Back in 1923, the New Cornelia Copper Company of Ajo, Arizona, installed their first battery of Marcy Open End Rod Mills. The installation consisted of twenty 6' x 12' units. These Marcy Open End Rod Mills prepared hard copper ore of 3/8" size for selective flotation. The management was pleased with their grinding efficiency and high operating time.

In 1928, this company wanted greater capacity quickly and at low cost and due to the simple design of Marcy Open End Rod Mills, the shells of their mills were lengthened by three feet which resulted in an immediate increase of 25% in grinding capacity.

In 1929, favorable metal prices dictated a further increase in grinding capacity, and their previous experience and complete satisfaction with Marcy Open End Rod Mills caused them to order twelve more units, which are now being installed.

You, too, may profit from their experience. Get the facts by writing for Bulletin No. 73.
The TRAYLOR Vibrating "Screen Supreme" is constructed to handle a full load, running at top speed without transmitting any vibration to the screen supports or building.

You should see one of these screens in operation, they are sturdy, compact and require less attention with full surface vibration insuring more profit at least cost.

Write our engineers for information, they are always glad to help with screening problems.

1400 Delgany St. THE TRAYLOR VIBRATOR CO. Denver, Colo.
Your Choice of a Summer School—

First: The summer school you choose should be the school that specializes in teaching what you want to be taught.

Second: The summer school you choose should be the school that is located in a pleasant summer climate, conducive both to good health and study.

The Colorado School of Mines,
A Summer School for Engineers—

At the very entrance to the Denver Mountain Parks, and only twelve miles from the City itself, Golden, the home of the School of Mines, offers to the summer student the advantages of outdoor recreation and the diversions to be found in a large city.

The Colorado School of Mines,
A Pleasant Place for Summer Study—

Engineering students who wish to make up work or gain advanced standing during the summer are invited to write for the Summer Session Bulletin. High School graduates deficient in entrance requirements demanded by engineering schools can make up such deficiencies during the summer.

Come to Cool Colorado to Study!

For information regarding the Summer School for Engineers, write the DIRECTOR OF THE SUMMER SESSION, at Golden, Colo.

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Economy in Mineral Exploration means practical application of Geophysical Instruments

Askania Geophysical instruments have been successful in assisting geologists and mining engineers to locate iron, copper, zinc, lead, coal and salt deposits in many districts throughout the world. They remove doubt, eliminate unprofitable borings and speed up exploration work. They have proved through the test of time the accuracy of their analysis.

We are making and selling for geophysical work: Eötvös torsion balances with photographic and visual reading (large and small types), magnetometers, seismographs and other scientific instruments.

For particulars write

American Askania Corporation
1024 Marine Bank Bldg., Houston, Texas
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The Chemistry Building is the first building of the Colorado School of Mines. Two additions were made to this building so that the structure that stands now on the original quadrangle is made up of three joined buildings.

This vine covered building holds many tales of failures and successes. Its walls have seen romance flowered and tragedy reign. What tales of humor and pathos could it tell if it were able to write its history of our School. And what memories does every student hold of its glamour. For within its walls are the first year men introduced to the requirements that Mines asks of the men that would carry her name into the world.

Now the building has seen its walls stretched to allow all the men that desired training within its embrace and it calls sorely to furnish larger quarters for its adopted sons.

To assist the Alumni Association of the School to carry on its work in this direction the following firms of Golden have contributed this page:

THE RUBEY NATIONAL BANK  THE GOLDEN FIRE BRICK CO.
JEFFERSON COUNTY REPUBLICAN  COLORADO CENTRAL POWER CO.
ROBINSON'S BOOK STORE  COLORADO TRANSCRIPT

The use of the Lowden Dryer means the lowest costs for labor, maintenance and power. Lowden Dryers are made in a number of sizes and to meet any conditions as to capacity and moisture elimination.

Ask for pamphlet 28-B, or better, send us full data on your drying problems and permit us to make recommendations and quote prices.

Another Colorado Mill

Shenandoah-Dives 300-ton Amalgamation Flotation Mill at Silverton, Colo.
Building designed with sufficient space for installation of second 300-ton unit.

The Lowden Dryer

FOR FLOTATION CONCENTRATES

A Lowden Patent Dryer will enable you to ship dry concentrates. It will save you freight loss due to shipping water. With the Lowden Dryer you can reduce the moisture content as low as desired. Most important of all, it dries without dusting, and therefore absolutely without dust losses. The Lowden dries those sticky, troublesome concentrates—which formerly caused so much extra labor—both rapidly and efficiently.

A Lowden Dryer following a Rotary Filter forms a perfect combination for the finishing of concentrates. There is no dewatering or balling. The dried material is delivered in ideal condition for smelter treatment. The Lowden Dryer does away with all handling of material while in a sticky condition.

The Lowden Patent Dryer is standard the world over.

For further information, write to:

THE LOWDEN DRYER
FOR FLOTATION CONCENTRATES

...
“HELLO-HELLO. Long distance speaking. Hold the line, please, here’s a call from Golden, Colorado.”

Colorado School of Mines Commencement exercises will be held May 16. Commencement time is when the Alumni hold their regular annual meeting.

The Alumni Banquet is scheduled for May 15, the day before the Graduates of 1930 receive their diplomas. As usual, this banquet will be held at the University Club in Denver.

Scott Turner, director of the Bureau of Mines, is the Commencement speaker. He will be a guest of honor at the Alumni banquet. Come on and help welcome him.

The election of officers will be a part of the business at the May 15 meeting. If you can’t come, fill out and mail in your ballot.

A big program for Commencement will be announced in the May issue, which will be mailed out in time to reach you before the fifteenth. Among the things to look forward to is the Annual Banquet, the Commencement address by Scott Turner, and the Junior Prom.

“HELLO-HELLO! Yes, you are invited to come back for the 1930 Commencement.”

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**Power Castles in Spain**

Spain, which has housed many of her hydroelectric installations in veritable architectural castles, has invested 2,500,000,000 pesetas (about $500,000,000) in the development of this, her foremost industry.

By closing a circuit breaker in a switching station at Central de Camarasa, 12 miles away from the source, one man will add 10,000 kw-a. to the capacity of that particular power castle—when two waterwheel generators, switchgear, and transformers built and tested this year by General Electric are put in operation. This installation will be the only automatic supervisory control installation outside North America and Japan.

Waterwheel-generator testing and study are among the assignments of recruit Test men—recent engineering college graduates. Under the supervision of an experienced “Head of Test,” they carefully adjust for, and note responses to, such tests as core losses, friction losses, windage, heat runs, and high-speed runs. A valuable foundation is thus laid for industrial, sales, research, general, or miscellaneous engineering work.
A young man is graduated from high school with the desire to become an engineer, and the broadening process is, of course, desirable. Whether a man is a roustabout in the field, a student in college, or a member of the training school of some great corporation, this observation of employees continues and the incompetent, regardless of ability, sooner or later are numbered with the unemployed.

All eight-week courses will begin June 14. Summer School closes August 22. The School of Mines now conducts the "engineering summer school of the Rocky Mountain region," and the extension of its trade.

In the selection of men for professional or industrial work, the most potent factors are there. It is through these factors that an organization exercises a selective process. This selection means elimination of the unfit which results in a better product.

