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ALUMINUM, and its power supply, holds center of stage as mobilization hits high gear. Leading producers have been asked to plan for a 2-billion-lb-per-yr expansion —that means more than 2 million kw.

Preliminary indications are that some new capacity will be gas-engine power (like Alcoa's Point Comfort works) while some will be steam plants burning gas or, possibly, coal at the mine mouth.

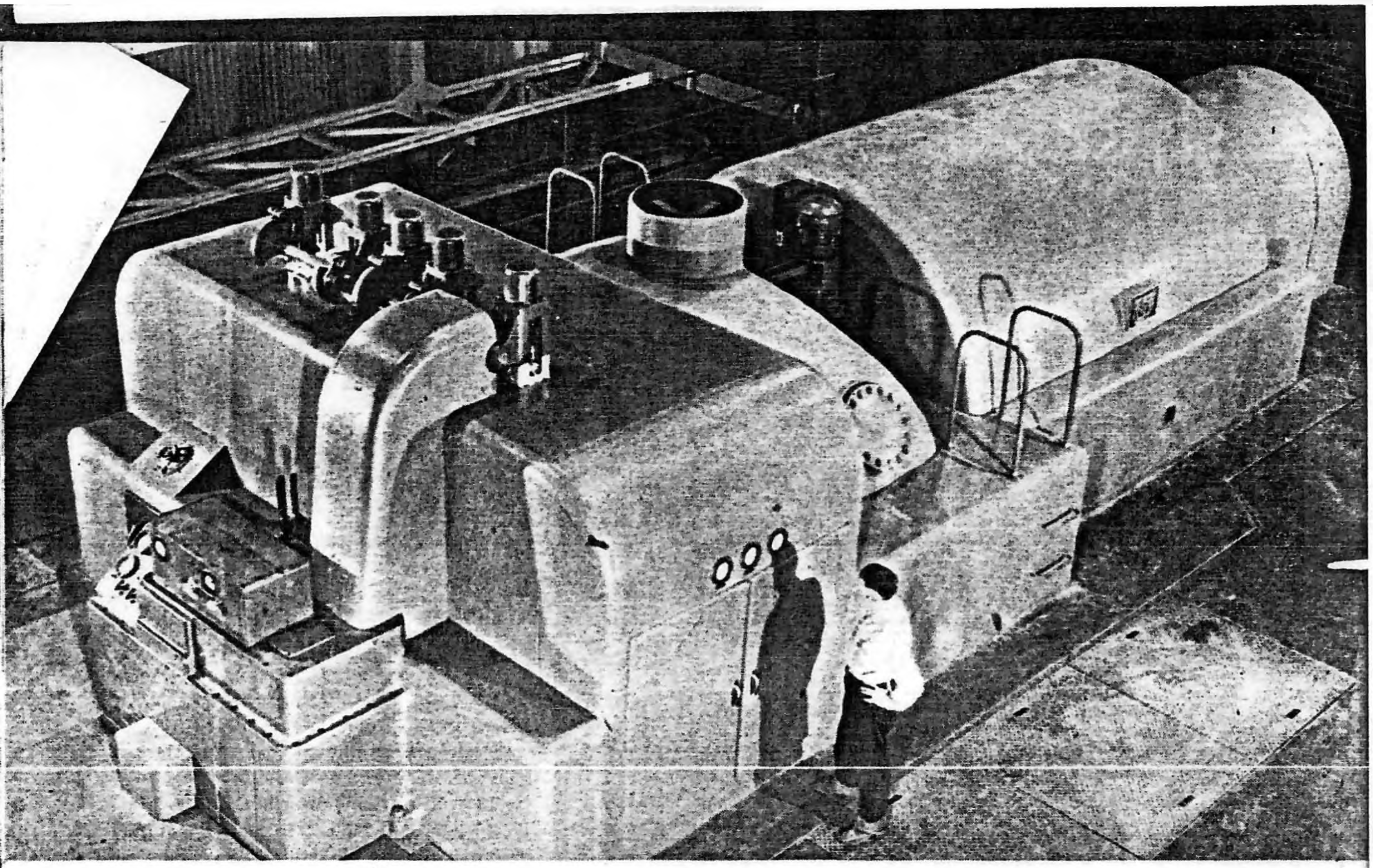
Whatever form new aluminum capacity takes, we'll probably see scenes like our cover repeated. In that photo, a worker at the Westinghouse East Pittsburgh works solders armature connections on a synchronous-converter collector.

Next month . . .

