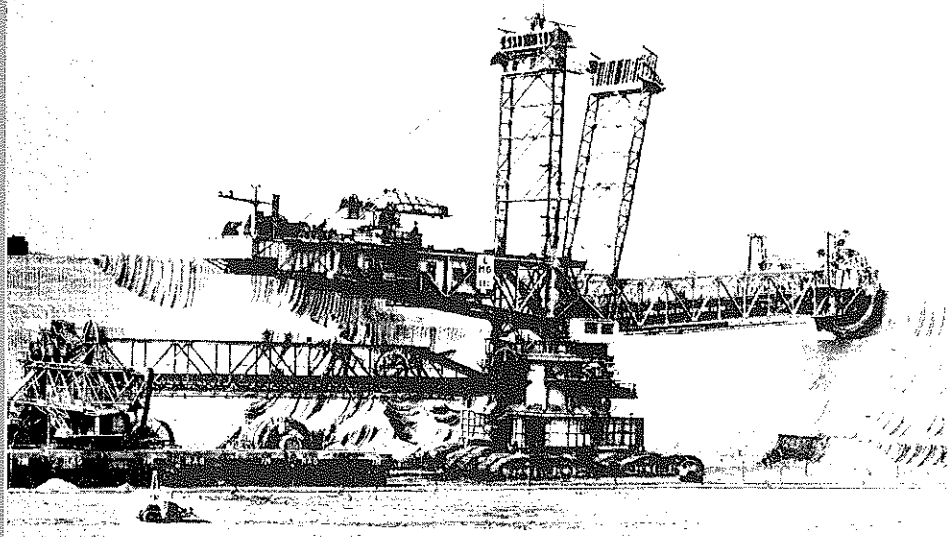
THE MINES MAGAZINE

AUGUST 1960

THE MINES MAGAZINE 50th ANNIVERSARY 1910 1960

Featuring—

- Selective Preparation of Coal
- Sweetening Up the Crude
- Engineering College of University of Wyoming
- Mining in Mexico
- Controlling the Dermatitis Hazard in Mining
- 50th Anniversary of Bureau of Mines
- Oil Show Comes to Colorado
- Mineral Engineering Education for the Future
- Theoretical Approach to Friction
- Replacement Problems of Modern Equipment Management



CLASS NOTES

1882-1930

CLEVELAND O. MOSS,, '02, has moved to a rural area about seven miles from La Jolla but still near the sea. His new address is Route 1, Box 467, Del Mar, Calif. He sends best regards to all Ancient M(ar)iners.

JACK C. BALLAGH, '10, has moved from Arcadia, Calif., to 569 N. Rossmore, Hollywood 4, Calif.

PITT W. HYDE, '22, has changed his address from San Francisco to 763 East H., Ontario, Calif.

HOMER A. GODDARD, '25, has moved from Gladwyne, Pa., to Brockway Lane, Fayetteville, N. Y. He is still with Gulf Oil in Philadelphia.

JOSEPH McNEILL, '28, formerly of Kikagati, Uganda, Africa, has left there and is now living at Bunloit, Drumnadrochit, Inverness, Scotland, where he lists himself as a "farmer."

1931-'40

JAMES R. DANIELS, '31, lives at 115 N. Fountain, Wichita 8, Kans.

FRANK R. HOLLENBACK, '32, may be addressed c/o Petroleum Publishers, Inc., P.O. Box 1469, Denver 1, Colo.

EDWARD C. KINYON, '35, has moved from Walnut Creek, Calif., to 105 Via Alameda, Palos Verdes Estates, Calif.

ROBERT W. PRICE, '35, has changed his address from Sonora, Mexico, to 7025 Paseo San Andres, Tucson, Ariz.

DONALD G. FOOT, '38, gives his new address as 5531 North Ave., Carmichael, Calif. He was living in Niagara Falls, N.Y.

J. BYRON JONES, '39, has changed his address from Panama City, Fla., to USN Underwater Ordnance Station, Newport, R.I.

LT. COL. ALLAN P. NESBITT, C. E., '38, has just completed a tour in Iran, and is now assigned to the Office of Inspector General, Corps of Engineers, in San Francisco. His new home address is 113 Reed Blvd., Mill Valley, Calif.

1941-'45

DONALD W. DUNN, '41, has been promoted to production engineer, Gypsum, Tile, and Perlite Department, U.S. Gypsum Co., Chicago, Ill. His mailing address is 300 West Adams, Chicago 6, Ill. Mr. Dunn was formerly project manager, Mexican Operations, for the same company.

LEO JEAN GOLDSMITH, '41, 1363 Elevation Rd., San Diego 10, Calif., has left Rohr Aircraft Corp., where for nearly four years he was senior training coordinator in charge of engineering training. He is now employed as a technical training specialist, Educational Services Section, Management and Engineering Training for Convair—A division of General Dynamics Corp.

DR. R. D. POTTER, '41, employed by Associated Engineering and Management Consultants, has moved from Denver, Colo. His new address is P.O. Box 1407, San Diego 12, Calif.

GEORGE W. KING, '42, is on a temporary assignment in Europe for Brown & Root, Inc. His mailing address continues to be the same, P.O. Box 3, Houston 1, Texas.

JAMES R. LEONARD, '42, has moved from Pasadena, Calif., to 1601 Dorothy Lane, Newport Beach, Calif.

EDMOND A. KROHN, '43, employed by Stearns-Roger Manufacturing Co. since June 1, is living at 4510 Comanche Dr., Boulder, Colo.

J. E. McCALL, '43, gives his new mailing address as P.O. Box 3495, San Francisco, Calif. Mr. McCall is chief geophysicist, Exploration Department, Western Operations, Standard Oil Co. of California.

DON L. CEDARBLADE, '44, formerly of Scarsdale, N.Y., may be addressed c/o Standard-Vacuum Oil Co., 1017 Isaac, Peral, Manila, Philippines.

1946-'50

JAMES G. CUNNINGHAM, '47, drilling engineer for American Overseas Petroleum, Ltd., has been transferred from Manila, Philippines, to Tripoli, Libya, where he may be addressed c/o Amoseas, P.O. Box 693.

FREDERICK C. ALDRICH, '48, has been transferred from Findlay, Ohio, to London, W. 1, England, where his address is Carlton House, 33 Duke St. Mr. Aldrich is manager, International Oil Sales Department, The Ohio Oil Co.

JAMES W. KULISH, '48, lives at 3055 S. Forest St., Denver 22, Colo.

DEWEY D. BOWLING, '49, division production geologist for Shell Oil Co., is now living in Abilene, Texas, where his address is P.O. Box 2240.

ROBERT H. DUNWOODY, '49, geophysical interpretive supervisor for Pan American International Oil Corp., lives at 148 Hawthorne Ave., Glen Ridge, N. J.

FOSTER E. ENDACOTT, JR., '50, engineer with The Martin Co., is now living at 6560 S. Washington St., Littleton, Colo.

Professional...

CARDS

WILLIAM H. FRASER, JR., '49, has moved from Casper, Wyo., to 760 Birch Dr. Cortez, Colo.

HARRY D. HALL, '49, has moved from Elliot Lake, Ont. to Remac, British Columbia, Canada.

CLEMENT R. HOFMANN, '49, has moved from Englewood, Colo., to 186 N. Datura, Littleton, Colo.

DAVID B. SCHULZ, '49, has changed his address from Midland, Texas, to Perforaciones Laughlin-Porter S. A., Box 19, Rio Grande, Tierra del Fuego, Argentina, S.A.

JOHN E. TUTTLE, '49, division exploitation engineer for Shell Oil Co., has moved from Billings, Mont. to 2501 Braun Dr., Golden, Colo.

LAWRENCE E. BARRETT, '50, lives at 1102 W. 5th St., Williston, N. Dak.

JOHN D. CLOSS, '50, has returned to the United States from Bogota, Colombia. His new address is 4231 Jerry Ave., Baldwin Park, Calif.

PETER A. MACQUEEN, '50, petroleum engineer, has his offices in the Ft. Worth National Bank Bldg. and his home address is 4129 Hildring Dr., West, Fort Worth, Texas.

EDWIN J. METS, '50, physical metallurgist, Semi Conductor Prod. Dept., General Electric Co., lives at 60 W. Lake St., Skaneateles, N.Y.

JOSEPH H. MILLER, '50, scout for Carter Division, Humble Oil & Refining Co., lives at 1208 Colorado Ave., Elk City, Okla.

DONALD T. MOORE, '50, may be addressed at 3445 Estes St., Wheat Ridge, Colo.

JAMES R. PATCH, '50, geophysicist, Superior Oil Co., has his office in the New First National Bank Bldg. and may be addressed at P.O. Box 600, Denver 1, Colo.

KENNETH J. SCHNEIDER, '50, lives at 1507 Alder Ave., Richland, Wash.

1951

J. H. AUVIL has asked to have his mailing address changed from Macon, Ga., to Box 375, Gordon, Ga.

PAUL A. BOLLHEIMER, geophysicist, Carter Division, Humble Oil & Refining Co., lives at 4019 Del Rosa Dr., Jackson 6, Miss.

VICTOR INMAN is geologist for Standard Oil Co. of Texas with mailing address P.O. Box 3403, Victoria, Texas.

ELMER F. KESSLER has moved from Oroville, Calif., to 1161 Spur Rd., Odessa, Texas.

W. F. ROBERTSON, JR., has been transferred from Billings, Mont., to Durango, Colo., where he may be addressed c/o The Pure Oil Co., Box 3372.

JAMES C. TIFFANY has moved from Kellogg, Idaho, to 1017 2nd Ave., San Manuel, Ariz., where he is a shift boss for San Manuel Copper Corp.

1952

JACKSON W. BROWN, college relations coordinator for Texas Instruments, Inc., lives at 13866 Birchlawn Dr., Dallas 34, Texas.

EDGAR W. DAVIS, JR., metallurgist for Susquehanna-Western, Inc., lives at 415 E. Spruce, Riverton, Wyo.

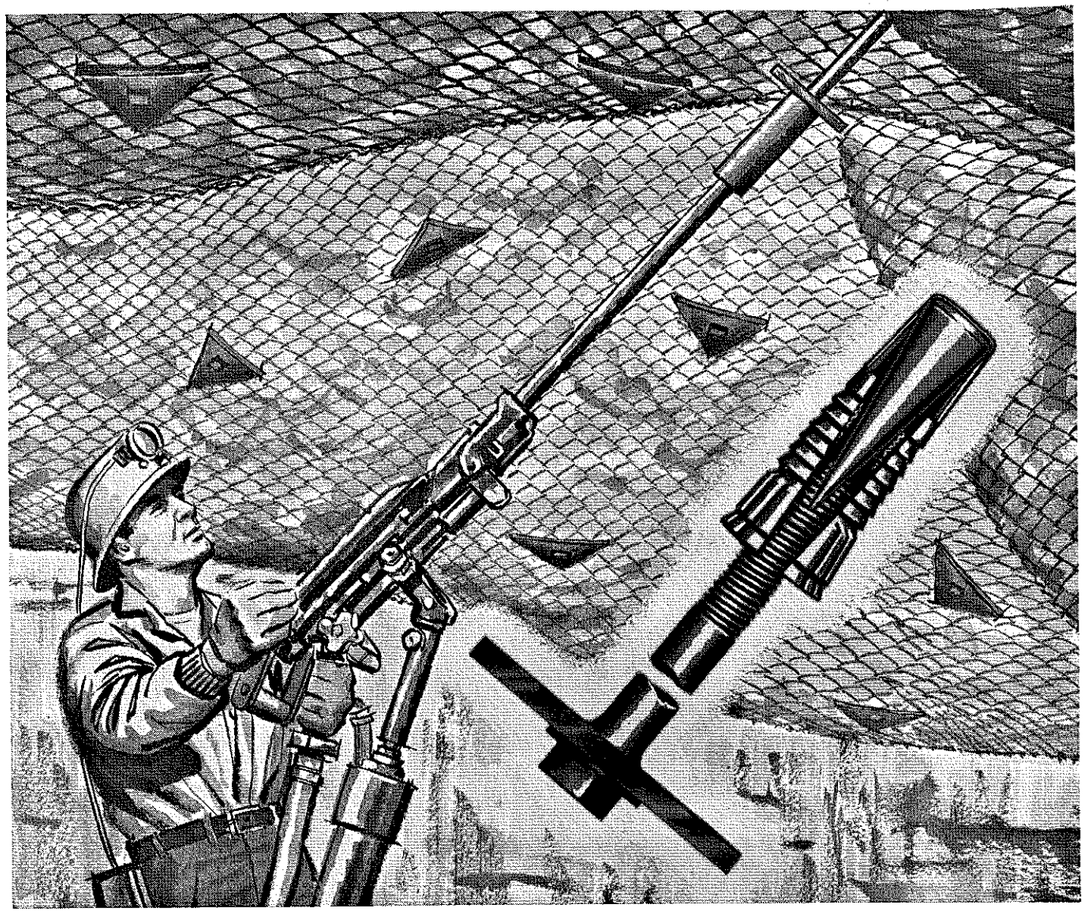
JOHN J. FREEBURG, JR., is living at 390 Brentwood, Denver 26, Colo.

DR. RAYMOND W. GOVETT has moved from Bartlesville, Okla., to 8520 Cedar Lane, Westminster, Colo.

GUERDON E. JACKSON, industrial engineer, Nevada Mines Division, Kennecott Copper Corp., gives his address as P.O. Box 855, McGill, Nev.

EUGENE KRYSUIK has moved from Venice, La., to 6210 Brunswick Ct., New Orleans 14, La.

(Continued on page 39)



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Volume L August, 1960 Number 8

CONTENTS—

DEPARTMENTS—

FRONT COVER—

LMG bucket wheel excavator, built in West Germany and sold in U. S. and Canada by Link-Belt, digs continuously, delivering excavated material from discharge boom belt in a practically continuous flow. Booms of wheel and discharge conveyor rotate independently. Digging wheel of unit shown in picture is 52 feet in diameter. Capacity is about 13,000 cu. yds. an hour. (Also see story in PLANT NEWS.)

ADVERTISERS LISTING PAGE 47

Official Organ of and Copyright 1960 by the Colorado School of Mines Alumni Association, Inc. Entered as Second Class matter at the Postoffice at Golden, Colorado, under the Act of Congress of March 3, 1879. Subscription price $6.00 per year U.S. and Possessions. Single copies 75 cents, except special editions. $1.50 additional charge outside U.S. and Possessions. Published every month in the year by the Colorado School of Mines Alumni Association. Address all correspondence relating to the Mines Magazine to L. Carter Kaanta, Editor, Guggenheim Hall, Golden, Colorado.

NEWS OF THE MINERAL INDUSTRIES

Susquehanna to Explore Canadian Mining Property

The Susquehanna Corp., Chicago, recently announced that it has entered into option agreements with Raindor Gold Mines, Ltd., of Toronto, to conduct explorations of Raindor's Canadian mining properties.

Raindor's properties consist of deposits of gold, silver, lead, zinc, and minor amounts of copper and cadmium, and are located near Revelstoke, British Columbia.

Susquehanna will conduct Canadian operations through a wholly owned subsidiary, Susquehanna Metals, Ltd. Allen D. Gray, president of the newly formed subsidiary, reports the company has executed an option-lease with Raindor, and has commenced a program of exploration and ore development, together with a feasibility study of metallurgical treatment methods.

According to Gray, Susquehanna will only exercise its option if sufficient ore is proven to support an integrated mining and milling operation.

In the United States, Susquehanna operates two uranium ore processing plants and several mining properties. The company also is engaged in the chemical manufacturing, electronics, and transportation fields.

Open-Pit Uranium Mine In Shirley Basin Area

Stripping operations for a new open-pit uranium mine in the Shirley Basin area about 60 miles south of Casper, Wyo., are being conducted by Plateau Construction Co. of Rawlins. Nearly 120 feet of soil (about 2.3 million cubic yards of waste) will be removed to reach a bed of uranium ore. The excavation eventually will be 800 feet long by 600 feet wide. Ore production is scheduled to begin this fall.

The uranium property is jointly owned by three oil companies—Skelly, Tidewater and Getty.

Mining Legislation Introduced in Congress

Sen. Gordon Allott of Colorado reports a wide variety of legislation as having been introduced at the last session of Congress to help the hard-hit mining industry. Senator Allott's bill to establish by law a clear national policy on minerals—as notice to the world that we intend to protect a going domestic industry—has been approved by the Senate, but so far no action has been taken by the House Interior Committee on it.

Mining bills remain in committee except for lead-zinc legislation. The Senate will likely take up in August a House passed bill patterned after the Allott formula to provide stabilization payments to small producers. A tariff revision bill applying to lead and zinc is before the House and Senate.

Kennecott Electrolytic Copper Refinery Dedicated

Kennecott Refining Corp's $30,000,000 electrolytic copper refinery—newest and most modern in the industry—was dedicated recently at Hawkins Point in Anne Arundel County just south of Baltimore, Md.

The new refinery, wholly owned subsidiary of Kennecott Copper Corp., processes 16,500 tons of high-purity copper from Chile and the company's copper mines in Arizona, Nevada, New Mexico and Utah. It was recently named one of the top 10 plants of 1960 in the United States.

John D. McIver, '50, who spent two years assisting in the design and construction of the refinery, is production superintendent. His address is 47 Cedar Rd., Severna Park, Md.

C. D. Michaelson, '32, vice president and board member of Kennecott Refining Corp. and general manager of Western Mining Division of Kennecott Copper Co., attended plant dedication ceremonies with some 200 other civic, industrial and political representatives.

Mining Record Proposes Program to Aid Mining

National legislation to revive and restore the domestic mining industry as a vital and dynamic factor in the national economic welfare is being proposed by *The Mining Record,* Mining Exchange Bldg., Denver 2, Colo.

The Mining Record program would (1) repeal laws which prohibit the general public from acquiring, owning, or disposing of newly-mined gold; (2) prohibit all agencies of the federal government having custody of gold and silver owned by this country from selling such gold or silver for commercial, industrial, or artistic purposes, and that such gold and silver be devoted solely to bona fide monetary transactions; and (3) establish an import quota system, whereby each foreign country producing metals or minerals in competition with domestic mines would be given a quota or amount which could be shipped into this country each year, and that the yearly total of all such quotas for each metal or mineral shall be so limited as to guarantee the stability and profitable operation of domestic mines producing base metals and minerals.

In support of the program, an editorial in the July 7, 1960 issue of The Mining Record points out that its program while not a cure-all has the following advantages:

(1) Its proposals to solve the metal mining problems are simple, short, practical and possible of attainment.

(2) The program avoids two of the standard arguments against increasing the price of gold: It does not change the official price of $35 an ounce for gold, which is required by the Bretton-Woods Monetary Agreement and is used by the U.S. and its agencies in monteary transactions. It will not raise the value of Soviet gold stocks because it makes no change in the official price of gold. This country now lacks approximately one-third of the gold necessary to meet its foreign obligations and reserve requirements in full. As for silver, annual demand exceeds production by about 100 million ounces. Prices of gold and silver would rise considerably in both domestic and world markets if the practice of the U.S. Mint in selling these metals for commercial, industrial and artistic purposes at prices far below their costs of production should be terminated.

(3) Import quotas have worked successfully for years in the case of sugar. Thirty years ago U.S. sugar producers were facing the same situation as do now the producers of copper, lead, zinc, uranium, manganese, fluorspar, and other base metals and minerals. The Sugar Act gave other sugar-producing nations specific quotas or amounts of sugar each could sell in this country each year—40 per cent of U.S. sugar needs being supplied by foreign countries, 60 per cent by U.S. producers. As a result, the U.S. sugar industry today is fairly prosperous—so much so that a similar program was recently adopted for wool.

(4) The program is something the newspapers, the public, and the congressmen and senators can readily understand and appreciate. It will not cost the taxpayer one penny. On the contrary, it may show the prices our federal government has placed upon gold and silver are far too low. All it needs to put it into effect is favorable action by Congress.

(Editor's Note.—The MINES Magazine does neither endorse nor criticize this editorial position but feels that it is a good point of departure. Many governments have tried to solve monetary problems by legislation and have invariably failed. To attempt to solve the production problems of base and monetary metals at a single stroke is expecting much. The MINES Magazine will welcome your comments on this problem.—WF)

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Studies by Vitro Minerals indicate the new ore is readily soluble in sulfuric acid and is amenable to conventional hydro-metallurgical processing. Petrographic and mineralogical studies by Vitro geologists indicate the ore contains a new beryllium mineral called "vitroite." Laboratory studies to prove out the economics of processing the mineral are being conducted at Vitro Chemical Co.'s uranium plant at Salt Lake City.

Rockets and Missiles

Heat-resistance plastic coating, used to protect missile and launching pad components usually destroyed during firing, has been developed by Dyna-Therm Chemical. A hard ceramic crust, which glows red-hot and reflects heat, forms and lifts away from rest of coating providing additional insulation, as direct heat up to 6,000 F. is applied. Coating consists of phosphates and boron compounds held together by a polyurethane binder.

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TECHNICAL SOCIETIES and ASSOCIATIONS

Coal Meeting Program In St. Louis, Sept. 8-9

Several important aspects of the coal and iron mining industries will be under discussion at the meeting Sept. 8 and 9, 1960, of the Coal Division of AIME and the St. Louis Section of the Institute.

On the morning of Sept. 8, the following papers will be presented:

"Shaft Sinking and Lining in Illinois Coal Fields," by J. W. McDonald, Old Ben Coal Corp.; "Fluorspar Mining," by Gill Montgomery, vice president and general manager, and Durward C. Spees, metallurgist, Minerva Oil Co., Eldorado, Ill.; "Relationship of Stripping Machinery Mass to Overburden Volumes," by Henry F. Rumfelt, application engineer, Bucyrus-Erie Co., South Milwaukee.

H. Eugene Mauck, vice president, Freeman Coal Co., Chicago, will be chairman of the opening session. At luncheon, the speaker will be S. L. Jewell. In the afternoon a visit will be made to River King Mine and Mississippi Dock.

On the following day, Sept. 9, Hubert E. Risser, mining economist, Illinois Geological Survey, Urbana, will speak on "The Adaptability of Illinois Coal for Use in Iron and Steel Production." Burrel L. Curry, production supervisor and safety engineer, Lone Star Steel Co., McAlester, Okla., will present a paper on "Oklahoma-Arkansas Coals." "St. Joe's Pea Ridge Iron Mine" will be the subject of a paper by Earl L. Bilheimer, resident manager, Meramec Mining Co., Sullivan, Mo. "Stream Pollution" will be discussed by Clarence W. Klassen, chief sanitary engineer, Illinois Department of Public Health. Chairman of this session will be David H. Davis, assistant to vice president, operations, Consolidation Coal Co., Pittsburgh.

Solid Fuels Conference Oct. 24-25 in Charleston

The 23rd Annual ASME-AIME Joint Solid Fuels Conference will be held Oct. 24 and 25, 1960, at the Daniel Boone Hotel, Charleston, W. Va. The event is sponsored by the Fuels Division of the Society of Mechanical Engineers and the Coal Division of the Society of Mining Engineers of AIME.

Theme of the Conference will be "Economics in the Production and Utilization of Coal."

Committee Studies Education Of Nuclear Engineer

A trail-blazing study on the education of the nation's nuclear engineers was begun in May under a contract from the Atomic Energy Commission. Sponsored jointly by the American Society for Engineering Education and the American Nuclear Society, a committee of 30 nuclear engineering experts from educational institutions, industry, and government research groups will take a close look at this educational offspring of the nuclear age, where it stands, and the direction it should go.

Chairman of the study committee is Dr. Glenn Murphy, head of the Department of Theoretical and Applied Mechanics at Iowa State University in Ames. In announcing the AEC grant, Dr. Murphy said, "There has been enough experience in nuclear engineering education in the United States now for us to profit by a study of the philosophies underlying programs and objectives. Proceeding from the excellent programs that have been developed, the Committee will endeavor to establish guideposts for the use of universities in the future."

The role of government laboratories and industry in the nuclear field will be carefully considered in the study. "After all, these are the 'consumers' of the product of the nuclear engineering educational program," Dr. Murphy said.

With the support of the AEC, several graduate programs in nuclear engineering have been established at colleges and universities throughout the United States, Dr. Murphy pointed out. Because this field is relatively new and has developed rapidly, a wide variation in the level and content of programs has resulted. "Because of this variation, a prospective student has little to guide him in choosing a school for study of nuclear engineering," he said.

The group, whose official name will be the Committee on Objective Criteria for Nuclear Engineering Education, will spend a year in the study. The members will come from industry, government agencies, and colleges and universities in all parts of the country. The secretary of the committee, who will coordinate committee activities and issue special and interim reports, will be D. D. Glower, an assistant professor at Iowa State University.

The work of the Committee will to some extent be patterned after the highly influential work in 1955 of the ASEE committee on the Evaluation of Engineering Education.

Volumes on Geophysics Are Now Available

In 1955 the Society of Exploration Geophysicists embarked on a program of reprinting all out-of-print volumes of geophysics. Fifteen of the first 18 volumes have been reprinted and are now available at reasonable prices. In 1957 the Society began offering current issues in volumes bound to match the earlier reprints. Members and subscribers may enter standing orders to receive the current volumes at the end of the year published by writing to Society of Exploration Geophysicists, Box 1536, Tulsa, Okla.

Structure and Purpose Of AIME Published

Signalizing its membership growth to a roster of more than 13,000, the Society of Mining Engineers, a constituent organization of the American Institute of Mining, Metallurgical, and Petroleum Engineers, has published a comprehensive summary of its structure and purposes. As stated by President Arthur B. Cummins, SME is recognized as the professional organization for all qualified participants in the mineral industries. The summary appears in the Society's magazine, *Mining Engineering*.

When organized in 1871 in Wilkes-Barre, Pa., the American Institute of Mining Engineers set out in the world with an initial membership roll of 71. Today there are 35,000, including students.

"Metallurgical" became part of the AIME name in 1919. In 1956, "Petroleum" was added and the then three branches became the Society of Mining Engineers, The Metallurgical Society and the Society of Petroleum Engineers. Each has its own officers, directors and staff, operating within the structure of AIME. General Institute policies and affairs are determined by the AIME Officers and directors.

The Society of Mining Engineers operates through four Divisions, under direction of SME officers and directors. The stated objective of the Society is "the mutual exchange of knowledge and ideas leading to a higher technical and professional standing for its members."

Each Division has its own committees to cover the full scope of interests embraced by the Division. A total of some 75 committees and subcommittees requires the volunteer work of hundreds of SME members.

In addition to the Society's extensive sponsorship of technical sessions at the AIME Annual Meeting, there are major regional meetings and Local Section assemblies in which SME members are active. The Local Section meetings are gegarded as an ideal means of personal exchange of experiences and ideas.

There are joint meetings of some of the Divisions. There also is held, annually, a Joint Solid Fuels Conference of the Coal Division of SME and the Fuels Division of the American Society of Mechanical Engineers.

Professional... CARDS

The Coal Division, established in 1929, includes all members interested in the finding, mining, cleaning, and utilization of bituminous coal and anthracite. H. O. Zimmerman, of Wheelwright, Ky., is chairman of this Division.

The Industrial Minerals Division, this year completing its first quarter-century, is devoted to the industrial minerals field and functions through nine commodity committees. R. H. Feierabend, of Port Sulphur, La., is chairman.

The Minerals Beneficiation Division, organized in 1948, deals with the problems of making marketable products out of run-of-mine ore. The chairman is H. R. Spedden, of New York.

The Mining & Exploration Division, originating in 1949 as the Mining, Geology and Geophysics Division and taking its present name in 1958, includes members interested in underground and open pit metal mining, geology, geophysics, and geochemistry. The chairman is R. J. Lacy, of Salt Lake City.

