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HUMPHREYS SPIRAL GRAVITY CONCENTRATOR

Treats

OREGON BLACK SANDS

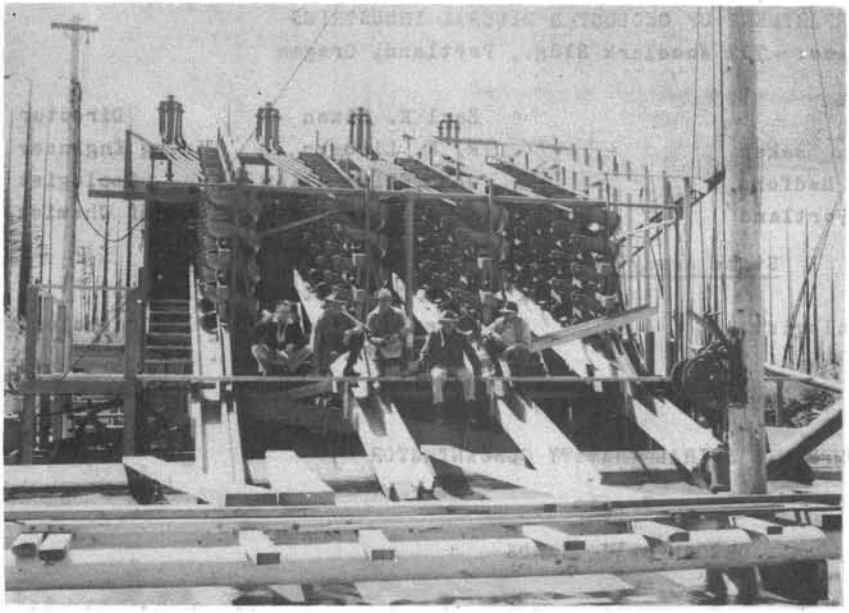
A major innovation in gravity concentration of ores has been recently developed and tested in large-scale operation by the Humphreys Gold Corporation, Denver, Colorado; and a plant employing the process is now treating 1000 long tons daily of chromite-bearing black sands at the Lagoons, located near the coast between Marshfield and Bandon in southwest Oregon.

This plant, which treats sand containing from 5 to 15% chromic oxide, raising this content to 20 to 30% in one simple operation, is contained in a small one-story building 24 by 28 feet square. The only moving parts in the plant itself are the motors and pumps which raise the sand and water, and the drag and stacker belt assembly for the finished concentrate. One man is sufficient to supervise and control the entire concentrating procedure.

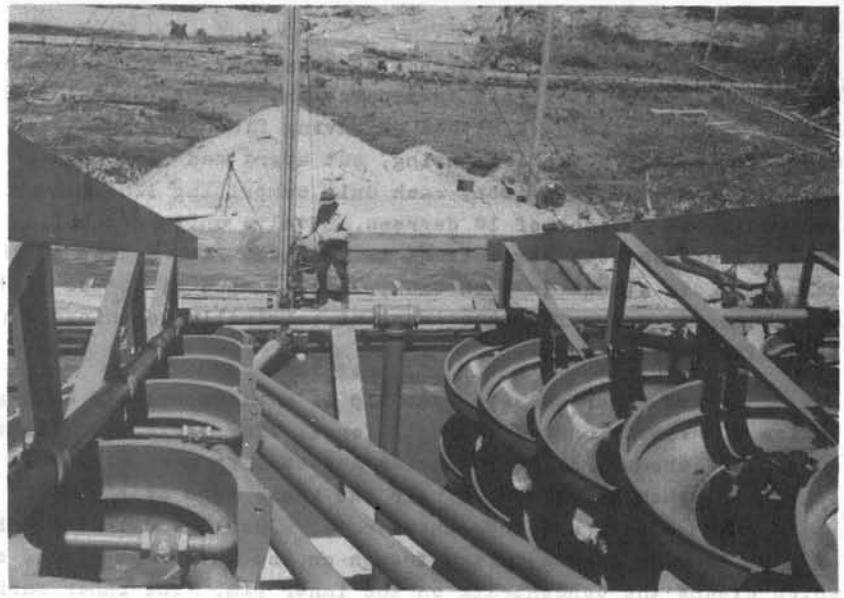
The heart of this new method of treatment, which may prove adaptable to other materials susceptible of gravity separation, is the "spiral", which was first developed by Mr. I. B. Humphreys as a method of saving fine gold in placer operations. The first model was made from a tire casing, cut apart and stretched. The spirals in the black-sand plant are of cast iron, each unit comprising 120° of arc with an outside radius of 13 inches and a slope of 10 degrees. Twelve units are bolted together to form a stack, giving four complete revolutions to a stack, with a drop of 18 inches for each revolution. There are six stacks in each bank, which slopes at 20° so that each stack is lower than the preceding one. The Lagoons plant originally contained four banks; a fifth bank was installed late in August.

