FONTANA BLAST FURNACE SLAG USED IN NEW MINERAL WOOL PLANT

PLAINTIFF'S EXHIBIT
JM 1077

another ON THE SPOT report

AIR-COOLED blast-furnace slag, a by-product of Henry J. Kaiser's much-publicized steel mill at Fontana, Calif., is now being utilized in the production of high-quality mineral wool.

The insulating material, which is finding a ready market on the Pacific slope, is being produced in the new plant of the Mineral Wool Insulations Co., which was erected adjacent to the Kaiser slag dump. Its owners are Harvey H. Head, president; C. W. Hawthorne Jr., vice-president and chief engineer; and C. T. Sauers, secretary-treasurer and sales manager. Mr. Head and Mr. Hawthorne were formerly connected with the steel mill and negotiated the contract with the Kaiser interests which gives their company access to the slag supply for a 30-year period under a lease arrangement.

The new plant started operating with one cupola in November, 1946, and a second began blowing wool in the spring of 1947. Production at present is confined to loose, granulated wool, but there is ample room and adequate provision in the plant for the addition of batt machinery and ovens, as well as space for the erection of two more cupolas and appurtenant equipment in the future.

The plant, warehouse and offices are housed in a modern steel and concrete-masonry structure containing 16,000 sq. ft of concrete floor space. (The concrete blocks, incidentally, utilized another Kaiser Steel by-product—coke breeze—as the lightweight aggregate in their manufacture.)



• View showing the two cupolas with a skip hoist in the middle and an induced draft fan at the right. In the foreground are piles of slag (left) and coke.

A portable crushing plant operating on the slag dump produces the slag sized from 1 to 4 in. used in the wool plant, besides loading out railroad cars of the material for other industrial uses and for shipment to other mineral-wool plants on the west coast. A Northwest gasoline-powered dragline with a ¾-cu.-yd. bucket loads a steel hopper with a reciprocating feeder in the bottom which puts the slag into the feed opening of a 20- by 36-in. Universal jaw crusher set at about 4 in. The crushed slag is carried by a belt-conveyor to a car- and truck-loading hopper fitted with a 1-in.-mesh screen, the minus 1-in. fines being wasted. A high-intensity electromagnet suspended above the conveyor removes any tramp iron, a 7½-kw. generator, driven from the Minneapolis-Moline gasoline engine which powers the crusher, supplying the direct current to energize the magnet.



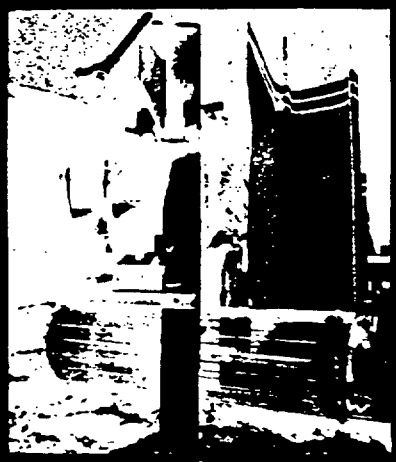
• Plant of Mineral Wool Insulations Co. at Fontana, Calif., showing two cupolas and water-cooling tower. The room immediately to the left of the cupolas will eventually house the third and fourth cupolas.

A dump truck brings the slag via short haul to the wool plant, where only about a day's supply, 60 tons, for the two cupolas is stockpiled. High-grade industrial egg-size foundry coke is received by rail from various sources, principally St. Louis, Mo., and is stockpiled alongside the slag convenient to the cupolas. The only additive used is silica for flux, and a bank of sand on the property supplies the small quantity required.

Feed to the cupolas is measured by volume in the bucket of a skip-hoist, a bucketful being known to contain 800 lb. of slag or 300 lb. of coke. A dividing chute at the point of discharge above the cupolas allows either cupola to be charged. Alternate layers of slag and coke in the charge are in the approximate ratio of 4:1 by weight.

The two cupolas were built to company specifications and are identical, being 48 in. inside diam-

MTC 017216







- Left: Two streams of molten slag are blown into wool which settles into collecting chamber.
- Center: Belt conveyor carries the fluffy wool up to the granulators.
- Right: Plant end of collecting chamber showing wool being discharged to cross conveyor from traveling floor.

eter and water-jacketed to a height of 8 ft., with 12 ft. of stack above. Draft is induced by a U. S. Hoffmann 1,500-c.f.m. turbo-blower, the air at 1½-lb. pressure being introduced through a bustle pipe and eight tuyeres into the fusion zone of each cupola.