There is some overlapping of interests among the Division. This aids the unity of the Society and members may be active in any, or all, of the Divisions. Each Division is fully represented on the Board of Directors of the Society, just as, in turn, the Society is well represented on the Board of AIME. Incidentally, in a process of rotation, each of the Institute's three constituent Societies nominates for President of AIME in its turn. This year's AIME President, Dr. Joseph L. Gillson, was nominated by SME.

As a service to its members, SME preprints many scores of papers presented at certain meetings. Thus, it preprinted 116 technical papers presented at SME sessions during the 1960 AIME Annual Meeting. It also preprinted SME-sponsored papers at the Joint Solid Fuels Conference, and those presented at Bedford Springs, Pa., at a joint meeting of the Coal and Industrial Minerals Divisions.

In addition to the Society's magazine, *Mining Engineering*, the annual "Transactions" of AIME are published under SME auspices. They contain carefully edited articles and papers and are the recognized authority on mineral industry technology.

SME members participated prominently in the preparation of outstanding AIME-sponsored volumes, including such recent publications as "The Porphyry Coppers," "Economics of the Mineral Industry," and the third edition of "Industrial Minerals and Rocks." The last-named was edited by Dr. Gillson.

John C. Fox is secretary of the Society of Mining Engineers of AIME, 29 West 39th St., New York 18, N. Y.

AMC Convention Scheduled Oct. 10-13 in Las Vegas, Nev.

American Mining Congress Convention and Exposition for the metal mining and industrial minerals industry will be held Oct. 10-13 in the new $5 million Convention Center in Las Vegas, Nev.

Speakers—mining men recognized for their ability and leading members of Congress and top government officials—will examine (1) problems of economic and legislative policies, and (2) practical operating problems in open-pit and underground mining and in minerals beneficiation. Subjects to be discussed include national mineral policies, exploration and geology, general operating problems, taxation, industrial engineering, safety and health, open pit mining, labor relations, underground mining, milling and metallurgy, uranium; gold, silver and monetary policies; management tools and techniques, underground drilling.

Colorado School of Mines men who will present papers at the convention are:

Arthur W. Woods, '55, mine superintendent, Trace Elements Corp., Maybell, Colo., "Use of Radio Communication in Small Mining Operations."

V. L. Mattson, '26, manager of mining and milling, Kerr McGee Oil Industries, Inc., Oklahoma City, Okla., "Plastics in Metallurgy for Resistance to Abrasion and Corrosion."

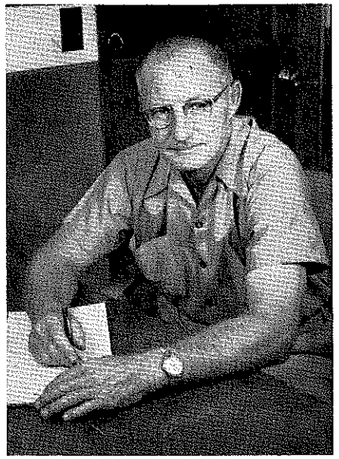
Raymond M. Stewart, '40, assistant planning engineer, Climax Molybdenum Co., Climax, Colo., "Scheduled Maintenance."

J. Gordon Craig, '40, mill superintendent, Hecla Mining Co., Wallace, Idaho, "Construction of the New Mill and Surface Plant of the Lucky Friday Mine."

Those attending the convention may take trips (1) by chartered plane to Ely, Nev., for a visit to the mining, milling and smelting operations of Nevada Mines Div., Kennecott Copper Corp., and (2) by special buses to the Apex kiln plant and quarry, U.S. Lime Products Div., The Flintkote Co., the Stauffer Chemical, American Potash & Chemical and Titanium Metals plants at Henderson; and the open pit mine, plaster mill and wallboard plant of Blue Diamond Co., Div. of the Flintkote Co.

Selective Preparation Of Coal

By DR. PARKE O. YINGST, '30



DR. PARKE O. YINGST

There are many problems in mining that are common to both coal and hard rock mining. To be sure, these problems vary in detail, but drilling, blasting, loading, and transport are all common problems.

In order to understand the problems of selective preparation of coal, we must first understand the composition of coal. This may be explained, to some degree, by making comparisons between coal and ores, or rocks.

You are familiar with hard rock. If it is coarse grained, you can see that it is composed of grains of different minerals. A particular ore may be predominantly quartz, with the economic values present as sulfides. These sulfides may be massive or disseminated.

In order to extract and/or concentrate the sulfides the ore must be crushed to a size at which the individual grains of sulfides are liberated. This may range from 10- or 20-mesh to minus 200-mesh, or finer. Sometimes the size at which liberation takes place is so small as to make it uneconomical to grind so fine. In that case the problem is attacked from a different angle, probably by roasting, leaching, and direct extraction.

Physical and Chemical Composition of Coal

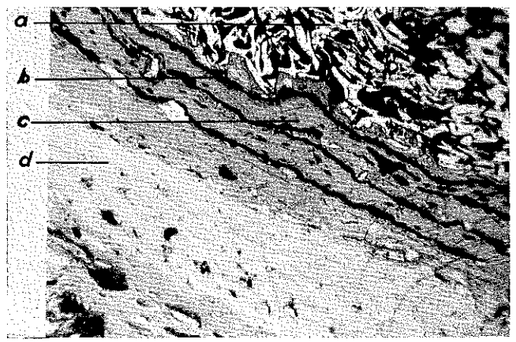
Now what about coal? We know that some coals are very hard and others soft; that some coals coke and some do not; that some are high in volatile matter and others quite low; that some are easy to ignite and others very difficult. But what about the physical and chemical composition of coal?

We generally think of coal as being homogeneous. This is far from true. Just as rocks are made of different mineral components, coal is also made of different components. In rocks and ores we call these components minerals. In coals we call them macerals. The word maceral was suggested from the maceration the original vegetable material was subjected to before it became coal.

THE AUTHOR

Dr. Parke O. Yingst holds three degrees from the Colorado School of Mines: E.M. in 1930, M.Sc. in 1951, and D.Sc. in 1960.

After receiving his E.M. degree from Mines, he was employed for three years in the Safety Division of the U.S. Bureau of Mines in the coal regions of Pennsylvania, Alabama, Virginia, and Kentucky. From 1933 to 1942 Mr. Yingst was engaged in gold and tungsten mining in Colorado, California, and Venezuela. From 1942 to 1946 he was with the Corps of Engineers, and from 1949 to 1952 he served as an instructor in mining at the Colorado School of Mines. Since 1952 he has been project engineer, CSM Research Foundation, Inc. Dr. Yingst has specialized in the application of mineral beneficiation methods to the physical improvement of coals.



▼ Figure 1. Principal Macerals of Coal: a. Fusinite which has been crushed and compressed; b. Cuticles and spores; c. Vitrinite, the predominant maceral of coals; d. Semifusinite. The cell structure is barely visible.

We know these macerals have different physical properties, such as hardness, specific gravity, color, and structure. These properties can be observed and measured. As for the chemical composition, we have only been able to determine it in a general way. We

▼ Figure 2. Mineral Material in Coal: a. Semifusinite; b. Calcite; c. Pyrite; d. Narrow band of Vitrinite.

can analyze for carbon, hydrogen, oxygen, and other elements, but we do not know the exact form in which these elements are combined. We do know that certain hydrocarbon compounds are found in coal. But the distribution of these compounds changes with each gradational change in rank, from subbituminous, through the bituminous ranks to anthracite.

In milling or concentrating an ore, we are generally faced with the problem of recovering a small amount of valuable material, percentage-wise, from a large amount of waste material. In coal preparation, the problem is reversed in that the valuable portion constitutes the bulk of the material treated.

In ore milling the valuable material is generally distinct and pure in itself. If the mineral is separated from the waste material it is usually of good grade.

Waste Material in Coal

The waste material in coal, broadly speaking, occurs in three different forms. First, there is the coarse rock that may be present as dilution. This may be from the roof or floor, or from thick rock layers, or partings, within the seam of coal. Second, there is the mineral material that has been deposited as thin plates along the minute fractures within the coal seams. Third, there is the mineral material that was present at the time the coal seams were deposited. This latter class is almost molecular in size and distribution because most of it was the ash material of the original vegetable material.

The recovery of coal and separation of the first class of waste material is fairly easy in that there is ample difference in the specific gravities of the coal and waste to permit gravity separation at relatively coarse sizes.

Recovery of coal and separation of the second class of waste material is dependent upon the reduction of the coal to a size that will liberate the material. Once liberated, this class of material can be separated by conventional methods because of the gravity differences between the coal and the waste material.

The third class of waste material cannot be removed by conventional methods because of its extremely fine size and distribution. The extent to which the ash content of a given coal can be reduced by conventional milling or preparation methods is thus determined by the amount of the third class of waste material present in the coal. This may be as low as 0.5 per cent but usually ranges from 2 to 5 per cent.

Low-Ash Coal Product Produced

At present most coal preparation is aimed at producing a uniform low-ash product. The future will probably see many changes in the specifications for coal for special uses. The future may also require utilization of lower grade coals where only the best are used now. We have already seen the market change from a time when lump coal was preferred and the fines were discarded or sold at a low price to the present when lump coal has only a limited market and the finer sizes are in greater demand.

It was with these changes in mind that the author began research in the selective preparation of coal.

Let us now go back for a minute to the treatment of metallic ores. In treating an ore we concentrate the valuable materials in one product and the waste tailings in another. If selective methods are used a concentrate is made of each valuable mineral. Sometimes three, four, or more, separate concentrates are made. The more of the mineral material recovered and the higher the grade of the concentrate, the higher is the profit—other things being equal. The same is true in coal preparation: recover the coal with as low an ash content as possible.

Selective Preparation of Coal

Now, how does selective preparation fit into this picture? An example will best illustrate this. Suppose a mine operator has a large market for his coal with a 5 per cent maximum ash limitation. His mine-run averages 12.5 per cent ash. He finds that a 5 per cent ash content, he only has 50 per cent recovery. The remainder contains 20 per cent ash. He finds he can recover a second product with 10 per cent ash and amounting to an additional 30 per cent recovery. This is acceptable to a less demanding customer at a slightly reduced price. Now the remaining 20 per cent contains 35 per cent ash. He finds he can sell this in limited quantity, but at a much lower price to a third customer. By selective preparation he has produced three products and is able to market all of his mine run. Without preparation his mine run was acceptable to only one customer.

This example deals with a coal in which the ash is the critical factor. There are other coals with different types of problems, i.e., coking coals and their plasticity, steam coals and their caking properties, by-product coals and their volatile matter content. Time does not permit going into all of them, but each is a case calling for special preparation.

The example given may appear somewhat far-fetched to some of you at this time. However, the author visited a property in Europe in which the plant produced four products by heavy media, all of which were used. A 1.50 gravity float product with about 6 per cent ash went to the coke ovens, a 1.50 × 1.90 product with 30 to 40 per cent ash was used for power generation. A 1.90 × 2.3 product with 70 to 80 per cent ash was gasified and the gas used in both the coke ovens and power plant. The final reject of 2.3 sink material was used as road ballast.

Equipment Used in Coal Preparation

The equipment used in coal preparation does not differ greatly from that used in ore concentration. Crushers, screens, tables, jigs, flotation cells, dense media separators, pumps, and cyclones, all are common to both. They only differ in size, appearance, and minor details.

The selective separation of coal was investigated by both flotation and gravity separation. Only the results of gravity separation tests will be discussed in this paper.

Samples of mine run product were obtained from a number of mines operating in the different coal fields of Colorado. These included both coking and non-coking coals.

Gravity Separation Tests

The procedure for these tests were, briefly:

The samples were stage crushed to minus 6-mesh. The stage crushing avoided the production of an excessive amount of fines. The crushed material was thoroughly mixed and then a head sample was cut from it. The remainder was used in the test.

The material was separated into fractions of different specific gravities. The point at which the separation was started was determined by experiment. A small portion was placed in a beaker with heavy liquid. This was usually of about 1.22 specific gravity. The specific gravity was gradually increased until a small amount of float material was obtained. With this specific gravity as the starting point, separations were then made in steps with an increase of about .01 in the specific gravity for each increment.

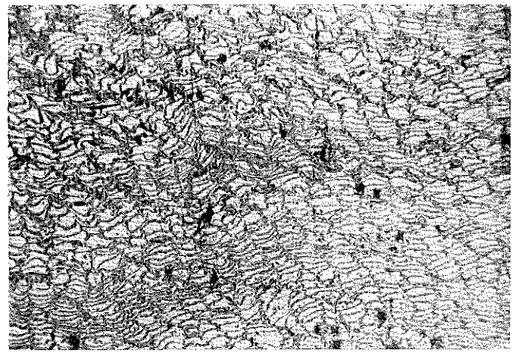
The separations were made in a mixture of gasoline and carbon tetrachloride. This mixture can be adjusted to as high as 1.50 specific gravity. If it was found necessary to go higher, tetrabromide was substituted for the tetrachloride. The mechanics of the separation are very simple. The material is agitated in the heavy liquid and then permitted to settle. The float materials are skimmed off, using a ladle with a 100-mesh screen bottom. When all the float is removed, the sink material is filtered and the heavy liquid adjusted to the next higher specific gravity. This was continued, taking off the various float fractions, until the sink fraction had been reduced to about 5 per cent of the original sample.

The individual fractions were then thoroughly air dried and weighed. Each fraction was split into two portions. One portion was pulverized for analytical purposes and the other retained at the coarse size for petrographic purposes.

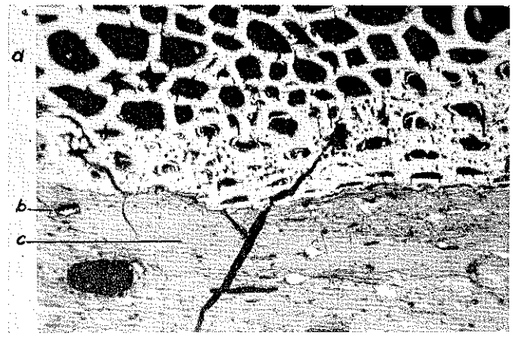
The analytical determinations were made according to the standard procedures of the American Society for Testing Materials. These included the moisture, ash, volatile matter, and fixed carbon. The volatile matter and fixed carbon were corrected to a moisture-ash-free basis.

Petrographic studies were made on polished fine-grained mounts of the coal fractions. These were made using a special wax mixture. The studies were made at 200X, using an oil immersion lens. The petrographic components were estimated in each field of view and a total of 60 fields—three traverses across the polished block—were examined on each block. These estimates were averaged and the average taken as the analysis.

The petrographic analysis indicates whether there has been much segregation of the various macerals in any particular gravity fraction. These different macerals have different chemical compositions which are somewhat reflected in the proximate analysis, i.e., the volatile matter/fixed carbon ratio. Vitrinite has a higher volatile matter/fixed carbon ratio than fusinite. This is slight, especially if the concentration of either of the macerals is low in the original coal material. The petrographic analysis reveals the extent



▼ Figure 3. Vitrinite. This unusual photograph of vitrinite shows clearly the cell structure of the original vegetable material. In this form it is classed as tellinite.



▼ Figure 4. Fusinite: a. Typical course cell structure freqently found in fusinite; b. Small bituminous body; c. Vitrinite with small white inclusions of micronite.

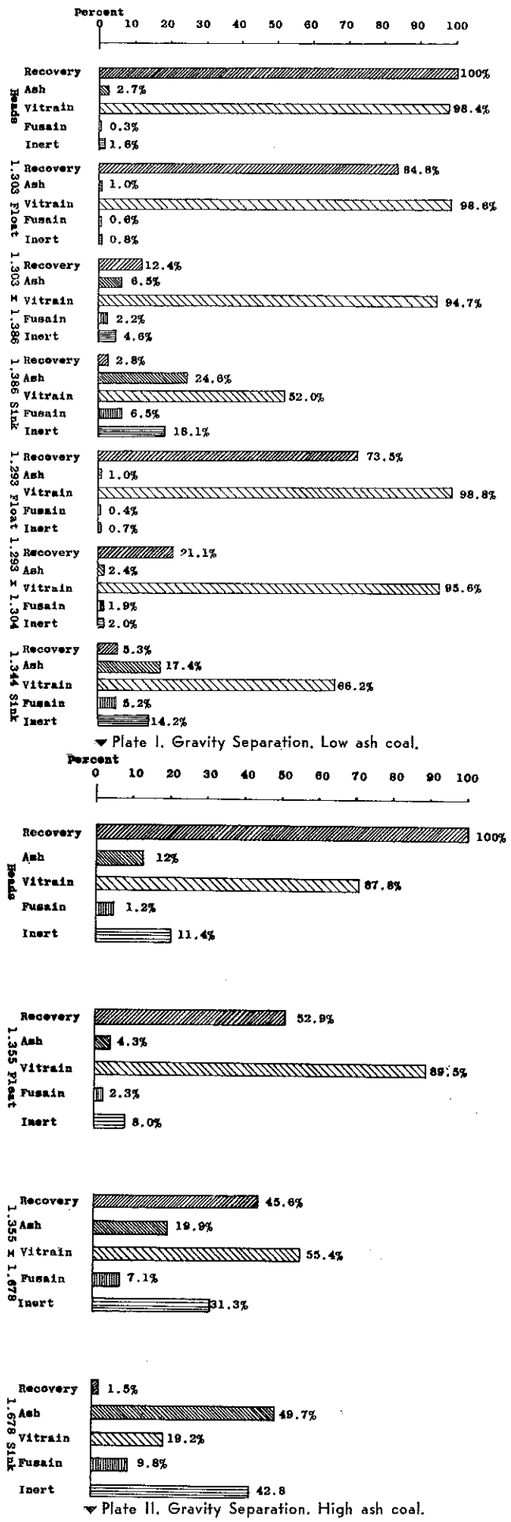
of the concentration of the macerals better than the volatile matter/fixed carbon ratio.

Another fact of importance is that in coking coals the vitrinite cokes and the fusinite does not coke. Other macerals also affect the coking properties, some improve it while others do not. For example, exinite, which is usually a minor component, increases the plasticity but also tends to increase the shrinkage of the final coke.

Results Summarized

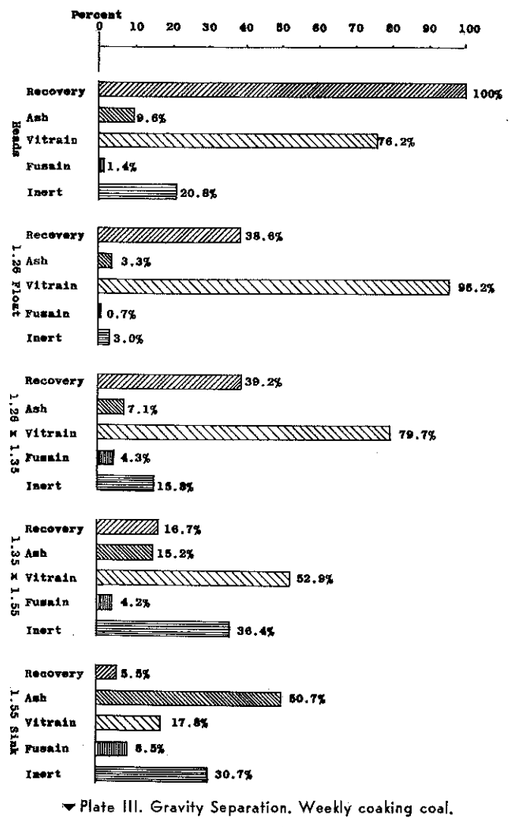
To summarize the results, I have prepared three plates to show the effect of selective gravity separation with respect to recovery, ash content, and the concentration of the macerals. The macerals are shown as three principal types. Vitrain contains all the macerals with coking and high volatile characteristics and includes vitrinite, resinite, and exinite. Fusain contains only fusinite and the fillings within the cell cavities of the fusinite. Inert contains the inert macerals, other than fusinite, and includes semifusinite and micronite.

Plate I shows the results obtained with a coal of rather low ash. The original coal showed no coking properties. The light fractions, representing almost 85 per cent of the original, contained only 1 per cent ash and had slight coking properties. This low ash coal is a possible source of electrode carbon. The heavier fractions in this separation all represent good usable fuel.



▼ Plate I. Gravity Separation. Low ash coal.

▼ Plate II. Gravity Separation. High ash coal.



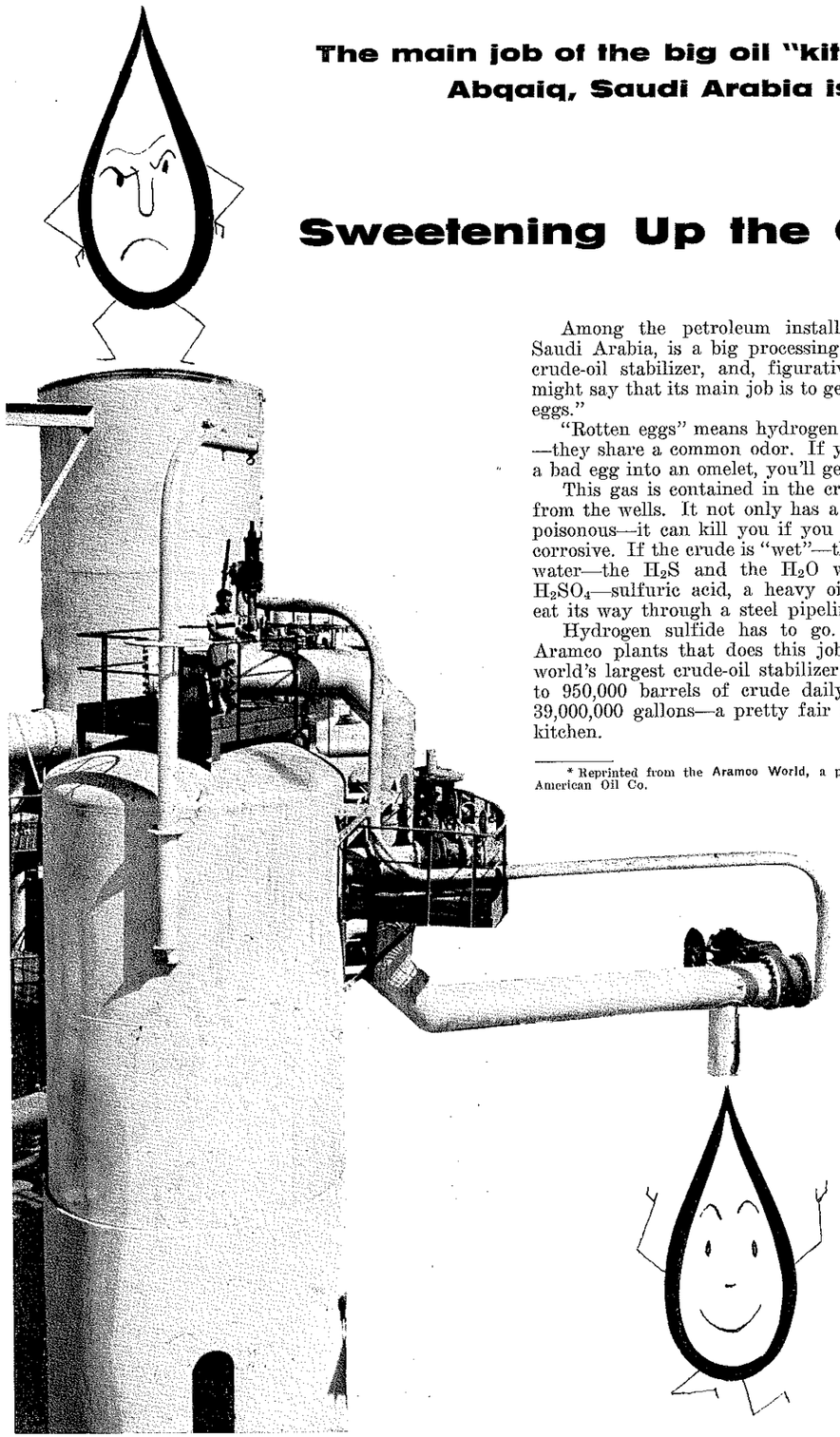
▼ Plate III. Gravity Separation. Weekly coaking coal.

Plate II shows the results of a high ash coal in which there is apparently no distinct change in the ash content with the increasing specific gravity. It is not possible to obtain a real low ash product but it is possible to obtain a high ash reject. In preparing this coal the operator is guided by both the washability curve and the market. He must maintain as high an ash content as the market will stand in order to obtain as high a recovery as possible. The high ash reject with this coal is strictly refuse.

Plate III shows the results obtained from a weakly coking coal with a fairly high ash content. This coal exhibits low plastic properties, having a Gieseler rating of about 10. The 1.26 specific gravity float product has a Gieseler rating of about 70. The 1.26 sink × 1.35 float has a Gieseler rating of about 12. The example indicates how selective preparation can produce fractions of differing coking properties.

I hope this brief summary of work done on the selective gravity preparation of coal has shown the similarity of problems facing the coal and metal mining operators. Perhaps some of the experimental work is a little premature, but as I see the picture, the selective preparation of coal will be of increasing importance in the near future. Perhaps this work will point the way to future developments.

(Editor's Note. Under Plant News is a short article on the beneficiation of coal by froth flotation, rather than by gravity treatment.)



The main job of the big oil "kitchen" at Abqaiq, Saudi Arabia is

Sweetening Up the Crude*

Among the petroleum installations at Abqaiq, Saudi Arabia, is a big processing plant known as a crude-oil stabilizer, and, figuratively speaking, you might say that its main job is to get rid of the "rotten eggs."

"Rotten eggs" means hydrogen sulfide gas (H_2S) —they share a common odor. If you've ever cracked a bad egg into an omelet, you'll get the idea.

This gas is contained in the crude oil as it comes from the wells. It not only has a vile odor, it's also poisonous—it can kill you if you inhale it. And it's corrosive. If the crude is "wet"—that is, if it contains water—the H_2S and the H_2O will react to form H_2SO_4—sulfuric acid, a heavy oily liquid that can eat its way through a steel pipeline or storage tank.

Hydrogen sulfide has to go. And one of the Aramco plants that does this job at Abqaiq is the world's largest crude-oil stabilizer: it can process up to 950,000 barrels of crude daily. That's equal to 39,000,000 gallons—a pretty fair batch in anybody's kitchen.

* Reprinted from the Aramco World, a publication of the Arabian-American Oil Co.

The stabilization process—basically a form of partial distillation—does two jobs at the same time: it sweetens "sour" crude oil (removes the hydrogen sulfide) and reduces vapor pressure, thereby making the crude safe for shipment in tankers. Vapor pressure is exerted by light hydrocarbons, such as methane, ethane, propane, and butane, changing from liquid to gas as the pressure on the crude is lowered. If a sufficient amount of these light hydrocarbons is removed, the vapor pressure becomes satisfactory for shipment at approximately atmospheric pressure.

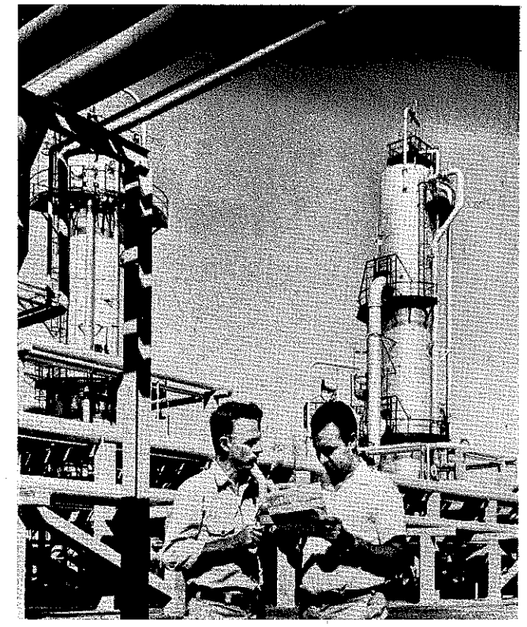
All the crude produced in Saudi Arabia—except for that of the off-shore Safaniya Field in the Persian Gulf—is "sour." At ground level the pressure may be as high as 1,000 pounds per square inch (or "1,000 psi," as the engineers say). It must be reduced considerably before it reaches the stabilizer, so it's sent first to a gas-oil separator plant, or "GOSP." There are eleven of these in the Abqaiq area.