- Another installment of Phil Swain's popular insulation handbook—practical dope on asbestos, insulating concrete, aluminum foil and other modern materials for cutting heat loss.
- All eyes still focus on America's first commercial power-producing gas turbine—the unit at what used to be called Huey Station (now Belle Isle). Last February we brought you Oklahoma Gas and Electric Co's first operating report on this installation. Next month we'll add another year to the record. Performance still looks good!
- For years, paper-industry engineers have wrestled with the problem of disposing of sulfite liquor. Back in January 1949, we told of a new magnesium-base process that forms one solution. Now experiments show calcium-base sulfite liquor—the common garden variety—can be burned successfully without auxiliary fuel. February article reveals how it's done, possible applications.
- Free-piston compressors have been interesting American engineers because they look good for gas-turbine plants. They also do a job as self-powered air compressors—witness our February report on developments in France.

. . . and future months

- Watch for the new, revised edition of the Power Handbook—bigger and better than ever! First part now scheduled for March, second part for June.



SHEET-METAL JACKETING gives compact finished appearance to unit besides performing practical function to protecting insulation just as earlier lagging did. It also provides air-insulated space for all piping and auxiliary equipme

How Your Steam Turbine Is Insulated

By C H TeBRAKE, *Steam-Turbine Dept, Allis-Chalmers Mfg Co*

► IN THE EARLY DAYS, little thought was given to heat loss from piping and engine parts. Steam pressures and temperatures were low, and fuel cost was reasonable. Some lagging was used, but primarily to protect operating personnel from burns. It also helped to reduce boiler and turbine-room temperatures. Early forms of lagging included wood, rags, gypsum plaster, and some types of clay used with mixtures of rope fiber, straw and hair as binding material.

During the early 1880's carbonate of magnesia began to be applied as insulating material to water and other fluid vessels. We have no data on the type of insulation used on the first turbine built (in 1905) by our company. Probably it was magnesia, applied as plastic material in layers of about 1½ in. at the areas of highest temperatures.

Heat Conservation. Operating temperatures have steadily risen, paced by increasing fuel costs. Adequate insulation on steam turbines became an important consideration. Heat radiated to surrounding air reduces efficiency of the entire plant cycle.

Possible distortion of the turbine cylinder by subjecting one side to cold drafts creates an operating hazard. Under severe conditions this causes misalignment and damage to moving parts.

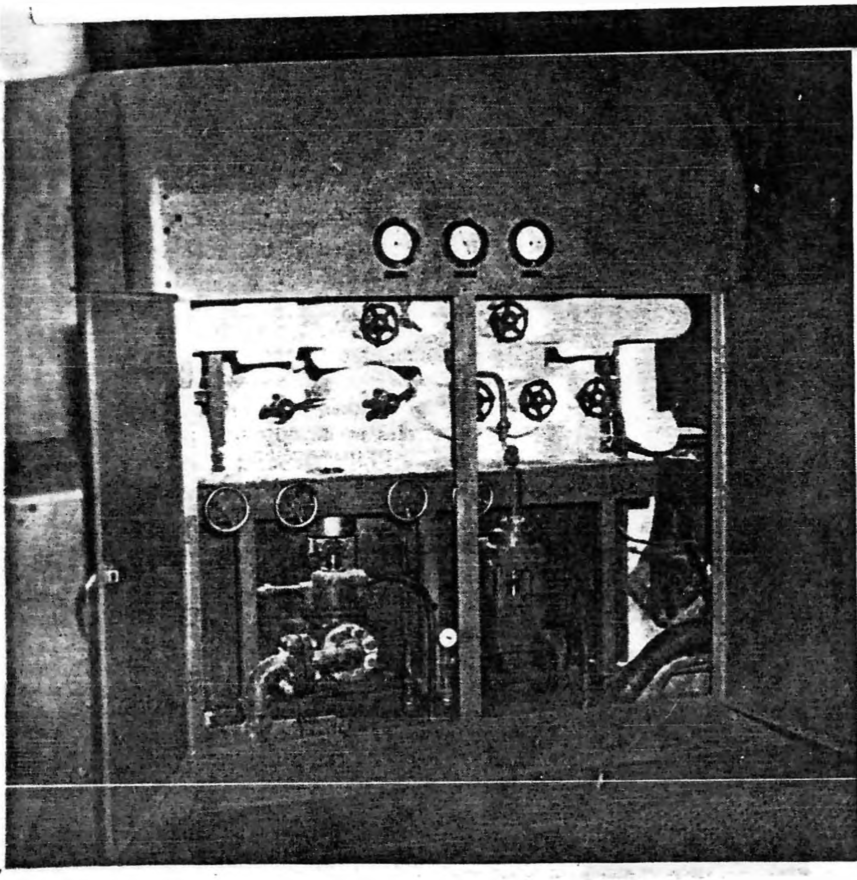
These conditions of loss and hazard can be controlled with various forms and combinations of magnesia and asbestos insulating materials.