The process of selection is not only in evidence at the time of employment, but is continuous thereafter. Whether a man is a rookabot in the field, a student in college, or a member of the training school of some great corporation, this observation of employees continues and the incompetent, regardless of ability, sooner or later are numbered with the unemployed.

The purpose of this selection is the same in each instance: that is, to determine individual qualities in a man which later will determine his ability, leadership and strength of character. These qualities being determined, nine cases out of ten the principle promotion or dismissal naturally follows.

There is no such thing as Madam Luck in the actual accomplishment of things worth while in this game. The choosing of the right opportunity as it presents itself may be termed luck by some, but in the final analysis it is the exercise of good judgment. The result of the famous Carson litigation is one example. The reputation of these two terms. A school child, on being asked to define these terms, wrote: "Character is what we mean: Character is what we are; Reputation is what people think we are. Character we have; Reputation we make." This is not a half bad definition, if we qualify it in a few respects.

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Endowment for a Greater School of Mines

What Endowments Have Done for Other Schools Throughout the Country

The Mines Alumni Association was organized primarily for the promotion of greater friendship among those who have been trained as engineers at the Colorado School of Mines. This Association, however, is something more than a social organization, and its activities in furthering the engineering profession have met with much success.

In building a greater School of Mines, the Alumni feel that they are contributing to the advancement of the mineral industries. It has been this desire to build which has prompted Mines men to sponsor the Colorado School of Mines Foundation Plan. This plan has provided a regular channel through which gifts and other donations may be received and administered for the employment of the best teachers, the production of the most fruitful research, and for the construction of more adequate buildings.

The sponsoring of the Foundation Plan is the most significant task that has ever been undertaken by the Mines Alumni Association.

Harvard's Endowment

The full significance of what this plan may mean to the School of Mines in future years, may be gleaned from the Harvard's new housing plan for undergraduate students; the majority of these are western schools but none of them are from the Rocky Mountain group. Two Rocky Mountain colleges have over one million endowments and even these are not state institutions.

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Not Impossible for Mines

A million dollar endowment for the Colorado School of Mines seems a remote dream now, but it is not an impossibility. The School has numerous friends in the mineral industries who are willing to support it. Each and every endowment is a step forward in the direction of securing the assistance. The Foundation plan is new, and few realize that Mines Alumni have undertaken to endow their School. Greater success will come in time as the Alumni make their purpose known. There is no reason why an endowment for a greater School of Mines has built cannot be considered worthy of its friends' generosity.
method for separating a soluble compound of zinc from ores and concentrates. Unfortunately, however, chloride solutions are difficult to handle, and are particularly troublesome in electrolysis, so that this roast is not of immediate value.

The reducing roast is very little used; its chief application is in treatment of silicates and ferruginous substances: 

\[ \text{CuS} + \text{CO} \rightarrow \text{CuO} + \text{SO}_2 + \text{CO} \]

or 

\[ \text{ZnS} + \text{CO} \rightarrow \text{ZnO} + \text{SO}_2 + \text{CO} \]

Of late years the production of base-metal sulfates has attained some importance. In almost any normal oxidizing roast a certain amount of SO\(_2\) is formed in the gases in contact with the gas; and the oxidation of SO\(_2\) is undoubtedly due to the catalytic action of certain of the solid surfaces; and since the trioxide begins to break down rapidly only after considerable amounts of sulfate may be formed in slowly rabbled, readily cool portions of a roasting mass. Taking advantage of these facts, considerable work has been done on the production of water-soluble zinc sulfate from concentrates and ores, and of copper sulfate from matte by means of the concentrative roast, and the split-draft roast. The reactions taking place can be conveniently represented by:

\[ \text{ZnS} + \text{O}_2 \rightarrow \text{ZnO} + \text{SO}_2 \]

\[ \text{FeS} + \text{O}_2 \rightarrow \text{FeO} + \text{SO}_2 \]

Another method of forming sulfates which has come into importance recently is that of utilizing the direct action of very hot, concentrated sulfuric acid on certain metallic compounds, notably “zinc ferrate” (ZnFe\(_2\)O\(_4\)), a common compound which is formed in zinc roasting. These reactions are mentioned under various names, such as Skinner, McDiuplag, Evans-Klepetko, Wedge, Herreshoff, etc. Figure 1 shows the direct production of water-soluble zinc sulfate from concentrates and ores, and of copper sulfate from matte by means of the concentrative roast, and the split-draft roast on a practical scale. These reactions are of considerable importance in the future in connection with the production of base-metal sulfates for hydrometallurgical purposes.

2. THEORY OF ROASTING

In any roasting reaction we have to deal with a polyphase system. That is, we have one or more kinds of gas, one or more kinds of gas, and a liquid or solid phase, and a liquid phase. Hence we have what is known as a heterogeneous system, or a system of more than one phase.

To take the simplest case, suppose we are dealing with the reaction between ZnO and air. By experiment we find that, once this solid/gas system is heated to a sufficient temperature (about 650°C), the oxygen of the air reacts with the solid, producing ZnO and SO\(_2\). If some iron is present (as pyrite, for instance), other reactions may take place, not only in the solid, but in the gas phase as well. Two points may be noted at once: however; first, the temperature must be kept above a certain minimum point; and second, the reactions evolve heat, is exothermic.

Now if we take particles of different sizes, and heat them together, in contact with air, we notice that the smaller ones ignite at a lower temperature than do the larger particles. Further, if we take particles of uniform size, but of different materials, we notice that some minerals ignite at a much lower temperature than others. In a general way, it may be said that the ignition temperatures of the various minerals stand in about the same order as their molecular heats of formation (q.v.), for uniform grain size.

In brief, we are dealing with a system in which the reaction takes place at one or more surfaces, or interfaces, between different phases. The heat evolved is an approximate measure of the "usability", and the temperature is a measure of the intensity factor, or the "push" required to start the reaction (energy change) going. Evidently, then, since we are concerned with a reaction at a surface, it follows that the greater the surface exposed in proportion to the masses involved, the faster the reaction will go. Hence in roasting we should try to have the particles as small as possible. The lower limit to grain size must then be determined by economic factors, such as cost of grinding, dust loss, etc.; and the optimum grain size for a given case, usually represents a compromise between the metallurgist and the treasurer. Incidentally, this condition will be found to obtain throughout all industry.

The initial reaction takes place at the exposed surface of the solid particles; but almost immediately that surface is altered from sulfide to oxide and is covered by a layer of the gaseous reaction product, SO\(_2\). Before the reaction can be considered as proceeding, it is necessary that the reaction may take place in order that fresh air can come to the next underlying sulfide surface. Furthermore, this air must penetrate through the outer layers of oxide and reach the inner sulfide surface. Once this is accomplished, the SO\(_2\), N\(_2\), and other gases must diffuse out again through the oxide layers before they can be swept away to make room for more air. Thus, as the roast proceeds, the reaction rate must become slower and slower, since diffusion is not a rapid process at best, and since all the pores, or channels,
through the oxide layers must carry two-way traffic without the aid of any such master minds or mechanical devices as preside over our street intersections.

