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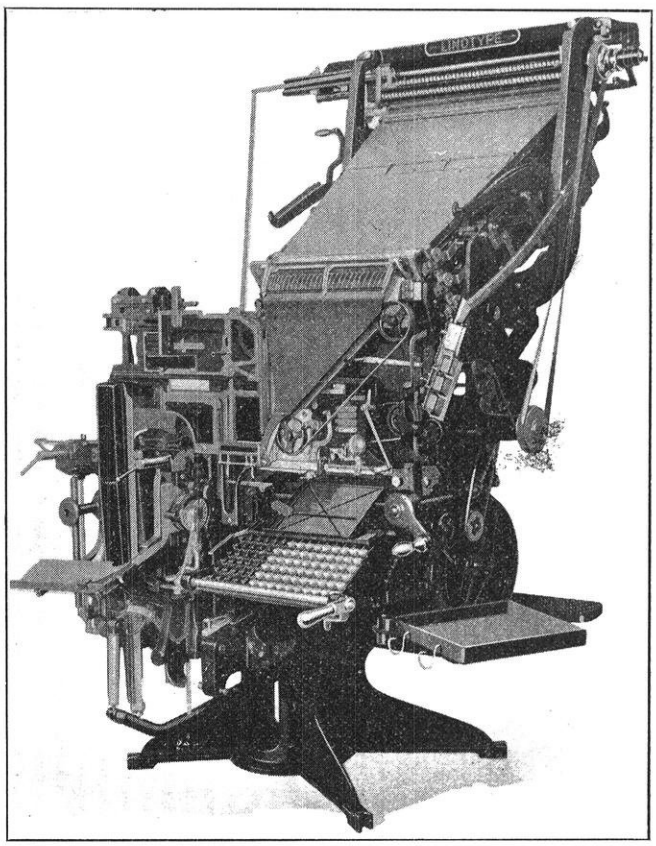
VOL. XXIX No. 4 MADISON, WIS. JANUARY, 1925

MECHANICAL EQUIPMENT OF A MODERN NEWSPAPER PLANT

By W. E. Wines
Assistant Professor of Mechanical Engineering,
University Extension Division

BEFORE proceeding to a detailed description of any of the mechanical equipment of a modern newspaper establishment, it will be well to give a bird's eye view of the plant and show the sequence of processes through which the editorial and advertising copy pass on the way through the plant. Copy is first sent to the composing room. The business of the composing room is to set the copy in type and arrange the type, together with the necessary illustrations, into pages. Each page of a newspaper is "made up" by itself on an iron-topped table provided with substantial casters so that it can readily be moved from place to place. The type matter for each page is placed in a heavy steel frame and "locked up." A page of editorial matter in this stage is known as a "form," and there must evidently be as many forms as there are pages.

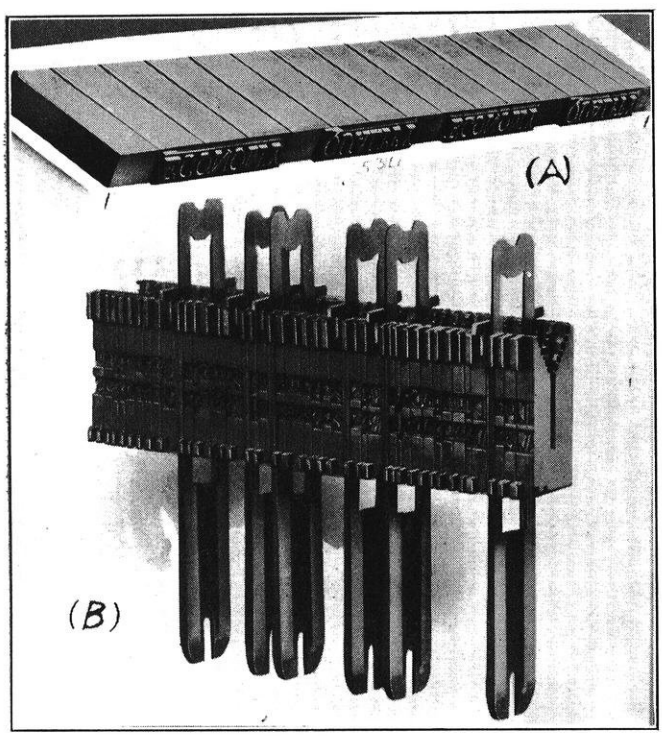
The next step in the process is to send the form to the stereotyping room where a number of reproductions are made. No modern newspaper of any considerable size prints directly from the type, but uses curved sterotyped plates which can be very cheaply and quickly made in any number desired. Whereas the preparation of one form requires the labor of many men for some hours, the making of a stereotyped plate requires the labor of a few men for a very few minutes. When the form is received in the stereotyping room, an impression is made from it in a sort of soft blotting paper technically called a "flong." While the flong is still in contact with the form, it is passed into a steam-heated drying press and emerges from the drying press baked into a fairly hard but flexible mold or "matrix." This matrix is sufficiently flexible to allow it to conform to the curvature of the interior of the casting box which usually has a radius of about seven and a half inches. By means of this very simple expedient, a curved plate, usually about 7/16 of an inch thick and having a radius of about 7 or 7 1/2 inches and bearing on its face all of the characters which appeared in the form, is made in a time which will range from about three to seven minutes. The number of plates to be made from each form depends upon the number of presses to be run, — each press usually taking two plates of each page. That is to say, if four presses are being run on a twelve-page edition, a total of 96 plates will be required. After the first plate has been cast, subsequent plates can be turned out at the rate of from two to four per minute.



Linotype Machine. *Although popularly known as a "type setting machine," the Linotype assembles a row of matrices and casts therefrom a solid line of type called a "slug." One operator on the Linotype will produce as much composition as five or six men setting type by hand.* *(Mergenthaler Linotype Co.)*

As soon as the stereotyping room is finished with the form, it is returned to the composing room and the corresponding plates are delivered to the press room. The plates are placed on and securely locked to cylinders of the rotary presses as soon as practicable after being received from the stereotype. When the last plate is delivered to the press room, everything should be in readiness to receive it so that the starting of the press lags only a few seconds behind the delivery of the last plate. The press can be brought up to speed very rapidly and it is a matter of only an additional few seconds before the printed papers are being delivered to the mailing room or city delivery room.