Present practice is to charge the cupola at approximately 30-min. intervals, production from each cupola being upwards of 2,000 lb. per hour. Control at the point of incipient fusion is accelerated through poke holes arranged radially around each cupola at the tuyeres, and viscosity of the molten slag is regulated by remote control of the induced-draft fan which supplies air for burning through the tuyeres.

The melt flows from the cupola through twin orifices at the bottom at about 2,400 deg. F. and is immediately fiberized by the blast from the steam nozzles. The steam, under 125-lb. pressure, is generated by a 500-hp. Riley Type RO water-tube boiler fired with Bunker "C" fuel oil. The oil is atomized by a Todd burner which gets its air from an American Blower forced-draft fan. The boiler has sufficient capacity to care for the eventual installation of the four cupolas.

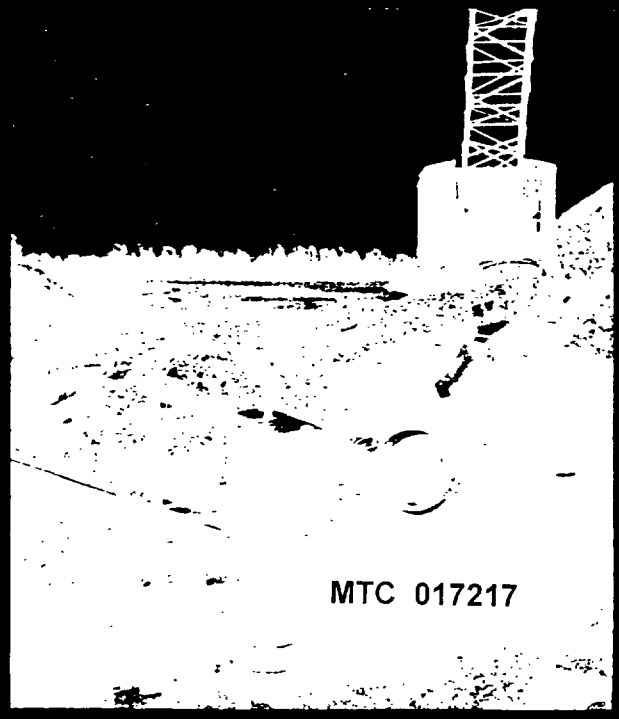
Water for cooling the cupolas is circulated by pump at a temperature of 140 deg. F., some of the heated water leaving the cupolas being used in the boiler. The remainder is tower-cooled and returned to a sump for recirculation through the jackets of the cupolas. Water for both cooling and boiler requirements is treated by a Permutit softener in the supply circuit.

Collecting chambers served by the two cupolas are identical, each being 40 ft. long, 5½ ft. wide and 15 ft. high, the flight-conveyor floors inclining upward toward the discharge end. U. S. Vari-Motor drives enable the speed of floor travel to be readily varied between 3 and 10 ft. per min. As the wool is blown into the chambers, it is oil-treated to resist moisture and eliminate dust, the oil being atomized by steam. Since the speed of floor travel governs the thickness of the layer of wool deposited, close control will be a necessity when the company begins

(*Continued on page* 68)

- Below, left: A screw packs the wool into paper bags which are weighed on the platform scale at left.
- Below, right: Close-up view of crusher with magnet suspended over the belt conveyor.





MTC 017217

with it.

The vertical height or thickness of the deposit cored may be determined by noting the dip of the drill (angle up or down from the horizontal plane) and calculating by the rules of simple trigonometry. Overall dimensions may be correlated to the distance in the room from the starting point on the face to the floor and to the roof or to some distinctive laminae that can be identified in the core. The vertical thickness of the individual samples is, of course, determined in the same way.

In the use of the core-drill some lessons in the handling of the machine will be learned. These small air-driven machines have a positive advance pressure regardless of the cutting ability of the bit. Naturally, if too high a gear is used, to gain time, the pressure "builds up" until something happens to the core. The core breaks, the pieces get jammed in the bit, flush water becomes thicker with silt from the attrition of the broken pieces, and real core cutting ceases. Since only solid core has any value in this method of sampling, the barrel must be withdrawn, emptied and the drilling begun again. Accordingly, the driller must determine what combination of drilling adjustments available in the machine is most regularly productive of continuous core in the deposit to be drilled. Note the bow in the mounting column of Fig. 4. To prevent this the postive gear advance should be less than the possible cutting advance of the bit.

