Carney Company Expands Rock Wool Plant at Mankato for Third Time

New Batt Unit Increases Output To 50,000,000 Sq. Ft. Annually

ON THE SPOT

THE Carney Company of Mankato, Minn., was the first concern in the northwest section of the United States to undertake the production of mineral wool. The first facilities for its production went into operation at Mankato in 1939, after extensive pilot plant studies at the company's cement mill. Since that time repeated expansion programs have been carried out in a determined effort to keep abreast with the soaring demand for this prime insulating material. In 1940 production was doubled with the installation of a second cupola, and at the same time a batt machine was added to the plant. In 1942 a third cupola was built.

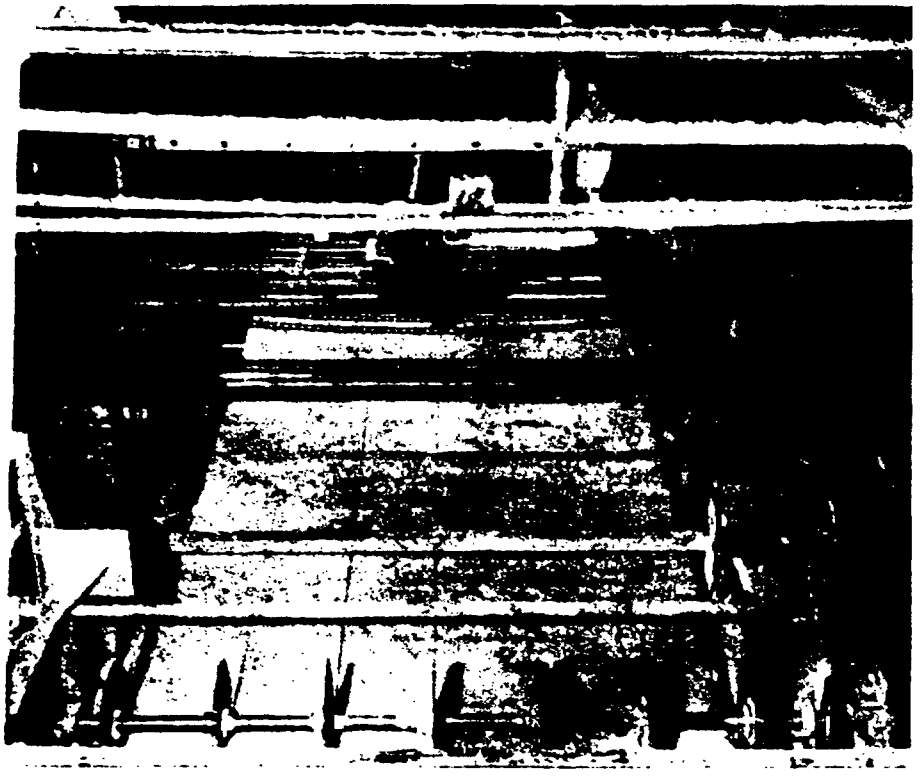
Notwithstanding this rapid expansion of what started out as a sideline business, by 1946 the company was again swamped with back orders, and a third expansion program involving expenditures of more than $100,000 was launched. Completed by mid-1947, this program included the installation of a fourth cupola and a second batt machine, increasing Carney's production of Golden Fleece insulation batts to about 50,000,000 sq. ft. per year. The batt machines now in operation produce close to 215,000 sq. ft. of house and industrial batts every 24 hours. Output of granulated wool runs about 30 tons per cupola per day, or 60 tons for the plant.

By WILLIAM M. AVERY

The Carney Company controls several hundred acres of main quarry land comprising nearly 30,000,000 tons of stone, in addition to several smaller parcels aggregating some 10,000,000 tons. With one exception, these deposits contain all the materials needed in the production of Carney's growing list of products. Slag for rock wool production is shipped in by rail from Illinois and Indiana, and blended with quarry shale to make up the feed for the cupolas. Straight stone feed, which was used for a time, was found to melt at about half the speed of slag, and to consume correspondingly larger quantities of coke.