The more important machines will now be described more in detail. The most prominent machine in the composing room is the Mergenthaler Linotype machine. This is popularly spoken of as a type setting machine. Strictly speaking, it is not. The linotype assembles a series of matrices (called "mats" by the printers) into a row or line, and casts therefrom a solid line of type called a "slug." It was this feature of casting lines of type which suggested the name "Linotype" which was coined by the late Whitelaw Reid, publisher of the New York Tribune. A linotype slug and the assembled line of mats ready for casting are shown in an accompanying illustration. A front view of a typical linotype machine is also shown.



(a) LINOTYPE SLUG. *The "line-of-type" which gives the machine its name. These solid lines are more easily handled than individual letters of type set by hand.*

(b) LINOTYPE MATRICES. *A row or line of matrices and space bands "set" and ready for casting.*

—Courtesy of Mergenthaler Linotype Co.

When the operator presses any particular key of the keyboard, the corresponding mat is released from the magazine and takes its place in the line. The magazine is the flat sloping affair in the upper part of the picture. Between words, "space bands" are inserted by pressing the long key at the left of the keyboard. The space bands show very clearly in the illustration of the assembled line. As soon as the complete line is assembled, the operator presses the lever at the right-hand side of the keyboard, thus engaging the clutch, also shown in the picture, which actuates the cam shaft at the rear of the machine. The cam shaft makes one revolution and then stops automatically, putting the machine through its cycle of operations, thus casting one line and returning the mats to the magazine. When the lever is depressed, the line is elevated, moved to the left, and lowered to the casting position. The space bands are automatically tightened, immediately after which molten metal is forced by a small pump in sufficient quantity to fill the mold and force the liquid metal into all the characters in the mats. After hesitating a little to allow the metal to solidify, the metal pump moves back from the mold, the mold wheel containing the slug is rotated, and the slug passes over a knife that trims it to the required height. The mold wheel stops, and the slug is ejected from the mold and passes over a knife which trims it to the proper thickness. The ribs on the side of the slug are placed there to facilitate the trimming. The opposite side of the slug is perfectly flat. As soon as the line of mats has been delivered from the elevator, the elevator returns to its normal position ready for the assembling of another line, so that the operation of the keyboard proceeds almost without interruption; that is to say, while the operator is assembling a line, the previous line is being cast, and the mats for this line are being returned to the magazine.

An inspection of the illustration of the assembled line of mats will show that each mat has two characters engraved upon it. Such mats are known as "two-letter" mats. In this particular case the characters are Roman and Italic. The additional character is frequently a bold face. This arrangement of two-letter mats gives the operator a choice of two styles or faces of type from one magazine. Additional faces are placed at the disposal of the operator by building machines with two or more magazines from which the operator can draw mats as desired. The size of type and the length of slug which the linotype will handle have been increased from time to time until it is now possible to cast faces as large as 60-point on slugs as wide as 36 picas, or in more familiar units of dimensions, the linotype is capable of casting a slug 6 inches long by 5/6 of an inch in thickness. The standard height of all slugs is 0.918 inch. The introduction of machines capable of casting these larger sizes of type has made it possible to set a considerable portion of the display advertising matter on the machines

instead of by hand as was the custom even long after the linotype had displaced hand composition for the body type of the newspaper.

A good operator of the linotype will produce as much composition as five or six good hand type setters. An especially good operator may be able to double this record. Besides being much faster than hand composition, machine composition has other advantages. It is a great advantage to the printer or "make up" man who handles the type matter after it is set to have each line an individual unit rather than to have each character a unit as is the case with hand set type. Inasmuch as the slugs are melted and re-used after the forms have been "killed out," the paper has a new "dress" of type every day.

In the early days of the printing art, all printing was done from type or wood cuts which were necessarily supported upon a plane surface during the process of printing. The type was inked by hand, and a sheet of paper placed thereon was forced into intimate contact with the printing surface in order to take the ink. For many years the necessary pressure was obtained by means of a lever which operated a screw which in turn forced a heavy plate against the upper surface of the paper. The power was furnished by the muscles of the pressman, and the operation of one of these primitive presses was hard work indeed. The output was necessarily very small.

It was not until the invention and development of the Fourdrinier machine, in the early part of the nineteenth century, for the manufacture of paper in continuous webs instead of in separate sheets, and until the development of the stereotyping process by means of which a form of type could very quickly and easily be reproduced in plate form that the modern web perfecting press was even possible. The stereotyping process makes possible the reproduction of type in either flat or curved form with equal facility. The curved plate, when attached to the periphery of the press cylinder, becomes a medium by which it is possible to print continuously at high speed upon a web of paper fed from a comparatively large and heavy roll of paper. Not only does the stereotyping process permit the making of a curved plate from a flat form of type, but it permits the making of any number of these plates from a single form. Thus it makes possible the simultaneous operation of any desired number of presses all turning out an identical product.

The printing surface of the plate is the outer or convex surface. The inner or concave surface carries a number of ribs an inch or so apart which are for the purpose of facilitating trimming of the plate to the exact thickness required. The plate as it leaves the casting box also has at one end a riser or gate which the stereotyper calls a "tail." The first operation of finishing a plate is to saw off the tail by means of a high speed rotary cutter, and the next operation is to shave the ribs by means of a shaving machine carrying a knife which makes one revolution and automatically stops. The face of the plate may need a little hand trimming along the edges and in some of the larger open spaces. The finished plate weighs approximately fifty pounds and is usually about 7/16 of an inch thick. The curved edges of the plate are bevelled to permit fastening the plate to the press cylinder. In width, that is measured parallel to the axis of the cylinder, the face of the plate is equal to the