The actual conditions in a roasting furnace are still more complicated by the fact that the solid particles are not isolated from each other, nor is there free access of air to all particles on all sides. The particles, usually lying in a bed, several inches deep, on the hearth of the furnace. Hence, in that all particles may roast at somewhat different rates, due to the same cause, stirred, or roasted. Here again, theory would call for a rate of stirring which would permit an adequate decrease in temperature, dust loss, and other costs without rapid rate of roasting. So, again, each case must be determined by a balance between the ideal and the practical. The ideal furnace would consist simply of a shaft, or other space, in which the solid particles could fall freely, or be injected by air blast (as in firing pulverized coal) in such a way that no two particles would touch, and all would have the same exposure to the gases.

Since not only the rate, but also the extent, of a roast depends upon the gas relations through the pores of a particle, it follows that the density (concentration of matter) of the solid must be of importance. Thus magnetite, FeOx, is more dense than hematite, Fe₂O₃; and by the same token magnetite is reduced at about one-half the speed of hematite by hydrogen, for equal weights, and of equal specific surface. In this case, a porous roasting bed, the density of the solid product is the important factor; if the oxide formed is of low porosity, then the rate of movement of gases to and from the active surface will be slow, and the roast must be slow. Of course, sintering must also be avoided, since this produces an impervious surface, and blocks all further action.

Rise of temperature increases the rate of all chemical reactions. Hence the higher the temperature, below the temperature of melting point, the faster the roasting reaction. The limiting factors here are fuel cost and the production of undesirable compounds. Thus in roasting zinc concentrates containing iron, the ferrous oxide and iron oxide formed combine rapidly above 750° to form zinc ferrate, which is not desirable compound. Thus in roasting zinc concentrates containing iron are: (1) the temperature of the ore bed, (2) the time of roast, (3) the physical condition of the particle, (4) the chemical nature of the particle, (5) the rate of air feed, and (6) the temperature of the gas. The interaction of all these factors leads to a lack of direct proportionality to time of roast. To simplify the case, however, we may assume that we are dealing with a first-order reaction in a heterogeneous system; that is, we assume, for the instantaneous velocity of reaction, at any time, t, measured from the start of the reaction,

\[ \frac{dx}{dt} = KS(1-x) \]

where \( x \) represents the extent of conversion (say of sulfur to oxide) at time \( t \) to the oree, or bed (exothermic reactions). In the case of a theoretical, or ideal, curve of reaction in roasting a Pervious Zinc Concentrate of composition

\[
\begin{align*}
\text{Zn} & \quad 51.4\% \\
\text{Fe} & \quad 8.5\% \\
\text{Fe₂O₃} & \quad 1.3\% \\
\text{Cu} & \quad 3.6\%
\end{align*}
\]

an average temperature of 1370°F. The wide departure from the theoretical during the early stages of the roast is due to the fact that the new, or converted, iron oxide formed is of low porosity, thus slowing down the rate of movement of gases to and from the active surface, and the roast must be slow. Of course, sintering must also be avoided, since this produces an impervious surface, and blocks all further action.

In a roasting bed, the rate of reaction depends upon the percolation of gases through the pores of a solid particle, it follows that the velocity of reaction, at any time, \( t \), measured from the start of the reaction,

\[ \frac{dx}{dt} = KS(1-x) \]

At the temperature or "isothermal" process. That is, over any period of time, the heat lost must equal the heat gained; and by proper analysis and calculation we may set up a "heat balance" sheet for the process. For convenience of calculation, then, we may list the thermal items involved as follows:

- **(a) Thermal Assets; Heat Gained—**
  2. Heats of reaction occurring on or ore bed (exothermic reactions).

- **(b) Thermal Liabilities; Heat Lost—**
  1. Absorbed in drying and heating solids.
  2. Absorbed in drying and heating air.
  3. Heats of reaction in or on ore bed (endothermic reactions).
  4. Carried out of furnace in hot gases.
  5. Lost by radiation and convection.

In other words, a heat balance sheet is to the metallurgist what a financial balance sheet is to the accountant: it shows not only distribution, but condition as well.

Considering first the debit items, we note that all except (0) and (6) fall in the class known as "sensible heat" or "heat content". Sensible heat means physical heat (as distinguished from chemical heat, or heat of reaction), and is calculated by multiplying the weight of material by the temperature change and by the specific heat. Specific heat (a constant at all,—for all known substances. Hence, in calculating involving large temperature changes we know the general trend of a roasting reaction along an exponential curve is helpful in interpreting the observed roasting action. In an actual roasting operation postulates the existence of ideal conditions which may be approached, but never attained in practice. None the less, the realization of what a financial balance sheet is to the accountant: it shows not only distribution, but condition as well.

It should be noted that the relation

\[ \frac{dx}{dt} = KS(1-x) \]

holds only for constant temperature. As a matter of fact, the heat of reaction is not constant throughout a reaction, but increases, or decreases, with the temperature. The iron oxides act as preside over our street intersections.
School Given Model Furnaces

Used in the Carson Patent Litigation

The Anaconda Company fought its own case for three and a half years, from August 17, 1921, against the American Smelting and Refining Company, which was later joined by the Anaconda Company. The litigation was to determine the validity of Carson's patents. The Carson Investment Company was organized to defend the patents, and from that time there was no lack of funds. According to the newspapers, the total sum that Carson and his associates are entitled to receive from the smelting companies may amount to as much as $20,000,000. Anaconda alone was sued for $15,000,000. The courts, however, decided that the damages in each case should be determined by estimating the additional earnings due to the use of the furnace feeding system covered by the patents. For some time past the Anaconda company has been conducting tests on two furnaces for this purpose. One of the furnaces is fed from the side, as specified in the patents, and the other from the center. The tests are being carried out under the supervision of a third party.

The American Smelting and Refining Company has just announced, in its annual report for 1929, that it had effected a settlement with the Carson Investment Company for $1,059,585, which includes also the right to use the patents until their expiration. Adjustments have been and are now being made with a number of other companies, but in most cases no details are published.

George Campbell Carson was an old time prospector and inventor whose home is in California. He does not seem to have had any practical experience in copper smelting, but claims to have erected and operated an experimental reverberatory furnace at Berkeley. He applied for his first patent on Jan. 15, 1907. It was a long time, however, before the Government could see any merit in the application, and the patent was not granted until Aug. 10, 1915, more than eight years after it had been filed. Another patent was granted on April 20, 1919.

The first suit was started on August 17, 1921, against the American Smelting and Refining Company, which was later joined by the Anaconda Company. The litigation was to determine the validity of Carson's patents. The Carson Investment Company was organized to defend the patents, and from that time there was no lack of funds. According to the newspapers, the total sum that Carson and his associates are entitled to receive from the smelting companies may amount to as much as $20,000,000. Anaconda alone was sued for $15,000,000. The courts, however, decided that the damages in each case should be determined by estimating the additional earnings due to the use of the furnace feeding system covered by the patents. For some time past the Anaconda company has been conducting tests on two furnaces for this purpose. One of the furnaces is fed from the side, as specified in the patents, and the other from the center. The tests are being carried out under the supervision of a third party.

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George Campbell Carson was an old time prospector and inventor whose home is in California. He does not seem to have had any practical experience in copper smelting, but claims to have erected and operated an experimental reverberatory furnace at Berkeley. He applied for his first patent on Jan. 15, 1907. It was a long time, however, before the Government could see any merit in the application, and the patent was not granted until Aug. 10, 1915, more than eight years after it had been filed. Another patent was granted on April 20, 1919.