Insulation. For surfaces with temperatures at and below 500 F, 85% magnesia has proved most economical. This material contains hydrated basic carbonate of magnesium, bonded with about 15% of asbestos fiber. The magnesia is the chief insulating component in this mixture because of its high percentage of minute dead air spaces that it contains. The asbestos fibers act as a heat-resisting reinforcement to add structural strength and long life. This material handles easily. It is clean, light and inorganic in nature. It does not char, burn, shrink or loosen in service. It has no corrosive action on the metal it touches.

When temperatures do not exceed 500 F, insulation of pipes and surfaces utilizes 85% magnesia in block or sectional form, applied in one or tw layers to the total thickness need for the temperature. An exception made for pipelines, 2 in. and small These are insulated to a maximum thic ness of 2 in.

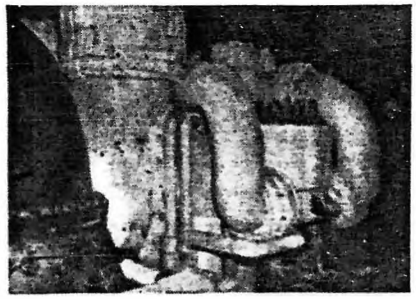
In applying block insulation, joints and crevices are filled with pla tic cement of like material. Where t layers are needed the joints are brok or staggered. After fastening the se mental insulation in place with no corrosive wire, the entire outer surfa is coated with ½-in. thickness of bestos cement in two layers. Gal nized wire mesh reinforces the ceme which is troweled to a smooth, ha finish. Instead of a metal-jacket la ging, the exposed surface may be co ered with a canvas jacket wrung in cold-water paste, then pasted a stapled in place.

Subjecting 85% magnesia to te peratures above 500 F tends to calci it on the hot surface. This produces thick film of magnesium oxide, whi possesses high insulating qualities lacks structural strength. For this r son, a combination of insulation bloc is provided, which has an inner la

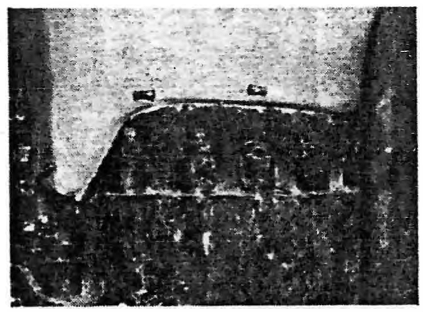


INSULATION FORMS INTERMEDIATE SURFACE between turbine-casing surface and sheet-metal jacketing. Casing doors open to give access to piping and auxiliaries

BLOCK AND PLASTIC insulation cover turbine hydraulic throttle valve, strainer



INSULATING BLANKETS over the flange joints are easy to remove for repairs



LUGS IN PLASTIC insulation make anchor points for blankets covering joint

Function of steam-turbine insulation has changed over the years. Here's an authoritative description of the need for insulation and how it is applied to the units

to withstand the higher temperatures and preserve all the inherent qualities of the 85% magnesia. Specially selected precalcined diatomaceous silica, blended and bonded with asbestos fiber, composes the inner layer. Such material, though high in refractory value, is usually lower in insulating value and higher in cost than 85% magnesia. Thickness of the high refractory layer is kept to the minimum needed to assure an interface temperature of not over 500 F.

Insulating Blankets. Because operating conditions involve temperatures calling for insulation thickness up to 5 in. or more, removal of insulation for turbine inspection and repair is usually difficult, destructive and costly. To avoid the necessity of breaking the insulation on flanges and covers that must be dismantled occasionally, a blanket type of material is made. These blankets consist of asbestos cloth in mattress form.

Three types of asbestos are commonly used in the insulation field. They all belong to the fibrous variety of hornblende, one of the amphibole minerals composed mainly of silica, magnesium and calcium. They often contain aluminum and iron. Chrysotile, or white asbestos, has extremely fine, strong and elastic fibers, can be spun and woven, ideal for cord and cloth materials.

Crocidolite, usually called blue asbestos because of the dull lavender color given by its iron content, compares with white asbestos in its physical and insulating qualities. Amosite, or brown asbestos, is comparable to white and blue asbestos in many ways, but has somewhat shorter fibers. Because of its lower cost, this material is used extensively for reinforcement of the magnesia blocks and for filling in the mattress type of covering.

Blanket cloth is usually woven of white asbestos. For high temperatures the cloth is woven of monel-wire-inserted yarn and sewed with yarn of the same material. The stuffing is usually brown asbestos, made with a uniform thickness and density of not less than 12 lb per cu ft.

All blankets are closely tufted to prevent sagging. They are fitted with hooks or rings for attaching to surfaces to be insulated. Blankets are usually applied to horizontal flanges of the cylinder casing, throttle valve cover and connecting flanges, steam strainer cover, and such other surfaces as will require dismantling. The blanket is applied in one or two layers to the total thickness needed for the temperature. In general, blankets are arranged in two layers with joints staggered, except where cap or muff types lend themselves more readily as on pipe flanges or vessel covers. For the latter, single layers are made up as needed.