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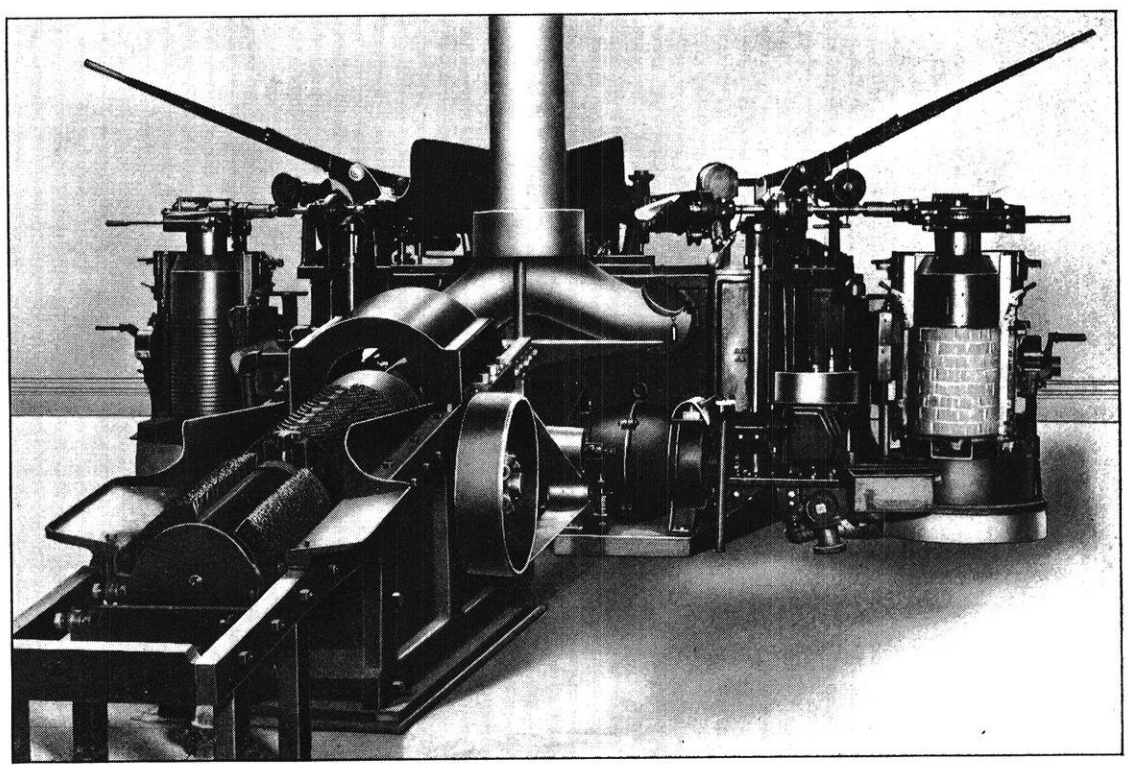

JUNIOR AUTOPLATE AND AUTOSHAVER. *This combination outfit casts, saws, shaves, cools, and wipes the curved stereotype plates from which the printing is done.*
—Courtesy of Wood Newspaper Machinery Corporation.

THE PUBLIC UTILITY AS A FIELD FOR THE ENGINEER

By R. GILMAN SMITH, M '15
Statistician, North American Company

AN examination of the most recent directory of the Engineering Alumni of the University of Wisconsin indicates that more than ten per cent of such alumni are now employed by public utility organizations. In making this analysis electric light and power companies, electric railway companies, gas companies, and telephone companies have been considered as public utilities. Steam railroads have not been so included, nor does the ten per cent figure include any allowance for the considerable number of engineering graduates who are engaged in consulting engineering work or employed by state or municipal regulatory bodies, whose work brings them in intimate contact with the operation and management of public utilities. With such a considerable percentage of engineering graduates in this general field, the natural conclusion is that the public utility offers a large and considerably diversified opportunity for the technically trained man. A brief review of the various phases of operation and management of these several classes of public utilities indicates that with very few exceptions nearly all of the problems encountered are of an engineering character.

R. GILMAN SMITH

For the purposes of this discussion these problems of the public utility have been divided into three major groups, as follows:

(1) Operation
(2) Construction
(3) Financing

These three general groups of problems arise primarily in the operating companies. Whether they are finally disposed of within the operating company organization, or are passed on to management or holding company organizations, depends on local conditions. Certain of the larger utility companies which are independent from holding company control maintain complete organizations capable of meeting with and disposing of all current requirements. In other types of organizations where the operating companies are relatively large and maintain their own engineering organizations for current operation and construction, the general policies of management and financing for the operating companies are determined by a holding company which controls through stock ownership or a management company which has an operating contract. In other cases where many of the operating subsidaries are smaller in size, the holding or management company also maintains a general engineering staff, and practically all problems of operating and construction are referred to the holding company.

Operation

For a public utility furnishing electric light and power service or gas service, the primary operating problem is the generation of the product which it distributes. This involves primarily the operation of a steam-electric or hydro-electric central station for the generation of electric energy, or a coal gas or water gas generating plant to furnish a supply of artificial gas unless the company has available a reliable source of natural gas. The operation of such plants is essentially an engineering function, and in order to keep production costs at a level low enough to prevent private plant competition in the case of large industrial power users, the modern central station operator must make maximum use of the various engineering developments designed to increase plant economy and safety.

The next step in the case of either the electric company or gas company is the distribution of its product from the source of supply to the consumer. This again involves engineering problems in connection with the operation of substations, either manual or automatic, high tension transmission lines, and the accompanying net work of primary and secondary distribution systems, both overhead and underground. The comparable setup for the distribution of gas consists of gas holders, high pressure and low pressure distribution mains with booster stations and pressure regulators, the operation and maintenance of which presents an engineering problem of considerable importance.

The growth of electric and gas central station companies is dependent primarily upon the normal growth of the communities served, supplemented by making central station customers out of industrial plants and others who have formerly received power from other sources, such as privately owned generating plants. The selling of central station service in such cases is strictly an engineering problem as it requires an intimate knowledge of production costs combined with the

technical knowledge as to the uses to which central station service can be applied.

The electric railway, either city or interurban, has the same problem with respect to the production and distribution of its power as has the electric utility, but to a somewhat lesser extent. The function of the electric railway is the transportation of passengers and express or freight, and its major problem is the operation of its cars or trains in such a manner as to furnish safe and rapid transportation service suited to the needs of its patrons, and to furnish such service at the minimum possible cost, so as to prevent loss of business to competitive carriers. In the case of interurban electric railways the science of train operation and schedule making has been developed to a degree of accuracy and precision which in many cases is in advance of steam railroad practice. Such scientific determination of schedules necessitates a knowledge of the maximum rates of acceleration and deceleration of the equipment in use, and grade, curve and train resistances, as well as the traffic requirements. The same basic technical considerations determine the theoretically possible city railway schedules, but the actual performance is frequently the result of street congestion over which the operating company has no control. City railway operation also involves the handling of a large crew of trained men. As a result of these diversified problems the superintendent of transportation of a city railway company is frequently selected because of his ability to handle men rather than because of his technical knowledge. Such is not generally the case with respect to other operating departments which carry on the maintenance of track and roadway and maintenance of equipment, these being primarily jobs for the engineer.