Sand and water entering the top of a stack spirals downward under the combined action of gravity and centrifugal force. The larger and lighter particles move to the outside of the spiral; the heavier and smaller particles move downward near the inner edge. One-inch holes, bored near the inner edge of each 120° unit, contain an adjustable knife which bleeds off the concentrate. Just ahead of the knife, an adjustable length of pipe leading from a raised trough on the outer rim of the spiral provides wash-water which cleans the concentrate on the inner rim. The inner surface of the spiral has a semi-circular cross-section with a radius of 8 inches.

At the mine, located near the plant, a Bucyrus-Erie dragline with 1½-yard bucket excavates the sand which is largely unconsolidated, and transfers it to a dry-land washing plant mounted on caterpillar treads. The sand is washed through a trommel to remove wood and trash and is then pumped through a 10-inch hose to a wooden storage sump built



VIEW OF HUMPHREYS SPIRAL CONCENTRATORS AFTER THEY WERE INSTALLED BUT BEFORE BEING HOUSED.



TOP VIEW OF HUMPHREYS SPIRAL CONCENTRATORS.

in the form of an inverted pyramid 40 feet square with 45-degree sides. Fresh water and middlings returned from concentrators are also fed to the storage sump.

A double-walled vertical pipe is suspended in the center of the sump from a pulley (the outer wall is bolted to the apex of the sump but raised sufficiently so that sand and water may be drawn in at the bottom). Agitation is effected by water pumped in through the inner pipe which may be raised or lowered in order to vary the amount of agitation required to keep the sand in suspension so that it may be pumped out through the outer pipe to the plant. Density of feed is quite variable.

The flow to the plant is split, first to serve each of the four banks of spirals and further to serve each stack, by an ingenious system of pipe distribution which assures an even flow to each stack.

The lower bleeder pipes in each spiral discharge a middling product into a launder which empties into the storage sump. When so desired, concentrates may be sent to the sump and re-treated. A high circulating load is maintained.

Concentrates are partially dewatered in a small drag classifier ahead of the stacker belt. They are loaded by clamshell-bucket into 10-ton trucks and hauled over a new access road to the Defense Plant Corporation's secondary concentrator located on a railroad spur at Beaver Hill, Oregon, 12 miles east of the Lagoons. Until late in the summer the concentrates had to be trucked by way of Bandon, a round trip of 59 miles.

The mill is electrified; draglines, bulldozers, etc., are gasoline or diesel-operated.

J.E.A.

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POST-WAR MONETARY STANDARD

(Reprinted from Bulletin Service of American Mining Congress, issue of October 1, 1943.)

A monetary system based on gold and silver by international agreement among leading commercial nations was advocated in a statement by Francis H. Brownell, chairman of the American Smelting and Refining Company, this week. Such action, according to Mr. Brownell, would retain every advantage of the international gold standard and yet assure an adequate supply of monetary metals for the post-war era.