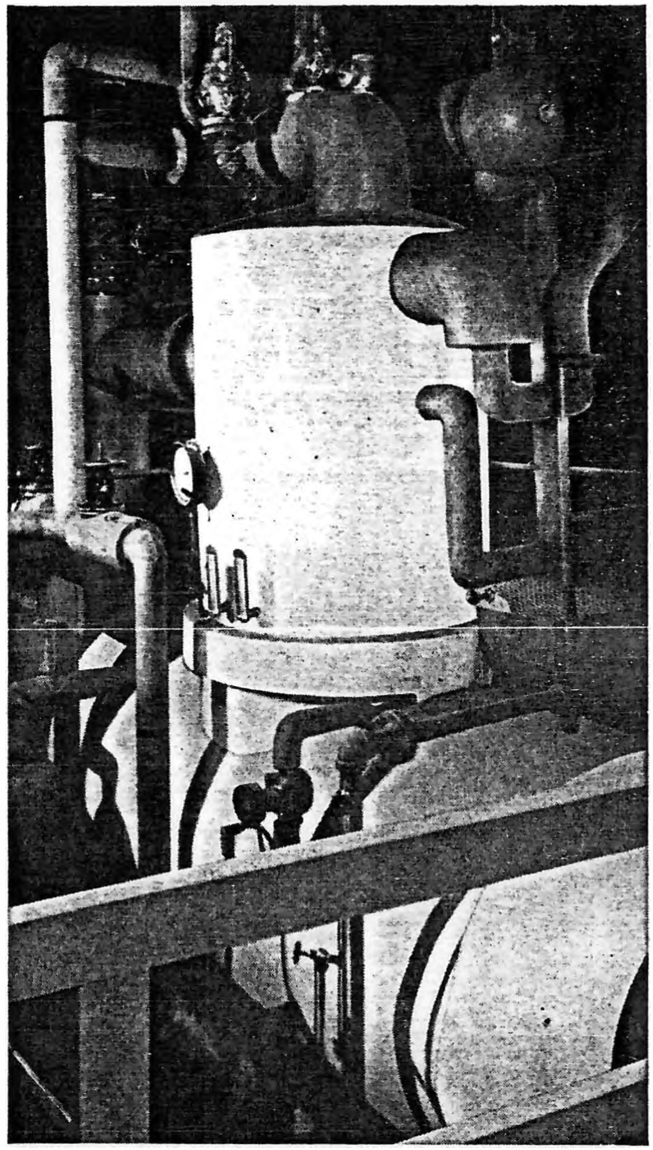
A noncorrosive wire, such as monel, is used to lace the blankets together and to the lugs, which are screwed or welded to the surfaces to be covered.

Insulation methods we have talked about have been used for many years, though we have always been alert for improved and more economical methods.

There are, of course, many other types of insulating materials, such as rock wool, spun glass, aluminum foil, etc. Moreover, the industry is always developing new materials and methods for reducing heat losses. Each material possesses qualities that make them most suitable for certain specific applications and should be used where experience has proved them best.

We have been asked:

Can insulation save my buying a new feed water heater?



Here's what a manufacturer wrote us recently: "Our factory uses steam for processing. Condensate return lines, which are now uninsulated, total 2106 feet in length. Our peak loads average 3 hours daily, and the feed water heater can furnish only 80% of recently increased load. Of course, this makes steam costly and inadequate for full production. Will it be necessary to buy a new feed water heater to increase the efficiency of our boiler, or can the application of insulation to the condensate lines do the job?"

Here's what we advised: While an additional feed water heater might solve your problem, it isn't necessary. Insulating your condensate lines will prevent loss of heat on the way back to the boiler and consequently will increase boiler efficiency. Too, insulating the lines will cost far less than installing a new feed water heater. The question then is—which kind of insulation will do the best job? Air-cell pipe covering would be adequate if peak loads were brief and occasional and return lines were short. However, the loads here are too heavy and the lines too long to make air-cell desirable.

Insulation of the return line with 85% Magnesia pipe covering is the best way to attain economical operation. The extra cost of this type of insulation will be repaid, under present conditions, within just a few months.

Armstrong engineers run across questions like this every day. Helping to solve these problems has given them valuable knowledge that could be put to work on your next insulation problem. You'll find these trained engineers in your near-by Armstrong office, and they will be glad to help you.

IF YOU HAVE ANY QUESTIONS involving industrial insulations for low- or high-temperature applications, we'll do our best to help you solve them. Just address a letter or post card to Armstrong Cork Company, 7001 Maple Avenue, Lancaster, Pennsylvania.

ARMSTRONG'S INDUSTRIAL INSULATIONS

MATERIALS - INSTALLATION

FOR ALL TEMPERATURES FROM 300°F. BELOW ZERO TO 2800°F.