In some respects the telephone utility is similar to the city railway in that the labor element is of considerable importance. The maintenance of telephone exchange equipment, overhead and underground lines and other portions of the telephone plant are primarily engineering problems, but the actual operation of manually controlled switchboards introduces the problem of handling large groups of especially trained employees. This situation is changing, however, with the introduction of automatic telephone exchanges which greatly reduce the number of switchboard operators, but considerably increase the technical problems involved in both operation and maintenance.

Within the last few years the regulation of the rates and service of public utility companies by State Public Service Commissions or by City Council has made it necessary for such companies to develop on scientific bases schedules of rates for various classes of service which, insofar as possible, are representative of the cost of furnishing such services. The determination of the costs on which to base such rate schedules involves among other things the determination of the value of the utility property used in connection with furnishing such services. The preparation of these cost and valuation figures and their proper presentation before regulatory bodies has become a matter of such vital importance to the successful operation of public utility companies that such work is generally carried on by a department organized especially for that purpose and consisting of technically trained men.

Construction

The construction of new plant equipment for any industry naturally requires engineering supervision. While industrial plants in general make plant expansions at irregular intervals, dependent upon business conditions or other related factors, the public utility is continually required to expand its facilities to meet the normal growth of the territory which it serves, and in the case of most utility companies to expand and enlarge that territory. This means that there is always a certain amount of construction work for the utility company irrespective of industrial and business conditions, because the nature of the service rendered makes it obligatory on the part of the utility to supply such new customers as desire service. This expansion of a utility property creates a construction problem that not only is ever present but is of considerably greater magnitude when compared with the revenues of the utility than is the case in most other industrial enterprises. On the average, the electric utility must invest from $3.00 to $4.00 in new plant and equipment for every dollar per year which it adds to its operating revenues. For the electric railway and the gas utility the ratio of dollars of plant investment to dollars of annual operating revenue is somewhat higher. To better visualize these construction requirements, let us assume that a public utility company has an annual operating revenue of $20,000,000.00 and that the normal growth of the territory which it serves produces a ten per cent annual increase or $2,000,000.00. In order to properly care for this additional business, this particular utility will find it necessary to spend from $6,000,000.00 to $8,000,000.00 per year in additional plant facilities.

The carrying through of such an annual construction program from preliminary plans to completed construction is a task requiring a high grade engineering staff.

Financing

The financing of the construction requirements of the public utility presents a problem which the company must always face and which is particularly serious because of the relative magnitude of these construction expenditures. Unlike other industrial concerns the utility is not able to finance any large portion of its construction program from current earnings. In practically all states, public utility rates are regulated by State Commissions or otherwise, so as to limit the company to a reasonable return on an agreed valuation of its property. Under the best conditions this return is sufficient only for interest requirements on various kinds of funded and floating debt, preferred stock, dividend requirements, and some return on the common stock. If common stock dividends are withheld and

turned back into the property to finance construction, the company's credit is impaired to a certain extent and other financing made more difficult. This means that the only funds available for financing construction are the unexpended balances of reserves, such as depreciation reserve.

Many utility companies in recent years have provided a substantial portion of their new capital requirements by selling preferred stocks, secured notes, and, in some cases, bonds through local selling organizations, to customers and other residents of the territory served by the company. In some few cases, companies have been able to provide their entire capital requirements in this way. This is, however, the exception rather than the general rule. The greatest portion of new capital for public utilities is secured by the issuance of mortgage bonds, and such bonds are generally sold by the company either to a single banking house or to a syndicate composed of several banking houses. Before the purchase of such a security issue, a banking house will require detailed information concerning the company issuing the bonds. Such information involves reports of earnings, status of franchises under which the company operates, and other legal and accounting details. A banking house will also generally require an engineering report on the property in question, so as to be sure that the company's property is in good operating condition and that the property and the territory served are such that the company will continue to enjoy the earnings reported by the accountants. It is frequently this engineering report that determines whether or not a banking house will undertake a piece of financing, and a favorable engineering report frequently permits the utility to dispose of its bonds at a considerably better price than might otherwise be the case.

Conclusions

This brief discussion has outlined in a general way the more important features incident to the operation and management of a public utility company, which account for the appearance of such a considerable number of technically trained men in the plants and offices of light and power, electric railway, and telephone companies. Not only do engineers appear among the productive personnel of the several departments of public utility companies, but department heads and principal executives are also frequently men of engineering training.

These are several reasons why a connection with a public utility should appear attractive to the technical graduate. In order to secure the services of the young engineer just out of school and supply this need for technical talent, many utility companies offer special inducements in the way of training courses which furnish experience in the several principal operating and construction departments of the company. Such a course provides a general bird's-eye view of the problems confronting the company, besides giving the young engineer an opportunity to determine to what particular phase of engineering work he is particularly adapted. In an effort to keep operating costs at a minimum and at the same time to improve the reliability of the service furnished, public utility companies are continually experimenting with and developing new and better methods of plant construction, machine design, and other factors which enter into the production and distribution of the product which they furnish. A notable example of such development work is the use of coal in powdered form as a fuel for central stations. The three years of successful operation of the Lakeside plant of the Wisconsin Electric Power Company, at Milwaukee, with sustained efficiencies considerably in excess of those obtainable with stoker firing, indicates that this particular development has passed the experimental stage.

The long distance transmission of direct current energy at high voltage is an engineering development which is still in its experimental stage, but which will undoubtedly have far reaching effects on the long distance transmission of electrical power. On this problem, considerably greater progress has been made abroad than in this country. Associated with the development of high tension direct current transmission, is the development of the vacuum tube in sizes suitable for the conversion of power in large quantities from alternating current to direct current. In addition to these fields of investigation which are entirely technical, there are large opportunities in the public utility field for the engineer to engage in work which is not strictly engineering. The problem of the development of new territory, the study of probable growth in development of existing territory, and other phases of development work are almost without exception carried on by engineers.