The first suit was started on August 17, 1921, against the American Smelting and Refining Company, which was later joined by the Anaconda Company. The litigation was to determine the validity of Carson's patents. The Carson Investment Company was organized to defend the patents, and from that time there was no lack of funds. According to the newspapers, the total sum that Carson and his associates are entitled to receive from the smelting companies may amount to as much as $20,000,000. Anaconda alone was sued for $15,000,000. The courts, however, decided that the damages in each case should be determined by estimating the additional earnings due to the use of the furnace feeding system covered by the patents. For some time past the Anaconda company has been conducting tests on two furnaces for this purpose. One of the furnaces is fed from the side, as specified in the patents, and the other from the center. The tests are being carried out under the supervision of a third party.

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Interesting Geological Formation Near La Veta, Colorado

The scene pictured on the left is one of six views used in an article, "Some Interesting Geological Formations in Southern Colorado," which appeared in the March Magazine. It shows the "Devil's Stair Steps," one of the dikes radiating from the west Spanish Peak, near La Veta, Colorado. Through a typographical error the location of this and the other formations pictured in the March article was given as being near La Junta. This is a much regretted error.

The composition of the gas in contact with the oil has a decided effect upon its absorptive power. Methane is the least soluble with Air and Hydrogen next. Ethane, Propane and Butane have progressive solubility, and Carbon Dioxide is the most soluble of the gases commonly associated with oil.

High gravity oils will absorb more of a given gas than low gravity oils. The solubility decreases with increased temperature. The presence of liquid gas in the oil decreases the density and increases power to absorb gases. The amount absorbed varies directly as the absolute pressure against which the gas is maintained, with the formation pressures.

Gas Absorptive Power:

As capillarity is affected by surface tension it is also dependent upon the pressure and temperature of the formation. The force of gravity and diameter of the openings are factors which principally affect capillarity. It might be said that capillarity is the property of a fluid which resists flow. Frictional resistance to flow, offered by an oil, depends principally upon its viscosity. It might be defined as, "The property of a fluid of which it resists flow."

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The special courses are so arranged that all geophysical methods of prospecting may be covered within one year. This has been done in order to accommodate graduate students who are sent to the institution by oil and mining companies. However, senior students of the Colorado School of Mines are well prepared for the special courses, the geophysics department offers a seminar and a class in geophysical research, for graduate students.

**Equipment**

The following equipment is available at the Colorado School of Mines for instruction in geophysics: Torsion balance; apparatus for the standardization of wires; two magnetometers for vertical and horizontal intensity; apparatus for standardization of same; an earth inductor; instruments for the determination of magnetic properties of rocks; mechanical seismographs for photographic recording, now being supplemented by electromagnetic type; short wave radios for time signal transmission; equipment for the self-potential, resistivity, D.C. equipotential, A.C. equi-potential, and electromagnetic methods; apparatus for the determination of resistivity of rocks and for model experiments; two sets of geophones; one emanation electrometer; one deep well temperature apparatus.

**Texts**

A set of mimeographed notes together with the text books by Jeffreys, Gutenberg and Humphreys, etc., are used during the first semester of the general geophysical course. In the second semester, the text books by Amburn and by Evе and Keys, together with a quarterly prepared by the Colorado School of Mines on "Geophysical Prospecting" are used. In this part of the course, extensive use is made of the volume on geophysical prospecting, prepared by the A. I. M. E., and other special geophysical publications. However, the instructor uses his own notes for the most part in each special course.

The text books mentioned above are also used in the following special courses and are recommended for the volume on geophysical prospecting, prepared by the A. I. M. E., and other special geophysical publications. However, the instructor uses his own notes for the most part in each special course.

**Model Furnaces**

(Continued from page 20)

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<th>Model Furnaces</th>
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<td><strong>Technical Paper 463 by A. S. Eve, D. A. Keys, and F. W. Lee</strong></td>
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In addition to the so-called special courses, the geophysics department offers a seminar and a class in geophysical research, for graduate students.

**Depth Attainable by Electrical Methods in Applied Geophysics**

Repeated experiments have firmly established the conclusion that there are several different electrical methods that can, under favorable circumstances, detect conducting mineral bodies underground, even when their presence could not be inferred by any other method than actual drilling. The primary objects of geophysical prospecting are to guide the mining engineer in such a manner as to avoid useless expenditure of time and money in drilling for ore or for oil at random and to select for him those definite points or localities in which ore or oil is likely to yield minerals in profitable quantities. Clearly, then, there must be close cooperation, rather than jealous competition, between mining men, geologists, and those applying the new methods of geophysical prospecting.

At conferences and public meetings the two questions that arise most often are those of depth attainable in geophysical prospecting and of cost; both are difficult to answer. Nevertheless, the question of the depth from which indications can be obtained is so fundamental that the Bureau of Mines decided to devote several months to its investigation. The results of the work done have just been published asTechnical Paper 463 by A. S. Eve, D. A. Keys, and F. W. Lee.

The entrance salary ranges from $2,600 to $3,100 a year. Applications for assistant geophysical technologists must be in charge of the Land and Geological departments of the Dixie Oil Company, Incorporated. Mr. Schneider will be in charge of the Land and Geological departments with headquarters in Tulsa, Oklahoma.

**Henry G. Schneider, '18**

Schneider's rise in the oil industry has been the result of steady and purposeful application. His affiliation with the Dixie Oil Company has made his practical experience gained in many of the major oil fields in the United States and South America. His work during this time brought him into close contact with operations in practically every department of the oil business. With such a varied experience, and the natural ability and training needed to make the most of it, Schneider's rise to the top among the oil men of the Mid-Continent field is not surprising. A splendid future lies before him.

Schneider was very active in campus affairs while attending Mines. He was captain of football in 1917 and played three years on the track. He was for one year a member of the School of Mines faculty.

**United States Civil Service Examination**

**Assistant Geophysical Technologist**

Applications for assistant geophysical technologist must be on file with the Civil Service Commission at Washington, D. C., not later than April 30, 1930.

The examination is to fill a vacancy in the Bureau of Mines, Department of Commerce, for duty in the field, and vacancies occurring in positions requiring similar qualifications, for duty in Washington, D. C., or in the field.

The entrance salary ranges from $2,600 to $3,100 a year. Higher-salaried positions are filled through promotion.

The duties are to design, develop, make drawings and layouts, write specifications, and supervise the construction and testing of new electrical, mechanical, acoustical, or visual apparatus required for geophysical prospecting.

Competitors will not be required to report for examination at any place, but will be rated on their education and experience.
WITH Denver clamoring for the school to be trans­ferred there, the State Legislature forced the Board to find some way to finance part of the current expenses of the school, and the Golden question was referred to a consulting committee consisting of two editors of the Denver papers and two of the mines of the Territory. It was learned that the Editor West and Editor Johnson of Denver had agreed to submit their plan for the location of the School of Mines to the residents of the Territory for their approval. The committee was called upon to make a report, and the plan was approved by a vote of 1,000 to 500. In addition, Editor West contributed $500 to the support of the school.

We have not been able to consult the minutes of the school meetings, but it is known that some positive benefit from the work of the school, including the collection of minerals and coals peculiar to Colorado, a natural history collection, and a large herd of native plants, was achieved during the earlier years of the school. During the last summer, the campus was first filled, and some $1,500 was expended on the school in the form of apparatus for instruction in chemistry and natural science.