Now, the gas can't be allowed to "blow off" all at once. If it did, a considerable amount of liquid would also be lost—something like shaking a bottle of soda pop before uncapping it.

The gas is released in stages in a series of drums or columns, known as separators, before it reaches a spheroid where the pressure is cut down to about 2 psi. By now, most of the light hydrocarbon gases have been removed, but the gas is still "sour." The next step is to pump it to the sour-crude storage tanks at the stabilizer to await processing.

Booster pumps push the oil from the storage tanks to the top of one of the stabilizer columns. It enters the column and starts to flow down through a series of "bubble trays." Near the bottom, the down-flowing oil is channeled to a reboiler that heats it. By the time it reaches the bottom section of the stabilizing column, it's hot. Gases contained in the crude—both hydrogen sulfide and light hydrocarbons—begin to boil off at this temperature. They rise to the top, while the heavy crude remains at the bottom.

The rising gases, incidentally, perform a useful

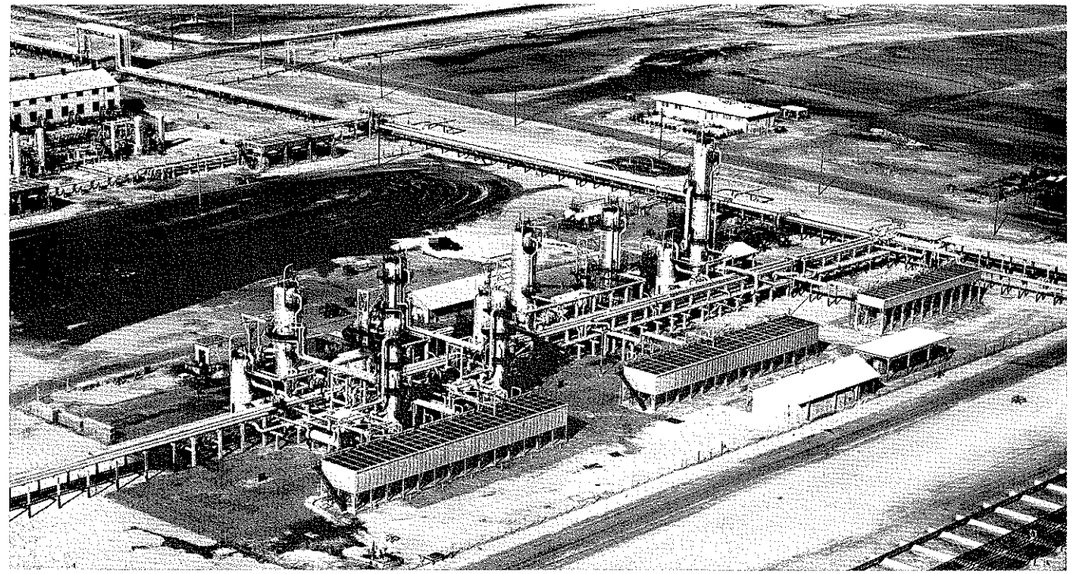


▼ Harley Drury, engineer in charge, and Hassen bin Hussain, head operator, double-check the performance of this fully automatic plant.

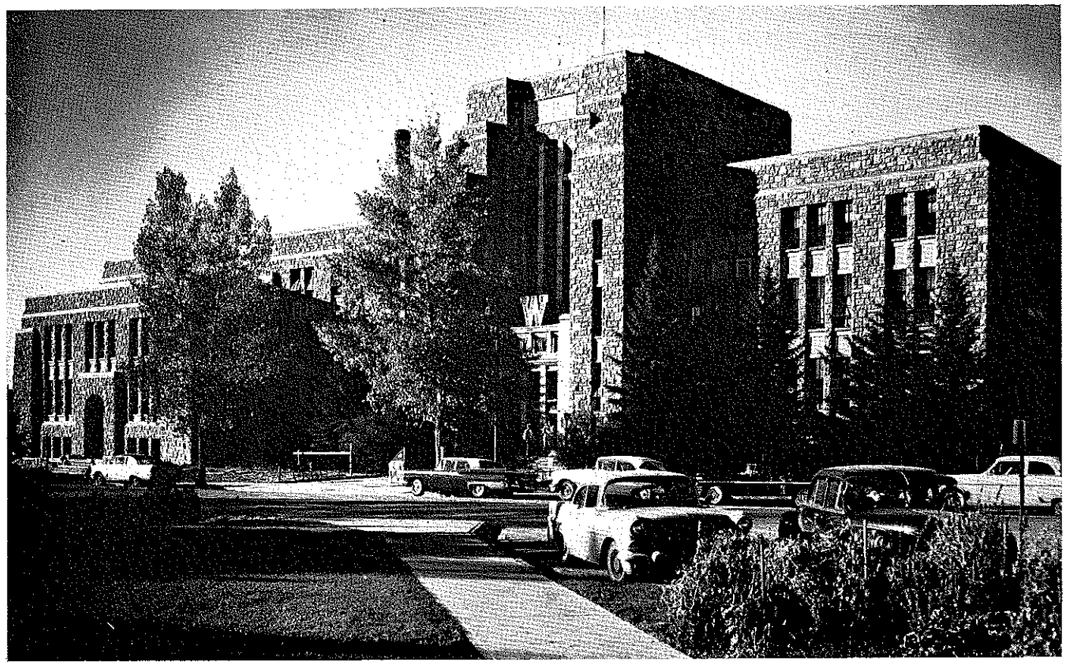
function on their way up the column. Being hot, they supply preliminary heating to the incoming sour crude, and also "strip out" some of the gases contained in it.

When the hot gases leave the column, they're piped to what's known as a "scrubber." Its purpose is to recover most of the liquid hydrocarbons contained in

(Continued on page 19)



▼ Abqaiq's giant stabilizer seen from the air: cooling units in the foreground, stabilizer columns in the rear. The giant column, at right, can process 275,000 barrels of crude per day.



▾ Building housing the Engineering College, University of Wyoming, was completed in 1927.

A Brief History of the

Engineering College of the University of Wyoming

The University of Wyoming, established in 1887 with a faculty of seven, had a rather ambitious program. Degrees were to be granted in six departments: Liberal Arts, Philosophy, Letters, General Science, Fine Arts and Practical Arts. Included in the Practical Arts were mining, metallurgy and engineering, all taught by a one-man department at a salary of $1500 per year.

The first revision of the curricula appeared probably in 1889 or 1890 and included the school of irrigation engineering and the school of mining.

It is interesting to note that Cecil Rhodes attended one of the first summer sessions held at the University of Wyoming and from the interest gained here established the Rhodes Scholarships at Oxford University.

The 1909 catalogue showed three colleges: Agriculture, Engineering, and Liberal Arts. This was the first indication of a separation of agriculture and engineering. In 1908 a professor in Civil Engineering was employed and specialized courses started.

The Engineering College continued a normal growth except for the war years of 1917-18 until 1932. However, during this period plans had materialized for a new building to house the Engineering College. This building was completed in 1927 and is at present part of the building occupied by the college.

During the period from 1908 to 1933 some consolidation and change of the offerings were made. The school of irrigation engineering was included in the Civil Engineering Department. The Mining Department was eliminated in 1933 and limited training in metallurgy had been included with Mechanical Engineering. The three departments—Civil, Electrical and Mechanical—showed a gradual growth after the first impact of the depression. In 1942 World War II practically closed the College of Engineering as most of the students and faculty were serving in the armed forces or were engaged in defense employment.

About 1945 the General Engineering Department was added as a degree department. The four departments with about equal enrollments have continued until the present time.

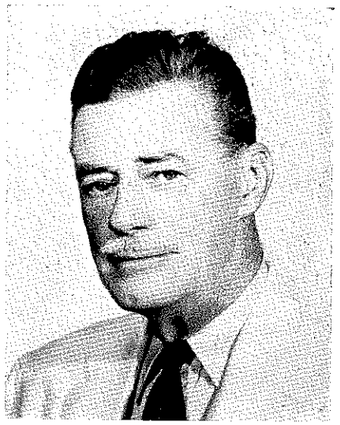
The Engineering Building had remained essentially unchanged from 1927 to 1958, when a new wing was started containing about the same floor space as the original building. The Petroleum and Aeronautical wing was erected by state appropriation, and the equipment for Petroleum Engineering will be furnished by the oil companies operating in the state. The Department of Petroleum Engineering will in the near future be granting degrees.

R. A. Morgan, who received an E.M. degree in 1929 and a M.Sc. in 1933 from the Colorado School of Mines, was recently named assistant dean of the UW College of Engineering. He also heads the Departments of General Engineering and Engineering Drawing. (See p. 57, June 1960 MINES Magazine, for story about Dean Morgan.)

It is interesting to note that several of Colorado School of Mines faculty members have come from the University of Wyoming, including A. E. Bellis, a long time head of the Physics Department, and J. C. Fitterer who moved from head of the Civil Engineering Department at Wyoming to head of the Mathematics Department at Mines.

Mining In Mexico*

By CLIFFORD R. PARLIMAN



C. R. PARLIMAN

In Mexico's state of Durango, located in the north-central mountainous portion of the country, a number of tremendous deposits of pay-ore have been discovered. These deposits have made the producers huge fortunes, yet figuratively speaking, the surface has only just been scratched. No area could be so highly mineralized as the state of Durango—without presenting untold advantages to the men who intelligently undertake its exploration.

Although no "shingle" hangs over my doorway yet, people from all walks of life have wandered into my office, in the city of Durango, to talk about mining. Durango, the capital of the state, is the fulcrum of the state's mining interests. Few of the people who called upon me were versed in Mexican mining laws or knew how to go about acquiring mining titles or concessions for exploration and development. The prime step for all people is to observe carefully Mexico's mining laws and never attempt to circumvent them.

In almost every instance, people have asked questions about the mercury prospects in the state, about copper and fluorspar, and about the prospects of reopening old Spanish gold and silver mines. None of them ever fails to ask questions about Durango's famous "Iron Mountain." "Iron Mountain," just outside the city of Durango, is a prominent and an unusual sight and can be seen from almost any point in the city. It has a habit of stimulating the imagination and has become one of Mexico's mining monuments. It has an interesting history.

Cerro de Merado Discovered in 1552

This mountain of rich iron ore was discovered in 1552 by Captain Gines Vasquez de Mercado and named after him, "Cerro de Mercado." One of the greatest of Spanish explorers, Captain Mercado's main objective was to seek and recover gold. He had no idea in those early days of the importance of iron to the industries of today. On painstaking examination, he was terribly vexed to find his mountain was totally iron ore without a sign of gold. In chagrin at his discovery, history reports, he sat down and cried. Later he sought and found gold in the Coneto area.

In recent years, the ore from "Cerro de Mercado" proved to be high grade iron. It needs no separation except for the removal of apatite crystals, and is being shipped run-of-mine. For the past 25 years the Mercado Iron Mountain has been producing high grade iron ore, under splendid management, with modern mechanical equipment that loads a standard size railroad car in a period of two minutes. The project is operated at a capacity of from 2000 to 3000 tons per day and has already made a fortune for its operators, with many years of production blocked out ahead of operations. The sight of the big automatic selector screens, erected in a series of steps extending down the face of "Cerro de Mercado, is impressive and not easily forgotten.

Ore Shipped to Monterrey

A good portion of the daily production is being shipped directly to the Monterrey furnaces of Cia., Fundidora de Fierro y Acero, for treatment. The pro-

* The request that I write an article on "Mining in Mexico" sounded like a pleasant undertaking and I gladly tackled the job. Frankly, I had no conception of the work it would require until I began to gather data. Visiting mines and taking pictures was a pleasure, but the work required in securing detailed data to write the article was tedious and sometimes exasperating. However, I wanted the article to be accurate yet interesting and believe it has both attributes.

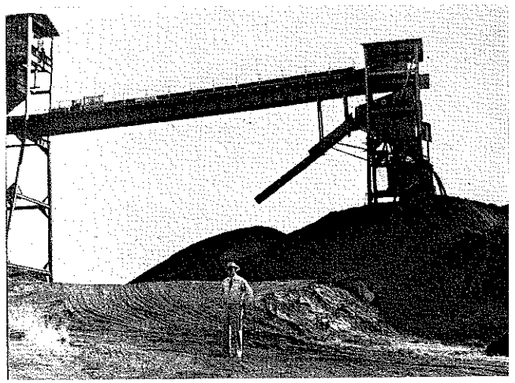
THE AUTHOR

Clifford R. Parliman has been mining in Mexico since 1935. At the present time, he is president of High Fidelity Engineers of Durango, Mexico, where he also is engaged in mining exploration and agate production.

Born at Shelter Island, N. Y., in 1890, Mr. Parliman studied civil engineering at Syracuse University and industrial engineering at Massachusetts Institute of Technology. In 1914 he designed and constructed the first Permutit plant in Brooklyn, N. Y., for the manufacture of Permutit, a water softener. The next year he constructed a power house and mill for concentration of manganese ore at Crimora, Va. During World War I he was a pilot for the French Escadrille.

After the war he held such positions as assistant engineer, The Koppers Co., Pittsburgh; assistant chief engineer, Hammermill Paper Co., Erie, Pa.; 1920-34, industrial design and construction; 1935-40, exploration for tin in Mexico; 1942-44, exploration of gold and silver prospects of Coneto, Mexico; 1944-1955, development of citrus in lower Rio Grande Valley, Texas; 1956-1960, mining exploration and agate production, Mexico.

▼Steel bridge and automatic screen selectors on face of Cerro de Mercado, Durango, Mexico.



▼No. 5 selector screen with ore pile below. From here another conveyor takes the ore to overhead bins that load a railroad car in two minutes.

duction operation is being handled by Cia., Cerro de Mercado, S. A. of Durango, under the able management of Don Carlos Maldonado, who by virtue of his charities, is held in affection and esteem by the people of Durango.

Captain Gines Vasquez de Mercado, in the same year of 1552 that he discovered the Iron Mountain, traveled north and discovered the silver deposits of San Lucas and those of San Juan Del Rio, about 55 miles due north of the present city of Durango. Finding but little gold with the silver, these deposits did not interest him, so he proceeded another 30 miles north into the rugged mountainous tin area of Coneto.

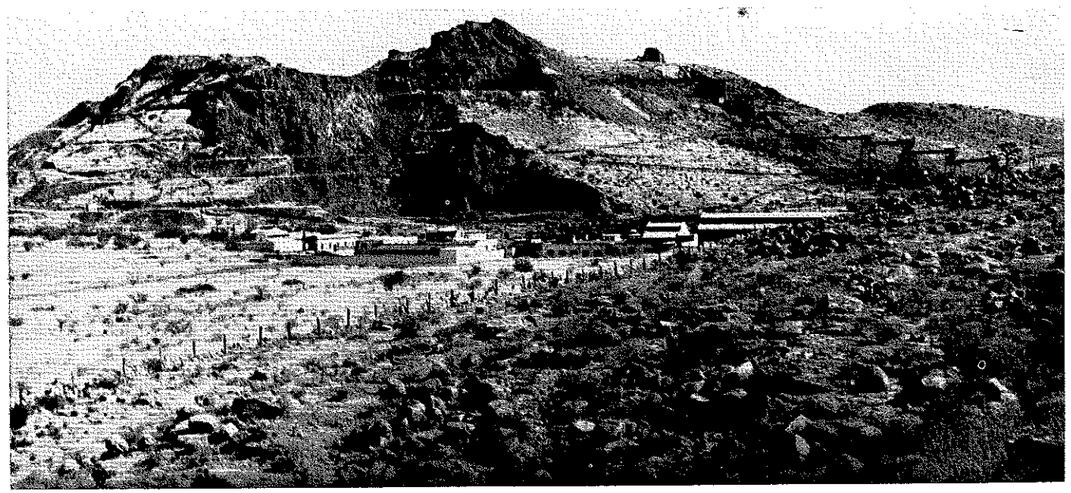
Lomo de Camello de Mercado

The nearly pure tin-oxide of Coneto did not hold his interest, but it was in this area that he discovered a prominent mountainous ridge, resembling the back of a camel, on which he discovered gold—and this did interest him. This ridge was over three kilometers (two miles) long its structural formation being almost in a straight line—and was named after him, "Lomo de Camello de Mercado" or "The Mercado Camel-Back." At a point near the north end of this "camel-back" where outcrops of a cross-vein occurred, he sank a test pit some 20 feet deep and began to encounter ore that ran 100 grams of gold per ton.

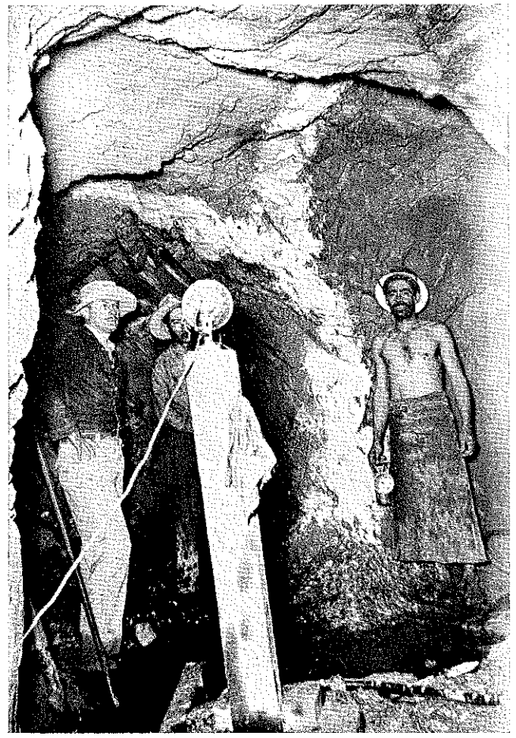
He was so elated with his discovery that he left a portion of his soldiers in Coneto and traveled south with a few soldiers through Durango to visit his wife in Guadalajara. He reported his silver discoveries in the area of San Lucas and his more important discovery of Gold on the "Camel-Back" of Coneto, as he stopped over briefly with the Durango garrison. Unfortunately, enroute to Guadalajara, his small party was attacked by unfriendly Indians. He was so severely wounded that he died before reaching Guadalajara.

Ibarra Opened Up Gold Production

It was Capt. Francisco de Ibarra, therefore, who in 1556 opened up the gold production on the "Mercado Camel-Back." He started at the north end of the camel-back where Captain Mercado had sunk his test pit—and followed down the vein's enriched structure. He named this the Number One Mine, but later called the San Miguel. He developed seven gold and silver mines along the two miles of the Camel-Back, numbering them in sequence from north to south. From the old Church records, his Number One Mine was richer in gold than all the others, so much detail was



▼Cerro de Mercado Iron Mountain operation from one mile distance, near Durango, Mexico.



▼The joiner "Y" of the north drift on the 200-foot level of San Miguel Mine on Mercado Camel-Back. Cross veins of sulfides are still 60 feet below this level.

written about it. No. 1 opened many gold-pockets and five large enough to be recorded that some of the gold nuggets found were as large as chicken's eggs.

He completed building his Hacienda in the year of 1559 and installed a "mint" in it in 1560. He minted his first gold coins of the realm of Spain in his Coneto Hacienda during the year of 1560. The old Hacienda is still in existence. The Church history recites that over a long period of years he shipped a large volume of gold coins from his Coneto Mint to his residence depot in the city of Durango.

There being no economical method in those early days of recovering gold or silver from their sulfides, the Spaniards were forced to abandon each of the Camel-Back mines as it got down into the rich sulfides.

Gold and Silver Recovered from Sulfides

It was not until about the year of 1900 that a German-owned smelter of Monterrey began to use an economical method of recovering gold and silver from the sulfides. Subsequently, a few courageous men with some money reopened the No. 1, No. 5 and No. 6 mines of the Mercado Camel-Back. Between the years of 1905 and 1911 they produced ore with marked success and substantial profit. However the activities of Pancho Villa caused them to shut-down the mines. None of those mines have been reopened since, but certain exploration work was done on the No. 1, in 1956, which was opened to the 200-foot level, but not to the reportedly rich cross-veins at the 250-foot level.

(Editor's Note: In the September issue, Mr. Parliman's article will discuss mercury and silver deposits, the Mexican Mining Commission, and mining possibilities in the Durango area.)

SWEETENING UP THE CRUDE

(Continued from page 15)

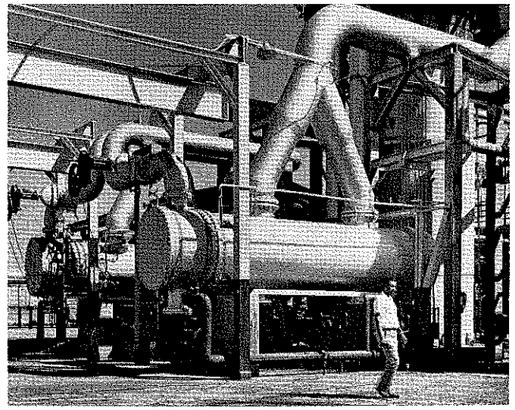
the gas mixture. The leftover gases—mostly hydrogen sulfide—are ignited and flared off.

Plans are underway, however, for installation of new facilities which will permit utilization of these gases in Aramco's oil conservation program. The gases that come off the top of the stabilizer columns will be combined with spheroid gases, compressed and liquefied, and piped to the Ain Dar area. There, they will be combined with high pressure gases from the Ain Dar gas-injection plant and injected into the underground reservoir.

This injected combination serves as a solvent that "flushes out" crude oil and also helps to maintain reservoir pressure, thus permitting a higher percentage of the crude oil to be recovered.

The stabilized crude oil goes on to the cooling unit, where enormous fans reduce the temperature. Why? Because if the oil remained warm, all the lighter fractions of crude oil would evaporate. The cooler the oil, the more stable it is.

The Abqaiq stabilizer can process 950,000 barrels of crude oil daily in summer, but only about 860,000 daily in winter. Most crude oil has some water in it when it comes from the reservoir. In warm weather the water vaporizes easily and is taken off at the gas-oil separator before stabilization. But in cold weather it remains in the crude that is pumped to the stabilizer and causes "foaming," which reduces the efficiency of the process. "Foaming" is similar to the action that occurs when you shake oil and vinegar to make a salad dressing. Ordinarily the oil floats free above the vinegar, but shaking them together produces a bubbly emulsion, a frothy mixture that will not separate for quite a while.



▼Sour crude oil is heated in the hroizontal vessels to "boil off" the hydrogen sulfide and light hydrocarbons.

As in other modern oil-processing installations, practically everything is operated automatically from the control room. There are only five men on each shift: a head operator and four assistants, all Saudi Arabs.

By the time the stabilizer has finished its job, the hydrogen sulfide that was in the oil has been almost entirely removed—reduced to an infinitesimal ten parts per million.

Controlling The Dermatitis Hazard In Mining

By E. A. PIERSALL

E. A. PIERSALL

Underground mining probably presents one of the greatest potential dermatitis problems in industry today. We say this because we have been through a rough siege with it, and now have it licked. Controlling the incidence and spread of this disabling and costly occupational disease has been accomplished largely through a coordinated program of employee education in cleanliness. For a major part of the success of our program we can thank the Association of American Soap & Glycerine Producers, Inc., which provided us with the communications tools including an effective flipchart for use at safety meetings, that have helped sell our men on maintaining higher cleanliness standards.

Program of Education

The Association's research showed us that if we followed a definite plan of educating our miners and underground workers by telling them to wash more frequently; change work clothes more often and keep them clean; and report immediately any sign of rash, itch or redness of the skin—we could nip potential skin troubles in the bud. This program of communications—even including underground health and safety meetings—supplemented the company's long-established routine of requiring the men to wear oil skins, heavy rubber boots, rubber gloves, aprons, goggles and other protective equipment.

Our dermatitis problem really came to a head some two years ago. Union Carbide Nuclear Co's operation at Bishop, Calif., is devoted to mining and milling of nonferrous metals, primarily tungsten and molybdenum. This is probably the only operating tungsten mine in the United States today. Mined intermittently since World War I, it has been in continuous operation since it was acquired by Union Carbide Corp. in 1938. While the word "nuclear" does appear in the name of the company, we do not produce or mine nuclear materials and consequently do not have the special problems of safety maintenance and hygiene usually associated with fissionable products.

Our mine is, however, fairly typical of underground mining and processing operations. We are located high in the Sierra Nevada Mountains, about 10,000 foot elevation. Our installations are built on steep terrain, which restricts surface facilities considerably. The main entrance extends horizontally into the side of Mt. Morgan for a distance of over 7,000 feet.

Underground Cleanliness Problems

Underground cleanliness problems center largely around contact with fine particles of ore; oils and greases used in drilling equipment and other mechanical devices; explosives, and to a certain extent, solvents. Mechanical and physical factors, such as friction and cold are present too. The temperature underground may average around 40 degrees, and it is damp. Humidity will run from 90 to 95 per cent. At the mill, which is a combination mechanical and chemical plant, various chemicals, oils, heat and fine rock particles are encountered daily. About 120 men are employed at the mine, and there are up to 120 at the mill.

Mining in the High Sierras does not lend itself to fancy installations for washing. In fact, it was quite a feat to install running hot water in one washup station and assembly point on the way out near the entrance. However, there are adequate facilities provided in the buildings clinging to the side of the steep mountain at the face of the mine. Our "change" or washup room, features complete facilities for thorough cleansing. These change rooms are in the mill and machine shop; washrooms are in the garage, between the garage and the carpenter shop, and in the chemical and metallurgical lab as well as the offices.

THE AUTHOR

E. A. Piersall grew up in Reno, Nev., and attended schools there from the first grade through the University of Nevada, where he majored in psychology, graduating in 1943. He spent the next three years in the Navy as an officer on minesweepers.

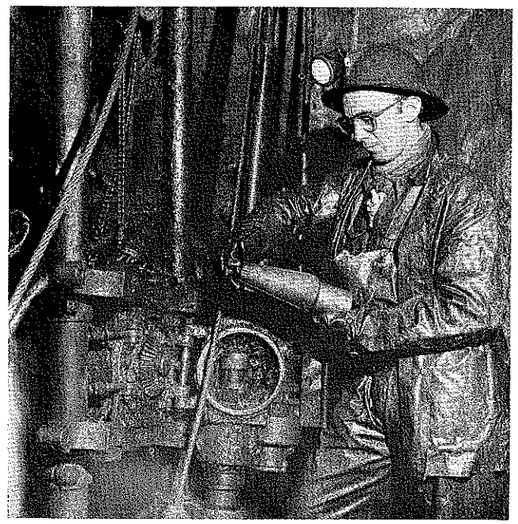
After the war, he studied law for a year and worked at various construction and mining jobs. In 1950 he was hired at the Bishop operation of Union Carbide Nuclear Co. as safety engineer. Early this year he was transferred to Colorado as safety engineer for all Union Carbide Nuclear Co. mining and milling operations in Colorado, Utah and Wyoming.

Although our buildings are about 12 years old, they are kept in immaculate condition. Sufficient showers, with hot and cold running water, and several circular wash basins are provided. In the hand wash basins we provide running water and a quality hand scrubber. In the shower room, men normally bring their own hand soap, and of course they bring what they like. We *do* provide a waterless, ammoniated cream hand cleaner for those people who do especially greasy work, whose soil cannot be readily removed by normal soap and water washing. This hand cleaner is used largely by our mechanical maintenance men in the garage and machine shop. In addition to being available in the washup room, the cream is also dispensed at five stations in the mine and six in and around the mill.