The demand on the part of utility companies for men of technical training is generally recognized throughout the industry. The following editorial which appeared in the issue of the *Electrical World* for October 14, 1924, expresses the thought admirably:

WHERE SHALL WE LOOK FOR EXECUTIVES?

"Vacations over, the halls and lecture rooms of our colleges and technical schools are again filled with aspiring students, many of them specializing in electrical engineering. No doubt a question has come up in the minds of some as to their future. What prospects are in store and what are the chances for success? While that is not the highest view to hold regarding education, nevertheless many students and their parents do regard a technical education as a means to an end. To these it may be surprising to learn that in the electric light and power business alone there is a lack of men for executive and administrative situations paying high salaries.

Many public utilities would grow more rapidly if this want could be filled. Over and above this, investiga-

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THE WESTERN MINE INSPECTION TRIP OF 1924

By E. R. SHOREY
Assistant Professor of Mining and Metallurgy

WE had about decided that a few of our group had failed to make their 3:00 o'clock last June 14th when the belated ones hurriedly checked in at the Illinois Central depot, and the annual Western Mine Inspection trip began. H. P. Ehrlinger, E. D. McNeil, W. L. Tietjen, C. C. Gladson, O. O. Fritsche, Jose Zapata, O. H. Hering, J. P. Servatius, F. J. Sonday, D. C. Roscoe, E. J. Verhaeghe, and Prof. E. R. Shorey made up the party which had started on a six weeks inspection of the important mining and metallurgical centers of the Northwest.

The first break in the monotony of the long ride was at Omaha. The Omaha smelter of the American Smelting and Refining Company was visited, and its operation outlined by T. D. Jones, min '22, efficiency engineer and assistant superintendent of the blast furnaces. The Omaha smelter is the principal "clean-up" smelter of the company, and to it are brought base lead bullion for refining, together with the residues from other smelters. Some raw ores and concentrates are also used.

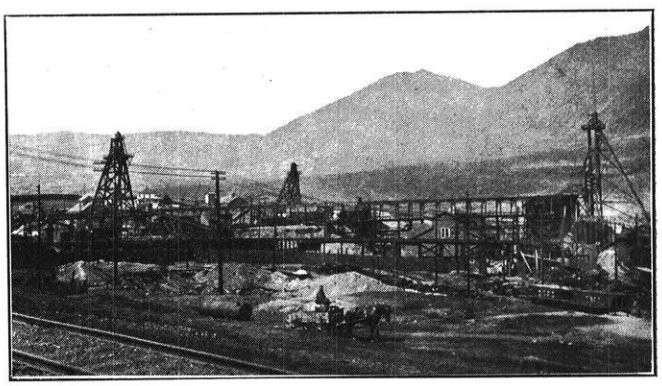
In the course of these operations precious metals are recovered as doré metal, antimonial-lead is formed to provide an outlet for antimony, lead is refined by the Bett's electrolytic process, and bismuth is electrolytically recovered and refined. At the time of our visit the plant was completing a campaign of tin recovery from residues of an eastern smelter. Copper is recovered as a matte which, by repeated melting and building up, is brought to a high copper content and then shipped to copper smelters for reduction.

The ride across Nebraska was made at night, but we greatly enjoyed the beauty of the Southern Black Hills through which we passed on our way to Lead, South Dakota. The Black Hills form a part of a great Central Plains uplift;—they are really mountains. Elevations well above 7,000 feet are reached. The hills were densely wooded originally, though much of the timber has been logged off by the mining companies for fuel and mine timber.

The only operating company in the Hills last summer was Homestake Mining Company. This company operates one of the most remarkable properties in the world. The ore-body is large, remarkably uniform in outline and value, and of low grade. The ore averages about $4 per ton in gold and silver. An annual production of somewhat more than $6,000,000 is realized. The mines are located in the heart of the city of Lead and have been the chief reason for its existence for half a century.

The early discoveries of the precious metals in the Black Hills form a romantic story, and one of considerable historical interest. The Hills were a reservation allotted to the Indians who resented the encroachment of the whites who were lured on by the news of gold to be found. Their resentment culminated in outbreaks, the most notable of which led to the Custer Massacre. Of course the results of these disorders were inevitably the eviction of the Indian, and the district was rapidly opened up by the white settlers.

The present Homestake Company, formed early in this development by consolidation and purchase, has acquired the entire holdings on the lode. Present mining extends more than two thousand feet in depth and over a great length on the lode. Shrinkage stoping, starting on the sill floor in some cases and from branch raises driven from cross-cuts through the lode at regular intervals in others, is the principal method of mining employed. No timber is used in developing



A GROUP OF SHAFTS ON "THE RICHEST HILL IN THE WORLD" — *Butte, Montana*

these stopes as the walls and ore stand well unsupported. Loading is done by hand or by drawing chutes where branch raises lead to the stopes. All tramming, both surface and underground, is done by compressed air locomotives. Small sized locomotives gather cars, but the large trains hauled in main haulage ways are moved by larger machines. Air is compressed to 1,000 pounds per square inch gage and distributed to charging stations conveniently located throughout the mine.

At Homestake hoisting is preceeded by the first crushing stage. Three of the main haulage levels were selected and the ore from the levels above is by-passed to them. Mammoth jaw crushers that are placed just below these levels deliver the ore, crushed to seven inches maximum diameter, to the loading pockets. Hoisting is done in balance by a large electric hoist supplied with energy by a Ward-Leonard set using an Ilgner equalizer.

Homestake operates its own foundries (grey-iron and brass), logging operations and saw mills, limestone quarries and kilns, and its own hydroelectric power plant. A company store at which the employees trade,

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EDITORIALS

WISCONSIN ENGINEERS AGAIN ASK LICENSE LAW

Notwithstanding previous defeats, the Engineering Society of Wisconsin plans to sponsor, before the coming legislature, a bill for licensing engineers. The prospects are exceedingly good that the bill will be passed.