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A monetary system based on a fixed ratio of silver to gold arrived at through international agreement, Mr. Brownell states, would have the following advantages: (1) the volume of standard money would be immediately increased, particularly outside of the United States, to meet the larger needs of the post-war world, thus enabling nations to maintain stability of their currencies; (2) the yearly addition to the world's stock of standard money would be expanded, for the normal annual output of some 40 million ounces of gold would be supplemented by production of some 270 million ounces of silver; (3) the stock of monetary metal could be expanded further, if found necessary, through drawing in considerable quantities of silver from the arts; (4) nations whose populations desire would be able to restore the coinage of standard money on a large scale; (5) if a world-wide shortage of standard money should again threaten, it could be corrected through stimulating silver production and lowering the ratio of silver to gold by international agreement; (6) the monetization of gold and silver would not make the International Stabilization Fund plan unnecessary, but would rather help assure the success of any such plan by facilitating each nation's ability to replenish its credit on the books of the International Fund through its power to deposit silver, as well as gold, for the purpose; (7) this is the only monetary plan that assures the world at large will possess an adequate stock of monetary metals, no matter how large domestic and external trade becomes, nor at what points world prices are stabilized; and (8) a much larger number of nations would be themselves producers of standard money and thus would be aided in maintaining the stability of their currencies through the production of monetary metals within their borders.

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LIMESTONE DEPOSITS IN OREGON

NAME	OWNER	LOCATION					RESERVES Tons	ANALYSIS	REMARKS
		County	Sec.	T.	R.	Nearest R.R. Shipping Point			
Dallas Quarry	Oregon-Portland Cement Co. Portland, Ore.	Polk	1 2 11 12	8S	6W	On spur of Southern Pacific 3 mi. from Bridgeport	Fairly large- in hundreds of thousands of tons	SiO_2 24.08 Al_2O_3, Fe_2O_3 15.66 CaO 31.58 MgO 2.74 CO_2 20.24 H_2O 3.56 Undet. 2.14 Total 100.00	Has produced cement rock for Oswego plant for number of years.
Lime Products Co. Quarry	T.T.Leonard Silverton, Ore.	Polk	11	8S	6W	Dallas- 4 mi.	Approx. 500,000	$CaCO_3$ from 50% to 80%	Stone is quarried and crushed for ag. stone
Marquam Quarry	T.T.Leonard, Silverton, Ore.	Clackamas	2	6S	1E	Molalla- 6 mi.	Approx. 500,000	$CaCO_3$ from 50% to 70%	Shell-marl beds. Some stone has been used as ag. rock.
Oden-Hatfield Property	R.V.Hatfield Roseburg, Ore	Douglas	33	27S	4W	Roseburg- 11 mi.	?	"Good grade" (No analysis)	Marble sawed for County Court House at Roseburg.
Harrington Deposit	W.K.Harrington, Roseburg, Ore.	Douglas	21	28S	5W	Roseburg- 11 mi.	Possibly 12,000 tons per foot of depth	$CaCO_3$ 97.6% Insol. 2.4	Lenticular deposit unexplored.
Bristol Quarry	F.I.Bristol, Grants Pass, Ore.	Jackson	6	37S	3W	Rogue River- 5 mi.	?	$CaCO_3$ 97%	Lenticular deposit undeveloped. Reserves could be fairly large.

NAME	OWNER	LOCATION					RESERVES Tons	ANALYSIS	REMARKS
		County	Sec.	T.	R	Nearest R.R. Shipping Point			
Hurricane Creek Deposits	Mr. R. Green Imperial Hotel Portland, Ore.	Wallowa	10	3S	44E	Joseph - 4 - mi.	20,000,000 Approx.	SiO_2 0.12 Al_2O_3 Trace Fe_2O_3 Trace MgO 0.28 CaO 55.62 Na_2O 0.11 K_2O Trace H_2O 0.10 CO_2 43.67 Total 99.90	Spec. gravity 2.71. All parts of deposit do not contain such high-grade stone. Pyrite shows in places.
ORC Quarry at Lime	Oregon-Portland Cement Co. Portland, Ore.	Baker	27	13S	44E	On main line- U.P. Ry.	Large - in excess of 40,000,000	SiO_2 1.99 R_2O_3 0.47 CaO 54.07 MgO 1.03 Loss on ignition 42.88 Total 100.44	Supplies stone for cement kilns at Lime and Oswego, Oregon. Also sells sugar-mill rock & ag. stone.
Conner Creek Deposits (Marble Mtn.)		Baker	5 27 28 29 32 33 34	12S 11S	45E 45E	4 mi. from Homestead Branch U.P. Ry	Very large; in excess of 300,000,000	SiO_2 None Al_2O_3 None Fe_2O_3 None MgO 0.52 CaO 55.65 Na_2O Trace K_2O Trace CO_2 43.93 Organic None Total 99.84	Spec. Gravity 2.68. Considered to be one of largest bodies of easily accessible high-grade limestone in state.