All this brings the total cost, in money, to $6,072.45, to say nothing of the collections and apparatus that have been received as gifts, and which, if valued at their actual worth, would bring the present outlay up to at least $10,000.

And now, what is proposed?

The School of Mines, to be continued under the supervision of the Legislature, shall have an endowment of $5,000, and the Territory to put it into active working order, whereas the public purse should take care of the necessary apparatus for instruction in chemistry and natural science, and the second securing for the institution the favor of parents living at a distance.

As many of the mining schools thus far established have partially failed of complete success by reason of their distant location, and the advantage of close proximity to the mining districts of Colorado, being within easy reach of the schools, the board of trustees of the School of Mines cannot go on with its appropriate work, as the buildings, when completed, will be—instead of in Denver—where it ought not to be. In Golden, there is no place of education so near to the mines, and from the mines, and the second securing for the institution the favor of parents living at a distance.

The mining schools of Sweden, Germany and England are not failures—neither is Columbia College of New York, which was opened with young men who intend to remain in Colorado, and who could, were the latter school in operation, avail themselves of its course of study. We have no right to expect that the School of Mines alone could attract a great number of students, but it is in connection with other schools that are established near it that an endowment would be—was and was last summer—large enough to justify a fair appropriation from the State legislature. Governor Elbert, true to his reputation as a Territorial man, has taken an interest in this school, and may safely be relied upon to approve of any aid that our legislators, in the interest of mining and metallurgy depend for success, are those of the great body of students, to say nothing of the inconvenience entailed, or the lack of advantages that it could not possibly hope for were it located at a point distant from those schools.

The present building, of brick, two stories, with Mansard roof and tower—was put up in 1870-71, costing the Territorial Board $45,000, and the present estimate is $500 more. In addition to this cost there has been contributed or purchased for the school, since its erection, by the different mining districts of Colorado, being a few miles of the leading and successful metallurgical works of the State, which are the best methods of treatment of ore can be observed to advantage.

One editor advances the opinion that a wagon road might be worth more to the Territory than a school of mines, and, in order to support this enlightened position, he cites the advantages of personal investigation—the location of this school being so near to the point as convenient to a degree of usefulness that it could not possibly hope for were it located at a point distant from those schools.

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Alumnus Made General Manager, United Verde Copper

A well-merited promotion has been given to a Colorado School of Mines graduate in the naming of V. D. De Camp as general manager of United Verde Copper Company. Announcement of the appointment was made in an official bulletin issued by Robert E. Tully, former general manager of the company, and recently elected president.

Graduating from the Colorado School of Mines in 1908, Mr. De Camp filled various positions in Old Mexico and Colorado mines and left his native State in 1918, serving for a while as engineer with El Tigre Mining Company in Sonora, Mexico, and since 1919 has been manager and shift boss at United Verde, and as superintendent of mines for Consolidated Arizona Smelting Company at Humboldt, Arizona. The new manager is a native of Pueblo, Colorado, but was educated in the University of Colorado.

After his discharge from the army, Mr. De Camp took graduate work in geology at Columbia University. This work later proved of especial value to him in handling the difficult geological conditions encountered at United Verde. He returned the employ of United Verde Copper Company in 1920, as general mine foreman. Thereafter, his progress has been rapid. He has held the various positions of mine superintendent, general mine superintendent, and assistant general manager with this Company.

United Verde Copper Company is one of the outstanding examples of the effective use of the bonus system. Practically all operations at the mine and smelter are carried on on bonus or contract, seventy-five per cent of employees being so engaged. A large share of the credit for the successful operation of this plant must go to Mr. De Camp, who has given unselfishly of his efforts in this direction.

Mines Professor Given Credit

Professor J. Harlan Johnson of the Colorado School of Mines is given credit for contributions to a bulletin of the Museum of Comparative Zoology at Harvard College. This bulletin is entitled "The Fossil Ants of North America," and was written by F. M. Carpenter.

Professor Johnson's contribution was a collection of fossil specimens which were given over to Mr. Carpenter for his examination. Paragraph of the Floraorient species were to be found in Professor Johnson's collection.
Display Equipment Given the P.E. Department

Several pieces of oil field equipment have recently been donated to the Colorado School of Mines Petroleum Engineering Department to be used for instruction and display purposes.

Two pressure control valves were loaned, for an indefinite period, by the Chaplin-Fulton Manufacturing Company of Pittsburgh, Pennsylvania. Both are full scale, two inch valves which were cut away, in places necessary to show construction details, at the factory. One of the valves is a pressure regulator for low operating pressures, the other a back pressure regulator for high operating pressures. Pressure regulators are an indispensable part of gas transmission systems and the valves a valuable addition to the collection.

The Zero Hour Torpedo Company of Boulder, Colorado, sent in an enclosed, working model of their time bomb together with a complete testing outfit. These bombs are used to detonate the charges of nitroglycerin when "shooting" oil wells. The model enables the observer to see how they function in addition to the construction details.

The Mirian Company of Cleveland, Ohio, donated a ten inch, "Jumbo" manometer for use in measuring small fluid pressures. These manometers are especially valuable in laboratory or gas measurement work.

DFC Assay Furnaces are high in output, low in upkeep

Except for the muffle, its plates and supports, there is nothing in this furnace to be replaced. Utterly simple in design, built to cheat repair bills, this muffle type oil burning furnace sets a high standard for efficient service. Complete furnace or any repair part can be furnished from stock.

DFC Assay Furnaces are built to burn oil under high, low, and medium pressures, gas, gasoline, or coal. Write for complete data on any DFC product.

Chaplin-Fulton Pressure regulator which has been loaned to the Petroleum Engineering department for an indefinite period.

A two inch, lubricated plug valve, manufactured by the Barco Manufacturing Company of Chicago, Illinois, was sent to the department with their compliments. The valve is especially designed for use under severe operating conditions. It can be lubricated, without disassembly, in a high pressure line avoiding the "sticking" so common to most plug valves.

"And while we are at it, it's just as well to recall that no tutor ever discovered that Wellington was a bright lad, suggested how Sir Isaac Newton would later fill his quill with indelible ink and rewrite science and philosophy.

Richard Wagner, Oliver Goldsmith and Sir Walter Scott, additional graduates of the dunce stool, sitting pretty within reasonable limits the amount of time devoted to athletics. This refers to hours of daily practice as well as to the number of contests and length of trips, or any other athletic requirements, which detract from academic freedom.

Wyoming University Wins A. A. U. Title

Wyoming University won the national championship in the 1929 Airplane, and passed its way through an inadequate Colorado University defense to take the Rocky Mountain Athletic Association championship. The list of Wyoming's stars is cut from the state of Wyoming for a year.

The brand new is the highly publicized the national figures. Seven to 11 or 19 score in the final intramural baseball championship game ever held.


Intramural Swimming

The Intramural Swimming meet will consist of the following sports: Valley, Swimming, Diving, Baseball, Tennis, (doubles), Basketball, (doubles), Wrestling, Cross Country, Track.

Allen Will Select Assistant Coach

George Allen, newly appointed director of athletics, will make the selection of his assistant. No man will be allowed to compete in any sport in which he has earned a letter.

No Basketball Championship

No Rocky Mountain basketball championship will be awarded this year. The Eastern Division champions, Colorado School of Mines, found it impossible to play after eliminations. The Western Division, which was compelled to play off a tie, throwing the divisional schools out of series of the Western Division in Utah State, next March 15.