The law as proposed will be a modification of the existing law licensing architects. It will not cover the land surveyor, whose champions were chiefly responsible for the defeat of the bill last year. The law will not attempt to regulate the practice of engineering; it will simply "copyright" the term "engineer." The clause covering this point reads: "After July 1, 1925, no person doing business in this state shall use the term 'architect' or 'engineer' as part of his business name or title, or in any way represent himself to be an architect or engineer, without a certificate of registration, as provided in this section."

Under the proposed law the unregistered engineer will be as free to practice as the registered engineer, so far as legal restrictions are concerned. If an individual or a community prefers the unregistered engineer they will be at liberty to employ him. The proponents of the law, believe, however, that there will be a decided tendency for employers of engineers to prefer the engineer whose qualifications have been approved by the state board.

The proposed law, which is a model of simplicity and fairness, should result in benefit to the public and to the engineering profession. It is no hasty concoction; it is the result of many years of thought and labor on the part of some of the leading members of the profession in the state. The success of the architects' law augurs favorably for the success of this law.

Happy the man who early learns the width of the chasm between his desires and needs, that he may bridge it with service and thus find rest on the isle of felicity. —John Grant Lyman.

WHAT IS WRONG AT WISCONSIN?

During the last decade the building program of the university has been practically at a standstill. The physical plant of today was originally intended to accommodate about five thousand students. To-day we have nearly eight thousand, and the conditions in some departments are frightful. Furthermore, during the same period many of our greatest faculty members have joined other universities. To-day in almost every department we find inexperienced student instructors teaching subjects which require more intimate knowledge of their application to actual conditions of life. The reason given is that the salaries offered do not attract the qualified men. Whatever the reason we all are losers. The older faculty members are handicapped in their research work by too much routine work which should be delegated to others. The students suffer because they fail to get the valuable personal contact with older and more experienced instructors. Eventually the whole community suffers. The question raised on every hand is "What is wrong at Wisconsin?" That something is wrong is generally agreed. Ten years ago Wisconsin was considered on par with Illinois, Michigan, and several other great mid-western universities. Is it today? In some ways Wisconsin is advancing by leaps and bounds but in some very vital respects it is slipping. Why? Is it due to lack of legislative appropriations, or is it due to the lack of harmony between the university and the state government? In our judgment it is the latter. The first condition is a result of the second. It is no secret that the university and the state government do not work together. This is vigorously brought out whenever the university seeks appropriations for the purpose of increasing the salaries of its members or for the purpose of increasing its physical plant to remedy the badly crowded conditions. Such a situation is deplorable. It not only decreases the prestige of the university but reflects injuriously against the state government. Why cannot the situation be changed from one of bucking to one of co-operation? Why cannot the university more intimately invite members of the state legislature to inspect the university and become more familiar with the work being done? A little of this old fashion friendly "handshaking" would go farther than the present defiant attitude assumed by both sides. It must be remembered that the people of Wisconsin, who support the university, overwhelmingly endorse the principles of their state government. The men who appropriate funds for the university are the men whom they have entrusted to carry out their will. If one side is to give way a little is it not reasonable to expect that the university should go a little out of its way to bring about the co-operation and harmony with the state government which is so necessary for the greater Wisconsin of tomorrow?

The best piece of good fortune which can come to one is opportunity for intimacy with a leader, in whatever line of life he may be engaged. —Edward Everett Hale.

EXTENSION NOTES

SPECIAL LECTURES IN MILWAUKEE

The following series of special lectures to be given in Milwaukee on various industrial and manufacturing subjects has been arranged in co-operation with the Milwaukee association of Credit Men.

December 5, 1924: —"The Romance of the Wheat Harvest," — Don D. Leschier, Ph. D., Associate Professor of Economics, University of Wisconsin.

December 12, 1924: —"Growing American Interests in South America," — Ray H. Whitbeck, B. A., Professor of Geography, University of Wisconsin.

December 19, 1924: —"The Development of Water Power," Daniel W. Mead, C. E., Professor of Hydraulics and Sanitary Engineering, University of Wisconsin.

January 9, 1925: —"The Packing Industry," L. D. H. Weld, Director Commercial Research Department, Swift and Company.

January 16, 1925: —"The Transportation Problem of the U. S.," Sidney L. Miller, Ph. D., Assistant Professor of Economics, University of Wisconsin.

January 23, 1925: —"The Forest Industries," C. V. Sweet, Acting in Charge, Section of Industrial Investigations, United States Department of Agriculture, Forest Products Laboratory, Madison.

January 30, 1925: —"Our Mineral Resources," Armin K. Lobeck, Ph. D., Assistant Professor of Geology, University of Wisconsin.

February 6, 1925: —"The Knitting Industry," J. J. Phoenix, President Bradley Knitting Company, Delavan, Wisconsin.

February 13, 1925: —"The Making of Leather," John A. Wilson, Chief Chemist, A. F. Gallun & Sons, Milwaukee.

February 20, 1925: —"Land as a Resource," Vernon C. Finch, Ph. D., Associate Professor of Geography, University of Wisconsin.

E. W. Hubbard who recently completed the University Extension course in Show Card Writing has opened a sign shop in Oshkosh. He says the training he received in the course was invaluable to him.

Quirin Ewen of Appleton, has been promoted to Educational Director of the Niagara mill of the Kimberly-Clark Company, Niagara, N. Y.

A large number of machine tenders, backmen, and third hands, engaged on paper making machines in the mills of the Wisconsin River Valley have enrolled for new Paper Making courses developed by the University Extension Division and based upon Volume 4 of the text book prepared by the Technical Association of Pulp and Paper Makers of the United States and Canada. Classes in these courses are being formed in the mills at Nekoosa, Port Edwards, Mosinee, and other Wisconsin River Valley towns.

Marvin Prosser, an Electrical Engineer in the Nekoosa-Edwards Paper Company, has completed by correspondence with the University Extension Division correspondence courses in Practical Arithmetic, Practical Algebra, Trigonometry, Elementary Electricity and Magnetism, Theory and Operation of Direct Current Machinery, and a class in Steam covering boiler room efficiency. At the present time he is enrolled in and actively working on Theory of Alternating Currents, Electrical Engineering Course 312.