NAME	OWNER	LOCATION					RESERVES Tons	ANALYSIS	REMARKS
		County	Sec.	T.	R.	Nearest R.R. Shipping Point			
Lostine R Deposits	Mr. R. Green Imperial Hotel Portland, Ore.	Wallowa	3	2S	43E	Lostine, Approx. 6 mi.		SiO_2 0.92 Al_2O_3 0.34 Fe_2O_3 Trace MgO 0.52 CaO 54.50 Na_2O Trace K_2O Trace H_2O 0.10 TiO_2 Trace CO_2 43.18 P_2O_5 Trace FeS_2 0.24 Total 99.80	Spec. gravity 2.72. Relatively accessible. In places contains pyrite. Three quarry sites.
Black Marble Quarry	Northwest Lime Company, James Cole, Atty Couch Bldg. Portland, Ore.	Wallowa	19	2S	44E	Enterprise Approx. 5½ mi.	2,000,000 to 3,000,000	SiO_2 1.17 Al_2O_3 0.17 Fe_2O_3 0.12 MgO 1.23 CaO 53.15 Na_2O 0.08 K_2O 0.08 H_2O 0.10 TiO_2 Trace CO_2 42.05 P_2O_5 Trace SrO 0.4 FeS_2 None Organic 1.75 Total 100.54	Spec. gravity 2.70. Elev. 7000 ft. Formerly quarried and hauled to lime kilns on RR at Enterprise. Burning produced high calcium lime - about 94.25% CaO.