George Allen Made Director of Physical Education

George Allen, head football coach at the Colorado School of Mines, was recently elected as director of physical education. Allen has accepted the position of director of physical education to fill the vacancy caused by the resignation of Ervin Hinds, who was involved in the last years of the present school year. This action was taken at the annual meeting of the Board of Trustees.

Allen has accepted the position, and will set about completing his organization of the department. The athletic director at the School is in full charge of athletic policies. Whether one full-time man or any part-timer, as soon as various sports, will be selected, in a matter which has not yet been decided. Allen will himself continue as head football coach, giving more of his attention to the Intramural sports program shall consist of the following sports: Volleyball, Basketball, Boxing, Wrestling, Swimming, Baseball, Tennis, (doubles). Intramural Sports and By-Laws

The Intramural sports program shall consist of the following sports: Valley, Basketball, Bobsled, Wrestling, Swimming, Baseball, Tennis (doubles), Intramural Swimming, Intramural Swimming.
Study Engineering in Cool Colorado

Miners Has Cosmopolitan French Class

"Four lies—Not—4 to 1!"

We have known all along that our School of Mines is a most cosmopolitan institution. Rarely, however, is the fact brought out so forcibly as in the present French class which has gathered from many remote parts of the world. Students from Mexico feel quite at home in the United States for several years in a New York High School. From Venezuela comes Pedro Beloqui, who has been in the country so great a time, hence, for him, transition from French to English is a real task.

Bulgaria is represented by Dagon Lambreth, much of whose education came to him in the Bulgarian language. To his credit stand several junior college years of Latin, Russian and French. Just now, however, his task is translating French into English, not into Bulgarian as before. Mr. Lambreth, recently spent six months in France.

"Chicago hat"

Everyone, of course, knows where Estancia is; you just turn to the map where that is! It is there all right, far, far from it in Edward Maxwell is enrolled as a scholarship student. When you know that Ed has been in the United States only about a year and further that upon arrival in New York knew very little English but at once enrolled in Columbia in the English class for English speaking students, well, on the whole he have it, "Chapay back" to Ed.

From Estancia, so easy to find, let us turn to Siberia, bytown home of Nikolai Nikolaii Kovalov, who really might have come to from here in Colorado. However, first his impression of the United States were so favorable that he induced his father to leave the homeland for the New World.

Still thinking of Siberia, imagine the surprise which may come to your latest arrival, Estancia Lately, recently enrolled at Mines from a little town in Siberia, where he met Nicholas and learned that over there they had lived no more than 200 miles apart.

The Miner French club, Cosmatop, per se, includes one native-born American, who wishes to become acquainted with the language of science and diplomacy, Men Charles Skelks of St. Paul, Michigan—Stapledon.

Band Gives Concert

Mistral, Egypt and Venice was featured in the concert of the Colorado School of Mines band, March 31st. These concerts are finding increasing favor with both golden residents and Mines as the large attendance at recent concerts testifies.

The cooperation of the Glee Club acts as an added attraction to the concerts.

New Quarterly on School Mines

The Colorado School of Mines spring quarterly is ready for distribution. It is maintained at Idaho Springs for experimental purposes by J. B. Read, Professor, of Mining, and has been so nicely printed by A. B. Rialson, Experimental Mine at Idaho Springs.

In summary, besides the purpose and courses offered, the quarterly also gives much information on the geological which was made by Professor Underhill, and is filled with illustrations and maps. The geological map shows some of the rocks and colors which are in and are especially attractive and complete. There is another illustrative map showing the locations of the claims in the vicinity of Idaho Springs which is very interesting to the students of Mining.

The quarterly is divided into subheads and each topic in the work and the conditions that exist at Idaho Springs during the summer courses are discussed in detail. The information included in the pamphlet is complete and will answer questions of men that are interested in the courses which are offered in the summer to the end of the summer.

Feats of Russian Students

 Theta Tau held in spring celebration and pledged eight members last new members. The men who upon arrival in America were left out in response to the various inquiries received for information on the Mines in the United States, also were given requirements and instructions needed for the following:

- BLUE KEY INITIATES
- Theta Tau PLEDGES
- THETA TAU PLEDGES
- C. U. FRATS TO BUILD
- TAU BETA PI PLEDGES
- MINERS EVERYWHERE!
- Colorado Central Power Co.
- Robinson's Book Store
- Golden Fire Brick Co.

Campus

Motion Pictures

A series of motion pictures showing recent construction, was started at the School, March 25. The graduating senior mining engineering and Mechanical Engineering Department presented the following films:

- "Look at the Bridge" over the Grand Canon of Colorado, and the Bank of Manhattan building, New York City, which it is stated that 108 taller than the Woolworth building. Both of these are recent structural steel buildings erected in Cleveland, entirely electrically welded, with some of the films showing electric welding of a building at Niagara Falls, N. Y., were also shown.

Professor Hulbert Returns

Professor W. Hulbert, Mines, has returned to school. He has recovered from his operation for goiter and is looking extremely well. It will be only a short time until he will be back at his old job and will be likely to return to the Mayo Clinic some weeks ago.

Ray Roberts of the Mines Christian Association has been selected as chairman of the committee which is promoting Golden’s 8th Annual Music Week.

Topics

New Quarterly on School Mines

Fraeisy News

The School of Mines chapter of Beta Theta Pi competed in the basketball tournament of their district and lost to the Colorado College Beta of 24 to 22. The Colorado College Frat, won the championship of the district.

TUAI BETI PI PLEDGES

The Tau Beta Pi held the second semester pledging on the campus early last spring. Thirteen members of the junior class for prospective Tau Beta Pi members were present. The men taken were D. Dillingier, L. Buborn et al. The second pledge meeting was held in an informal dance of the school year, and it takes place the night before the Senior Inspections trip.

C. U. FRATS TO BUILD

Fraternities and sororities at Colorado University are considering a $100,000 building project for the coming year according to recently announced plans. Five Greek organizations will get new homes, if present materializes.

Dames Club Entertains

All the panoply of a night club was presented in Guggenheim Hall, Monday evening, March 28, when the Dames Club entertained the ladies of the faculty.

The premier event of the evening was the appearance of Jack Dempsey and his dance number that was most appreciative. Jack sang his first appearance in two years in Golden "Sweet Georgia Brown," and his dance, "Voices of Spring," were most appreciated.

Janet Van der Wee, whose kiosk is mountaineers, presented her collection in a fantasy combining Chinese countesses and American jive.

Other numbers on the program included songs by the Golden girls, two playlets, the game "Cootie," and a specialty by the Denver Dames, "The Ball and Chains," featuring a parody on "The Mining Engineer."

Between numbers refreshments were served by mines maidens, Mrs. Ronald Morton and Mrs. Paul Stroud composed the general committee.

Spring Fools the Military

Spring is the day for Military affairs parade. The whines of the Spring season was heard recently that snow should fall on a certain Thursday night. No other person picked the Mines. But some whines of Spring decided to make the snow fall on Tuesday and Cape, to give first glance mistook the heterogenous array of costumes—narrow-jecked, miners caps (and uniforms) for the Mountain men. After that, however, he decided that aggressive appearance would not be helped by formal dress and most generously gave over the time to the Mines.