The main quarry, which is located adjacent to the rock wool plant, also supplies stone for the production of natural cement, masonry cement, bricklayer's mortar, mason's lime and crushed stone products. The 35-ft. face is worked on 10-ft. ledges, using an Ingersoll-Rand wagon drill, and firing 50 to 75 holes instantaneously with Du Pont 40-percent dynamite and electric caps. The stone shatters well and requires relatively little secondary blasting. Loading is done with a ¾-cu. yd. Link-Belt Speeder shovel into end dump trucks which make the 1,500-ft. haul to the crushing plant.

The pink shale used in rock wool production lies in a 3-ft. stratum under about 14 ft. of lime rock.



• The delivery end of the Carney Company's new rock wool batt machine at Mankato, Minn. Splitter knives in the foreground cut the blanket into strips of the required width. The power cross-cut knife in the background automatically cuts the batts to length.

• The wool blanket is formed in a downdraft blow chamber. The material is being taken off here on the belt conveyor to make granulated wool.

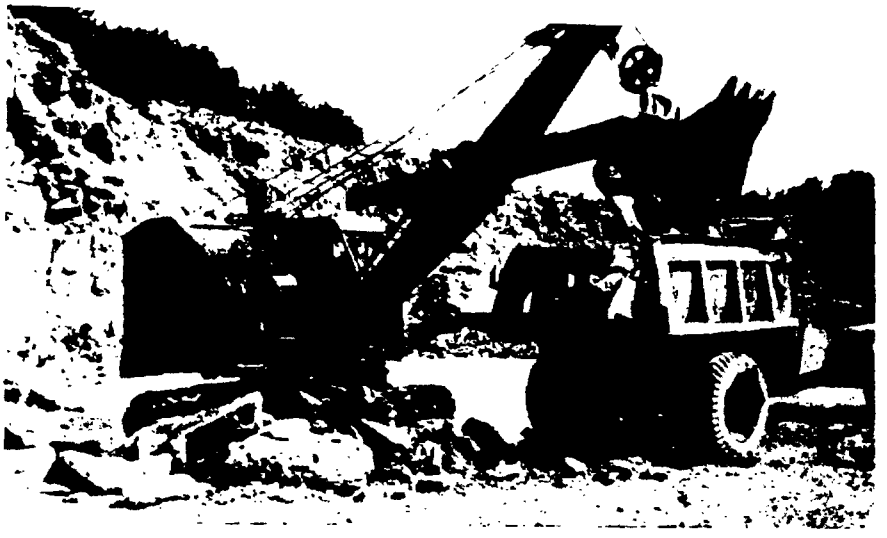
Below the shale there is another 10-ft. layer of lime rock and then about 8 ft. of natural cement rock. The various strata are worked and loaded separately in order to avoid contamination. Carney's Golden Fleece trade name is based on the unusual golden-pink color imparted to the batts by the blending of shale from the company's own quarry. Shale for rock wool production is stockpiled at the quarry and trucked to the plant as needed.

Except in the production of industrial batts, the quantity of shale used is actually quite small—about 1 part of shale to 5 parts of slag. In addition to imparting color to the wool, the shale effects a definite improvement in the quality of the fibers. However, the company has produced top quality mineral wool without using any shale. For making industrial batts the practice is to blend shale and slag in about equal proportions in order to increase the density of the wool somewhat. When this practice is followed the finished product weighs 4½ to 5 lbs. per cu. ft.