Hoists are used in the change rooms to speed drying of garments and underclothing. Our average miner normally wears a number of layers of clothing: long underwear, sweatshirt, maybe another shirt; over this overalls, and on top of everything, rubber clothing we call "diggers." Now we are switching from rubber to nylon suits. Also, they wear knee-length rubber boots and plastic gloves. We have felt that in addition to being lighter, nylon suits may help eliminate irritations possibly caused by rubber contacting the skin. In one or two cases, we feel this may have had some relationship to dermatitis reports. Each man has up to 15 minutes to shower and clean up after work before catching the company bus to the mill, and then into Bishop.

Controlling Dermatitis

For several years, of course, we have carried out a safety program aimed at controlling dermatitis, which is a recognized hazard. For years we have urged the men to clean up regularly, report rashes or redness, and keep garments clean. We have had the full cooperation of the union which is as much interested in controlling dermatitis as the men and we are. However, human nature being what it is, some men will just naturally let things slip. And this is why obtaining their voluntary cooperation through an educational program is a major reason for our recent good record on dermatitis control. For instance, we seldom used to see a miner taking his diggers home to clean them up and have them washed, prior to our new information program. In recent months, men have been taking work clothes home for cleaning once or twice a week; they seldom did it this often before.



▼ Safety Engineer Piersall emphasizes the importance of personal cleanliness in preventing skin troubles, using a flipchart produced by the Association of American Soap & Glycerine Producers, Inc.

▼ Miner examines drill bit at work face 7500 feet inside Mt. Morgan in the High Sierras. Note use of protective rubber outerclothing and gloves, to guard against irritations of the skin.

In considering a control program for dermatitis it is well to remember that it is something not frequently reported in its early stages. A man will get an irritation on the wrists (above or just inside the top of his gloves, where ore particles and oil spray may collect), or on the legs (just above his boot tops or inside them), and he will ignore it until it is so severe he has to go to a doctor. He may even have to lay off work. That this *can happen* is stressed in our prevention program. We urge the men to report immediately the first sign of irritation. This report on his condition goes to the mine foreman, the mine superintendent, and the safety engineer. In a day everyone knows about it, and arrangements are made to see that the man gets medical attention fast, so that the condition will not become more aggrevated.

As soon as we know that a person is having skin trouble, we immediately make an appointment with a local doctor for examination, and treatment if necessary. Normally, a man sees either the company doctor or his own physician within a day or two after he reports the irritation. Only in cases where there has been a delayed report, and the irritation has become severe, has there been any lost time.

Since instituting our new preventive program, there have been no serious cases of dermatitis, and no lost time cases in over a year—not a man off the job, or unable to continue his normal employment because of occupational dermatitis. A large part of the credit for the success of our program goes to the educational aids produced by the Soap Association, which have helped in getting across to the men the importance of cleanliness, the danger of dermatitis, and the frequency with which it can occur here.

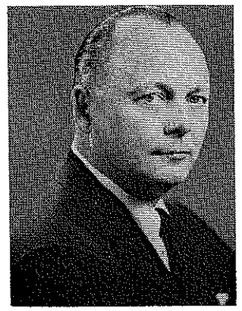
Lost-Time Incidents

Before we undertook this program, however, we had had several bad cases plus several lost-time incidents due to dermatitis. One of the worst cases we ever had occurred some two or three years ago. It apparently was brought about by disregard of precautionary measures in handling powder. The miner

(Continued on page 29)

On 50th Anniversary

Bureau of Mines Cites Accomplishments



FRED A. SEATON

M. J. ANKENY

The Federal Bureau of Mines, a leader in scientific development and conservation of the nation's mineral resources since 1910, was 50 years old July 1, 1960.

Secretary of Interior Fred A. Seaton noted that the Bureau was created at a time when coal-mine disasters were claiming the lives of many workers. He pointed out the agency's safety research and training and its cooperative efforts with management, labor, and other federal and state agencies have been major factors leading to improved working conditions in all segments of the mineral industries.

In the ten years before the Bureau began its work in a single research laboratory on the old Arsenal grounds in Pittsburgh, Pa., coal miners died at the rate of 364 a year in major disasters. Since, the fight carried on by the Bureau and others has reduced that yearly average disaster toll to 32, and impressive safety gains have been made throughout the nation in all activities concerned with the mining and processing of minerals.

Bureau of Mines Director Marling J. Ankeny said his agency's accomplishments are not limited to the mining field, but touch, directly or indirectly, the lives of all Americans. For example:

The electric bill paid by most American homeowners is relatively low, partly because Bureau research helped improve the efficiency of coal-burning equipment at power plants so that a pound of coal today will generate as much electricity as five pounds did half a century ago;

Air conditioners and refrigerators are leak-tested with Bureau produced helium—a lightweight gas that also helps insure the purity of many products from candy mints to medicines and has essential uses in missiles, electronics and space exploration;

Bureau studies paved the way for safe ventilating systems in structures like New York's Holland Tunnel, and they still are providing information that will help reduce air pollution from automotive exhaust gases and incinerators;

Some hospitals in this country are still using radium extracted by the Bureau years ago from domestic carnotite ores. This achievement, which came early in the Bureau's history, made the element available for medical use at $40,000-a-gram less than the price then paid for imported radium;

By controlling fires that sometimes break out in inactive coal deposits, the Bureau has saved for future generations millions of tons of valuable fuel reserves at a cost of less than a penny a ton. Valuable reserves of anthracite also have been saved through the Bureau's participation in mine-drainage projects in the hard-coal regions of Pennsylvania;

American businessmen are aided by Bureau fact-finding programs that supply statistical information and economic analyses on domestic and foreign minerals. Friendly foreign nations also benefit from technical advice and assistance provided by Bureau experts through the Economic Cooperation Administration.

Ankeny, the agency's tenth director, noted that in half a century the Bureau has published nearly 8,000 reports describing its findings in research and development work on minerals, mineral fuels, and industrial health and safety. An equal number of articles by Bureau researchers has appeared in the scientific, trade, and technical press of the United States and many foreign countries, he said. Comprehensive 50-year lists of these reports and Journal articles will be issued soon to mark the Bureau's golden anniversary.

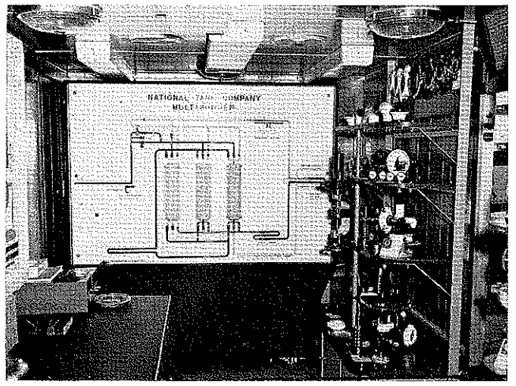
Bureau scientists provided the nation with new metals like titanium and hafnium, Ankeny commented. They also engineered the process now employed by industry to make zirconium metal, used in the atomic engine that powered the nuclear submarine, *Nautilus*, on its record-breaking run beneath the North Pole.

Ankeny said the Bureau has also added substantially to domestic supplies of mineral raw materials. Increased production of copper resulted from Bureau investigations at San Manuel, Ariz., and White Pine, Mich., and many additional barrels of crude petroleum have been produced through the Bureau's promotion of secondary oil-recovery techniques. Bureau studies of blasting, roof bolting, rock dusting and other mining methods and practices have not only improved safety but also have increased efficiency in mines throughout the Nation. As an example, Ankeny cited the American coal miner, who now produces an average of 12½ tons of coal a day. In 1910, he said the average output per man was 3½ tons a day.

"Although the Bureau is proud of its achievements," Ankeny concluded, "it values the past primarily because it provides the knowledge needed in solving problems of the present and future. With 50 years of experience as a guide, the Bureau hopes in the half century ahead to strengthen further the mineral-resource base upon which the industrial progress and economic security of the United States depend."

▼ National Tank Co.'s mobile display unit.

Oil Show Comes to Colorado

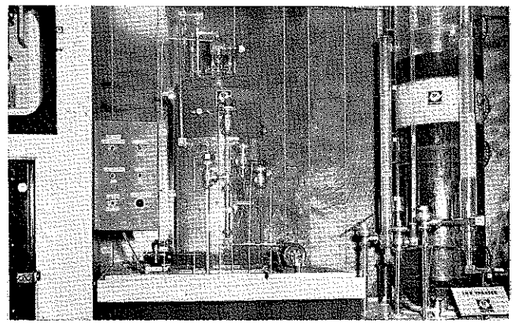


▼ Hydrocarbon recovery unit, a Multasorber on a lighted display panel. To right are controls, valves, couplings and thermostats in cut-away models.

Although many oilmen in Colorado were unable to go to the May 1959 International Petroleum Exposition in Tulsa, some of them took the opportunity of visiting National Tank Co.'s big trailer-borne mobile display when it was in Denver May 2-3, in Craig May 5, and in Rangely on May 6. After leaving Colorado, the mobile display unit—featuring the identical assemblage of plastic working models which were in the Tulsa show—toured Utah, Wyoming, and Montana.

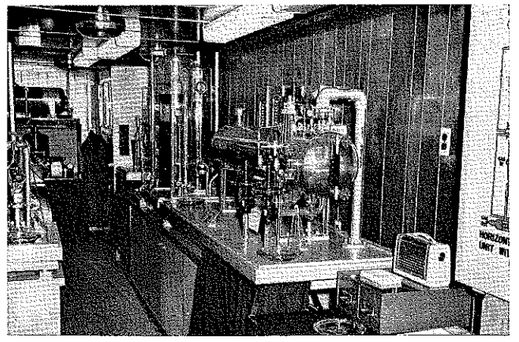
General purpose of the display, National says, was to promote a better understanding of the design, application and operation of National Tank products among production men, engineers, purchasing agents and lease operators. National Tank personnel were in attendance in the display trailer to demonstrate and explain the functions of each of the units.

Among the items in the display were: two water filters and a precipitator equipped with automatic new three-way valve manifold; PVM-LACT unit; IWP emulsion treater; NCP treater; metering treater; heater settling tank (submerged firetube); three-phase Monotube separator; COG separator; horizontal glycol gas dehydration unit; a Multisorber demonstration panel; HRU-hydrocarbon recovery unit; LTX lighted flow panel; liquid level control demonstration; flame arrestor demonstration; line oil sampler; Frigi-gas with lighted flow panel; the new Maniflow valve; new safety head; and more than 50 valves and controls in cutaway models.



▼ This is a vertical PVM-Lact clear plastic working model.

The display has been shown in Texas, the Gulf Coast, Louisiana. Mississippi, Oklahoma, Canada, and the Rocky Mountain region of the United States.



▼ In right foreground is a three-phase oil, gas and water monotube separator at work. In right background are scaled clear plastic working models of emulsion treaters and Lact system.

An Analysis of the Problem

Mineral Engineering Education for the Future

By Col. Wendell W. Fertig, '51

Both the previous articles in this series drew upon the Education Symposium held at the 1960 Annual AIME Meeting held in New York City. This will be continued because of the frank and open exchange of ideas between the leaders of the mining industry and educators directly involved with colleges of Mining Engineering. These two groups are as closely involved with this problem as it is possible to be. For the former, the trained mining engineering graduate represents a tool with which to cure production problems and effect economic survival. To the latter, the graduate is a trained product, whose success will influence the future supply of undergraduate students who, in turn, are necessary to keep the teacher of mining engineering employed. Thus both educator and industrialists are more closely involved in this partnership than either has been willing to admit.

The tendency has been for each to blame the other; and in each case, the critic was acting from a base of inaccurate, or at least incomplete or inconclusive information. When the industrialist undertook to criticize the educator, he did so without the knowledge and understanding required to be an objective critic. If he had taken the time to obtain the knowledge and understanding needed, he would have failed as an industrialist, for the reason that in our present society, one man cannot be both. He must be an expert in the field of industry or in education; he cannot be competent in both simultaneously. This is just as true of the educator when he endeavors to tell the industrialist how to run his business.

At this symposium, we found the industrialist attacking the present education of the young mining engineer, yet not doing more than to offer generalities—increase the scope of the curriculum, eliminate practical courses and produce a graduate who will be fashioned to the needs of a particular company. The educator defended his product, but was unable to answer the specific shortcomings pointed out, for he was training a mining engineer to meet not the needs of a single company, but the needs of such a company as happened to hire the particular young man. At no place in this situation is there a common meeting ground, and none can exist until industry takes an active interest in education and education assesses correctly the needs and desires of industry.

There has been much stress on the lack of communication or the ability of the engineer to express himself. Yet it appears that both industry and education are equally guilty in their inability to communicate their respective needs to the other.

Yet of all the published discussion, a young mining graduate of the class of 1959 seemed to have arrived at the pertinent conclusion. He said, "Industry should work more closely with mining professors. With the radical changes taking place in the mining industry and industry's growing dissatisfaction with the caliber of education offered the mining engineer, mining executives should arrange to meet regularly with educators to formulate, and revise when necessary, a program for students that will be satisfactory to both parties."

Education is not blameless in this matter, but industry could well take the lead for they are vitally interested in the quality of the product which is being produced by the mining colleges. It is this same interest that has been displayed by manuafcturers in other fields that helped popularize chemical, electrical and other branches of engineering. Industry was interested, thus alerting public interest, for industry means job opportunities while colleges merely mean education.

In April, the address by Charles M. Brinkerhoff, president of the Anaconda Co., before the Education Committee, AIME, was discussed. In May, the other side of the coin was presented in the welcoming address delivered by Dr. John W Vanderwilt, president of the Colorado School of Mines, to the opening session of the AIME. Now it is the turn of industry again, as S. D. Michaelson, chief engineer, Western Mining Division, Kennecott Copper Corp., presented his views in "The Future of Mining Engineering" to the Education Committee and Symposium.

In opening his address, Mr. Michaelson pointed out that the principal aim of the 1960 AIME Council of Education Panel Discussion was to explore the fundamental reasons for the serious and progressive slump in mining engineering enrollments in U. S. mining schools.

Based upon the assumption that mineral production will continue, the Panel proposed to discuss:

1) The present and future needs for mining engineers;

2) The qualifications and characteristics desired in young mining engineers;

3) The opportunities open to these engineers;

4) How mining school educators can do a better job;

5) How more effective communication can be developed between the mining industry and the schools serving it.

Although the problem of recruiting students was not mentioned in the chairman's original outline for discussion, it is still of paramount importance. In 1958 mining engineering undergraduate enrollment stood at 797, compared to 1512 in 1950. Did this mean that mining engineering is a dead field, or that it is merely dying? Unless training and practice of our average mineral industry engineer is severed from the wistful background of 1890, mining engineering will be a dying field, Mr. Michaelson concluded. Mining today's low-grade deposits requires the same talents that are required to stay in business in any other highly competitive field.

Yet the mining field should be a dynamically live professional field. John R. Bradfield, president, Noranada Mines, Canada, said in a recent address, "The world today is in the midst of a tremendous population boom, and people everywhere are striving for a higher standard of living . . . Since many of the present major deposits will be worked out during the next 40 years, all but a small percentage of this vastly increased demand would have to be supplied from ore deposits as yet undiscovered . . ."

Mining will be with us for a long time to come, for it is one of the keystones of our civilization. If this is true, then trained engineers should provide the technical help and direction that this industry will need. Therefore the properly trained mining engineer should be the one to provide both the highly specialized technology and the coordinating skill to pull them together.

Mr. Michaelson said, "Our schools are not now providing the kind of training needed to fit the mining engineer for valuable productive effort in a highly competitive mining business." Now the student learns some geology, some mine surveying, and a bit about open-pit mining, and how a flotation cell operates, but does this train him for a real job in a mining company of today?

If he goes into surveying, sampling, or mine layout work, he is competing as a technician with sub-professionals, while in an engineering department he will be engaged in feasibility studies, preparing schedules and estimates or writing reports for others. Yet each of these fields are more complex than surveying and sampling.

The average mining school does not offer financial training, knowledge of the operation of digital computers, programming, nor other than the most sketchy knowledge of mechanical and electrical machinery.

Mr. Michaelson goes on to question the skills of the young engineer in industrial techniques, the art of public speaking and psychology of public opinion, and concludes that he must know something about all of these if he is to succeed in his first supervisory job.

He does not question the job opportunities existent even for today's "poorly trained" graduates, for some 3000 young engineers are hired each year by the mining industry, and yet there will be only 190 mining engineer graduates in 1960.

Mr. Michaelson then outlined the things that the educators can do that would improve the product. His suggestions are:

1) Cut descriptive courses to the bone and build up solid backgrounds in the communication arts;

2) Improve the teaching of mining by pulling the mining schools together into a few universities;

3) Develop an appealing public relations program to show that mining has attractive scientific frontiers.

He closed his address by stressing the need for closer cooperation between industry and mining education, and offered suggestions that are both good and timely. If these were implemented by both industry and education, it should solve the problem of increasing the student participation in the field of mining engineering education.

Unfortunately The MINES Magazine does not have the space to reproduce this fine address in full, and consequently is constrained to limit its comments to those salient points mentioned in the limited digest presented here.

Mr. Michaelson is correct in seeing recruitment of students as the most important objective of all. Without students, the mining schools would close and industry would have to get along without even the limited number of trained mining engineers now available. Therefore regardless of the possible dislike of the term, recruitment of students is the first step. That, of course, implies that you have something worth while to sell or the program is doomed to failure from the start. To improve public relations will require industry confidence in its own field. To complain constantly, to appeal without end for traiffs on imports, to question pricing of competing materials does not strengthen the public's belief, and therefore the prospective student's belief in the strength of the industry. A show of optimism, even if only a show, is the first ingredient of a successful public relations campaign.

The curriculum needs stressed by Mr. Michaelson were reviewed by me, and the same conclusion reached as in April. The proposed range is so wide that it could not be covered in five years, and probably not in six. Generalities of mining are to be eliminated, not to provide further specialization in the mining field, but to allow even greater generalization in several fields that may be related to business in general but are not an essential part of general mining operations. The additional knowledge would be nice to know, but can hardly be expected or required of a young engineer just out of school. Rather the optimum suggested represents the accumulated knowledge of a well-trained graduate, plus several years of post-graduate reading and study on his own.

Frequently the competition with non-professionals as mentioned is a symptom of industry's failure to utilize their trained manpower rather than evidence of inadequate training.

Certainly the number of mining schools is being reduced by the economics of education. Without sufficient students to justify the course, it is abandoned. To teach mining engineering in only a few schools raises the question of excessive tuition for out-of-state students. If this is too high, then enrollment will be further limited. Industry may be required to support enrollment in mining engineering by more and larger scholarship grants to increase enrollment in this field.

(Editor's Note: The future is not all black, but it is necessary to point out the difficulties involved before a solution or solutions can be tailored to fit the problem.)

Theoretical Approach To Friction*

A new theoretical approach to friction and valuable information on the motion of tiny imperfections of metals have been expounded by Dr. John H. Dismant, professor of mining engineering at the University of North Dakota, and by Dr. George Alers of Ford Motor Co's Scientific Laboratory.

In an article published in the January 1960 Journal of Applied Physics, (pp. 221-222), Dr. Dismant presents a summary of his doctoral dissertation at the University of Utah, which involves a new theoretical approach to friction by reviving an older or classical theory. It has significance in the manufacturing of additives for oils and lubricants.

Classical Theory Explained

Dr. Dismant writes that the original or classical theory of friction accurately considered that any surface, no matter how smooth it appears, consists of small irregularities or asperites, which could be described as hills and valleys. This older theory further considers the source of friction as these small hills sliding over each other, then down into the valleys ready to start up a new hill, similar to sliding a sled up an inclined road in a rolling ice-covered country.

Dr. Dismant points out that the surface will have to act with rigidity or like a solid (for example, ice) for this to happen (for example, the sled will slide on the ice). If, however, the asperite or hill does not act like a solid but more like a liquid, then the factors governing the flowing process are the real source of friction, (for comparison, a sled in mud and what makes the mud itself flow).

Crystals "Flow" Through Each Other

Dr. Dismant asserts that modern studies of physics and metallurgy indicate that very small crystals (such as asperites) of solid materials do tend to "flow" through each other when put under stress and in a manner that may be considered similar to two wire brushes being rubbed together. He applies the modern knowledges of the deforming effects on metals and materials to revive the older classical theory of friction. He believes this new approach has possibilities of accounting for every phenomenon of friction, which is one of the most controversial of all scientific fields. He has performed experiments to demonstrate his hypothesis of what happens in boundary type lubrication such as when an additive is added to crankcase oil in automobiles.

Dr. Dismant points out that the older theory which he revives withstood the rigors of science for 200 years but was discarded some time ago based on different scientific measurements. This was then supplemented by the present so-called "welding theory" which Dismant believes to hold only in one special situation.

Development of Ultra-High Strength Metals

Dr. Alers' study—announced before the division of solid state physics of the American Physical Society at a meeting of the Institute of Arts in Michigan—is an important contribution to the development of ultra-high strength metals, and provides additional information on how to prevent materials from bending and breaking.

Defects, known as dislocations, in the orderly arrangement of the atoms of solids were discovered some 30 years ago. These flaws tend to move about, and their motion causes bending and breaking in materials. Scientists have spent the last three decades studying the stresses that make dislocations move about and ways to slow and stop them.

Significance of Dr. Alers' Study

The significance of Dr. Alers' study is that he has developed a method of accurately measuring dislocation travel which has led to discovery of factors that impede this motion. In order to detect this motion, the electrical department of Ford's Scientific Laboratory had to develop equipment capable of measuring time accurately to 1/100 of a millionth of a second.

Dr. Alers sent high-frequency (10-million cycle) sound waves into the face of a bar of high-purity (99.999 per cent pure) copper. The bar had been subjected to neutron irradiation in an atomic pile by Dr. D. O. Thompson of the Oak Ridge National Laboratory, co-author of the study. Dr. Alers then measured the length of time it took the sound wave to reach the other face of the sample and also measured the amount of energy absorbed by the dislocations during the wave's journey.

In a one-inch copper bar (a longer bar would have absorbed all the energy and a shorter one couldn't be measured accurately), it was discovered that elapsed time for the wave to travel the bar was five millionths of a second. When this figure was compared with that recorded with a bar that had not been irradiated, it was found that dislocation motion had made this time 1/10 of a second longer.

Measurements of the energy moving through the samples showed that the dislocations, where free to move, absorbed five times the energy that would pass through if there were no dislocations.

These measurements gave accurate information on how much energy was absorbed by dislocations and how much these imperfections slow down sound waves. They also provided information on the effect of sound waves on the motion of the flows.

During the experiment, successively lower temperatures were used until results were obtained at —452° F., nearly absolute zero. At this temperature, it was found that dislocation motion, while not stopped, was no longer absorbing energy.

The reasons for energy being absorbed by dislocations are not fully understood, but when they are it may be possible for metallurgists to develop stronger materials. A second investigation using lead in place of copper has produced comparable results, and further studies are being conducted to establish the universality of this effect in metals.

* Biographical facts about Dr. Dismant are given in Alumni News.

Replacement Problems Of Modern Equipment Management*

By FRANK A. ROZZA

In fields of construction and mining endeavor equipment is a fulcrum that can determine profit or loss to the activity. It is imperative in these days of expensive financing that the administration of any business organization, utilizing such equipment, have a means of appraising the acquisition and disposal of these capital assets. In the field of construction and mining particiuarly the problem of controling equipment investment is a great deal more complex than in manufacturing or other fields. This complexity is derived from the extreme variations of work duration, application and severity of working conditions. In construction and mining, a unit may work its theoretical economic life in only two calendar years, or, without evidencing any sign of mechanical deterioration, a machine could conceivably reach the end of its economic life through obsolescence alone, if it were retained through long periods of idleness.

Because of such variation, the impact of income taxes, the current cost of capital investment, fluctuation in market value and other factors, decisions affecting acquisition or disposal of equipment must be made on an individual basis. The analytical factors which should be considered before a proper solution can be reached are definable. Proper control of capital investment in typical construction or mining enterprise must contend with these three general problems:

1. To obtain or rent new equipment for a new undertaking.
2. Replacement, or overhaul, of equipment which is in continuous use.
3. Sale or storage of equipment which has become idle.

The first problem requires a decision to either purchase or rent new equipment. This decision must be made prior to bidding or negotiating new work. If proper equipment is not in company fleet stock, there is no choice but to obtain the new machinery required, in order to allow proper performance of the contract.

The second situation necessitates the establishment of a positive replacement program, in order to maximize profit on company operations. This is particularly true when the duration of such projects extends over several years. The mining industry, for example, is constantly faced with the problem of replacement, as the longevity of mining ventures usually exceed the anticipated life expectancy of standard equipment.

* Paper prepared by Mr. Rozza for presentation June 11, 1960, at Wyoming Mining Assn. convention, Jackson Lake Lodge, Wyo.

THE AUTHOR

As equipment director of Utah Construction & Mining Co., Frank A. Rozza is thoroughly acquainted with the many problems of equipment scheduling.

After graduating from the University of Tulsa in 1936 with a B.S. degree in engineering, he spent two years in the midwest oil fields for Shell Oil Co. From 1942 to 1954 he served as secretary and assistant treasurer of Pacific Bridge Co. of San Francisco, Calif.

Mr. Rozza joined Utah Construction & Mining Co. in 1954. He was in charge of all sub-contract work for the company during its construction (1954-57) of the atomic energy plant at Weldon Springs, Mo. From July 1957 to February 1959 he was project supply manager at Toquepala, Peru, and since March 1959 he has been equipment director.

The third problem is the most difficult of the three to resolve. This is the situation which the construction industry constantly encounters. The problem is centered around the economics of placing machines in storage until new work is obtained, as opposed to selling the machine immediately and reinvest the acquired funds in new equipment when the new work is obtained.

Let us now look at these three major problems confronting the construction and mining industry.

I. To Purchase, or Rent, New Equipment in Order to Equip A New Job

As mentioned previously, the decision to acquire new equipment for proposed work, whenever proper machinery is not available from fleet storage, is usually made prior to bidding or negotiating a contract. Whether for reasons of improved productivity in new equipment, or lack of such vehicles in company stock, there is no other choice but to make the investment, unless it can be determined that outside rental would prove more economical. In general outside rentals are costly on short term work. However, when the required equipment is very specialized and there is no foreseeable future work, it may be more profitable to sacrifice some current profit to avoid having idle equipment on hand in the future or equipment which is difficult to sell. Many organizations are giving greater consideration to complete equipment rental for the reason that outside rentals can always be expensed for income tax purposes. An analysis of the advantages

versus the disadvantages of equipment leasing would require a report within itself.

As a footnote, I would like to add that as new equipment is acquired, a policy of equipment "standardization," within the limits dictated by operating conditions, must be pursued in the interest of minimizing parts inventory and reducing maintenance problems.

II. Replacement, or Overhaul, of Equipment Which is in Continuous Use

Some types of operations, particularly mining, are normally on a continual basis. In the construction industry equipment is utilized for a long period of time only over several contracts. Equipment which is acquired for a long term operation will generally exceed its normal economic life before the completion of the operation. Obviously a time will come when the need for replacement becomes very apparent. This will propably coincide with the forecasted life expectancy of the unit. This point, however, will in every case have exceeded the "minimum cost range" of the equipment. Any organization, therefore, which wishes to remain competitive must establish a definite and continuing analysis program for all capital equipment that it operates.

There are many methods currently in use by modern business for solution of this problem. The basic criteria, of course, regardless of the method used, is to ascertain the rate of return on the proposed investment for the new piece of equipment, as opposed to the rate of return which could be gained through overhaul of equipment currently owned. Investment in capital equipment is no different than any other capital investment. There must be promise of an attractive return before the expenditure can be justified. To assure investors of a fair return, particularly in view of the wide variation in equipment operations, we need to review many variables and apply the values in a cumulative analysis. Representative of these factors are the following:

Net Investment

Net investment is the capitalized price of the new machine less the disposal price (if any) of the machine being replaced. In effect, it is the actual cash outlay required for acquisition of the new machine and is direclty affected by current capital cost.

