

## PHYSICS

# New Refrigerator

May employ a high speed rotor for its sole moving part and be capable of producing temperature drops as great as 270 degrees Fahrenheit.

► A NEW and ingenious mechanical refrigerator employing a high speed rotor for its sole moving part and capable of producing temperature drops as great as 270 degrees Fahrenheit with high efficiency has been proposed by Prof. J. R. Roebuck of the University of Wisconsin (*Journal of Applied Physics*, May).

By combining the conventionally separate processes of compression and cooling of the refrigerant, the new refrigerator approximates for the first time in a practical fashion the thermodynamical ideal Carnot cycle with the resulting high efficiency. The principle of ideal refrigeration formulated by the early French physicist Carnot (1796-1832) states that for greatest efficiency the refrigerant must be cooled as it is compressed, thus maintaining a constant temperature while heat is being given up; and then it must expand and do work without taking on any heat to produce the greatest cooling.

The proposed device employs a strong

hollow cylindrical rotor spun at a high speed through which the gaseous refrigerant passes to be cooled. The gas enters at the center of the rotor at one end. Centrifugal force which is proportional to the distance from the center causes the gas to be compressed as it moves out to the rim of the rotor.

This centrifugal compression causes the gas temperature to rise and allows the heat contained in the gas to be transferred to cooling coils placed inside and spinning with the rotor.

Thus the gas is compressed at a constant temperature, and at the rim of the rotor it is highly compressed but at essentially the same temperature as it had on entering.

Then by allowing the gas to flow back to the center of the rotor through insulated passages, the temperature drops as the centrifugal compression is removed and as the gas does work on itself in expanding. Thus the gas is expanded

while doing work with no heat transfer, and the two parts of the ideal Carnot cycle are approximated.

Because of the compression and heat transfer that takes place, the gas in the ducts going back to the center will be denser than that going outward, and therefore flow in the forward direction requires that the gas pressure be higher at the input than the output. The power required to maintain this pressure difference causes the refrigeration. Practically no rotational energy is extracted from the rotor because all the rotational energy taken from the rotor by the gas when moving outward is given up again when it moves back into the center.

The temperature drops produced are dependent upon the rotational speed of the rotor and therefore the structure must be made very strong to support the enormous centrifugal stresses.

Typical uses proposed for this refrigerator are commercial refrigeration by cooling air as the refrigerant from room temperature to about 70 degrees below zero Fahrenheit in one stage; the liquefaction of gases by using several stages in succession; and winter heating of homes by using a modification of the device as a Kelvin heat pump.

*Science News Letter, July 7, 1945*

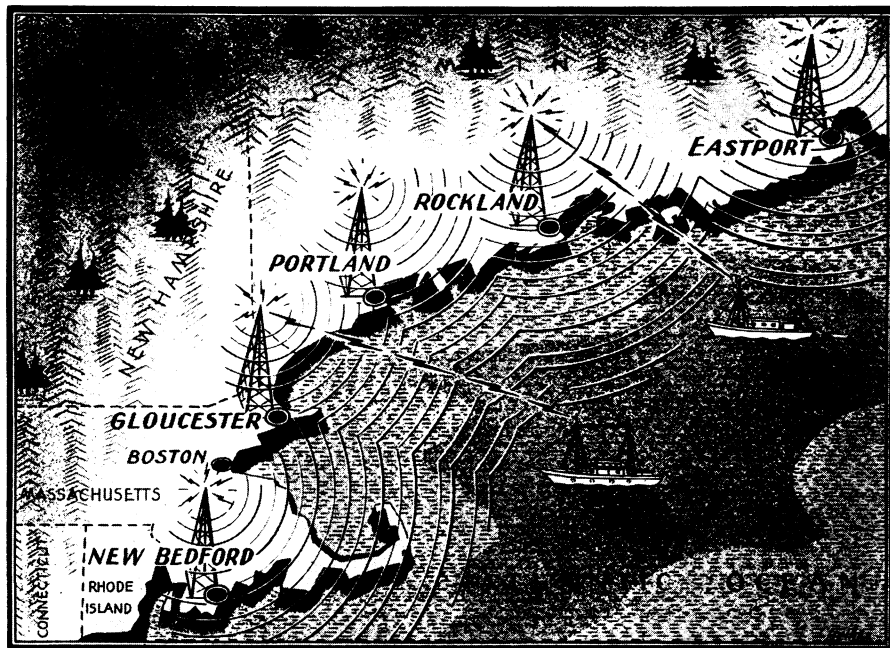
## COMMUNICATIONS

## Five New Radiotelephone Stations Are Planned

► SIX instead of one coastal harbor radiotelephone stations will soon be in operation on the New England coast for the benefit of shipping on the Atlantic if applications now filed with the Federal Communications Commission are approved. They will be installed by the Raytheon Manufacturing Company of this city at Eastport, Rockland and Portland, Maine, and at Gloucester and New Bedford, Mass. The one existing station is at Boston, operated by the New England Telephone and Telegraph Co.

While the service will be of benefit to all shipping in the general area, it will be particularly valuable to the great fishing fleets from New England ports operating in the north Atlantic. The new stations will also provide service to properly equipped trucks and buses within their ranges.

*Science News Letter, July 7, 1945*



**AID SHIPPING**—Five new coastal harbor radiotelephone stations will soon be in operation on the New England coast. The stations will be particularly valuable to the great fishing fleets from New England ports operating in the north Atlantic.

*Bamboo*, treated with plastics to make it water- and insect-proof, is being used in Latin America to crate foods for ocean shipment.