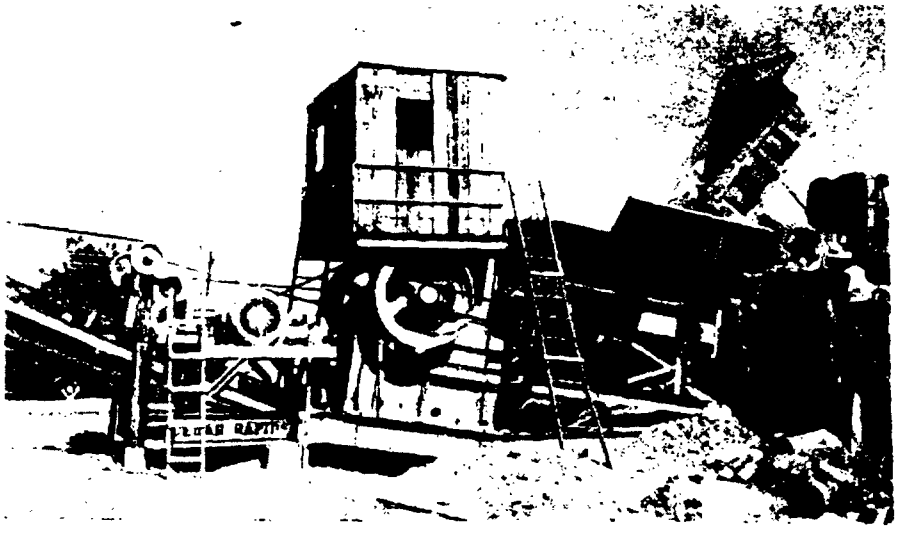
The materials are proportioned by weight at one end of the wool plant. Two mono-rail buckets are charged from either side of a material hopper at ground level, weighed on Fairbanks-Morse platform scales, and elevated on inclined mono-rails to the cupola charging floor. A batch consists of about 1,000 lbs. of 1½- to 2-in. slag, 200 lbs. of shale and 200 lbs. of coke. A switching arrangement on the charging floor permits each mono-rail bucket to serve two cupolas. In an 8-hr. period about thirty 1,200-lb. charges are fed to each cupola. The three older cupolas are 50 in. in diameter; the newest, designated as No. 4, measures 58 in. All four units are about 20 ft. high.

The melt is carried out at temperatures of around 2,700 degrees F., and the molten rock is discharged continuously through nozzles at the base of the cupolas. Fibers are produced by blasting the molten slag with steam as it flows from the cupolas. With the exception of No. 3, each of the units has six jets. Waterproofing materials, oils (to make the product easier to handle and to reduce dust), and asphaltic binders (for batts only) are introduced at the steam jets. These materials are stored and mixed in a separate building adjacent to the main plant.

The force of the steam blast carries the fibers into blow chambers,

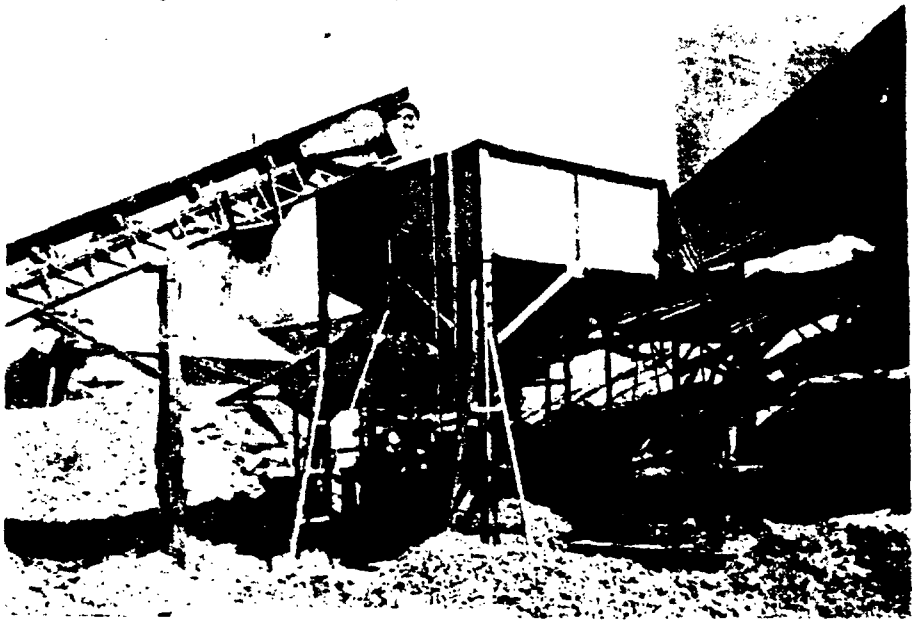


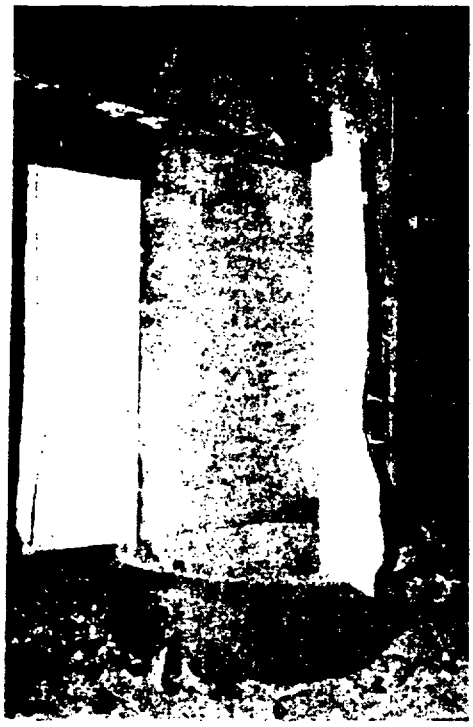
• Shale for the rock wool plant, as well as stone for other purposes, comes from the company's own quarry.