Investment Return

The monetary return of proposed equipment investment is reflected in definite cost saving which results from lower operating costs and higher productivity factors in new equipment in comparison to presently owned equipment. If this comparison, which is a forecast or projection of the future cost of the old equipment versus the future cost of the new equipment, indicates that a substantially lower unit production cost can be obtained, then the new machine should undoubtedly be purchased. This analysis must be weighed in view of the particular work for which the unit is needed and must consider such variables as the creation of an adverse mental attitude on the project or operation, toward old or poorly maintained equipment. This analysis must reveal an increased rate of return, sufficient to compete successfully with other possible outlets for the same capital which might be considered by the company.

Capital Decline

The greatest single item of ownership cost is depreciation, or capital decline. This real cost represents a loss in value due to age and use, and, as such, if fully recognized by the Department of Internal Revenue. It is a cost which is ever present, regardless of the care given to a machine.

The 1954 change in tax regulations, which permitted using depreciation methods with accelerated rates in the earlier years of the equipment's life, had the effect of applying different effective rates for the same piece of equipment during different years. This manner of accelerated tax write-off is extremely advantageous for modern business but, of course, it is completely useless in amortizing the capital decline of a piece of equipment for estimating or job charge purposes. It does not lend itself to use for long range cost records or control.

For purposes of cost control, equipment must be considered to depreciate at a constant rate each month of its entire life. With such information we may accurately predict the equipment depreciation cost for any future work.

Operating, Production and Availability

When new, a machine earns more than it costs, as it gets older it reaches a point where it costs more than it earns. This axiom tends to influence our financial thinking greatly as lower costs are our ultimate goal in any business. Through use of careful economic surveilance we can determine the approximate point at which our "minimum cost range" has been exceeded. This time period in equipment life has a great bearing upon our replacement program.

Operating and *maintenance* costs speak for themselves. They require no definition as they are obviously cost common to all types of equipment.

Productivity, however, is a hidden factor that must be ferreted out and considered before a proper analysis can be made. Technical advances and other improvements are constantly being made in the field of equipment. Obviously new equipment will produce more than old. This is more true in some classes of equipment than in others, however, in every case there is a definite productivity coefficient which must be utilized in determining operating costs. Usually productivity is represented as a percentage factor. This percentage can be derived from the formula:

$$\text{Mechanical Efficiency } (\%) = \frac{\text{Operated hours}}{\text{Operated hours} + \text{repair hours}}$$

Equipment can only produce when it is available for service. *Availability* is the measure of repair or down time, in comparison to the actual number of hours that a machine could have worked. This down time does not include major overhaul. Equipment is never 100% available, new or used, due to greasing, fuel or minor repairs. A new tractor will be available 90% to 98% of the time; as it grows older, availability time may drop to as low as 50%. A poor availability ratio affects not only the production cost of the unit involved, but also the costs of all the equipment with which it works. Availability may be derived from the formula:

$$\text{Availability } (\%) = \frac{\text{Operated hours}}{\text{Scheduled hours}}$$

Overhead and Investment

This real expense to equipment owners includes taxes, insurance, storage and overhead on capital equipment, as well as interest on the unrecovered portion of the cost of the machine.

These costs are relative to individual owners and will vary greatly with the amount of overhead required. In general they can be represented by a cost equivalent to approximately 11% of the average value of the machine each calendar year. A reduction of this percentage reveals the following approximate ratio:

Interest	3 %
Storage and yard handling	3.5%
Insurance	1 %
Taxes	1.5%
Total	11 %

Time of Replacement Analysis

All of the preceding variables must be considered in making a replacement analysis. As all of the factors are in a constant state of flux, it would be impractical and costly to constantly analyze each piece of equipment. The solution for those charged with the administration of equipment policy, is to make such analysis only as follows:

1. Prior to investing in a major overhaul.
2. Prior to transfer to a new project.
3. When hourly operating and maintenance cost, *which are constantly monitored,* reach a definite level above normal.

III. Selling, or Storing, Equipment Which Has Become Idle

The third and most complex problem concerns the selling or storing of equipment which has become idle. Fundamentally, we buy equipment to utilize through its full economic life and to dispose of it when some pre-determined salvage value has been reached. Unfortunately, however, as it is true in all phases of real life facts seldom adhere to theory.

Summary

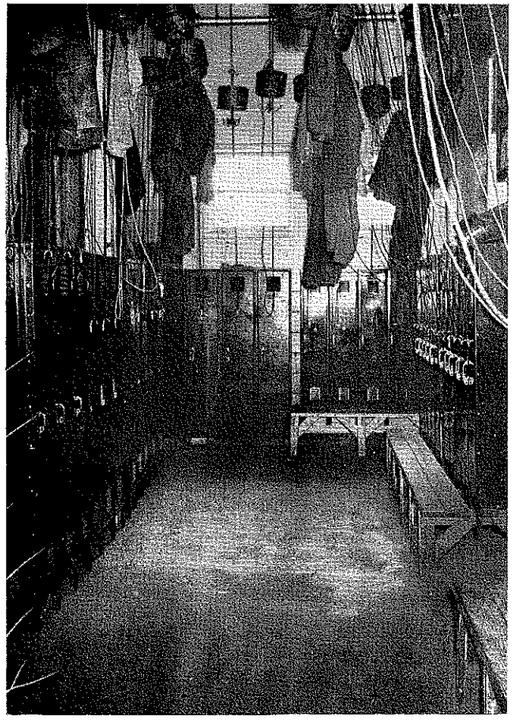
In order to resolve the three major problems which we have just discussed, a sound and dynamic program must be established. We must utilize administrative, statistical and engineering experience, and have complete familiarity with equipment and its problems, in order to provide good management and precise direction to all company equipment activities. Constant studies must be made on replacement programs, cost controls, preventive maintenance, fleet efficiency and fleet adequacy.

CONTROLING DERMATITIS

(Continued from page 21)

did not even wear protective gloves. When the case was finally reported to us by the man, it was necessary to send him to San Francisco for a number of visits with a dermatologist. He lost several months time.

Another, about that same time, was caused by either an irritation of the legs from contact with the upper part of the boot, or by a combination of oil and rock particles that gathered there and was not sufficiently cleaned up. In this case the man was off work several months before the skin lesions finally healed. When he returned to the job, we changed his type of boots, and urged him to wear long underwear, wash more frequently, and keep his clothing clean. We have had no trouble with a recurrence this year.



▼Each man is allowed 15 minutes to wash up in the Change Room. Work clothes and belongings are hoisted to ceiling for overnight drying.

A year or so ago, our most recent serious case concerned a long-hole driller who had what we thought was an oil rash. When he reported to the office, he had a severe rash on his arms, hips and side. He received immediate medical attention, and of course, was cured. He has had no recurrence since he has been extra careful with cleanliness and frequent changes of clothing.

Naturally, there are always persons more sensitive than others to skin irritations; there will always be some problems. One of these happened within the past few months. But through prompt attention, by recommending that the victim stop using solvents and other strong cleaners on already sensitive skin areas, we prevented a potential lost-time case and helped keep a healthier, happier employee.

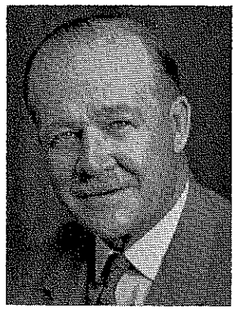
Program Pays Dividends

This program is not only paying dividends for the men, but for the company too. Lost time can interfere with production, and medical costs can mount. In analyzing costs in connection with this type of occupational disease, the following things are considered: the supervisor's time in making out the accident report; the re-scheduling of job assignments; making the investigation; management and clerical processing costs—plus the more commonly thought-of disability benefits such as compensation, sick pay, and medical expense. Prior to the elimination of lost time through our dermatitis prevention program, we did not find it unusual to have a case which cost $800 or more to handle.

Getting the men in the mine and mill to understand the dermatitis problem and help avoid it themselves has put our program over. Our audiences are interested now when we give our weekly talks on safety, at which time dermatitis prevention is a constant focal point. We also cover the subject with bulletin board notices.

Result: No problem with dermatitis for over a year—the best possible testimonial, we feel, to the success of our educational campaign.

FROM THE EXECUTIVE MANAGER'S DESK



COL. WENDELL W. FERTIG

The July issue is now in your hands. The cover is still a different shade of gold. I can only conclude that our printers have seen very little gold, and really don't know just what is the proper shade. Still it is an attractive cover, and we feel that it is serving its purpose of advertising our 50 years of publication. The October issue will be the last to wear this golden color, for the November Petroleum issue will mark the 25th Anniversary of the publication of the First Petroleum issue.

Homecoming

Although it is still three months until Homecoming, it is not too soon to begin planning to be here for that event. Too little attention has been paid to this event, and we would like to increase the emphasis. The crisp air of Golden, the football game at Brooks Field, the lovely girls who think that MINERS are wonderful—all this adds up to a scene that brings back a little touch of youth in the fall.

The Class of 1950 will be the honored class at their 10th Reunion. Their eyes are brighter, their step is more lively, but their thoughts are often more serious than those of some of the older MINERS who come back to renew their youth. The invitation has been issued; it is up to you to come back and see us.

Office News

The Directory is in the hands of the printer, and we can begin to pick up the pieces. With our small staff, that additional work means a disruption of programs. Of course we *knew* that there would be little to do during the vacation period. How wrong can you be? We have found more work to be done than can possibly be accomplished. Yet that load could be eased if you would just answer our letter when you receive it. We know you are busy, so we try to make it easy for you. A new triplicate form requires only a pencil note to answer our query, and there is a return envelope included for your reply. Won't you help by acknowledging our mail? Sometimes it seems that it would be almost as well to throw the completed letter in the waste basket and save the postage instead of mailing it. Weeks pass, and no reply. If it is important, that means another letter to write. The thing that bothers me is that the original letter was written because I thought it was important to you.

Change of Address

We are happy to note that most of you are quite prompt in notifying us as soon as you move. However, when you use the form furnished by the Post Office rather than the one sent out by the Alumni Association, you find that there is no space provided for your company affiliation. If you have been working for a large company with many operations, we naturally assume that you have just been transferred. When this isn't the case, it is embarrassing to have the mail returned with the notation that "the addressee is not connected with this company."

I doubt that you realize, unless you are in the personnel business, the wide extent to which our addresses are used by industry. We do not peddle them to general solicitors, but if a reputable company writes for an address, we supply it, for there must be some important reason back of the inquiry.

We need your help to keep our address list accurate and up-to-date. Please give us: Home address, Company address and Position.

Money, Money, Money

Whether we call it dues, advertising revenue, or just plain gifts, we are short of money. About 450 MINERS who were active in 1959 have not yet paid their 1960 dues. This would mean an income of more than $4,000 if everyone paid up. That would be wonderful, but it would still mean that 70 per cent are carrying the load that should be shared by the entire group of Alumni. If each Alumnus would carry his fair share, it would put us in position to do the best job that we can. Should the percentage of membership be increased to 85 per cent, the Association would then be in position to hire better talent if you are dissatisfied with what we are doing now. With the present membership, you have to put up with us because there is not enough money to hire any more competent people.

Unfortunately my remarks are read only by those who are already members, for they receive the magazine. The only way I can reach the missing 30 per cent is for you as individuals to do a little proselyting on your own. Why not try it? Bring in a new member. He might well find just the type of fellowship that he has been looking for.

Progress

This must have been an interesting six months, for I have been here for that period of time already. It does not seem that long, and looking back, I am not sure just what progress has been made. A number of MINERS have written in and said that they think that The MINES Magazine has improved, and that the Association is doing a better job. We like their kind remarks, but would still like to know what you—the great silent majority—think of our activities to date. Are we progressing? Are we doing things the way you like them to be done? It would be so pleasant if I could visit with each of you and ask those questions personally. Since I can't, won't you take time to tell us how you feel about the results achieved during the last six months?

ALUMNI BUSINESS and NEWS

October Schedule of Events

Keep in mind and attend the following events scheduled for October:

2-5: AIME Petroleum Engineers Convention, Denver Hilton

29: Homecoming Day at Mines, including 2 p.m. football game, Mines vs. Idaho State

30: Denver Broncos tangle with Dallas

31: Geological Society of America convention, Denver Hilton

Bertossa, x'47, Consulting Editor of Metal Progress

Robert C. Bertossa, who was a metallurgical engineering student at the Colorado School of Mines in 1946-1947 and afterward attended the University of Illinois, has been made consulting editor of *Metal Progress* Magazine.

Now technical director for Pyromet Co. in San Carlos, Calif., his professional career has included work as a senior research metallurgist in charge of welding and brazing research at the Stanford Research Institute in Menlo Park, Calif. Before that he was head of the metallurgical research laboratory, Chicago Bridge & Iron Co., Birmingham, Ala., where he directed the research and development of the patented Hortonclad vacuum-pressure cladding process.

During World War II, Mr. Bertossa served in the Marine Corps as a fighter pilot. In 1958 he was chairman of the First Western Welding, Brazing and Heat Treating Conference and general chairman of the Golden Gate Metals Conference held recently.

M. I. Signer, '50, Manager Planning Division of International Minerals

Merton I. Signer, '50, 1855 Strenger Lane, Deerfield, Ill., was recently promoted to manager of the Long Range Planning Division, Western Phosphate Project, International Minerals Corp. He succeeds Carl Arend, who was recently made general production manager of the Amino Division.

Mr. Signer has been with International Minerals Corp. since 1951—first at Carlsbad, N. M., and then in Canada, where he was field manager, Western Phosphate Project.

Dr. Dismant, '39, Points Out A Few Practical Uses of New Theory of Friction

Dr. John H. Dismant, a 1939 mining engineering graduate of the Colorado School of Mines has published an article in the January 1960 issue of *The Journal of Applied Physics* which summarizes his doctoral dissertation involving a new theoretical approach to friction. Dr. Dismant obtained his M.S. in 1951 and his Ph.D. in 1955 from the University of Utah.

(*For details about Dr. Dismant's theory, see the article entitled "Theoretical Approach to Friction" in this issue of The MINES Magazine.*)

Dr. Dismant makes the following comments about his new theory:

"You may well ask where does this thesis apply to MINES men, and my answer is that my petroleum- and mechanically-minded friends should find it thought-provoking in terms of both fundamental friction and of boundary lubrication, including when to use additives in lubricants. My physical metallurgical friends should find it an interesting new application of the 'Dislocation Theory of Deformation.' My extractive metallurgical friends will eventually find it helpful as boundary lubricants, flotation reagents, ion exchange resins, and solvent extraction. Even static electricity separations are closely related subjects. The Dislocation Theory will undoubtedly provide many answers in the area of comminution as well as providing answers in the fields of mining and geology via rock and soil mechanics."

In 1945-1946, Dr. Dismant was experimental and mining engineer developing the hardened bit, the drill jumbo and the higher air pressure for drilling at the Oil Shale Mine in Rifle, Colo. Last summer he worked on city and structural testing techniques as professor consultant with the Materiel Command of the U.S. Air Force at Tinker Field, Okla.

Prior to September 1959, when he accepted the professorship of mining engineering at the University of North Dakota, he taught metallurgy and geology courses as associate professor at Texas Western College, El Paso, Texas.

His present address is P.O. Box 477, University Station, Grand Forks, N. Dak.

McWhorter, '24, Reese, '43; Magazine Corrects Error In Picture Captions

McWhorter, '24

Reese, '43

Morris F. Cunningham, '24, vice president of sales for Goodman Manufacturing Co., Chicago, has written to say that C. E. McWhorter, '24, is serving as manager of mining products development. He has been in that position for more than a year.

C. D. Reese, '43, is district manager, Birmingham, Ala. District. He has also been in that position for more than a year.

Although this information is almost out of date by this time, it is being repeated in order that we may correct an error we made in the June 1959 issue of The MINES Magazine. At that time the picture of each MINES man had the wrong caption. We regret the error and hope that the correction will remedy any damage done.

White, x'32, Promoted To Construction Engineer

W. Boyd White, who attended the Colorado School of Mines in 1931-1932, has been promoted to construction engineer in the metropolitan district of the Colorado Department of Highways.

Mr. White was born in Greeley, Colo., and served with the U. S. Navy Seabees during World War II as surveying party chief in the Marshall Islands.

G. R. Bryant, x'20, Retires As President and Director Of Jefferson Chemical

George R. Bryant, a student at the Colorado School of Mines during 1919-1920, retired July 31 as president and a director of Jefferson Chemical Co., Inc.

Mr. Bryant spent his entire career in the petroleum and petrochemicals industries. Born in Paducah, Ky., he attended the University of Missouri and Mines. After spending 17 years with Indian Refining Co., he joined Texaco, Inc. in 1937. In August 1950 he was elected vice president of Texaco, a position he held until his election in 1955 as president and a director of Jefferson Chemical. He resides at 4206 Balcones Dr., Austin, Texas.

Jefferson Chemical Co., owned equally by Texaco, Inc. and American Cyanamid Co., is one of the nation's leading producers of ethylene derived chemicals and has recently entered the field of propylene chemicals.

Ripley, '36, Chief Engineer Of Hercules Powder Co.

In January, Albert E. Forster, president of Hercules Powder Co., announced the appointments of George H. Ripley, '36, as chief engineer, and Edward K. Lefren as assistant chief engineer. The appointments followed the retirement of Ernest S. Wilson as director of engineering.

Mr. Ripley, who lives at 2007 Fairfield Dr., Wilmington, Del., is a native of Denver, Colo., and a metallurgical engineering graduate of the Colorado School of Mines. After graduating from Mines, he joined Hercules in 1936 at Hercules, Calif., serving in supervisory posts in Missouri, Wisconsin, New Jersey, and Texas. In 1951 he was named manager of Sunflower Ordnance Works, Lawrence, Kans., and was responsible for rocket propellant production there during the Korean conflict. He was named manager of project engineering in 1956.

Mr. Lefren, a graduate of Stevens Institute of Technology, joined Hercules in 1940 as a chemist at the Hercules Research Center near Wilmington, Del. In 1951 he was named assistant works manager at Port Ewen, N.Y., and in 1956 was appointed manager. A year later he was named assistant director of operations for Hercules Explosives Department, and in 1958 he was named manager of technical services for the company's Engineering Department. (See Visitors to the Alumni Office.)

Bement, '54, Gets Grant To Study for Doctoral Degree At University of Michigan

Arden L. Bement, '54, is one of 18 pre-doctoral students at the University of Michigan to receive a grant under the fellowship-loan program. Awards to outstanding students, including loans, and grants, range from $1100 to $5000.

Mr. Bement's immediate plans are to engage in doctoral studies at the University of Michigan, and to continue investigations of neutron radiation damage to metals. Mr. and Mrs. Bement and their five children are now living in Richland, Wash., where Mr. Bement is employed as a metallurgical engineer in the field of nuclear metallurgy at General Electric Co.'s Hanford Laboratories.

Since graduating from the Colorado School of Mines in 1954 with an E. Met. degree, he has obtained an M.Sc. degree in metallurgical engineering from the University of Idaho and was elected to the UI Chapter of Sigma Xi.

Mr. Bement's principal outside interest is the Army Reserve where he is assigned to an Engineer Amphibious Company with the rank of captain. Recently he completed the advanced engineering course of the Army Engineer School.

Collier, '22, Dedicates New Building for Savings And Loan Association

Malcolm E. Collier, Sr., who received his E.M. degree in 1922 from the Colorado School of Mines and served as CSM Alumni Association president in 1958, recently dedicated the enlarged main offices of First Federal Savings and Loan Association of Denver.

According to Mr. Collier, president of First Federal, the new building will "keep pace with the firm's increased growth due to the space-age population boom in metropolitan Denver."

In addition to more than doubling the company's working space, the new building reflects the latest trends of stressing relaxed atmosphere in financial institution architecture. Broad expenses of glass, new pastel colors, uses of textured walls and woods, a rock garden, and a meeting room for community groups are featured.

Eighth largest savings and loan association in Colorado, First Federal's growth has been directed by the late Robert Collier and son, Malcolm E. Collier, Sr. Assets have increased from $16,874 in 1933 (when it was federally chartered) to over $33,000,000 as of June 30, 1960.

Advanced Degrees Granted Falcone, '49; Sohon, '53

Alfred S. Falcone, a 1949 metallurgical engineering graduate of the Colorado School of Mines, recently received a M.Sc. degree in engineering science from Rensselaer Polytechnic Institute. Mr. Falcone is living at 326 Long Hill Rd., East Hartford, Conn.

Robert Selkirk Sohon, who received his Geol. E. degree in 1953 from the Colorado School of Mines, was awarded a M.Sc. degree in geology by Pennsylvania State University at commencement ceremonies June 11. Mr. Sohon's address is 469 Palmetto Rd., Bridgeport, Conn.

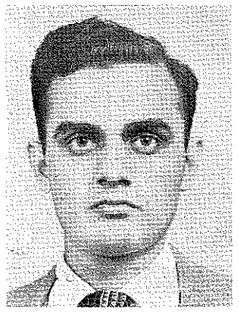
Hochscheid, '48, Transferred By Dorr-Oliver to Chile

Robert E. Hochscheid, a 1948 metallurgical engineering graduate of the Colorado School of Mines, has been transferred by Dorr-Oliver Incorporated from Johannesburg, South Africa, to a newly established office at Bandera 227, 50 Piso, Santiago, Chile, as technical representative. He has assumed this new post after a brief return to the United States and will serve Dorr-Oliver customers in Ecuador, Bolivia, Peru and Chile.

Mr. Hochscheid joined The Dorr Co. in 1948 as a metallurgical engineering trainee. He developed rapidly to junior development engineer and in 1950 was moved to Denver as sales engineer in the Western Industrial Division.

In 1951 he was transferred to the West Coast and became manager of the Seattle office. Having a strong desire for foreign work, he transferred in 1953 to International Sales at the head office, Stamford, Conn., and in 1955 undertook his first foreign assignment in Johannesburg. Mr. Hochscheid is married, the father of twin sons, and is a member of AIME.

Advani, '56, Appointed Technical Supervisor For Jefferson Chemical



Prem S. Advani, who received his master's degree in petroleum refining engineering from the Colorado School of Mines in 1956, has been appointed technical supervisor of Jefferson Chemical Co.'s Conroe, Texas plant. In his new position, Mr. Advani will be responsible for processing engineering and quality control.

Mr. Advani obtained his B.S. degree in chemistry from N. Wadia College in Poona, India. He became a process engineer with Jefferson Chemical in 1955. His address is Wilson Park Manor, Apt. 16, Conroe, Texas.

McKeever, '52, Appointed General Manager of Texas Gulf Sulphur Co.

Ira E. McKeever, '52, has been appointed general manager of Sulphur Operations of Texas Gulf Sulphur Co. McKeever, who will be headquartered at Newgulf, will have direct charge of Sulphur operations at all locations in the Gulf Coast region. In his new position he will act under direction of and will report to Hugh W. Strickland who is vice president in charge of all company activities in the region.

McKeever joined Texas Gulf in July 1952 as a member of the Exploration Department. Headquartered four years in Houston, he did exploration work along the Gulf Coasts of Texas, Louisiana and Mexico. Thereafter he served with Texas Latin Exploration Co.—a Texas Gulf subsidiary organized to explore in Sicily and other areas abroad. In Palermo, Sicily, as vice president of this subsidiary from 1956 to 1959, McKeever had charge of its drilling program in Sicily and also supervised geological inspections in Egypt, Ethiopia and Germany. He became assistant manager of Mining Exploration of Texas Gulf in 1958. Since returning from Sicily in May of last year, McKeever has performed company assignments both in the United States and Australia.

He holds the degree of Geological Engineer from the Colorado School of Mines and is a member of the American Institute of Mining, Metallurgical and Petroleum Engineers. His family includes his wife and their two sons and two daughters.

Hamlin, '58, Sales Engineer For Garrett Oil Tools Co.

Jon F. Hamlin, a 1958 petroleum engineering graduate of the Colorado School of Mines, is now Southwest Louisiana District sales engineer for Garrett Oil Tools Co., with mailing address c/o Garrett Oil Tools, P.O. Box 1226, Oil Center Station, Lafayette, La.

Page, '08, Loses Election; Wins Editorial Praise For Outstanding Record

We have just received word that Lawrence C. Page, '08, has failed by a narrow margin to win reelection as city councilman of Norfolk, Va.

An editorial in the *Norfolk Virginian-Pilot* extolls Mr. Page's record as a progressive councilman in every issue involving the expansion, development, and redevelopment of Norfolk. Recalling that there were times when Mr. Page was almost the lone official voice willing to appropriate for a new central library, the editorial suggests that Mr. Page's respect for book learning may have been reinforced at the Colorado School of Mines where he obtained a mining engineering degree in 1908. Except for a brief but interesting career in the Wild West, Mr. Page has lived most of his 75 years in Norfolk, helping to spur the city's striking growth.

The newspaper concludes that "Mr. Page is not the kind of man to worry long about the voters' decision. He will have no regrets about being the unexpected casualty in somebody else's war. If a slim majority of the voters thinks that 75 years is too much age for a city councilman, Mr. Page will have extra time for fishing on Magothy Bay on the Eastern Shore. And catch more fish than all of his juniors in the so-called prime of life."

R. W. Mills, Jr., '59, Makes First Solo Flight

A first solo flight was made recently by Marine 2nd Lt. Robert W. Mills, Jr., a 1959 graduate of the Colorado School of Mines. In addition to solo flights, Lieutenant Mills is being instructed in communications, navigation, engineering, athletics, aerology and civil air regulations during basic flight training at Pensacola, Fla.

Visitors to Alumni Office

DR. ROSHAN B. BHAPPU, '50, is now senior metallurgist with New Mexico Bureau of Mines at Socorro, N. Mex. In addition, Dr. Bhappu is teaching at the New Mexico School of Mines. During this summer he is supervising a National Academy of Science Grant to be used in teaching advanced students the proper approach to a specific research problem.

FRANK C. BOWMAN, '01, whom most of you remember as the executive manager of the Alumni Association, came to the office to volunteer his services in obtaining additional advertising for the magazine. He was met with open arms, for that is the one thing that is necessary for the success of The MINES Magazine. We need *advertising*.

HENRY W. EVERS, '35, melting superintendent, Universal-Cyclops Steel Corp., called on us while visiting the campus for the first time in 25 years. His wife, Edith, and daughters, Sally and Betsy, accompanied him on his homecoming to his old campus. We hope to see you again soon, and please don't wait another 25 years.

RUSSELL D. FERNALD, '37, supervisor, Western Electric Co., was in Golden on vacation. We took the opportunity to discuss the recent changes in the curriculum, for Mr. Fernald has done recruiting of college students for Western Electric. Based upon the information available, he felt that the Colorado School of Mines was proceeding in the right direction.

THOMAS H. GARNETT, '11, retired several years ago from New Jersey Zinc and is now living at 984-13th St., Boulder, Colo. This is the first visit that Mr. Garnett has made to the alumni offices since we moved to Golden. Come again, for it is just a short trip over the "hog-back road."

JOE R. GILBERT, '42, who is a metallurgist with Aluminum Co. or America, was in Denver and Golden for a short visit. He was both surprised and pleased at the increased facilities available to the metallurgy option in the new building.

GLENN GRAHAM, '60, has not settled on any particular job but expected to visit the oil refineries in Texas and Louisiana before going to work.

JOHN F. HATCH, '49, mining engineer for The American Agricultural and Chemical Co., has just completed a tour of western phosphate operations. He said that the methods of mining are quite different from those applied in the Florida phosphate fields. Col. Fertig remarked that there is an equal difference in the height of the mountains in the two areas.

HANS HEINECKE, '50, consulting geologist, is changing his area of interest by working on an invention.

LYLE R. JENKINS, '49, division superintendent of the Wagner Castings Co., was in Golden near the end of June and called at the office. He expressed surprise at the many changes made since he was last here. His address is 1625 W. Riverview, Decatur, Ill.

