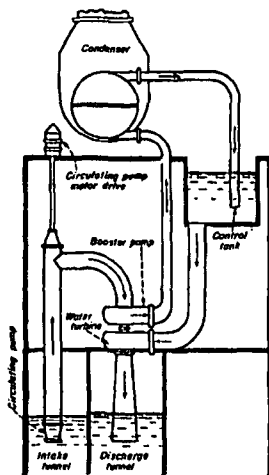


POWER ENGINEERS' NOTEBOOK

PLANT-TESTED IDEAS TO SOLVE PROBLEMS OF DESIGN, OPERATION AND MAINTENANCE

HYDRAULICALLY DRIVEN BOOSTER PUMP ALLOWS ELEVATED PLANT LOCATION



HIGH DEMAND for cooling water primarily dictates the placing of steam-electric plants within the area of a system. Because of the steady flow and relatively high-energy consumption for pumping required, special effort is usually directed toward maintaining a low pumping head through which the cooling water is lifted. This further limits locating the plant, along river banks, to sites of low elevation.

Studies of some sites have shown that placing plants at higher elevations than normal river level would lower substructure costs. This, together with the reduction in construction and operating hazards from flood waters, would justify the extra cooling-water pumping costs. Added to this advantage it proves economical to salvage part of the pumping energy by applying a booster pump driven by a water turbine that uses the energy in the cooling water discharged from the main condenser, as shown in the diagram.

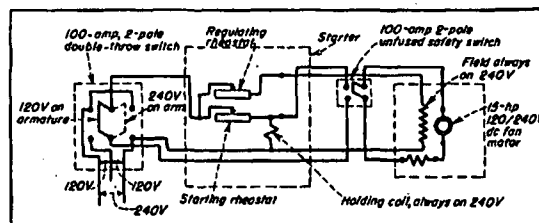
This system was jointly developed by the engineering departments of Elec-

tric Advisers, Inc. and Worthington Pump & Machinery Corp. One installation in the R. E. Burger plant of the Ohio Public Service Co. pumps 35,000 gpm. The main electrically driven circulating pump, of 600-hp rating, can deliver 60% of maximum flow when working alone against about 60-ft static head plus friction losses. Full flow develops when the water turbine drives the booster pump.

Combined efficiencies of the hydraulic unit are such that the turbine-pump unit salvages 70 to 80% of the power needed to develop the extra head. Water flow reaches design flow for low river stages and increases to 5% more at higher river stages. Power input to the motor-driven pump remains practically constant under the river conditions experienced. Pump and turbine characteristics are selected so that the control-tank water level remains stable. Pump-system factors are self-compensating and control proves no problem. At normal river stages the water turbo-booster recovers about 425 hp net.

USING AVAILABLE VOLTAGES INCREASES SPEED RANGE

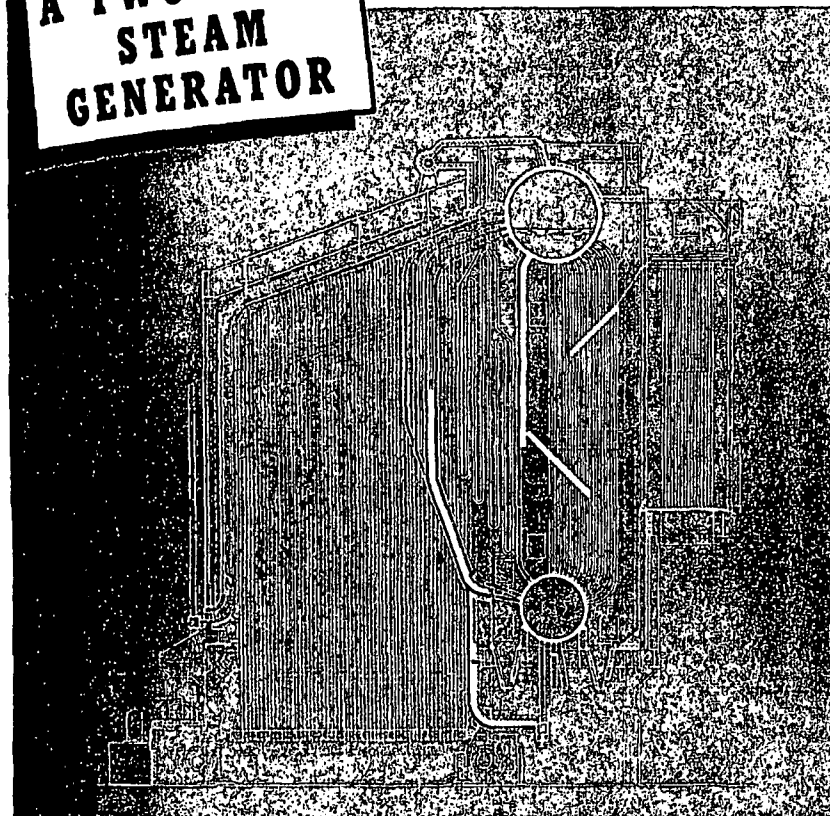
IN THE STANDARD HOOKUP of a 240-v dc motor driving a fan, the available speed range was 1700 to 850 rpm, or 2:1. The fan supplies cooling air to a dry-type radiator and this speed range proved ample in warm weather. For winter conditions as well as light-load periods less air is needed than that provided by the lowest speed. To reduce the resulting excess auxiliary demand, motor connections were rearranged as shown in the diagram with the aid of a 2-pole double-throw switch. Thus either 240 or 120 v could be thrown across the motor armature circuit with the field always fed at 240 v.



This gives the motor an additional speed range from 850 to 520 rpm or a total range of approximately 3.25 to 1. (Continued on page 112)

A TWO DRUM STEAM GENERATOR

Location: NATIONAL LOCK CO., Rockford, Illinois.
Contractor: THE AUSTIN CO., Chicago, Illinois.



THIS two drum steam generator is a modern Springfield unit developed for The Austin Co., Chicago, general contractors for a power plant modernization project at the National Lock Co., Rockford, Ill. It is designed to produce 110,000 lbs. of steam per hour at 350 p.s.i. and 750°F. It is equipped to operate on Illinois coals with continuous ash discharge spreader stoker.

Springfield service includes design, fabrication, and erection of units complete with firing, draft, and control equipment—all taken under a "Single Responsibility" contract. We will be glad to submit a proposal covering your requirements. Write to our main office in Springfield, or see your nearest Springfield representative. SPRINGFIELD BOILER CO., 1933 E. Capitol Ave., Springfield, Illinois.

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