A. J. Dudley, paper maker at Port Edwards, in his resignation to the Nekoosa, Edwards Paper Company, expressed appreciation of the University Extension classes arranged for the employees of the Neekosa-Edwards Paper Company, and stated that these opportunities provided for him by the company were responsible for his securing a splendid position. The Nekoosa-Edwards Company had University classes in Engineering subjects during the winter of 1922-23 and 1923-24. Similar engineering classes will be held in this and several othher Wisconsin River Valley paper mills during the coming winter.

Frank G. Lesniak, a member of the Engineering Department of the Marathon Paper Mills at Rothschild, Wisconsin, has during the last three years completed with thhe University Extension Division Engineering correspondence courses as follows: Advanced Shop Drawing, Trigonometry, Strenth of Materials, Mechanism, Elements of Machine Design, Steam Boilers, Structural and Steel Drafting, and Design, and at the present time is studying Elements of Mechanics and Geometry. A number of other employees at the Marathon Paper Mills are also carrying correspondence courses with the University.

Mr. E. L. Mundin, Worcester Polytechnic Institute graduate and correspondence student in Reinforced Concrete Design, is now with the Oshkosh Steel Construction Company, Oshkosh, Wisconsin.

Over a hundred students are registered for a special lecture course in "Fuels and Combustion" at the University Extension Division in Milwaukee.

ALUMNI NOTES

R. T. HOMEWOOD

CHEMICALS

Merrill E. Hansen, ch '23, is chemical engineer with the Decatur Branch of the Illinois Power & Light Co. His address is 125 Home Ave., Decatur, Illinois.

Harold C. Knapp, ch '21, is a chemist with Fairbanks Morse Co., Beloit, Wis. He was recently married to Esther Verity of La Habra, Calif.

Cleveland Nixon, ch '23, is with the Westclox Mfg. Co., Peru, Ill. He was recently married to Charlotte Davis, ex. '24, Racine. Their address is 541 Chartres St., La Salle, Illinois.

B. A. Weiner, ch '24, is chemical engineer for the M. & M. Paper Co., Marinette, Wis. His address is 741 Marinette Ave., Marnette, Wis.

CIVILS

B. F. Ahrens, c '23, gives his address as 259 35th St., Milwaukee.

Helmer C. Amundson, c '24, was married on November 27 to Leone Helen Post of Sauk City. They will be at home after January 1 at 228 Elizabeth St., Baraboo, Wis.

Ray E. Behrens, c '19, is assistant engineer M. C. R. P. O., 133 2nd St., Milwaukee. His home address is 4508 Pabst Avenue.

Eugene F. Bespalow, c '21, who is with the Spearman Concrete Pipe Company of Knoxville, Tenn., writes from Jacksonville, Fla., as follows: "As regards advice to outgoing seniors, all I can say is come to Florida or anywhere in the South, because wonderful opportunities await a man with initiative and pep. There is a tremendous amount of construction work of every description going on and being planned, and a scarcity of good men to handle it."

Herman A. Blau, c '20, has changed his address to General Delivery, Metropolis, Illinois.

Leonard F. Boon, c '10, is assistant professor of civil engineering in the University of Minnesota. His address is 611 Ninth Ave., S. E. Minneapolis.

N. W. Breivogel, c '24, is assistant engineer for Board Public Land Commission. His address is 155 Knapp St., Apt. 18, Milwaukee, Wis.

Frank L. Bumer, c '23, is doing drafting work in Gary, Ind. His address is 448 Marshall St., Gary.

R. M. Connelly, c '16, has hung out his shingle as Consulting Engineer and Contractor in Ft. Wayne, Ind.

ELECTRICALS

Herbert H. Beck, e '23, is with the General Electric Co., Ft. Wayne, Ind. He was recently married to Arabel Holum, Mt. Horeb.

N. Borusiak, e '24, is junior engineer with the "Electric Company," Milwaukee. His address is 604 Galena St., Milwaukee, Wis.

Royal E. Coates, e '24, is student engineer with the General Electric Co., Fort Wayne, Ind.

Donald Dewire, e '22, is with the Western Electric Company, La Grange, Ill. He was married on September 16 to Ethel Lemmer, '21.

E. A. Kerler, e '20, s a Sales Engineer at West Bend, Wis.

Carl W. Kranse, '23, is engineer for the Western Electric Company. His address is 156 N. Oak Ave., Oak Park, Ill.

W. J. Ludwig, e '20, has moved from 562 Thirty-second Street to 837½ Thirty-fourth St., Milwaukee, Wis.

G. W. McCollum, e '21, is engineer with Joslyn Mfg. & Supply Co., 3700 S. Morgan St., Chicago. His home address is Downers Grove, Ill.

James Mainland, e '11, has moved to 2109 Clear Lake Ave., Springfield, Ill.

J. O. Merrill, ex. '18 is engineer for Grangord, Lowe & Bollenbacher. His address is 2018 Lincoln St., Evanston, Ill.

Milton P. Naab, e '24, is with the Wisconsin Telephone Co., Milwaukee. His address is 2102 Prairie St., Milwaukee.

H. M. Olson, e '05, is sales engineer with Acme Boiler and Tank Co., 48th and Morgan, Chicago. His residence address is 8228 S. Peoria St.

Louis W. Olson, e '99, was elected president of the American Foundrymen's Association at a convention of that body held recently in Milwaukee. Mr. Olson lives in Mansfield, Ohio.

H. P. Palmatier, e '12, is chief electrical with NeKoosa Edwards Paper Company, Port Edwards, Wis.

H. A. Petersen, e '21, is electrical engineer, 72 W. Adams St., Chicago. His home run address is S. Wilson Ave. Chicago.

Gilbert W. Schaeder, e '21, is in the distribution department of the Milwaukee Electric Ry. & Light Company. His address is 1428 Wright St., Milwaukee.

H. Sorenson, e '21, is with the Underground Division, T. M. E. R. & L. Co. Milwaukee. His address is 416 Kenilworth Place.

J. R. Steen, e '23, has left the testing department and has taken a position on the General Electric Company, at Schenectady.

F. L. Webster, e '23, gives his home address as 156 N. Elmwood, Oak Park, Ill.

MECHANICALS

R. P. Bethke, m '22, and **E. W. Fiedler,** m '20, are with the Western Electric Co., Chicago. Their address is 142 N. Lorel Ave., Chicago.