Dr. Von Tuyl, H. L. Horduin, and Doctors Horduin and Doctor Horduin have been the two prominent men of the Mining Engineer, the American and foreign Mining Engineers. The conven- tion was held at St. Paul by the Mines. Doctor Von Tuyl and Horduin presented papers before the convention.

At a dinner of lively appointments, with St. Patrick green predominating, the dancing by the Mines the following Friday, band and songs, March 1, at the Hotel Bond, was the most enjoyable. Dr. Tuyl played the re- mainder of the evening.

Mrs. A. J. Hinter is the new assistant in the work in engineering the director of the Engineers for the Colorado School of Mines. Mrs. Hinter is taking the place of Mrs. H. J. Vanderwee, Illinois.

When the colored couple were being married, one of the guests, by the way, was being married, and, "Lover, honker and obey" were spoken, the marriage being interrupted.

"Read that again, huh? Read it one more time. We've got to kiss the both solemnly up de man." I've been married before."
 Prospector

Student Yearbook

The 1930 Year Book will be something different from books of past years.

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Paffe Thirty-four

The Colorado School of Mines Magazine

April 1930

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Athletic Editorial

This issue of the Magazine will be featured by the time the Miners play their first baseball game of the season. Consequently, a great deal cannot be said about the prospects of the team, without being stale at the first game.

The Miners hope to redeem themselves in baseball and, make up for their disastrous basketball season. We could say now that things look bright for the diamond squad—but wait until the first game is played, April 5.

We understand that the proposed "playing football games" with a confederate team was not planned to be a game at all, but only a "scrimmage" and no admission, no big noise and sub—just a practice session between the Miners and some other aggregation.

Well, in that case, much of what we harped on in last month's editorial goes by the board. We mean, of course, that a scrimmage practice session does not carry with it some of the thrilling events that a regular admission, spring game does. More added emphasis on college football anywhere at this particular time, when a reaction is being set in, would not stimulate the sport but would, we feel, help it to carry on in proper "scrimmage" and with no admis­

The 1930 Year Book will be something different from books of past years.}

News & Chapters

Coach Allen Talks

Coach Allen gave a short talk to the "M" Club assembly in March. He pointed out that a football player gets little compensation for the load he carries throughout the long three months of foot­

Rocky Mountain Distributors—Cedean-Bickford Detonating Fuse for deep well blasting.

Baseball Schedule

Right games will be played this spring at the Colorado School of Mines, according to announcement made by Dave Johnson, Manager of Athletics. "Mines' schedule is as follows:

April 5—Denver University at Denver
12—State Teachers at Greeley
19—Colorado Aggies at Fort Collins
10—State Teachers at Golden
17—Colorado University at Boulder

"Your uncle seems rather hard of hearing," was the reply.

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Wyoming Section

This meeting was held in the Gladstone Hotel, Casper, at 7:30 P.M. on March 25. The meeting started early and enjoyed a dinner during which they were entertained with musical num­

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Dear Mr. Cothurn—

I have been intending to kick through the offer you made me the enclosed application blank with the request for a position. I am in a wonderful locality for collecting specimens and I am sending a number of Loyal Miners without going through the orals which were sent to me by the personnel manager. I want to take this opportunity to congratulate you on the success and appearance of the "Loyal Miners" magazine. It has been a wonderful addition to my library and I have been able to find some interesting and valuable specimens through its pages. I am particularly interested in the section on quartz veins, which has provided me with valuable information on the occurrence of these veins in Colorado. I would appreciate receiving any future issues of the magazine so that I can continue my research on this subject.

Very truly yours,

Charles C. Taylor, Esq.

March 6, 1930.
Moving the Mountain to the Sea

From Link-Belt News

O N E of the outstanding material handling achievements of the past year, is the Denny Hill Regrade Project No. 2, in Seattle, Wash., where 5,000,000 cubic yards of earth has moved from the century city by belt conveyors to barges and dumped into Elliott Bay.

It would be less of a drama if, in the swift continuous flowing even progress there were none, the crunch and clatter of gears, or the bumping and falling of rock striking iron or timber. But the Anti-Friction Belt Conveyor which is carrying the hill to the sea is almost silent. Night and day it conveys a gray stream of earth, never speeding, never slowing—relestant, irresistible—and an iron or timber.

The journey begins, with the material being loaded by shovel onto field conveyors. The cut is being made in two benches, two shovels operating at the top bench making a cut of about 40 feet, and three shovels on the lower level, which is about 80 feet.

In 1906 Seattle's first project of grading, which consisted of the leveling and removal of approximately 3,400,000 cubic yards of earth, was inaugurated. Forty-three city blocks were embraced in the area affected, about Fourth Avenue and Blanchard Street. And in the same year another project was started, known as the West Lake Fill. In both of these projects industrial railroad methods were used for handling the excavated material.

Then, in 1907, a project at Third Avenue and Spring Street was undertaken, and the previous methods were again employed.

What is known as the old Denny Regrade, or Denny Regrade No. 1, was started in 1919, and this time the hydraulic process was the principal method used. Water from Elliott Bay was pumped at the rate of 3,500 gallons a minute against a pressure head of 180 pounds, and from Lake Union it was pumped at the rate of 12,000 gallons per minute under similar pressure head. This tremendous volume of water was played upon banks of earth by nozzles having diameters of from 3” to 4”.

The water and earth were delivered to large pipes, and the debris was sluiced in a big tunnel down Bell Street, emptying into flames carrying mud and water out into the bay for disposal. In addition to this, stream shovels were employed, delivering their material into cars of the industrial type, which in turn dumped its contents into the tunnel, where hydraulic jets broke up the debris, all being delivered into the bay.

In the previous grading projects just described, the City of Seattle has moved approximately 50,000,000 cubic yards of earth by various methods other than by belt conveyors.

Therefore, when it came time to study the present grading project now well under way and widely known as Seattle's Denny-Hill Regrade Project No. 2, Mr. W. B. Barkhuff, Seattle's chief engineer, had an excellent opportunity to compare the striking differences between what were considered good standard methods of moving materials a few years ago, and the simpler, more efficient and economical use of conveyors, as practiced now.

After investigation and comparisons Mr. Barkhuff decided that the proposed arrangements of conveyors would not only handle the material at reasonable cost, but would eliminate waste and tear on the city's streets, cause no interference with traffic, and would do away entirely with the annoyance formerly endured by residents and business houses on the streets along which the material was to be handled.

It was required for Project No. 2 that the material be moved from Fifth Avenue to the Bay, and after a careful study of the whole situation in consultation with Link-Belt Engineers, the belt conveyor system was approved.

The length of the different conveyor sections are 1300-ft., 720-ft., and 600-ft., centers, and the field conveyors are 200-ft. centers. The portable or movable shovels are fitted with apron feeders, which are so timed as to deliver the two-yard load onto the belt before the shovel can return with another load.

The belt conveyors are working 23½ hours a day, six days a week, only stopping 15 minutes at the end of each 8-hour shift. During the last two months they have been handling from 500 to 600 cubic yards per hour and at times as much as 900 cubic yards per hour have been handled.

The recently taken airplane view shows the portion of Seattle involved in Denny Hill Project No. 2. A little at the right of the center will be seen the portion on which shovels conveyed Denny Hill to scows in Elliott Bay, at the rate of 400 cu. yds. an hour by Link-Belt Anti-Friction Belt Conveyor Idlers.

