between 50 to 100 K. Two or more of these pumps may be cascaded to extend the lateral and/or vertical cryopumping distance.

Note:

Requests for further information may be directed to:

Mr. Robert J. Morris
Technical Information Division
Lawrence Berkeley Laboratory
University of California
Berkeley, California 94720
Reference: B72-10314

Patent status:

No patent action is contemplated by AEC or NASA.

Source: N. Milleron and P. J. Batson
Lawrence Berkeley Laboratory
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