Another cause of difficulty in getting good cores is the rotation of the inner barrel, because it is locked at the upper end to the outer barrel carrying the cutting bit. Regardless of any other use for these small-diameter core drills, for sampling purposes the inner barrel should be as free from the outer barrel as is the case with the large-sized double barrel drills. The core newly cut should feed into the inner barrel and there be free from the twist unavoidably imparted to it by its contact with the inner barrel which is rotating with the outer barrel. The machine shop can turn the trick by disconnecting the inner barrel from the outer—and you have a better drill because the core in the inner barrel is free from the direct rotational action of the outer barrel.

It will also be learned from experience that for mine work a 5-ft. barrel is about the longest that can be used advantageously, and that 5-ft. drilling rods are also the longest units that can be manipulated with any degree of ease. At least one 2-ft. and one 3-ft. rod should be included in the list of equipment.

The weight of the water hose hanging on the end of the drilling rod is quite a strain on the machine, unless it is properly supported, especially when the drill is set for holes sloping downward.

The use of the 7/8-in. dia. core drill for this special purpose, where wholeness of core, not footage per minute, is the prime requisite, will present with every application some problem for special solution. The dominating consideration must be that the core, to be useful, must be continuous. The core may be separated; but, so long as the pieces match, the core gives all the information the sampler wants.

Fontana Blast Furnace

(*From page* 64)

the manufacture of blankets and batts. For the present, with all output being marketed in granule form, the regulation of floor speed is unimportant.

A common cross-conveyor (24 in. by 20 ft.) running at right angles to the ends of the collecting chambers carries the wool to another belt conveyor (18 in. by 15 ft.) which puts the material into a granulator, or "chopper." Here the long fibers are shredded and picked apart before the wool enters a 48-in. by 12-ft. revolving screen fitted with No. 6



• Left to right: Harvey H. Head, president; C. T. Sauers, sales manager, and C. W. Hawthorne, Jr., chief engineer at office entrance of the new plant.

wire cloth. The screen takes out any "shot" which may be present and rolls the short fibers into pellets, or granules.

Now in its finished form, the wool drops into a steel hopper supplying a screw feeder which fills the paper bags into which all the wool is packed. Weighed out, 40 lb. to a bag, on a platform scale, the bags are tied and warehoused for rail or truck shipment.

The company's trade-mark is "Fontana Rock Wool" and the reaction of the trade to its product, new on the West Coast, has been extremely gratifying to company officials. Shipments are being made to all points in California, Arizona and Nevada and occasionally into the Pacific Northwest. The basic and acidic balance of the Fontana slag is well-nigh perfect, assuring ease of melt, good viscosity, and a high recovery of finished wool of excellent quality. Shot presence is so low as to be non-existent at times and what little does occur is loose and easily removed in the granulator screen.

Mineral-wool prices are higher on the Pacific slope than in the East, influenced principally by the cost of coke which, because of the long haul and the high transportation cost, delivered for 2½ to 3 times the cost laid down in the East and Middle West.

Before joining the Kaiser organization, which he left to become associated in the wool-manufacturing venture, Mr. Hawthorne spent seven years with the Johns-Manville Co. in an engineering capacity at its plant in Manville, New Jersey.

U.S. Bureau of Mines Issues Mine Sewage Disposal Tract

To help improve mine sanitation and health conditions, the U. S. Bureau of Mines has released a report on underground sewage disposal methods and precautions to be exercised in their installation and operation. Sanitary facilities and effective sewage disposal systems aid in preventing amebic dysentery, typhoid fever and hookworm among mine employees, the report states. Although such installations are lacking in most coal mines, they have been made in the majority of metal and nonmetal operations.

A copy of the publication, Information Circular 7392, *A Mine Sewage-Disposal Study*, by R. T. Artz, federal coal mine inspector at Pittsburgh, Pa., may be obtained from the Bureau of Mines, Department of the Interior, Washington 25, D. C.

Flood waters recently reached a depth of two feet at the plant of the General Crushed Stone Co. near Horseheads, N. Y. Clive A. Blowers, plant superintendent, said that electric motors were removed from the plant before they were damaged.

Offices of the Cleveland Quarries Company, Cleveland, O., have been moved to 1740 E. Twelfth Street, Cleveland 14, O. The firm's new vice-president is William M. Jones, who is also general sales manager.

MTC 017218

1577

Pit and Quarry

August 1947