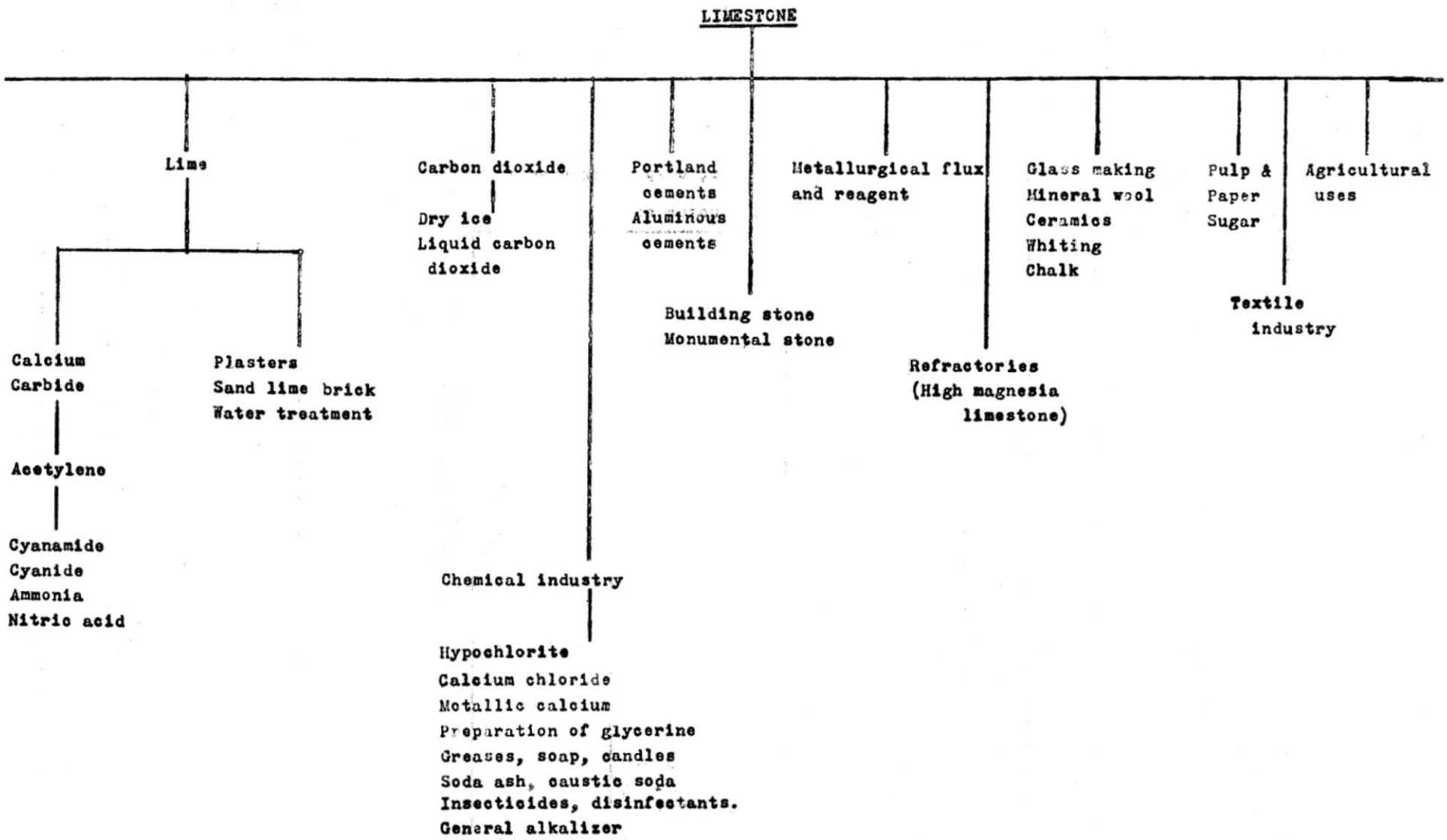
NAME	OWNER	LOCATION					RESERVES Tons	ANALYSIS		REMARKS
		County	Sec.	T.	R.	Nearest R.R. Shipping Point				
Marble Mtn. Quarry	Pacific-Portland Cement Co., 417 Montgomery, San Francisco.	Josephine	19	37S.	6W	On leased spur track to Grants Pass - 12 mi.	Considered large in millions of tons.	SiO_2 Al_2O_3 Fe_2O_3 CaO MgO Ig.loss Total	0.87 0.35 0.31 54.60 0.80 43.41 100.34	Most of production goes to cement kilns at Gold Hill, Ore., but paper mill rock and ag. rock are also sold.
Washington Brick and Lime Quarry	Washington Brick and Lime Co., Spokane, Wash.	Josephine	22	38S	5W	Grants Pass - 26 mi.	?	SiO_2 Al_2O_3 Fe_2O_3) FeO) CaO MgO Ig.loss Total	0.05 0.21 0.28 55.61 0.34 42.88 99.37	Lenticular deposit. Stone is sorted and most of production is burned to "chemical lime".
Jones Limestone Quarry	F.I.Bristol, Grants Pass, Ore.	Josephine	31	38S	5W	Grants Pass - Approx. 26 mi.	?	SiO_2 Al_2O_3) Fe_2O_3) CaO H_2O CO_2 Total	0.13 0.38 55.55 0.26 43.63 99.95	Lenticular deposit, unexplored. Some marble monuments formerly produced. Analysis shows quality of the pure marble.

Other deposits which may be less important because of accessibility, size, or grade are as follows:

Imnaha River deposits,	Wallowa County	Byron property, northeast of Olalla,	Douglas County
Eagle Creek "	Baker "	Lively property, near Gold Hill,	Jackson "
Sisley " "	" "	Seattle Bar property, on Applegate River,	" "
Durkee region "	" "	Briner deposit, southwest of Phoenix,	" "
Suplee " "	Crook "	Bear Gulch deposits, near Little Applegate River,	" "
Fisher property, south of Roseburg,	Douglas "	Millionaire Mine deposit, east of Gold Hill,	" "
Dodson " " " "	" "		

References: (1) Moore, B.N., Non-Metallic Mineral Resources of Eastern Oregon; U.S.G.S. Bulletin 875. (2) Hodge, E.T., Market for Columbia River Power Using Northwest Minerals, Sec.III, Northwest Limestone; War Department, Office of Division Engineer, Portland, Oregon. (3) Mines Handbook, Bulletin 14, State Department of Geology and Mineral Industries, Portland, Oregon.

PRINCIPAL USES OF LIMESTONE



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