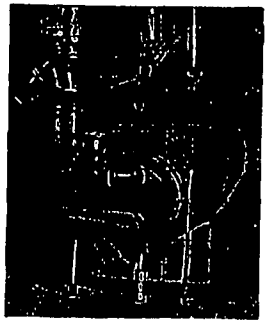
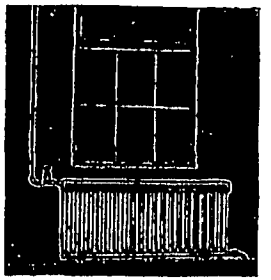
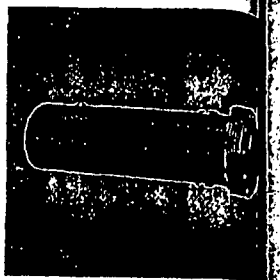


1 Heat exchanger for generating steam (2 to 150 psig) from high-temp water



2 High-pressure steel radiator for use in space heating on high-temp water



3 For domestic hot-water heating wi h-t water, use this type exchange

Consider High-Temperature Water fo

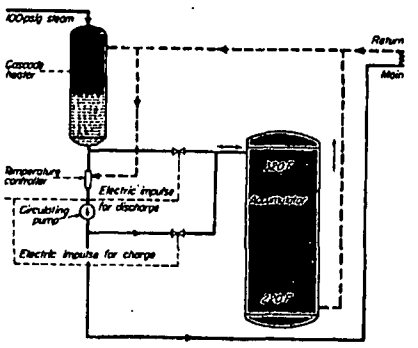
Tick off the plants that can use high-temperature water in process and heating systems and you'll have an impressive list. Here's a quick review of latest design thinking of importance to all future users

By ALEXANDER KULI, *Engineer*
American District Steam Co, Inc

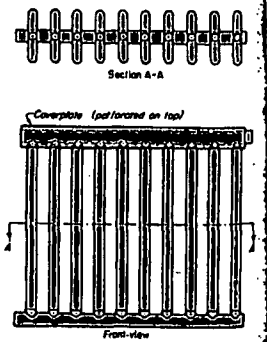
► BECAUSE THEY OUTLINE principles of a system not yet widely accepted in America, Owen Lieberg's articles on high - pressure high - temperature hot water were most welcome (POWER, May and June 1952). European engineers have obtained excellent results with this system for many years, but only in the last 25 years have American engineers given it much thought.

Origins. H-p h-t hot water is not a completely new idea. Its forerunner, the Perkins heating system, was used in England and on the Continent more than 100 years ago. This system was closed but had no circulating pump, the heart of the modern h-p h-t installation. Man of the early English systems are sti running today.

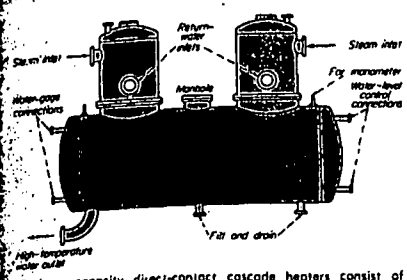
Advantages. Good points of h-p h systems of interest to all engineers in clude: (1) Completely closed piping system of simple design does not need condensate-return equipment or pres sure reducers. (2) Negligible makeup reduces amount of water treatment needed. (3) Boilers are scale-free, have high efficiency. (4) In space heating output is easily controlled. (5) Piping system has small temperature drop— about 3 F per mile. (6) There is no pipe corrosion. (7) Maintenance cos



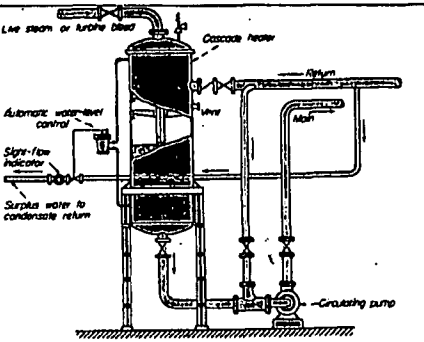
6 This is one way of hooking up a high-temperature water accumulator. Control may be either manual or automatic



7 High-pressure steel radiators are widely used in Europe for heating



4 Large-capacity direct-contact cascade heaters consist of a horizontal expansion tank with heaters in the two domes



5 Piping layout for a typical vertical direct-contact cascade heater for a high-temperature water-heating system

Your Process and Space-Heating Jobs

for simple piping and valves is low. (8) Pipeline is easy to install because it follows ground contours. (9) System has large heat-storage capacity that reduces peak loads on boilers, equalizes heat demand and production. (10) There is no water hammer.

Chief advantages are fuel and maintenance savings together with productivity increase from more exact temperature control. These are important in plywood, rubber, plastics, textile, food processing and other industries. Fuel savings of 25 to 40% are recorded in many plants in Germany, Switzerland, Austria, Italy, France and other European countries where steam-heating systems were converted to h-p h-t water. In Nurnberg a large electric company is presently converting from steam to h-p h-t water and has saved 43% in fuel by eliminating the condensate return line.

What Is It? High-temperature water is water heated to above 212 F, the boiling point at atmospheric pressure. Its pressure corresponds to the saturation value at the given temperature.

Though called by a number of different names, including high-pressure hot water, high-pressure high-temperature water, superheated water, high-temperature hot water and high-temperature (h-t) water, I believe the last is the best and briefest name. We will use it throughout the remainder of the article.

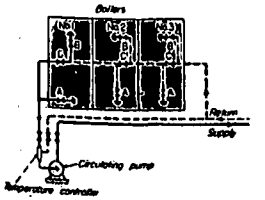
Conversions. Many engineers acknowledge that this system is the most economical and efficient for new plants but object to converting an existing steam system to h-t water because of high cost. Though labor costs more in America than in Europe, while fuel is cheaper, no plant should overlook a fuel saving of 30% or more. This is just what h-t water offers.

H-t water lowers production costs. Conversion from steam to h-t water does not have to be done overnight; it can be carried out gradually. Eighty per cent of h-t water installations replace former steam systems. Usually conversion was gradually made. Units like that in Fig. 5 help in system conversion.

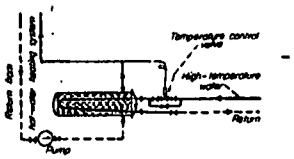
Cascade Heaters. These, Fig. 4 and 5, use live or bled steam to generate h-t water. An expansion vessel with water-level control, it has a series of water-dispersing units called cascades or trays. These expose a large surface of the water for fast, efficient heat absorption.

Steam enters heater top, filling vessel to water level. Water entering heater side comes in direct contact with steam, condensing it. Level of water is automatically controlled, surplus water being discharged through condensate return main to the boiler. Surplus water is usually taken from heater return line, Fig. 5. Water at this point is the coldest in the system.

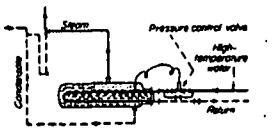
Circulating pump below heater forces



8 Connect boilers in series to raise storage capacity of h-t water system



9 Heat exchanger using h-t water replaces boiler in hot-water heating



10 Hookup to generate steam from h-t water in a tubular heat exchanger