The self-dumping type of scow is built reversible, with two decks for alternate loading, and an intermediate storage. The self-dumping type of scow is built reversible, with two decks for alternate loading, and an intermediate storage. The cut is being made in two benches, two shovels operating at the top bench making a cut of about 40 feet. Two other shovels operate on the lower level, which is on the grade line. Belts are 100 ft. wide, operate at a speed of 500 ft. per minute, and have a capacity of more than 600 cubic yards per hour.

When the project is completed, field or portable conveyors, one of which can be seen feeding to the main line conveyor, will be running in the opposite direction, having turned gradually around the junction point, to an angle of 108 degrees from starting position.
and field conveyor are at work, with the overhead conveyor, as shown on Page 39, leading down Battery Street, and off at an angle over the pier, to the barges in Elliott Bay. Much of the lower part of the view will be included ultimately in the grading operation.

So it is that, day and night, without noise or show, Denny Hill melts under the magic of energy and brains of man—a mammoth hill from the city’s midst, silently and unobtrusively disappearing to the depths of Puget Sound.

Card Catalog No. 30
Superintendents and master mechanics, and mining men in general, who have anything to do with haulage problems, will find much of interest in the new catalog issued by the C. S. Card Iron Works Company, Denver, Colorado. This is a 124-page book, substantially bound, covering the entire Card line of wheels, trucks, coal mine, ore and industrial cars, track equipment, rope haulage equipment, tipple equipment, etc. In addition to illustrations and descriptions full data is given covering dimensions, weights, etc., wherever it is practical to do so.

Index to Advertisers

The journey begins with the material being loaded by shovel onto the field conveyors, shown in illustration No. 1. These deliver to the receiving end of elevated belt conveyor shown in illustration No. 2, which conveys the material 2,870 ft. to a barge in Elliott Bay, at the rate of 600 cu. yds. an hour. Illustration No. 3 shows the curving run of Timken equipped Link-Belt Anti-Friction Belt Conveyor seen in illustration No. 2.

AFTER making a careful study of modern handling methods, W. B. Barkhuff, Seattle’s Chief Engineer, in conference with Link-Belt Engineers, selected belt conveyors to move the 5,000,000 cu. yds. of earth from Denny-Hill Regrade Project No. 2. The contract was awarded to Geo. Nelson & Co., who are using Link-Belt Anti-Friction Belt Conveyors. The conveyor sections are 1,360 ft., 920 ft., and 600 ft., and the field conveyors 200 ft.

This belt conveyor system handles the material at a reasonable cost, eliminates wear and tear on city streets by trucks, and interference with traffic. The conveyors are practically noiseless. Night and day they convey the material, never stopping, never speeding, never slowing. Experienced Link-Belt engineers are always ready to help you solve your handling problems.
Mineral Wealth of Western Colorado Will Be Advertised

The Chamber of Commerce of Grand Junction has announced an active campaign to list and market development capital for the mineral wealth of Western Colorado. A survey of the mining properties has been started.

The following twenty-seven counties will be included in the survey: Alamosa, Archuleta, Conejos, Costilla, Delta, Dolores, Eagle, Garfield, Grand, Gunnison, Hinsdale, Jackson, La Plata, Mesa, Mineral, Moffat, Montezuma, Montrose, Ouray, Pitkin, Rio Blanco, Rio Grande, Routt, Saguache, San Juan, San Miguel, and Summit.

Gas, oil, coal, slates, rare clays, stones, precious and semi-precious metals and stones will be included in the survey. Individual properties will be listed, investigated and findings will be published in booklet form through which it is expected investment capital and markets may become available.

Complete description of each property, extent, development work, values and samples will be required, and to facilitate and expedite the work, citizens of every community are urged to cooperate. The project is enormous in extent.

Years of observation have brought us to the conclusion that the only reason a great many American families do not own an elephant is that no one has ever offered elephant for a dollar down and easy monthly payments.

The Engineer

The tawny, glistening, silent plain Lies shimmering through ten thousand years; The Indian’s mournful cry for rain Brings no response but his own tears. The pack-train drags its weary way Along the scorching leagues of sand. The campfire at the end of day Burns the desert half in and out. The Indian’s mounting cry for rain Brings no response but his own tears. The pack-train drags its weary way Along the scorching leagues of sand.

The desert wolf their only ward.

The snow-clad mountains stand as guard Beneath the silence of the star, O gathering snow that blinds and chills! Beneath the silence of the star.

While reverent Wonder cries: “Behold! Lo! Desert sands are changed to gold; And sends it laughing o’er the lands."

THE GOODMAN TRAMMER

THE COLORADO SCHOOL OF MINES MAGAZINE

April 1, 1930

Page Forty-three
The Colorado School of Mines Magazine

We've started another page of Professional cards How about yours?

WRITE NOW to C. Lorimer Colburn, Secretary, Colo. School of Mines Alumni Ass'n.

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721 Marion St. Denver, Colo.

HEY MINERS!

The publication of a new series of papers which will present the details of milling practice and itemized costs at the principal ore-dressing plants in the United States is announced by Scott Turner, Director of the United States Bureau of Mines. Officials and mill superintendents of the mining companies will prepare these papers, in cooperation with the mining division of the Bureau of Mines, and in accordance with an outline designed to obtain uniform presentation.

The first paper in this series is Information Circular 6256, "Milling Practice at the Alaska Juneau Concentrator," by P. R. Bradley.

"No man ever becomes educated or effective as a result of what he learns in school. By the time he gets into the arena of action either he has forgotten what he learned in school or the facts he learned in school days have gone obsolete in this rapidly changing day. But if a man can learn how to learn he can afford to come to the end of his school days knowing even less than the average college graduate now knows on commencement day." -Glen Frank.

LETTERS TO THE EDITOR

Albert G. Fish, Pres. & Trst.

ISA. C. Bowker, Sec.

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Lighting the International Exposition

Night view of the National Palace and Cascades at the International Exposition at Barcelona, Spain. Elaborate and spectacular are the immense lighting effects achieved at this Exposition. The engineering organization of the Westinghouse Electric and Manufacturing Company worked out these effects. Clarence Guth, graduate of Mines, '22, is a part of Westinghouse's organization.

This Exposition is a part of the Exposition Universelle. The engineering organization of the Westinghouse Electric and Manufacturing Company worked out these effects. Clarence Guth, graduate of Mines, '22, is a part of Westinghouse's organization.
ANNOUNCING

Model 411 is a lightweight machine recently added to the Gardner-Denver line of popular and economical drills. Although weighing but 39 pounds, it is ruggedly built, and embodies the fine craftsmanship that is evident in all Gardner-Denver products.

Its low air consumption makes it an ideal drill for use with portable compressors, and due to its fast drilling and economy it will find a wide range of usefulness in mines, quarries and construction work.

Further information will gladly be furnished on request.

GARDNER-DENVER COMPANY

Model 411

WHEN MINING CONDITIONS ARE COMPLICATED

Complex faults and folds in metamorphic rock areas may delight geologists—but not mine superintendents. The job of mining under such conditions is no easy one, although the selection of proper methods, equipment, and supplies considerably offsets natural difficulties.

Specifying the correct explosive for each blasting need is one way of making mining easier. Because the Hercules Powder Company has explosives for all purposes, mine superintendents know that each blasting requirement will be met by one of them.

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