K. D. KASCH, '51, was in Denver on business and stopped to inquire about the manner in which the Placement Service is now being handled. Mr. Kasch may be reached at 440 N. 7th St., Grand Junction, Colo.

DON LONGENECKER, '50, stopped in to report that he has been accepted as a fellow in the Department of Industrial Management at M.I.T. Mr. Longenecker will report there shortly after Sept. 1.

JAMES V. LUXNER, '58, said that he was assistant chief mining engineer for Fulton Co., Truax-Traer Coal Co. His wife, Lois, accompanied him, and they expected to be here for their annual vacation.

MORAD MALEK-ASLANI, '50, is now senior geologist with Tennessee Gas and Oil Co., located in Houston, Texas. He is very much interested in his work and has little interest in returning to his home in Teheran.

HARVEY J. MATHEWS, '13, vice president of Stearns-Roger Manufacturing Co., paid us a personal call. Of course, Mr. Mathews is a member of the Executive Committee and usually visits us at least once a month in his official capacity.

CHAS E. MULLER, '42, is the foundry engineer for Ingersoll-Rand Company in Easton, Pa. Mr. Muller was in Golden on his vacation and expected to spend much of it in the Colorado mountains.

GEORGE H. RIPLEY, '36, chief engineer, Hercules Powder Co., was on his way back to Wilmington after having visited a new plant being constructed for Hercules. Although Mr. Ripley was promoted in January, The MINES Magazine is late with its congratulations. For that we are sorry.

R. B. SHALLER, '49, was in the Denver area for a few days. He reported that most of the major oil companies are moving their district offices out of Billings, Mont. His address is still 924 Delphinium, Billings.

LAWRENCE E. SMITH, '31, senior mining engineer, Philippine Iron Mines, Inc., P. O. Box 626, Manila, stopped here en route to Minnesota to inspect the new plant being installed by the Reserve Mining Co. En route to the states, Mr. Smith stopped in Sweden to observe mining procedures there. He is returning to the Philippines about Aug. 1. There the Philippine Iron Mines are proceeding with the plans to install the necessary equipment to upgrade and pelletize 5,000 tons of ore per day. The entire production will be shipped to Japan under contract. Mrs. Larry Smith (Marie) will visit with her family in Denver for a few weeks.

HOMI J. TATA, '51, is in the Research Division of the United States Steel Corp. in Pittsburgh. He has found the work interesting and is looking forward to the time when they move into their new expanded U. S. Steel Research Center.

JOHN J., '41, and ROBERT TORPEY, '49, came in force. Jack is still in Spokane, where he reports mining at a very low ebb due to low metal prices and a threatened strike in the Coeur d'Alenes. Bob is in business for himself in Denver where he is with the Power-Transmission Engineering Co.

DR. PARKE O. YINGST, '30, who is with the CSM Research Foundation, called at the office to discuss his coal beneficiation article which appears in this issue.

PETE SMYTHE, KOA Radio and Television personality and "mayor" of Tincup, Colo., thanks Colonel Fertig for the editorial comment (p. 58, May 1960 MINES Magazine) with these words:

"Sure want to thank you for the material and we will add it to our scrapbook. Thanks too for the editorial. And be sure to come see us in East Tincup. Keep singin'."

LETTERS TO THE EDITOR

D. F. BOYD, '53, wrote to President Crabtree:

"I wonder if it would be possible to send an alumnus, who is not already a member of the Association, a year's membership as a gift? A printed Christmas card from the donor with a gentle hint to bring more graduates into the Association could be included and if you and executive committee should decide favorably on this means of winning more memberships."

(Editor's Note. It can be done, Dusty, and it's a fine idea. You send the gift subscription and we'll see to it that the recipient is notified properly.)

JOHN J. RUPNIK, '33, writes that he has just moved his offices (J. J. Rupnik & Co., Petroleum Exploration Consultants) to 730-31 Beacon Bldg., Tulsa 3, Okla. He adds:

"I have two men working for me on geophysical management, consulting and review. They are John A. Ries, formerly with Seismograph Service Corp., and John F. Morris, formerly with Geophysical Consultants, Inc., and Republic Exploration, Inc. We manage to get quite a bit done although these are not exactly 'boom' times . . . When I am in or near Golden, I'll drop by."

Referring to recent issues of MINES Magaine, he makes the following comments:

"While I am writing this letter, I may as well take the opportunity to compliment all of you on the magazine. The organization and material are generally good. I like the segregation of news of members into groups by years, too."

D. O. RUSSELL, '09, writes from 4 Victoria Ave., St. Helier, Jersey Channel Islands, England, in reply to Colonel Fertig's letter:

"I have just returned from my annual visit to Hong Kong and Malaya and found awaiting me your welcome letter of May 24. I was greatly interested in learning that you had spent some time in Kuala Lumpur attached to General Templar's Staff in the fall of 1952. Of course I know Malaya very well and in fact this particular visit was a special one—it being just over 70 years since I first arrived there with my parents and four brothers. I returned to England in 1893 on the death of my mother in Singapore but went out again in 1897 and after graduation from Mines in 1909 started work in Kuala Lumpur with one of my elder brothers. So you see my association with the country goes back many years and I have seen the place grow from a small village to a large town. Were you to go out again I am sure you would be surprised at the great growth of Kuala Lumpur during the past few years.

"MINES Magazine reaches me regularly and is of great interest, although I find it sad to read of the passing of many old classmates, but I suppose this must be expected now that we are all getting on in years . . ."

(Continued on page 42)

ALUMNI BUSINESS

Executive Committee Meeting Of Mines' Alumni Assn., May 12

The regular Executive Committee meeting for the month of May was held at 7:30 p.m. Thursday, May 12, in the conference room of the Research Foundation, Golden, Colo.

Members present were: Edwin H. Crabtree, president; John M. Petty, vice president; Robert H. Waterman, treasurer; James A. Mullinax, secretary; S. M. del Rio, Executive Committee; Robert W. Evans, Executive Committee; Wendell W. Fertig, executive manager; Robert L. Bolmer, Publications Committee chairman; Warren Prosser, Public Relations Committee chairman; C. D. Deringer, Alumni Endowment Fund Committee member.

Members absent were: Harvey Mathews, executive committee.

The minutes of the previous meeting held on March 17, 1960, were read and approved.

The financial statements for both March and April were presented individually and approved.

The Executive Manager reported briefly on the successful Alumni Dinner sponsored by the Denver Section for alumni and their wives. It was held on Thursday evening, April 21, the opening day of the National Western Mining and Energy Conference, with 138 attending the dinner.

The membership drive to obtain as many members from the Class of 1960 as possible has been stepped-up. However, to be completely successful, the campaign must be started much earlier in the year. As of this date, 39 out of 162 possible graduates have paid their dues of $3.

The Executive Committee authorized the purchase of a new electric typewriter.

The Executive Committee approved applications for the Associate Membership of:

Guido del Castillo, Cerra de Pasco, Peru
Earl W. Markwardt, Belleville, Ill.
Clark Price, Detroit, Mich.

These petitions were proposed respectively by the Lima, Peru, Section, St. Louis, Mo., Section, and by William Kellogg, '43, a classmate of Mr. Price.

Three petitions for Honorary Membership were presented to the Executive Committee. Since each bore the required number of signatures and upon motion by Mr. Waterman and second by Mr. Robert Evans, the Executive Committee approved each petition by separate vote. Honorary Membership in the Alumni Association will be conferred at the Annual Banquet upon:

Lester S. Grant, '99
Tenney De Sollar, '04
Thomas C. Doolittle, '27

The Executive Committee approved the continued use of Application for Junior Membership.

Mr. Warren Prosser summarized the plans for the annual banquet to be held at 6 p.m. Thursday evening, May 26, at the University Club, 1673 Sherman St., Denver. Tickets will be $3.75 each. Mr. Ted C. Stockmar, '43, will be the toastmaster.

The Executive Manager reported that class reunion letters were prepared and mailed for the Class of '25 (this included the Classes of '24 and '26) and the Class of '50. Envelopes were addressed to all members of the Class of '35 and delivered to Albert Keenan for use in mailing notices to this class. Invitations to the Annual Banquet were mailed to 2,030 alumni who live in all the states contiguous or closely adjacent to Colorado. Personal invitation letters were sent to all members of the Class of 1960. An article repeating the invitation appeared in the *Oredigger*.

Local Sections—The Great Lakes Section in Chicago has been nearly inactive for several months. Charles Fitch, '49, and Ray Watson, '56, are in the process of rejuvenating this section. Salt Lake City Section is in the same condition. Bob Ingalls, '48, has agreed to try and get it back on its feet. Present officers, as listed in the magazine, have not answered any correspondence since October 1959.

The Alumni Endowment Fund at this time has approximately $37,000 in common stock and $4,700 in cash. Mr. Deringer, speaking for Mr. Essig, chairman of the Alumni Endowment Fund Committee, said that a preliminary study would be completed and recommended the following:

Since the portfolio is wholly in common stock, this committee recommended that 20-25% should be put in bonds. As a specific recommendation, United Biscuit shares should be sold and the proceeds, together with the cash, should be used to purchase three (3) Cerro de Pasco 5½% 1979 convertible bonds and three (3) United States Treasury Bonds paying approximately 4½%. This recommendation was discussed by the Executive Committee, and Mr. del Rio moved that the amount of approximately $6,000, depending upon the prices of the bonds involved, be used to purchase three (3) Cerro de Pasco and three (3) United States Treasury Bonds. The motion was seconded by Mr. Evans and approved by the committee.

Directory—as approved by the Executive Committee previously, advertising is being accepted for the 1960 Yearbook and Directory of Mines Men.

CSM Foundation—Mr. Troy Crowder, Assistant to the President, has resigned effective July 1st. The Executive Committee, although not consulted officially on the selection of his successor, expressed a unanimous opinion that it would be more desirable to have a Mines graduate in that position.

The Executive Manager reported briefly on our experience since having deleted the AADF (Annual Alumni Development Fund) solicitation from the annual dues card sent out by the Alumni Association. So far, the amount of money contributed to the Alumni Endowment Fund of the Alumni Assn. has increased during 1960 while that contributed to the AADF has decreased. The Executive Manager expressed the opinion that collection of the AADF funds could be handled effectively through the alumni office at a considerable saving in cost. However, the present staff of the alumni office could not handle this additional workload but could do so if the foundation contributed in either cash or services that portion of collection costs that are properly charged against the AADF. The confusion which resulted from using only the names of the two funds (AADF) and (Alumni Endowment Fund) could be eliminated by giving a suitable concise explanation of the purposes of the two funds in question.

The Placement Service cannot be handled well under present conditions as Dean Burger has more than a full day's work without these additional duties. General supervision should be in the office of the Alumni Association as there need be only one set of files, rather than two files for each man as at present. Solution—Foundation contribution to reestablish the Placement Service—not in its previous form—as a service to the MINER who needs a job.

Advertising solicitation—In establishing the accounting system used by the association no previous attempt to segregate this cost has been made. A new account —#439 (Advertising Solicitation)—has been added for this purpose. Mr. Otto Highfield has made many calls but with little results to date; however, this was anticipated, for our advertisers had been allowed to drift away, and much effort will have to be devoted to winning them back.

The May magazine consists of 84 pages with book paper cover printed at an estimated cost of $2,530. Forty-one hundred copies were printed.

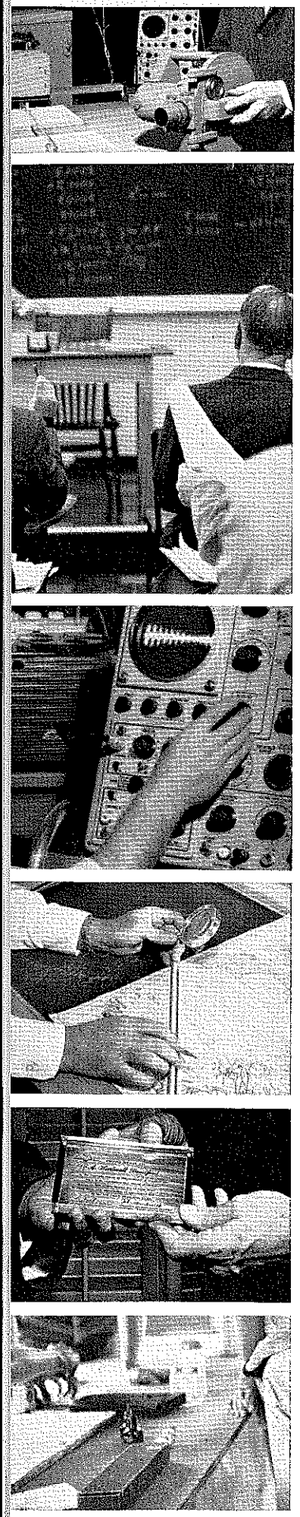
Future Plans. Arrangements have been made for the Executive Manager and the Editor, Mr. Carter Kaanta, to attend the Wyoming Mining Convention to be held in Jackson Hole, Wyo., June 10-12. Many advertising solicitation letters have been sent to prospective advertisers in Wyoming. The feature article of the July issue of the Mines Magazine will cover the activities in Western Mineral Industry.

As a result of the success of the alumni booth at the National Western Mining and Energy Conference, preliminary plans have been drawn to have a booth at the AIME Regional Convention in Salt Lake City in mid-September, the Geological Society of America Convention at the Denver-Hilton in early October, and the Petroleum Engineers of AIME Convention at the Denver-Hilton in late October.

Meeting was adjourned at 9:45 on the motion of Mr. Waterman seconded by Mr. Robert Evans.

Nominations—Officers 1961

EDWARD F. KINGMAN, '34, chairman of the Nominations Committee, has requested that names of individual members to be considered by the Nominations Committee for the offices of President, Vice-President, Secretary, Treasurer, Member of the Executive Committee (3 year term) of the Alumni Assn., and Director, CSM Foundation (2 year term). Send your suggestions direct to Mr. Edward F. Kingman, 5650 E. Stanford Dr., Englewood, Colo. Deadline for submission of names is Sept. 1, 1960.



THE *100 year* HORIZON

Perspective on Purposes and Progress

Since its beginning in 1874, the story of the Colorado School of Mines has been one of progress—progress in the education of superior mineral engineers—progress in new techniques for the mineral industries—progress toward the horizons of the future.

As each of its goals has been reached, new horizons have stretched before the institution. Each holds a continuing challenge.

In 1974 the School will be 100 years old. This milestone of a century's progress represents the School's aim.

To prepare for this significant date, the friends of the Colorado School of Mines have joined in order to draw up and implement a blueprint for the future. It is called the Horizon Plan. It is a program aimed at "Building a Great Future for a Great College."

Although the Colorado School of Mines is a state-supported institution, its leaders have for some time sought additional funds from supplementary sources. Because of its growth as the leading college of its kind in the nation, Mines must now look to individual, corporate and foundation support for projects and equipment which limited State funds cannot afford.

Much of this program is based on the interest which alumni show in their alma mater. Mines has actively sought alumni support for years and, as alumni interest continues to grow, grants and gifts from industry and interested individuals have grown proportionately.

This private support for Mines is the key to the Horizon Plan. Without the funds now stemming from these supplementary sources, Mines cannot accomplish its Horizon Plan.

In the recent alumni fund drive just completed, more than a quarter of all Mines alumni contributed toward the Horizon Plan. The "seed money" contributions by alumni increase the awareness of industry and foundations in Mines. And, by steadily increasing alumni support, Mines can attract more industrial aid.

The money contributed thus far has largely been used to strengthen the Mines faculty—the key to a Mines education.

This money has supported research which would not have been possible under State money. Opportunities for advanced study have been increased because of supplementary support. The private dollar allows greater faculty attendance at regional and national meetings of professional societies. Gifts underwrite experimentation with new methods and facilities to improve teaching.

The Horizon Plan is the story of the Colorado School of Mines and the CSM Foundation, Inc., a private, non-profit organization composed of individuals seeking supplementary support for the nation's leading college of mineral engineering. Nearly one million dollars has been raised by this organization in order to insure the future —the Horizon Plan.

FROM THE LOCAL SECTIONS

Minutes of Section Meetings should be in the Alumni Office by the 15th of the Month preceding Publication.

ALABAMA

Birmingham Section

Pres.: Joseph Hohl, '25
Sec.: Richard White, '42
249 Flint Dr., Fairfield

ARIZONA

Arizona Section

Pres.: Bob Thurmond, '43
V. Pres.: Gene Klein, '43
Sec.: John H. Bassarear, '50
c/o Pima Mining Co., Box 7187, Tucson
Annual meetings: First Monday in December; 3rd Sunday in May (annual picnic).

Four Corners Section

See New Mexico for officers

CALIFORNIA

Bay Cities Section

Pres.: John D. Noll, '51
V. Pres.: Ralph D. Eakin, '48
Treas.: Herbert D. Torpey, '51
Sec.: Charles G. Bynum, '26
2810 Loyola Ave., Richmond

Southern California Section

Pres.: R. E. "Ray" McGraw, '53
Treas.: J. R. Leonard, '42
Sec.: H. David Squibb, '34
2215 E. Sycamore St., Anaheim

COLORADO

Denver Section

Pres.: Ronald F. Lestina, '50
V. Pres.: Hugh Wallis, '28
Sec.-Treas.: Patrick C. Brennan, '53
1893 S. Leyden, Denver 22
Office: AC 2-2060

No luncheon meetings will be held during August. Regular luncheon meetings will be held weekly—every Tuesday at 12:00 noon, Denver Press Club, 1330 Glenarm Pl., beginning Sept. 20th. During the football season, films of the previous Mines game will be shown.

Denver Section

Denver Local Section held its regular monthly meeting at the Denver Press Club on July 19. The only business brought before the meeting was the question as to whether the Section should sponsor a family picnic sometime during the month of August. This was agreed upon and Ron Lestina, president of the Section, will appoint a committee to work out the details.

Hugh Wallis, vice president, reported that he had not received any confirmation from either the Petroleum Engineers of the AIME or the Geological Society of America Convention chairmen concerning the inclusion of a luncheon or a dinner during the respective conventions. As soon as information is obtained, Mr. Wallis will see that it is publicized.

In addition to the 30 members who were present for the meeting, Gus Stolz, '50, who is a professor at the Montana School of Mines attended with the other members of the class of '50.

Charlie Metro, manager of the Denver Bears, was the speaker at the luncheon. He was in excellent form because the Bears recently won the All-Star game of the American Association.

Jim Nylund, University of Colorado graduate, who is now employed as a geologist with Anderson-Pritchard, was present as a guest. Jim was offered a contract with the Yankees when he finished at Boulder but elected to remain in his profession rather than play baseball. Genial Chris Tolos of the coaching staff at Mines was present as a representative of the Athletic Department.

Denver Section will not hold its regular luncheon meeting during the month of August as the Press Club is being closed for alterations. The next regular luncheon meeting will be held on the third Tuesday, Sept. 20. At that time films will be shown of the game played between Mines and Highland University on Sept. 17 at Las Vegas, N.M.

Beginning with Sept. 20 and continuing throughout the football season, Denver Section will meet every Tuesday noon and will see films from the previous Saturday's game. All Mines Alumni living in the Denver area are invited to attend these meetings. The Athletic Department will present an interesting program each week. Come and meet the Mines football players.

Miners attending the July 19 meeting were:

Frank C. Bowman, '01; Mills Bunger, '09; O. L. Pack, '26; Hugh A. Wallis, S. M. del Rio, '28; Jim Colosanti, George D. Volk, '35; K. C. Forcade, '36; Lee Scott, '42; H. W. Addington, Douglas Ball, '43; Harry Bullock, '45; J. A. Mullinax, M. J. Bernstein, '47; John Flynn, Ken Nickerson, '48; Virgle Easterwood, Bob Torpey, Den Galbraith, '49; R. L. Boyers, J. M. Taylor, Ed Karn, Jr., Gus Stolz, Ed Howard, Ron Lestina, '50; Howard K. Loenshal, '51; Jim Stroh, Patrick Brennan, Robert E. Johnson, '52; Fred M. Fox, '54.

Four Corners Section

See New Mexico for officers

Grand Junction Section

Pres.: John Emerson, '38
V. Pres.: Tony Corbetta, '48
Sec.-Treas.: Joe Hopkins, Ex-'37
1235 Ouray Ave., Grand Junction

DISTRICT OF COLUMBIA

Washington, D. C. Section

Pres.: Charles T. Baroch, '23
V. Pres.: Vincent G. Gioia, '56
Sec.-Treas.: Thomas E. Howard, '41
9511 Nowell Dr., Bethesda 14, Md.
Luncheon meetings held every 2nd Thurs. noon at Sphinx Club, 1315 K St., N. W.

Washington, D. C. Section

Washington Section held its monthly luncheon meeting at the Sphinx Club on Thursday, July 14. James Robinson, assistant to the President (of the Colorado School of Mines), and Mr. and Mrs. William Peters were guests. In spite of his short tenure as assistant to the President, Mr. Robinson was able to answer a few of the many questions raised by members present. This was the first opportunity that the members had to meet Mr. Robinson and also Mr. Peters, who is director of Publications at Mines.

About 15 were present, although no list of names has been received.

ILLINOIS

Great Lake Section (Chicago)

Ray Watson, c/o Standard Oil Co., 910 So. Michigan Ave., Chicago 80, Ill.

KANSAS

Kansas Section

Pres.: Francis Page, '39
Sec.: James Daniels, '51, AM 5-0614
205 Brown Bldg., Wichita
Meetings: Called by Sec. Contact Sec. for date of next meeting

LOUISIANA

New Orleans Section

Pres.: George Burgess, '49
V. Pres.: Emory V. Dedman, '50
Sec.-Treas.: Thomas G. Fails, '54
6334 Essex Ct., New Orleans 14

MINNESOTA

Iron Range Section

Pres.: Paul Shanklin, '49
V. Pres.: Leon Keller, '43
Sec.-Treas.: James Bingel, '53
50 Garden Dr., Mt. Iron, Minn.
Exec. Com.: Wm. Gasper, '43 and Robert Shipley, '52

MISSOURI

St. Louis Section

Pres.: Earl L. H. Sackett, '33
Sec.-Treas.: E. W. Markwardt, X-'32
621 Union Ave., Belleville, Ill.

MONTANA

Montana Section

Pres.: John Suttie, '42
V. Pres.: John Bolles, '49
Sec.-Treas.: Wm. Catrow, '41
821 W. Silver St., Butte

NEW MEXICO

Four Corners Section

Pres.: Dick Banks, '53
V. Pres.: Tony King, '57
Sec. Treas.: Tom Allen, '41
2104 E. 12th St., Farmington

NEW YORK

New York Section

Pres. & Treas.: Ben F. Zwick, '29
Sec.: H. D. Thornton, '40
Union Carbide Olefins Co.
30 E. 42nd St., New York City

OHIO

Central Ohio Section

Pres.: Roland Fischer, '42
Sec.-Treas.: Frank Stephens, Jr., '42
Battelle Mem. Inst., Columbus

Cleveland Section

Pres.: Charles Irish, '50

Pennsylvania-Ohio Section

See Pennsylvania for officers

OKLAHOMA

Bartlesville Section

Pres.: R. C. Loring, '37 and '39
V. Pres.: C. T. Brandt, '43
Sec.-Treas.: W. K. Shack, '51
4726 Amherst Dr., Bartlesville

Oklahoma City Section

V. Pres.: Clayton Kerr, '30
Meetings the 1st and 3rd Tuesday of each month at the Oklahoma Club

Tulsa Section

Pres.: Chester H. Westfall, Jr., '52
V. Pres.: Brook Tarbel, '50
Sec.-Treas.: Charles J. Diver, '52
528 S. New Haven, Tulsa 12

Tulsa Section

Tulsa Section held a dinner meeting May 25. Dinner was preceded by a lively social hour with several toasts to R. C. Earlougher, '36, a 1960 recipient of the School's Distinguished Service Award. Frank Fisher, '39, with Sinclair Oil & Gas in New York, was an out-of-town guest of Dr. George H. Fancher, '30, a new member of the Tulsa Section. Dr. Fancher, formerly head of petroleum production department at the University of Texas, is now director of production research for Sinclair.

Present at the meeting were:

M. Parke Huntington, '26; G. C. MacDonald, '28; Dr. G. H. Fancher, '30; R. C. Earlougher, '36; Frank Fisher, '39; Norm Morrisey, '42; L. B. Spencer, '44; Brook Tarbel, '50; Chet Westfall, Jim Newell, and Charles J. Diver, '52.

PENNSYLVANIA

Eastern Pennsylvania Section

Pres.: Samuel Hochberger, '48
V. Pres., Sec-Treas.: Arthur Most, Jr., '38
91 7th St., Fullerton

Pennsylvania-Ohio Section

Pres.: L. M. Hovart, '50
Sec.-Treas.: George Schenck, '52
7130 Thomas Blvd., Pittsburgh
Meetings upon call of the secretary

TEXAS

Houston Section

Pres.: Jack Earl, '53
V. Pres.: John C. Capshaw, '54
Sec.-Treas.: Nick Shiftar, '40
5132 Mimosa St.,
Bellaire, Texas

Houston Section

Houston Section met June 1 at the Houston Club with 12 men in attendance. Jack Earl and Bob Turley led a discussion as to ways and means of increasing attendance.

Miners present were:

Albert Wolfe, '07; S. A. Mewhirter, '17; Jim Ballard, '25; Ivan G. Burrell, '31; R. A. Kerr, '36; W. B. Barbour, '37; Nick Shiftor and J. K. Pawley, '40; John W. Williams, '50; Robert D. Turley, C. A. Lehnertz, Jr., '52; Jack Earl, '53.

North Central Section

V. Pres.: Howard Itten, '41
Sec.-Treas.: Harley Holliday, '42
4505 Arcady Ave., Dallas 5
Sec.-Treas.: John Thornton, '50
609-B Scott St., Wichita Falls

Permian Basin Section

Pres.: Van Howbert, '51
c/o Honolulu Oil Co., Box 1391 Midland.
V. Pres.: Hal Ballew, '51
No luncheon meetings scheduled during summer.

South Texas Section

Pres.: James Wilkerson, '31
V. Pres.: Edward Warren, '50
Sec.-Treas.: Richard Storm, '53
1007 Milam Bldg., San Antonio

UTAH

Four Corners Section

See New Mexico for officers

Salt Lake City Section

Pres.: Robert B. Ingalls, '48
Vice Pres.: Edwin T. Wood, '48
Sec.-Treas.: Major W. Seery, '56
260 W. 1200 North, Bountiful, Utah

WASHINGTON

Pacific Northwest Section

Pres.: Wm. Douglass, '11
Sec.: C. Ted Robinson, '53
16204 S.E. 8th, Belleview

WYOMING

Central Wyoming Section

Pres.: M. Rex Curtis, '45
Vice Pres.: Martin Hegglund, '41
Sec.-Treas.: James F. Huff, '53
806 W. 13th St., Casper

CANADA

Calgary Section

Pres.: R. F. Zimmerly, '47
V. Pres.: J. S. Irwin, Jr., '54
Sec.-Treas.: G. L. Gray, '50
1304 4th St. S.W., Calgary
Luncheon meetings held 3rd Monday of each month in Calgary Petroleum Club; visiting alumni welcome.

PERU

Lima Section

Pres.: Richard Spencer, '34
V. Pres.: Martin Obradovic, '53
Sec.-Treas.: Norman Zehr, '52
Casilla 2261, Lima
Meetings first Friday of each month, 12:30 p.m., Hotel Crillon (April through December), or on call.

PHILIPPINES

Baguio Section

Pres.: Francisco Joaquin, '26
V. Pres.: Claude Fertig, x-'27
Sec.: P. Avelino Suarez
Balatoc Mining Co., Zambales

Manila Section

Pres.: Anselmo Claudio, Jr., '41
V. Pres.: Rolando Espino, '41
Sec.-Treas.: Edgardo Villavicencio, x-'40

TURKEY

Ankara Section

Alumni visiting Turkey contact either: F. Ward O'Malley, '42, Explr. Mgr., Tidewater Oil Co., Kumrular Sokakb, Yenisehir Ankara; Tel. No. 21328.
Ferhan Sanlav, '49, Turkiye Petrolleri A. O. Sakarya Caddesi 24, Ankara; Tel. No. 23144.

