

Pumping Heat

Every modern home uses heat and cold in the various appliances and systems. Both types of appliances produce a certain amount of excess heat that is wasted. This piece is about a concept appliance that saves energy by heating one thing while cooling another.

Consider refrigeration:

As air is pressurized its temperature is increased. When the pressurized air is allowed to cool, and then released, the exiting air will be cooler than it was before it was pressurized. Although due to its' reduced temperature the air released will have a smaller volume than the air that was compressed, it will still contain a certain amount of mechanical energy that can be utilized in compressing ambient air. This makes the refrigeration process more efficient.

Rather than waste the heat that is a byproduct of this refrigeration, why not use or store some of it for another purpose? You could compress this air into a coil immersed in a water heater for instance. With a higher compression-ratio pump, you could store temperatures suitable for cooking and baking.

Conversely, if the primary purpose of the compression was to produce higher temperatures, you could use the resulting byproduct of refrigeration to a good advantage.

Let's say though, that in some cases the available byproduct for either the heating or refrigeration is greater than you could store or immediately use. A Stirling engine operates on a temperature difference. In this case, one could be designed to work between excess cool and the ambient temperature, or between excess heat and the ambient temperature.

Such an engine would save energy in two ways: One, it would prevent the excessive heat or cool from changing the desired ambient temperature of the residence within which it was used. And two, the mechanical energy produced could help compress the air, and save energy that way.