• Above: A view of the primary jaw crusher at the stone plant.

• Below: Slag, shale and coke for the rock wool plant are batched in mono-rail buckets at this weigh station adjacent to the plant building.





where they settle onto a moving chain belt conveyor. All four blow chambers are about 90 ft. long by 20 ft. high; on the batt lines they are 105 in. wide, as against 40 in. on the two lines which turn out granulated wool. Each chamber has a down draft to hasten the settling of the fibers.

From the blow chambers the wool fibers pass into annealing furnaces which are about 22 ft. long. Here the binders are set at temperatures ranging from 350 to 400 deg. F. From this point the loose wool drops onto a belt conveyor and is fed to a granulator in which the material is shredded and beaten into granules of the desired size. Shot is removed by passing the granulated wool through a 7-ft. diameter by 20-ft. rotary screen with ⅛-in openings. The finished granules are packed in 40-lb. Multiwall bags.

In batt production the wool blanket is split into six strips by circular knives, and vapor-seal paper is applied to one surface. At the end of the production line a circular knife operating on a cross carriage automatically cuts the strips into batts of the required length. The batts are packed in cardboard cartons for shipment.

The newest of Carney's several producing plants at Mankato is the crushing plant, which went into operation in November 1945 and was described in detail in the January 1946 issue of PIT AND QUARRY. Prior to that time the company had quarried stone for its own needs alone. After the rock was blasted out, it was broken by hand into approximately 4- by 6-in. pieces, and loaded (by the same means) into stone gondolas which were hoisted to the top of the quarry by means of a derrick. Twenty men were kept busy just in the breaking operation, and the total number employed in preparing raw stone for the various processing units was closer to 30. At present the quarry and the crushing plant (which produces stone for commercial purposes as well as for the various processing units) employ only 15 men.

At the crushing plant the quarry trucks dump from a ramp into a apron feeder ahead of a Cedarrapids jaw crusher set at 8 in. Plus 3-in. stone is scalped off on a Cedarapids

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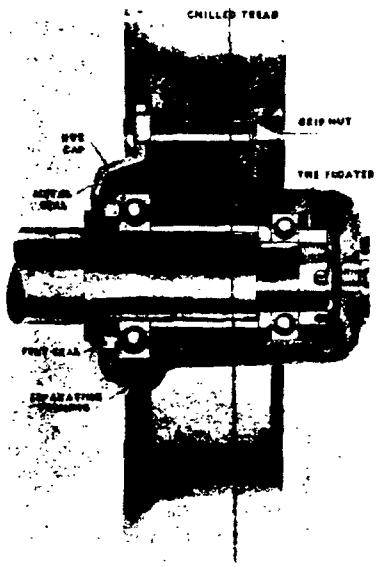
• Left: The cupolas are charged through doors in the tops. Buckets run in on monorail and are discharged.

• Left: Molten slag from the cupola is divided into six streams, and blasted with live steam to form fibers.

• Below: A general view of one of the batt lines, showing the annealing furnaces at the left.



Courtesy of Sanford-Day Iron Wks.
Fig. 12. Details of the Sanford-Day floater ball bearing mine car wheel.

bearings are lubricated according to the type of bearing.

Gears, in turn, require the use of specially prepared gear lubricant of sufficient body or consistency to enable it to adhere tenaciously to the gear teeth and overcome vibration and wear. Where gears are enclosed in oil-tight housings, a light bodied lubricant may be used to advantage, in order to assure reduction in drag and power consumption.

WIRE ROPE ON MINE HOISTS

The mine hoist became more and more important as deeper shafts and the working of lower levels was adopted. Some of these operations require thousands of feet of wire rope, comparable to elevator service in a modern office building, although quite naturally the service is much more rugged due to possible contact with water, acids, dirt and falling rock.