VENEZUELA

Caracas Section

Pres.: William A. Austin, Jr., '27
V. Pres.: G. V. Atkinson, '48
Sec.-Treas.: T. E. Johnson, '52
c/o Phillips Petr. Co.
Aptdo 1031
Asst. Sec.-Treas.: R. L. Menk, '51
c/o Creole Petr. Corp.
Aptdo 889

Technical Men Wanted

D. B. Morrison, Personnel Dept., Aluminum Co. of America, 1501 Alcoa Bldg., Pittsburgh 19, Pa., lists the following opportunities and enumerates requirements for Mines alumni who have not been out of school for more than three or four years:

Opportunities. Positions open as trainees in sales administration or industrial sales; six months, expenses paid, training program including visits to 11 plants; assignment to one of 70 sales offices; promotion, always from within the company, based on merit; annual performance review; dynamic growth industry, dealing with rapidly expanding products and markets; liberal employee benefits; salary: initial range $475-600, depending on qualifications.

Requirements. Recent college graduate, 21-30 years of age; genuine interest in sales; upper one-half of class; active, extra-curricular; draft exempt (preferred, but not imperative); flexible, regarding geographic location.

IN MEMORIAM

Richard W. Raymond

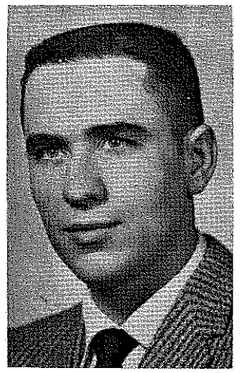
Richard W. Raymond, a senior student majoring in geophysics at the Colorado School of Mines, and his two friends—Mr. and Mrs. David K. Cowperthwaite—were killed July 17 when they were struck by lightning while on a hiking expedition on Arapaho Peak west of Boulder, Colo. All three victims were returned to Denver July 19 and services were pending at Olinger Mortuary.

Raymond had come home for the weekend from Sidney, Nebr., where he had a summer job with a geophysical firm. After attending church on Sunday morning, he telephoned his close friend, Cowperthwaite (a graduate student at the University of Colorado), and arranged the hiking expedition.

Members of the Rocky Mountain Rescue Unit who found the bodies of Raymond and Mrs. Cowperthwaite said the pair were huddled under a rock overhang in an area west of Arapaho Glacier and just off the trail leading from the Fourth of July campground. Cowperthwaite's body was found a quarter mile down a steep slope from the other two victims. Apparently he had been stunned and had attempted to return to the campground and summon aid.

Raymond was educated in the Denver public schools and was a graduate of East Denver High School. As a student at Mines, he was an active member of CSM Post of the Society of American Military Engineers, Pershing Rifles, Sigma Phi Epsilon social fraternity, and The Oredigger. His parents, Mr. and Mrs. Lester W. Raymond, live at 2401 E. Warren Ave., Denver, Colo.

Loan Fund Established In Memory of Dickson



A loan fund in memory of Andrew J. Dickson, '60, has been established at the Colorado School of Mines. The fund will be administered by the Colorado School of Mines Foundation, Inc. and will be listed in the General Information Bulletin each year as follows:

"The Andrew John Dickson Loan Fund of $1,200, established by family and friends in memory of Andrew John Dickson, Class of 1960. Available to senior students."

Dickson, who was killed June 11 in a traffic accident near Fort Morgan, Colo., was a member of both Beta Theta Pi and Theta Tau, honorary engineering fraternity. (See story in In Memoriam, July 1960 issue.)

CLASS NOTES

(Continued from page 3)

RICHARD D. LAND, former city manager of Valentine, Nebr., has moved to 177 G. Southeast, Ephrata, Wash.

WALLACE McGREGOR has moved from Grand Junction, Colo., to 2580 E. 33rd South, Salt Lake City, Utah.

IRA E. McKEEVER has moved from New York City to Newgulf, Texas, as Manager of Sulphur Operations for Texas Gulf Sulphur Co.

THOMAS M. McLAREN has left Austin, Texas, for 4301 Mercedes, Midland, Texas.

CRAIG O. MALIN's address is 4955 Calderon Rd., Woodland Hills, Calif.

BOBBY G. NEWTON, division geologist for Pan American Petroleum Corp., has a new address: P.O. Box 40, Casper, Wyo.

ROBERT M. POZZO, 938 Belmont St., Watertown 72, Mass., is vice president and general manager of Pylon Co., Attleboro, Mass.

CHARLES G. MASSIEON, supervising metallurgist, Research Department, Caterpillar Tractor Co., lives at 101 Decatur Rd., Marquette Heights, Pekin, Ill.

1953

JAMES E. CURZON has moved from Fairfax, Okla., to 214 McCarthy St., Borger, Texas.

F. KENNETH MEITZ's address is 2720 Navarre Rd., Casper, Wyo.

HOBERT G. ORTON has established a permanent address at Manursing Island, Rye, N.Y.

CHARLES TRAUTMANN has moved from State College, Pa., to Yale Divinity School, 409 Prospect St., New Haven, Conn.

LT. JOHN R. WITT's address is 610 Mary Lake Dr., Bryan, Texas. After graduating May 20 from Engineer Officer Advanced Course at Ft. Belvoir, Va., he began graduate study in civil engineering at Texas A & M College, College Station, Texas.

1954

MUHAMMAD AZHAR BHUTTA, former consulting geologist in Salida, Colo., may be reached c/o Petroleum and Mineral Affairs, Box 345, Jeddah, Saudi Arabia.

JAMES W. COOKSLEY, JR., gives his address as Office 2, New Lorenz Hotel, Redding, Calif.

WILLIAM G. DUTTON has moved from Midland, Texas, to 2109 Thomas, Hobbs, N.M.

JAMES W. FABER is no longer with the Westinghouse Aviation Gas Turbine Division in Kansas City, Mo. He is now metallurgical engineer at Bettis Atomic Power Laboratory, Westinghouse Electric Corp., Pittsburgh, Pa. His home address is 5689 Willow Terrace Dr., Bethel Park, Pa.

RICHARD F. HATFIELD's address is Bldg. 209, Apt. 11, Stanford Village, Standford, Calif.

ROBERT A. HILDEBRAND lives at 704 Niblic Dr., Grand Junction, Colo.

MORTIMER A. KLINE, JR., gives his new address as 650 S. Grand Ave., Los Angeles 17, Calif.

FRED T. KOTTENSTETTE may be addressed c/o Texas Butadine & Chemical Corp., 529 Fifth Ave., New York, N.Y.

CLYDE S. NEWELL, formerly of Waynesboro, Miss., gives his new address as P.O. Box 27, Morgan City, La.

CHARLES J. MARQUARDT's new address is 2012 Harvey St., McAllen, Texas.

1955

JOHN F. AUSTIN has moved from Denver to 7280 Bryant St., Westminster, Colo.

CHARLES J. BOYCE, formerly of Worland, Wyo., lives at 1535 Bumsey, Cody, Wyo.

BOYD M. HARNDEN is taking a leave of absence from The Superior Oil Co., where he is presently engineer in charge of the Casper, Wyo. office. His address for the next 18 months will be 632 Burton Ave., Highland Park, Ill. He has entered the Graduate School of Business, Northwestern University, and will be available for consulting work while attending the university.

NATHAN HOFFMAN may be addressed c/o Mr. Morris Hoffman, 1660 Harrison, Denver 6, Colo.

(Continued on page 46)

CAMPUS HEADLINES

Denver Broncos Train at Mines

Colorado School of Mines is currently playing host to one of the most exciting and colorful spectacles in sports—Pro Football.

The newly formed Denver Broncos of the American Football League are going through twice-a-day drills at Mines in preparation for the upcoming season.

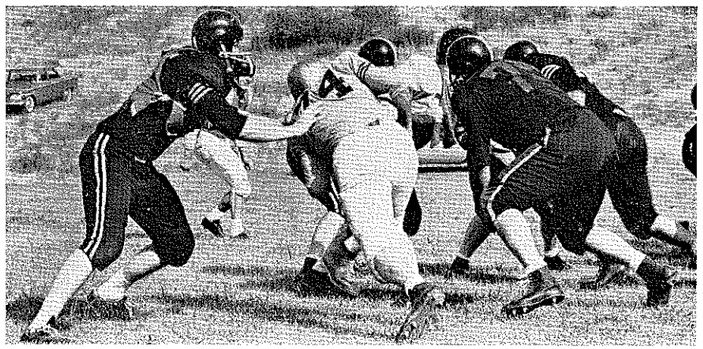
Guided by General Manager Dean Griffing and Head Coach Frank Filchock, the Broncos have kindled football interest in Golden, Denver and the surrounding area with an aggressive, positive attitude.

Built around the experience and know-how of quarterbacks Frank Tripucka, former Notre Dame great, and ex-Utah star Tom Dublinski, the Broncos figure to be in the thick of the fight for the Western Division Championship. Composed of the Dallas Texans, Oakland Raiders, Los Angeles Chargers and the Broncos, the Western Division race is shaping up to be a scramble.

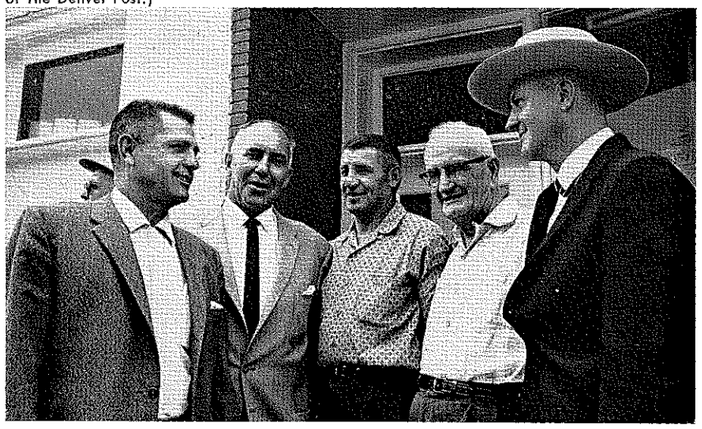
In the Eastern Division the Buffalo Bills, Boston Patriots, New York Titans and Houston Oilers will slug it out for the right to meet the Western winner for the AFL crown. Even though each club plays all of the other teams, standings will be kept in separate divisions for the playoffs.

The Broncos open their home season Oct. 2 against Oakland in Bears Stadium, which, by the way, will be the site of all Bronco home games. The AFL season actually begins three weeks prior to Oct. 2 as the Broncos play Boston, Buffalo and New York back east before coming home.

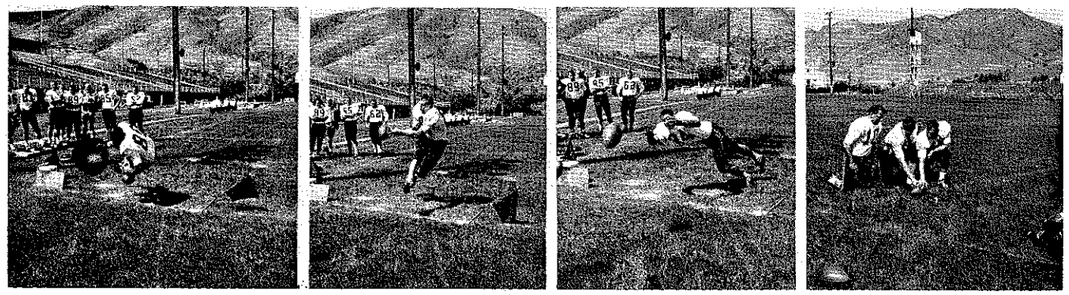
Season tickets are on sale at Bears Stadium with east and west sideline seats priced at $31.50 and north and south seats at $24.50. Mail orders should be accompanied by a check or money order. Single game tickets will go on sale Sept. 1.



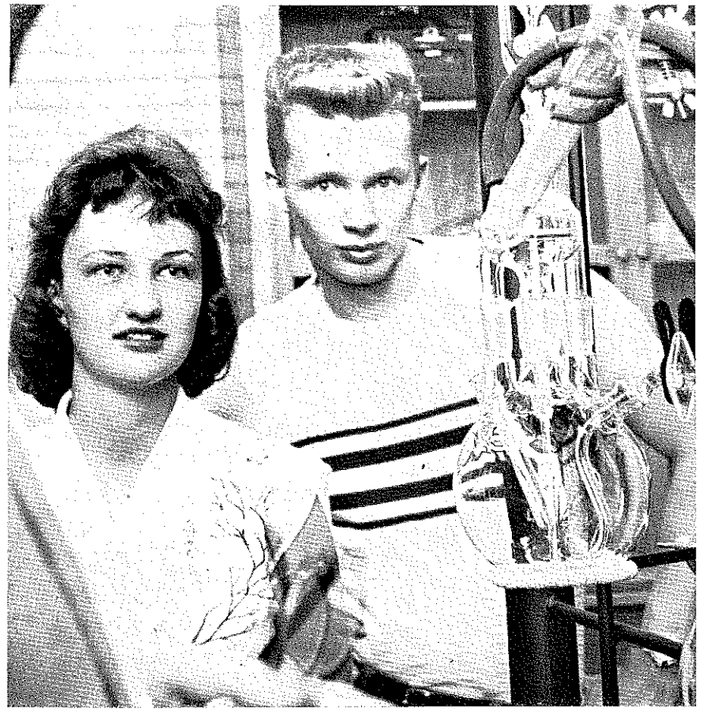
▼ Broncos in Action. Workouts are held twice daily: 9:30 a.m. and 3:30 p.m. (Photo courtesy of The Denver Post.)



▼ Golden Welcomes Broncos. Shown left to right are: Fritz Brennecke, Mines athletic director; Dean Griffing, Bronco general manager; Frank Filchock, Bronco head coach; Clark Carpenter, mayor of Golden and retired Mines faculty member; Earl Howsam, vice president of Denver Broncos and Denver Bears. (Photo courtesy of The Denver Post.)

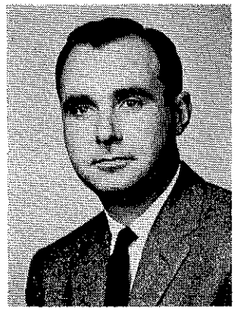


▼ Montage showing Broncos on the practice field at the Colorado School of Mines.



▼ Intense interest is reflected in the faces of these two high school students attending the Summer Science Training Program, July 11-Aug. 20, at Mines.

Mines Professor Has "Rewarding Experience" With High School Students



DR. J. L. HALL

"One of the most rewarding" experiences in Dr. James Hall's teaching career came this summer when he directed the six weeks high school summer institute at the Colorado School of Mines.

"I've never before experienced such searching effort by students, and that's the reason I call this so rewarding," he explained.

Dr. Hall, an assistant professor of chemistry, is the director of the unique chemistry-geology institute for high school juniors which began July 11th. The 56 students came from all over the nation and each brought a distinguished scholastic record.

"1st in a class of 540, 1st in 400, 2nd in 1560, tops in 700—they're all what we would call the high school 'brain' and, come to think of it, that's a pretty apt term," Dr. Hall continued.

The high school students spent six weeks at Mines and followed the same rigorous academic program for which the School has become famous.

"Up at 6:15, breakfast at 7:00, geology lecture at 7:30, chemistry lecture at 9:00, and two-hour labs from 10:00 until noon and 2:00 until 4:00. After that it's study, and they're more than eager to do it."

What does Mines receive from all this attention paid to high school students? Its major return is the satisfaction of aiding in the promotion of science and engineering, and certainly the students will return to their senior year in the hometown high school with a better understanding of both higher education and Mines.

"We don't expect to enroll all these students for college at Mines in another year, but perhaps some of them will return," Dr. Hall stated. "The important thing is that we have materially aided the furtherance of science and have given these students some yardsticks with which they can measure careers later on."

The National Science Foundation in January awarded Mines a $17,820 grant to support the institute. Dr. Hall plans to submit a request for a similar institute again next year. "Only this time we'll expand it a little. Perhaps we'll ask for time to study the philosophy of science, and maybe add some additional math and physics."

In the classrooms and labs most of the day, the high school students go into the fields on Saturday and Sunday, to study geological formations. One afternoon a week they spend inspecting Denver-area projects, such as Martin Missiles. On certain days they hear distinguished lecturers, such as the former president of the American Chemical Society.

The NSF sponsored some 135 high school institutes in science this summer, but Mines' was the only program combining chemistry and geology.

Dr. Fred Moore, assistant professor, headed the geology teaching staff which also included some graduate students. Two professors and a graduate student aided Dr. Hall in the chemistry end of the unique combination.

The students were so inquisitive in most classes that the teaching staff relied on graduate seminar-type methods of instruction in many areas.

The only difference between the accelerated high school institute and the normal routine of Mines' schedule was the lack of examinations. Since the high school students attended merely on their initiative—a few exams were given for the purpose of studying the effectiveness of this approach to science—the students received no credit on their high school records.

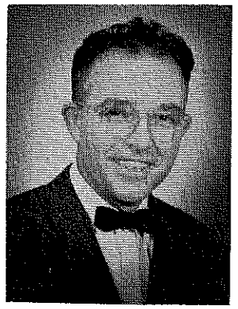
But, even then, they asked for tests—to measure their production and abilities. Perhaps that's an indication why Dr. Hall says this is the "most rewarding." (*A story about the Science Training Program at Mines appeared on p.* 58, *July* 1960 *issue of the Mines Magazine.*)

50th Anniversary Issue

The 50th Anniversary Issue, October 1960, celebrates 50 years of service and progress in the minerals industry and in the field of mineral engineering education.

Reserve your copy now (price $3) from The MINES Magazine, Golden, Colo., or order a year's subscription for $5 beginning with this 50th Anniversary Issue.

Dr. John S. Rinehart Named Visiting Professor by AAS; Now Lecturing in Europe



Dr. John S. Rinehart, director of the mining engineering research laboratories at the Colorado School of Mines, has been named a Visiting Professor by the American Astronomical Society. He was the only Rocky Mountain area educator named to the 30 member group.

The 30 astronomy authorities will lecture throughout the nation next year on a visiting professorship program supported by the National Science Foundation and the AAS.

Formerly research associate in astronomy at Harvard University and assistant director of the Smithsonian Astrophysical Observatory, Dr. Rinehart has been at Mines since 1958. His astronomy lectures will concern lunar colonization, lunar landings and meteors.

On July 13 Dr. Rinehart left Golden for a two-month lecture tour of Europe: at the University of Freiberg and several other colleges in addition to presenting research papers at the meetings of the International Union of Geodesy and Geophysics, the International Astronautical Federation and the International Congress of Theoretical and Applied Mechanics. The majority of his lecture tour (which concerns research he is directing on explosives for NSF) is being supported by research funds from the National Science Foundation. He will return to Golden on Sept. 10.

Mineral Economics Lectures At Mines During Summer

A special lecture series on mineral economics is being presented at the Colorado School of Mines this summer. Dr. Orris C. Herfindahl, research associate for Resources for the Future, Inc., is lecturing during four sessions at Mines.

Dr. Herfindahl, a Columbia University graduate and former economist for the federal government, will discuss mineral products, mineral conservation and long-term changes in the costs of minerals. His lectures are being held in the Mines chemistry building at 4 p.m. on July 29 and Aug. 5, 12 and 19.

The lecture series is presented for faculty, students and interested professional personnel in the mineral industries free of charge, as part of the Western Resources Conference, sponsored by Mines, the University of Colorado and Colorado State University. The Conference—which will treat water measurement and future requirements—will be held at the CU Law School, Aug. 22 through 26.

Mines Receives $5,100 Grant From NSF for Computer Center

The Colorado School of Mines has received a $5,100 grant from the National Science Foundation for use in the School's computer center. The grant was announced by Dr. Alan T. Waterman, NSF director, and Dr. A. Raymond Jordan, Mines graduate dean who will direct the grant.

The Mines computer center, established in 1957, contains both a digital and an analog computer. The NSF funds will be used to purchase a high speed tape punch and recorder to facilitate programming for both machines.

Housed in the mineral engineering college's mathematics department, the computer center averages 45 hours of operation each week. It is used both for classroom teaching and research. The addition of the tape punch and recording equipment will reduce by half the amount of time now devoted to preliminary programming for the computers.

Mines 1960 Football Schedule

Sat. Sept. 17—Highlands University at Las Vegas—8:00 p.m.
Sat. Oct. 1—Omaha University at Omaha—8:00 p.m.
Sat. Oct. 8—Colorado College at Golden—8:00 p.m.
Sat. Oct. 15—Westminster at Salt Lake City—2:00 p.m.
Sat. Oct. 22—Colorado State College at Greeley—2:00 p.m.
Sat. Oct. 29—Idaho State College at Golden—HOMECOMING —1:30 p.m.
Sat. Nov. 5—Western State College at Gunnison—1:30 p.m.
Sat. Nov. 12—Panhandle A & M at Golden—1:30 p.m.
Sat. Nov. 19—Adams State College at Golden—1:30 p.m.

LETTERS TO THE EDITOR

(Continued from page 34)

JACKSON W. BROWN, '52 writes that he has just received his June 1960 copy of the MINES Magazine which reminds him that he had better advise us of a change of address. He explains: "On June 27, I will assume my new responsibilities as college relations coordinator with Texas Instruments Incorporated. I am just winding up my responsibilities with Geophysical Service Inc. as employment director, a spot I have occupied for the past two and one half years."

He asks us to send the Magazine and correspondence from the Alumni Association to his home address, 13866 Birchlawn Dr., Dallas 34, Texas. When he is on his vacation in Colorado during the latter part of August, he promises to drop by the new Alumni offices in Golden.

(Editor's Note: Good luck in your new job and we'll be looking forward to seeing you soon.)

WALTER E. HEINRICHS, JR., '40, president and general manager of Heinrichs Geoexploration Co. of Tucson, Ariz., offered the following suggestions directly to Arthur Yarberry, '50, but we think they are of sufficient interest to publish:

"I thoroughly sympathize and endorse your desire to find a better ultimate solution to the current problems of large blasts in highly developed areas. But at the moment, any practical solution still looks like seismic energy will be required and if so, there is still apt to be excess available over that absorbed in breaking. Any excess might be possibly damaging or at least potentially annoying.

"At any rate, regardless of this, I wonder if we have fully utilized all of the interim possibilities for solution or at least alleviation? Of course one of the best things along this line is multiple micro delay and more elaborate stemming, more holes—but smaller holes to keep down drilling costs, etc. I am sure you are aware of all this as in New York Trap Rock, but maybe still more could be done along this line.

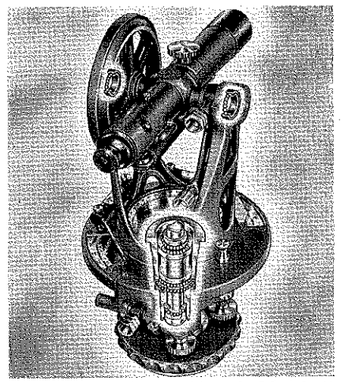
"Also, what are the true facts about damage vs. annoyance? U.S. Bureau Mines R.I. 3622, 3708 and Bulletin 442 experiments indicate that true damage probability was way overdrawn. For example, in 1949 the TVA shot 680 tons of dynamite in one shot which, by established proof was safe from endangering plaster at two locations 11,500 feet and 8,000 feet away. Also no damage was done to concrete foundations, glass and other materials of an office building 1,900 feet away. Very probably, similar data are available on other more recent large blasts such as the one in the B.C. harbor or A.E.C. shots. Maybe this indicates need for more and better public relations and public information.

"In this connection, are you set up to, or have you, recorded potential blast damage intensities at various distances from the shot points to the nearest buildings or other installations? If not, this can be done very cheaply and is not only good public relations when done before the fact, but is also excellent liability insurance, for after the fact. Data on maximum size of each individual instantaneous shot, distance to nearest structures, type of structure and intervening rock type, soil, etc., will all play a part.

"If you haven't already gotten into this, I would be interested in learning some of these factors and I'll bet you are well out of probable damage range."

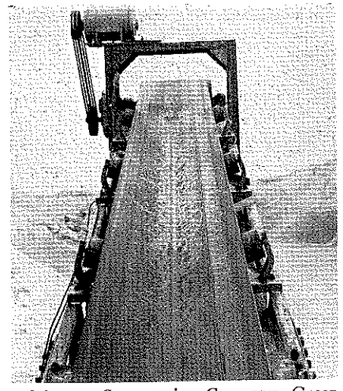
WITH THE MANUFACTURERS

Transit



Brunson Engineer's Transit Model 50 features securely sealed, permanently lubricated ball bearing construction for high accuracy under all climatic conditions. The precision instrument is being distributed nationally by Charles Bruning Co., Inc., Mount Prospect, Ill.

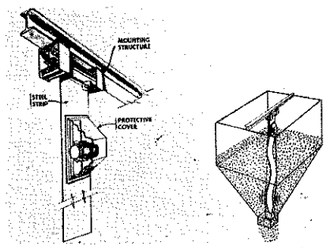
Motors



Schuster Construction Company, Green Bay, Wisconsin, installed a new type of open "protected" motor on this gravel conveyor to solve the problem of shortened service life under extreme conditions of weather and dust. The motor is a 10 horse power 1800 RPM open frame "Multiguard" protected type manufactured by The Lincoln Electric Co.

Open frame motors having protected construction offer a new approach for maintaining motor operation and increasing motor life under severe service conditions that normally require total enclosure. Protected construction guards the damageable parts of the motor by sealing the bearing housings from entry of foreign matter and impregnating and encapsulating the stator with a polyester plastic resin. This encapsulation is impervious to water, acid, abrasion and both mechanical and electrical abuse. Protected design differs from total enclosure in that protection is economically placed only where it is needed.

Vibrators



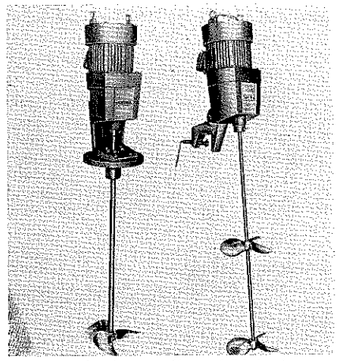
Constant, free-flowing materials from huge wood, steel or concrete bunkers can be assured by the use of the new Syntron Internal Bunker Vibrators.

The unit consists of a powerful, electromechanical rotary vibrator mounted at the top of a long strip of steel. It is suspended down into the bunker, directly over the discharge opening. In operation the vibrator causes the steel strip to undulate violently—breaking down arching and plugging.

The unit is furnished complete with the mounting structure supporting a 5 foot strip of steel, 18 to 24 inches wide on which is mounted the rotary vibrator. Additional lengths of strip steel can be welded to the unit to make up to a maximum length of 50 feet. For 220 or 440, 3-phase, 60 cycle, a-c operation.

A two-page catalog section is available from SYNTRON COMPANY, 705 Lexington Ave., Homer City, Pa.

Mixers

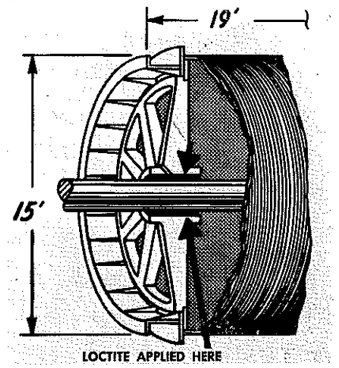


A completely new line of Lightnin propeller-type portable mixers for fluid agitation in process industries has been announced by Mixing Equipment Co., Inc., Rochester, N. Y. Designed as an integral unit, the new mixer offers increased mixing efficiency, improved handling convenience, and maintenance-free operation. It will be marketed in sizes ranging from ⅛ HP to 3 HP, and will also be available in a fixed mounting design in all except ⅛ HP sizes.

Both direct and gear-drive models require no lubrication or adjustment under normal operating conditions for five years. The units are thus maintenance-free.

The new mixer lines will be on the market Aug. 15, 1960.

Sealant

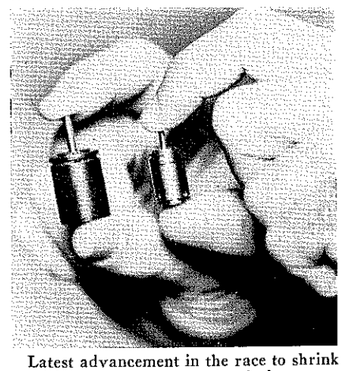


Helping to prevent the threatened breakdown of a large mine hoist pending delivery of a new drum shaft and spiders is the latest reported achievement of Loctite Sealant, a new plastic compound made by American Sealants Co., Hartford, Conn. "Without the use of Loctite we would have probably lost fifteen weeks of production, with a very considerable loss of income," stated R. R. Spencer, Calumet Division engineer.

Loctite Sealant is a "ready-to-use liquid with the unique property of hardening into a tough plastic when confined between close-fitting metal parts," the maker claims.

Free samples of Loctite, and complete information on the many uses for it, can be obtained by writing to American Sealants Co., Hartford, Conn.

Gearheads



Latest advancement in the race to shrink precision servo-motor gearheads for space-and-weight savings is the tiny "size five" unit (right) recently developed by Bowmar Instrument Corp., Fort Wayne, Ind. The new unit, only one-half inch in diameter, is compared with a "size eight" gearhead (left) which was formerly the world's smallest transmission. A dwarfed descendant of the familiar automobile transmission, the miniature, precision gearhead produces ratios up to 2,025-to-1, and is machined in tolerances far more exacting than those of a fine watch.

CATALOGS and TRADE PUBLICATIONS

Send your publications to The Mines Magazine, Guggenheim Hall, Golden, Colo., for review in these columns. Please mention The Mines Magazine when requesting publications from the manufacturer. Publications are free.

ANALYTICAL BALANCE. Wm. Ainsworth & Sons, Inc. has issued Bulletin No. 659 through its local distributor, Mine and Smelter Supply Co., P.O. Box 9041, Denver 16, Colo. The bulletin presents the distinctive features of the Right-A-Weigh Balance: fast weighing, accurate results, convenient, practical.

AUTOMATIC SAMPLING. Hardinge Co., Inc., 240 Arch St., York, Penn., has issued a revised eight-page catalog describing its re-designed automatic sampler, Bulletin 47-A. The literature describes in detail the new operating mechanism of the sampler and includes typical arrangements for both wet and dry processes. The sampler takes periodic "cuts" (or samples) from a stream of moving material, either wet or dry, at any stage in a continuous flow process.

BEARINGS. A new catalog of cylindrical roller precision thrust bearings is announced by the Rollway Bearing Co., Syracuse, N. Y. The catalog features detailed engineering data on the company's improved thrust bearing with an average of 30 per cent greater load capacity, and a new line of thrust bearing with metric dimensions.

Detailed information on dynamic and static bearing capacities, the company's patented tandem thrust bearings, new sizes of crane hook bearings, and bearing applications are contained in the 28 page publication.

Write for catalog PT-659, Rollway Bearing Co., 541 Seymour St., Syracuse, N. Y.

BIT GRINDER. A bit grinder, which performs custom grinding at the job site is available from Gardner-Denver Co., Quincy, Ill. Three types are offered for portable, bench or pedestal grinding. Known as the G-2, G-4 and G-6 series grinders, they will sharpen any detacable bit up to and including 12" diameters.

Design features of the G-series grinders include fixture positioning of the bit to provide perfect renewal of the cutting surface and gauge. 110° proper cutting angle is maintained. Grinding head is readily adjustable to height for different size bits.

For additional information on bit grinders write for Bulletin 6-6ii.

CHEMICAL GROUT. American Cyanamid Co. has announced "an entirely new concept of soil stabilization and grouting" —the development of a chemical that turns water into a stiff continuous gel in a controlled period of time.

Known as AM-9 Chemical Grout, it was designed for application by means of a patented process in the mining and construction industries to prevent various types of water seepage.

In most applications, the new chemical is a supplement for standard construction and grouting techniques, providing the final impervious seal. However, in many instances, the overall economics or physical limitations of the problem may indicate exclusive use of AM-9.

It may also be mixed with cement, bentonite, sawdust, dyes, salts and thickening agents to modify the properties of the solutions and the resulting gels.

Well over 150 successful field applications with AM-9 have been made in the United States, Canada and overseas by companies who are prominent in the fields of grouting and drilling.

A list of those who are authorized and licensed to apply AM-9 is available from Cyanamid.

A booklet describing the product and detailing nine specific applications is available through the Commercial Development Division, American Cyanmid Co., 30 Rockefeller Plaza, New York 20, N. Y.

CONVEYOR CONTROL SWITCH. A pilot circuit device of the pull-cord type for control of underground mine and other extensive conveyor insallations has been introduced by Schroeder Brothers Corp. of McKees Rocks, Pa., designers and engineers of special mining equipment.

The Jabco Switch as it is marketed keeps a belt conveyor under control at all times and will start or stop it at any point along its entire length. Rock falls on the belt usually pull the cord, halting the conveyor and minimizing the damage.

The Jabco Belt Switch, enclosed in a 5" x 7¼" x 9⅜" metal housing, may be mounted in any position on a sturdy surface or pole. An emergency lever on the housing for hand control and a safety "lock-out" attachment that holds the Switch locked in the "off" position during maintenance and loading are provided.

Bulletin No. 660, published by the Schroeder Co., describes the Jabco Belt Switch in detail and is available for the asking.

CRANE - EXCAVATOR. Bucyrus - Erie Co., South Milwaukee, Wis., has announced the 22-B Series Two crane-excavator with new and improved features designed to cut operating costs and boost production. It is available as a crawler, carrier or wagon mounted machine, fully convertible for crane, dragline, clamshell, hoe, or shovel service.

Longer machine life, trouble free operation, and minimum upkeep are advantages effected through such new features as. Adjustable hook rollers; splined horizontal propel shaft; alloy bronze bearings for propel machinery; splined clutch for quick shift swing-propel; surface hardened gear teeth; remote control lubrication of swing gear and pinion; improved swing clutch bearing seals; and improved crawler frame construction with shielded rollers and bearings.

For complete facts on the new 22-B Series Two crane-excavator, write Bucyrus-Erie Co., South Milwaukee, Wis.

DRILL. A new bulletin is available from Gardner-Denver Co., Quincy, Ill., announcing the "Mole-Dril" model AM5A. This efficient "down the hole" drill has a rugged 5 inch diameter and is 41" long with bit attached. The "Mole-Dril" is designed for heavy, rugged service for the construction, quarry and petroleum industries. Positive hole cleaning is assured by air passing through the air tube to the bit. Exhaust vents in the drill also provides additional air for hole cleaning.

Drill weight is 148 pounds and air consumption at 100 lbs. is 480 cfm. Bits are available in sizes 5¾", 6" and 6¼".

For additional features and information on the "Mole-Dril" write for Bulletin 6-6gg.

DRUM HOISTS. A new 20-page brochure illustrates and describes a wide variety of Vulcan-Denver mine and utility hoists. Included are single drum and double drum electric hoists from 1,000 pounds to 50,000 pounds rope pull, diesel and gasoline engine powered single drum hoists, low speed heavy duty winch hoists and the automation of small hoists at reasonable cost.

Copies of the two color bulletin, No. AC-6002, are available from Vulcan Iron Works Co., 2960 So. Fox St., Englewood (Denver), Colo.

ENGINEERING SERVICES. A new 12-page brochure, Bulletin No. 8010, describes Dorr-Oliver Incorporated, Stamford, Conn., as a source of engineering services in the development of complete plants on a world wide basis.

The services offered include laboratory testing, pilot plant demonstration, flowsheet preparation and engineering studies, cost estimates, plant design & specifications, purchase of equipment, supply of complete plants, erection and construction, supervision of initial operation, and training of plant personnel.

Dorr-Oliver Bulletin No. 8010 is available free to readers of *Mines Magazine*.

ENAMEL. A new descriptive folder on high-visibility "Pyralux" fluorescent enamel for safety and decorative painting of vehicles, aircraft and signs is now available. The four catalog-style pages are printed in the hyper-intense fluorescent colors—vermilion, yellow, orange, and red—which possess four times the daylight brightness of conventional hues. Copies may be obtained by writing Du Pont Co., AP-63, Wilmington 98, Del.

PIPE AND TUBING. Technical data of particular value to fabricators and users of alloy steel pipe and tubing are presented in Alloy Sales Letter 293M, issued by the Tubular Products division of The Babcock & Wilcox Co. The publication contains up-to-date data on the mechanical properties obtained by normalizing and tempering B&W Croloys 1¼ and 2¼ at various temperatures. Copies of Alloy Sales Letter 293M may be obtained at no charge from the company's sales office at Beaver Falls, Pa.

PLANT NEWS

M. E. Ziegenhagen to Head Babcock & Wilcox Advertising

M. E. Ziegenhagen has been appointed director of advertising and public relations of The Babcock & Wilcox Co.

Mr. Ziegenhagen's experience in advertising and public relations spans 12 years of service with the General Electric Co. and eight years as manager of these activities with the Worthington Corp.

Link Belt Given Sales Rights For LMG Bucket Excavator

Link-Belt Co. has acquired the sales rights in the United States and Canada for the LMG bucket wheel excavator, which is built in sizes to dig from 200 and up to the world's largest, 13,000 cubic yards an hour. (See Cover Picture)

The excavating wheel is manufactured by the West German heavy machinery firm of Orenstein-Koppel and Lubecker Maschinenbau AG, known as LMG. The announcement of the acquisition of sales rights was made by Link-Belt president Robert C. Becherer, who said his company will sell the LMG wheel in conjunction with its new line of high speed, high capacity belt conveyors.

The rotating digging wheel, which has buckets on its periphery, is used in open-pit mining operations for large scale removal of earth, overburden, sand, gravel, certain ores and lignite. The wheel, located at the end of a boom, scoops up overburden and drops it at a uniform rate upon a conveyor within the machine and thence to other conveyors of cars. The entire assembly is mounted on self-propelled crawlers.

The largest machine weighs more than 15 million pounds, and has a maximum cutting height from one bench of 295 feet.

Flotation Equipment Installed At Coal Preparation Plant

The Vesta-Shannopin Coal Division of Jones & Laughlin Steel Corp. is installing the latest in froth flotation equipment at the Coal Preparation Plant, La Belle, Pa. This equipment will make possible the recovery of very fine coal which has been lost, heretofore, in the plant water bleed-off system, and it will improve the quality of the coal as well.

Recent developments in froth flotation techniques have made possible the recovery of very fine coal from the slurry. The installation represents a major step in improving preparation plant efficiency and increasing yield, thereby conserving the dwindling reserves of the high-quality metallurgical coal in the Pittsburgh Coal Seam.

The material to be treated is 90 per cent minus-325-mesh in size. It is introduced into the flotation machines in the form of pulp or slurry. An agitating device produces minute bubbles. The bubbles attach themselves to the coal in the slurry and provide buoyancy to raise the coal particles to the surface. The bubbles and fine coal then are skimmed off and routed to a vacuum filter for dewatering.

The remaining slurry which is predominantly clay, leaves the machine from the tailings overflow. It then goes to a thickener where the fine clay particles are flocculated (aggregated into small lumps) and settle out. The clear overflow from the thickener is re-circulated to the plant water system. The thickener underflow is either filtered and sent to the plant refuse pile or pumped to the slime disposal pond where the clay particles settle out. A clear overflow from the slime disposal pond is maintained in compliance with clean stream laws.

Twenty flotation cells having a total feed capacity of 36 tons per hour at 38 per cent ash will be installed. These cells are expected to recover from the slurry 16 tons of coal per hour at 7.5 per cent ash. The tailings at 75 per cent ash will be disposed of as described.

The equipment used in this process is manufactured by the Western Machinery Co. of San Francisco, Calif.

New Hiller E4 Helicopter On Commercial Market

A new four-place business and utility helicopter, sister ship of the Hiller 12 E, widely used in construction, will go on the commercial market this fall, according to an announcement made by the Hiller Aircraft Corp. Designated the Hiller E 4, the 4-place helicopter is powered by a 320 hp Lycoming engine, a more powerful version of the same engine that lifted a 12 E copter to a world record rescue at 18,000 feet on Mt. McKinley, Alaska earlier this summer.

With more usable power than any 4-place copter, the E 4 is the only four-place business version in the U. S. with the performance to climb vertically when fully loaded. The E 4's verified climb rate is 820 feet per minute. For information on dealers or chartered helicopter services, write Commercial Division, Hiller Aircraft Corp., Palo Alto, Calif.

Cleveland-Cliffs Iron Co. Announces Expansion

Cleveland-Cliffs Iron Co. has announced plans for a 900,000-annual ton expansion of the production of high grade pellets from low grade iron ore at the Republic Mine, Republic, Mich.

This expansion closely follows that of the Humboldt Mine which is about to go into production — part of a program by Cleveland-Cliffs and partners to meet the needs of the iron and steel industry for a high grade blast furnace feed from the Lake Superior region. In the process, low grade iron-bearing rock is upgraded in iron content and shipped in the form of hard, marble-sized pellets. Both the Humboldt and Republic Mines will be using *Grate-Kiln* agglomeration equipment developed and manufactured by Allis-Chalmers.

CLASS NOTES

(Continued from page 39)

FRED J. GRUBERTH, analyst, Coordinating and Planning Department, Continental Oil Co., lives at Apt. 14, 8332 Hammerly Blvd., Houston 24, Texas.

ARTHUR V. KANE has moved from Coalinga, Calif., to 619 A St., Taft, Calif.

J. J. SWIFT's address is 16 East 15th St., Tulsa, Okla.

1956

RALPH ARMSTRONG is sales engineer for Cuba Consolidated Ind. with mailing address 245 Castro St., San Francisco 14, Calif.

DAVID C. BROWN lives at 21841 Central Park Ave., Park Forest, Ill.

C. A. DENNISON, JR., has been transferred from Casper, Wyo., to Rangely, Colo., where he may be addressed c/o The California Co.

JOSEPH R. DUNBAR has moved from Sidney, Nebr., to 1708 Salisbury Ave., Cody, Wyo.

KARL WILLIAM JEFFERS, junior engineer with Shannon & Wilson, Soil Mechanics & Foundations Engineers, lives at 1043 E. 114th St., Seattle, Wash.

RONALD L. LEWIS lives at 2803 S. Bandera, Wichita Falls, Texas.

CARL R. PIERCY is sales representative for Dearborn Chemical Co. with mailing address 807 Mateo St., Los Angeles 23, Calif.

1957

RUSSELL M. CORN, formerly of Arvada, Colo., gives his mailing address as P.O. Box 2070, Tucson, Ariz.

CECIL I. CRAFT, JR., who was living in Alice, Texas, may now be addressed c/o Shell Oil Co., 2119 Bagby St., Houston, Texas.

E. A. KRISHER has moved from North Highlands, Calif., to 178 Santa Clara Ave., Oakland 10, Calif.

RALPH T. SIMERMEYER, formerly in Company C, 17th Engr. Bn., Ft. Hood, Texas, is now living at 551 S. Gary Pl., Tulsa 4, Okla.

MELVIN M. SMITH is geophysical supervisor for Dhofar-Cities Service Petroleum Corp. with mailing address P.O. Box 1201, Steamer Point, Aden.

MARK J. WALTCH is vice president, Beacon Construction Co., Inc. with address 20 Orient Ave., Newton Centre 59, Mass.

1958

R. M. HAMILTON lives at 1741 Cedar St., Berkeley 3, Calif.

R. S. HUFSTEDLER's new address is 724 Pennsylvania Ave., Norfolk 8, Va.

RICHARD P. KELLENBENZ, formerly of Casper, Wyo., gives his new mailing address as P.O. Box 1519, Texaco Employes, Houston 2, Texas.

HARVEY P. O'BRIEN may be addressed c/o Orinoco Mining Co., Puerto Ordaz, Estado Bolivar, Venezuela, S.A.

PETER J. SANGER has moved from Englewood, Colo., to 1165 Grant St., No. 302, Denver 3, Colo.

1959

IVAN D. ALLRED, JR., is living at 229 N. Pennsylvania, Casper, Wyo.

J. MICHAEL BLACKWELL is director of construction, Special Programs Naval Station, Kodiak, Alaska. His mailing address is Box 30, Navy Nr. 127, c/o Postmaster, Seattle, Wash.

2ND. LT. RUSSELL E. BLOM has moved from Manhattan, Kans., to 1024 W. 5th, Junction City, Kans.

LARY G. CAHILL, metallurgist at AS&R Co.'s Tacoma smelter, lives at 601 S. Jackson Ave., Apt. 3, Tacoma 66, Wash.

WALTER S. CASE, JR., has moved from El Paso, Texas, to 615 Carrie, Killeen, Texas.

EDWARD A. COE, formerly of Riverdale, Ill., lives at 812 W. Huntington Dr., Apt. 13, Arcadia, Calif.

CHARLES H. COTTERELL, 4260 S. Fox St., Englewood, Colo., is assistant physicist at Ohio Oil Co.'s Denver Research Center. He writes that both C. O. Smith, '59, and R. D. Koehler, '59, are presently employed by Geophysical Service, Inc. of Dallas, Texas.

CLIFFORD R. CRAVEN has moved from Farmington, N.M., to 1607 E. Maple, Midland, Texas.

MARCIAL GARCIA is working in the Geology Department, Cerro de Pasco Corp., La Oroya, Peru. Norman R. Zehr, '56, writes that Marcial and other company geologists are trying to develop a high grade copper deposit at the Cobriza Mine located in the lower part of the Peruvian Sierra about 12 hours by road from Cerro de Pasco's management camp at La Oroya.

CHARLES A. HASKIN gives his mailing address as c/o The California Co., P.O. Box 33, Glenburn, N. Dak. He lives at 2502 4th St. NW, Minot, N .Dak.

JOHN M. LANGSKOV, 1338 Bleistein, Cody, Wyo., has been appointed to the position of civil engineer, Shoshone National Forest.

FRED A. KUMPF has moved from Odessa, Texas, to 1000 H. Linam, Hobbs, N.M.

RODERICK W. MACDONALD, patent examiner for U.S. Patent Office, lives at 2016 N. Adams St., Apt. 810, Arlington 1, Va.

JAMES L. PAYNE has moved from Salt Lake City, Utah, to 3708 Brave Ave., Bakersfield, Calif.

DAVID L. SMITH, formerly of Hurley, N.M., has moved to 1802 N. Towner, Santa Ana, Calif.

JAMES R. SWAISGOOD is geological engineer for Blair-Westfall Associates with mailing address 1558 Brooks, Apt. 4, Fresno 5, Calif.

LOWELL I. THOMAS, looper with Bethlehem Steel Co., lives at 22901 57th West, Mountlake Terrace, Wash.

WILLIAM WHITE's mailing address is Rt. 1, Box 573, Golden, Colo.

1960

KNOLLYS A. AHLOY lives at Main Rd., Diego Martin, Trinidad, W. I.

WILLIAM A. ANDERSON is employed by Richfield Oil Co. and lives at 2116 Chapala St., Santa Barbara, Calif.

GERALD J. BAGAN's address is 1240 St. Paul St., Denver 6, Colo.

RONALD D. BAKER, petroleum engineer for Carter Division, Humble Oil & Refining Co., lives at 415 N. Walnut, St. Elmo, Ill.

HARRY L. BALDWIN, JR., geophysicist with the U.S. Geological Survey, lives at 2200 Jackson St., Golden, Colo.

ROBERT M. BECKER is with the U.S. Bureau of Mines. His address is 10050 W. 8th Pl., Lakewood, Colo.

RICHARD E. BLODGETT, JR., receives mail at Box 186, Jerome, Ariz.

JOHN A. BOWLER, III, lives in Vernal, Utah.

BRADLEY K. BOYD, whose home is Stromsburg, Nebr., is employed by General Electric Co. at Richland, Wash.

CHARLES L. CARPENTER lives at 517 S.W. 42nd St., Des Moines 12, Iowa.

ALVA M. CASTER, assistant petroleum engineer with the North Dakota Geological Survey, lives at 1807 S. 10th St., Grand Forks, N. Dak.

ROBERT R. CEDERSTROM may be addressed c/o American Smelting & Refining Co., Silver Bell, Ariz.

RICHARD A. DANIEL is mill metallurgist at Kennecott Copper Corp.'s Hurley, N.M. plant. His P.O. Box No. is 311.

JAMES C. DORIAN, JR., is employed by U.S. Gypsum Co. with address 4223 Leimert Blvd., Los Angeles 8, Calif.

ALBERT L. DUGGER's address is c/o American Smelting & Refining Co., Baltimore, Md.

NEIL ROGER EVERETT is salesman in training for Standard Oil Co. of Indiana. He lives at 2404 Forest Dr., Apt. 7, Des Moines, Iowa.

JOHN F. EVERS has changed his address from Green River, Wyo., to c/o The Atlantic Refining Co., Odessa, Texas.

CLYDE W. FROST may be addressed c/o Colorado Fuel & Iron Corp., Pueblo, Colo.

EDUARDO GABRIEL, receives his mail at Cassilla 2049, La Paz, Bolivia, S.A.

DAVID R. GILBERT lives at 9140 Edgewater Dr., Tacoma, Wash.

JOSEPH C. GOLDHAMMER's home address is 382 Harris Rd., No. 5, Hayward, Calif. He is civil engineer with Alameda County Flood Control.

RICHARD V. GOOD lives at 309 Wyoming St., Dayton 10, Ohio.

JAMES F. GREEN, JR., may be addressed at 526 Ensign, Fort Morgan, Colo.

ROBERT E. GREEN is engineer in training for ASARCO with address c/o General Delivery, Silver Bell, Ariz.

A. LAWRENCE HOLMES, JR., gives his mailing address as c/o Mrs. E. E. Holmes, Brainard, N. Y.

JOHN R. SMITH gives his address as Box 216, Stratton, Colo.

KENNETH L. SPALDING lives at 1734 S. Grandridge Ave., Monterey Park, Calif.

A. SCOTT TURNER is employed by Ingersoll-Rand Co. with address Manor Road, Monkton, Md.

M. L. WEST may be addressed c/o Aluminum Co. of America, Rockdale, Texas.

ALBERT H. WIEDER, II lives at 1234 S. Gilpin St., Denver, Colo.

EDWIN E. WING's address is 4041 S. Cherokee St., Englewood, Colo.

JIMMY U. YU gives his address as 867 R. Papa St., Manila, Philippines.

DONALD R. ZELINKOFF lives at 909 Madison St., Denver 6, Colo.

BOOK REVIEWS

Principles of Geochemical Prospecting

By I. I. Ginzburg. Translated from the original Russian by V. P. Sokoloff. Pp. 311; Pergamon Press Inc., N.Y., 1960. Price $11.50.

Reviewed by Harold Bloom, special lecturer, Geology Department, Colorado School of Mines.

This book should more properly be titled "Principles of Geochemical Prospecting for Non-Ferrous Ores and Rare Metals," and one would not need to wonder whether petroleum prospecting was also included in this volume. Nevertheless, here is the most comprehensive volume yet to appear on this subject.

Since the early 1930's the Russians have been accumulating an enormous amount of data and have succeeded in assembling it into a well organized treatise on the subject. The coverage includes a history of prospecting, a description of their analytical methods, and a comprehensive presentation of the geochemical principles governing the mobility of metals.

Some of these subdivisions deal with: Geochemical Tracers, Accumulation of Metals in Igneous, Metamorphic, Sedimentary Rock, and in Unconsolidated Overburden. Prospecting techniques are presented for seeking deposits in varying environments such as: 1) Deposits without Surface Outcrops, 2) At the Surface of the Overlying Mantle, and 3) Bedrock. Hydrogeochemical, Biogeochemical and Geobotanical Prospecting are among the other subjects treated that are well documented. Their sources are mostly drawn from the Russian literature, with only a sprinkling of outside publications. An extensive bibliography, again consisting mainly of Russian sources, most of which are not available to us, is arranged for each chapter.

V. P. Sokoloff has done a very creditable job of translating this into understandable English. I am sure people engaged in exploration will want to own a copy of this book.

Engineering Index

The Engineering Index, 1959; 75th edition; published by the Engineering Index, Inc., 29 W. 39th St., New York, 18; 1532 pages, bound, $70 postpaid. Edited by Carolyn M. Flanagan and a corps of qualified engineering editors.

The book contains over 39,100 annotations of articles reviewed in some 1700 publications of engineering, scientific, and technical societies; engineering and industrial periodicals, and publications of government bureaus; engineering experiment stations, universities, and other research organizations. The Index is arranged under 249 field of interest Divisions of Engineering; 710 technical publications reviewed come from 44 countries and about 1000 from the U. S.

The Engineering Index Volume is comprehensive, covering all applications of engineering methods and concepts to industry, agriculture, mining — the entire economy. Reference to back issues on file in most public libraries provides a means of promptly tracing the progress in almost any department of engineering.

NBS Metallurgical Conference

NBS Metallurgical Conference, Summary Technical Report STR 2475, April, 1960, U. S. Department of Commerce, NBS Office of Technical Information, Washington 25, D. C.

A metallurgical conference was held at the National Bureau of Standards on March 31. It was attended by more than 100 representatives of industrial, academic, and government laboratories. At a technical session, Bureau staff members reported on fundamental research in metals now under way at NBS. The session was followed by a display of instruments recently developed to assist in studies of the properties of metals.

St. Lawrence Seaway

St. Lawrence Seaway and the Canadian Mineral Industry, Mineral Information Bulletin MR 40 (Mines Branch Publication Distribution Office, Ottawa, Canada), by R. B. Elver; price 25 cents.

In this report, the author has attempted to evaluate the effect that the St. Lawrence Seaway has had on the Canadian mineral industry during the first season of operation of this great inland water route. Since iron ore is the most important mineral commodity that will generate toll revenue, a large proportion of this study is devoted to the iron ore industry.

ADVERTISERS' LISTINGS

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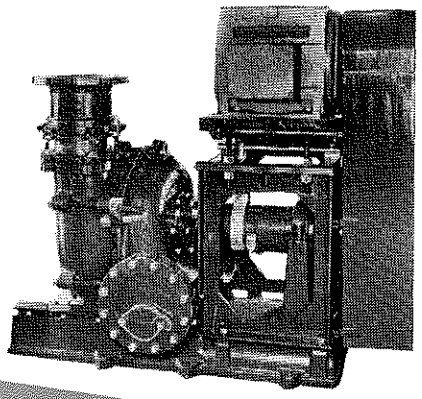
Price alone does not determine the actual value of a pump. Quality, efficiency, never-failing dependability . . . these are the prime factors a pump **must** have to give you **true** pumping economy. They pay off in low operating costs month after month, year after year.

WILFLEY SAND PUMPS guarantee true pumping economy through CONTINUOUS, MAINTENANCE-FREE SERVICE, LONGER PUMP LIFE, QUICK, EASY REPLACEMENT of PARTS, and MAINTAINED HIGH EFFICIENCY.



Wilfley Sand Pumps may be fitted with interchangeable electric furnace alloy iron, special application alloys or rubber-covered wear parts. Write, wire or phone for complete details.

Every Wilfley Installation Is JOB ENGINEERED

Wilfley Sand Pumps
"Companions in Economical Operation"
Wilfley Acid Pumps

A. R. WILFLEY AND SONS, INC.

Denver, Colorado, U.S.A. P.O. Box 2330
New York Office: 122 East 42nd Street, New York City 17, N.Y.