Effective lubrication insures against premature wear, it retards corrosion and prolongs the life of the rope. To perform these functions most effectively the lubricant must not only prevent friction between the strands which comprise the rope, especially when the latter is bent in passing over sheaves or hoisting drums, but also it must prevent entry of water, acids or dirt which would cause corrosion or abrasion.

Lubricant Characteristics A wire rope lubricant must penetrate between the strands and yet stick tenaciously to the contact surfaces. In addition to these properties, the product must not cake, gum or ball-up if contaminated with an excess of dust, dirt, or metallic particles. It must also be retained on the strands even at high temperature; this directly involves the nature of the lubricant as well as relative fluidity. Viscosity, while important from the standpoint of ease of application, should not be regarded as an indication of lubricating ability; penetration and adhesiveness are far more important.

The viscosity of a wire rope lubricant for mine service will range generally from 500 to 1200 seconds Saybolt Universal at 210 degrees F., according to the operating temperature and the intensity of the moisture conditions. The heavier grades are preferred for warm conditions where there might be possibility of a lighter lubricant thinning down to the extent of dripping off. Conversely, under relatively cold conditions, a lighter lubricant should be used.

Application of Wire Rope Lubricants High viscosity or semi-fluid wire rope lubricants, by virtue of their inertness should be applied in heated condition. Merely to daub or paint a rope with such a product at normal temperatures would be relatively ineffectual. Even though the surface might be more or less coated, the possibility of penetration occurring to any extent would be remote. This latter is the secret of effective wire rope lubrication.

CONCLUSION

This discussion of mechanized mining and the lubrication of the machinery involved is presented to emphasize the relation of lubrication to power consumption and dependable production. Obviously, an organized lubrication procedure, where the lubrication engineer is the predominating factor, is the basis. The machinery involved is costly and many of the parts are precision built. The output of the mine depends upon synchronized operation of all this machinery with production-line efficiency. The lubrication engineer assures of this by advising in the selection of lubricants and by seeing that they are properly protected in storage and carefully applied.

Carney Co. Expands

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vibrating screen and loaded into cars for the cement plant. Minus 3-in. is conveyed to a 36- by 42-in. Dixie pulverizer for processing into agricultural limestone, or it can be routed to a Diamond Model 65 portable plant for processing into various sizes of road stone. This plant, which incorporates a 10- by 36-in. jaw crusher, is driven by a 120-hp. Buda diesel engine. The agstone and road stone products are dropped into a pit and reclaimed with a 2-yd. stiff-leg clamshell. The Lundien Construction Co. of Mankato has the contract for secondary crushing and hauling. Two Baughman spreaders are used for agstone deliveries.

The original unit of Carney industries, a plant for the manufacture of hydraulic cement, was established in 1883 by P. H. Carney, pioneer Mankato industrialist. His son, Harry E. Carney Sr., as executive head of the company, developed and expanded the enterprises until his death in 1938. Harry E. Carney Jr., grandson of the founder, is now president of the company. He is also head of the recently organized Carney-Pacific Rockwool Company, which operates a new $250,000 mineral wool plant at Longview, Wash. This plant just recently got into production. Simpson Industries, the selling division of the Simpson Logging Co., has the exclusive sales agency for Carney-Pacific Rockwool.

Carney has completed within the past year a major expansion and improvement program involving the cement mill at Mankato. The construction of three additional lime processing silos has doubled capacity by making it possible to operate existing grinding equipment 14 to 16 hrs. per day, as against 8 formerly. The silos are of concrete stave construction and each has a capacity of 2,000 bbls. During the shutdown the company also installed new coal-handling hoppers, repaired stone gondolas, relined and repaired its kilns, and overhauled all major mill equipment. These improvements have increased output of all cement products to about 2,000 bbls. per day.

On capacity operations Carney employs about 145 men at Mankato, including 15 in the quarry and stone plant, 35 at the cement plant, and the remainder in the rock wool division. Only the rock wool plant operates on a 3-shift basis.

Expenditure on American cement-making machinery valued at nearly $3,200,000 was recently defended by Prime Minister Joseph B. Chifley of Australia. He told the House of Representatives that the government always gave earnest consideration to applications to buy machinery that would ultimately save dollars.