R. H. Raube, m '23, who is employed in the General Electrical Company's Sales Course, recently spent two weeks at the Lynn Massachusetts Works. Mr. Raube expects to be located in the Chicago district at the completion of his course.

J. Rosecky, m '24, is estimator with the Allis-Chalmers Co., Milwaukee. His home address is 901 Becker St., Milwaukee, Wis.

P. A. Royer, m '21, is designing engineer with the Illinois Power and Light Corp. His address is 4132 Kenmore Ave., Chicago.

F. C. Ruhloff, m '12, is engineer with the Bucyrus Co. His home address is 1193 Fairview Ave., South Milwaukee.

John Slezak, m '23, is development engineer for the Western Electric Co., Chicago. His address is 156 N. Oak Park, Ill.

Geo. E. Steudel, m '11, is assistant superintendent of the 1 to 4 and E blast furnaces of the Illinois Steel Company, South Chicago. His home address is 7034 Indiana Ave., Chicago.

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ALUMNI NOTES

(Concluded from page 70)

Bruno Nordberg, m '07, died at his home in Milwaukee on October 30 after an illness of two years. To Mr. Nordberg's credit stands a long list of mechanical achievements, among which is the air pressure power system which he designed for the Montana Mines of Anaconda Copper Co. He was the holder of thirty or more patents for mechanical devices, many of which have been of great industrial value. He is survived by his wife and one son.

Carl E. Schaefer, m '24, is engaged in sewer construction work on the sewer system north of Chicago. Address, Highland Park, Illinois.

Arnold Wegner, m '11, is chief engineer for the Chain Belt Company, Milwaukee.

Charles Vergin, m '24, is with the Wisconsin Public Service Corporation at Green Bay, Wis. He writes, "I came here directly from Milwaukee. At the present time I am operating in their station here. Mr. Carson, the manager, told me that soon they intend to begin preparing plans for a new station here of about ten thousand KW capacity and that I will have a chance to work on these plans. I think it will be an excellent experience."

MINERS

E. Azcon, min '24, is with the Elm Orlee Mining Company at Butte, Montana. Azcon has been slated for the work of developing standard mining methods for the company, but due to an extensive mine fire in the Elm Orlee has been in charge of ventilation while the fire fighting has been carried on. His address is in care of Y. M. C. A. Butte, Montana.

Carl T. Buchner, min '23, is employed as assistant to the president of the Sante Fe Ry. Co. Buchner writes describing interesting trips into the southwest, inspecting railroad company holdings and investigating possibilities of new railway construction in the Panhandle in Texas. His address is 6415 Maryland Ave., Chicago.

W. G. Dollmeyer, min '24, is employed as Metallurgist by the Inter-State Drop Forge Company at Milwaukee. His address is 381 Twenty-ninth Street.

E. W. Jones, min '23, has severed his connection with the Western Electric Company as an engineer in the development branch, and has taken a place as superintendent of a unit of the Manning Paper Company at Troy, N. Y.

H. G. Lynch, min '24, is employed as mining engineer by the American Smelting and Refining Company at Leadville, Colorado. Lynch's address is 206 E. Eighth Street, Leadville.

J. M. Murphy, min '24, is taking post graduate work in English and geology at Harvard. He may be reached at 1470 Beacon Street, Brookline, Mass.

F. A. Nelson, min '24, is metallurgist for the Taylor-Wharton Company at Highbridge, N. J.

Eugene J. Verhaeghi, M. S. min '24, has returned to Belgium. Verhaeghi writes that save for a period in which he combatted pneumonia rather strenuously he has been very busy doing squads "east and west" and studying Military Engineering with the Belgium Army. He is serving his period of compulsory service. He may be reached as E. J. Verhaeghi, E. S. L. R. Gn., Brasschaet, Polygône, Belgium.

THE ECLIPSE OF JANUARY 24, 1925.

By JOEL STEBBINS
Director of the Washburn Observatory and Professor of Astronomy

RESIDENTS of northern Wisconsin will have the unusual opportunity of observing the total eclipse of the sun on January 24, 1925. The path of totality traced by the moon's shadow is a tract one hundred miles wide, extending from northern Minnesota and Lake Superior to Long Island Sound, and then out to the Atlantic. The southern limit of this area is marked by a line drawn from Superior to Marinette, and Wisconsin cities lying wholly within the shadow are Ashland, Hurley, Eagle River, and Florence. Superior is just outside and Duluth just inside the critical region. For all of Wisconsin, the eclipse will have started before the sun appears, and it will seem much like a delayed sunrise. At madison the eclipse will be ninety-five per cent total, and this percentage increases northward until the line of totality is reached.

Unfortunately at this time of year it is more than likely to be cloudy in the early morning, but from the spectacular point of view the eclipse may be a good one even if viewed through breaks in the clouds. The best optical aid for viewing the crescent sun is simply a smoked glass, or better yet, one or more thickness of dark camera film.

At Madison the sun rises at 7:22 standard time, and the moon will be seen encroaching further on the sun's disk until the maximum at 7:58 and then pass off gradually until 9:08. It will not be possible to admit the general public to the Washburn Observatory, as observations will be made with the telescope by the class in astronomy.

The Observatory expects to send a modest expedition to Middletown, Connecticut, where parties from other observatories will be present, as there the sun will be high enough for accurate observation. The problem we shall attack will be the measurement of the total light of the solar corona for comparison with previous measures with the same apparatus in 1918. The expedition to California in 1923 failed because of unexpected cloudy weather, and while the chances for a good sky in Connecticut are only about even, there is a possibility that some scientific results may be secured.

There will be a similar eclipse in the Wisconsin region in the year 1954, but after that there will be no other for over two hundred years, or in the year 2144.

MINE MODELS ERECTED

The Department of Mining and Metallurgy, with the Department of Geology, has erected a large model of several of the mines at Butte, in the Mining Laboratory. The model is a gift from the Anaconda Copper Mining Co., of Butte, Montana, and is a very welcome addition to the department's teaching facilities.

THE WESTERN MINE INSPECTION TRIP

(Continued from page 67)

only if they wish to, acts as an efficient price regulator, as other merchants must meet its competition. A recreation building which houses libraries, club and reading rooms, bowling alleys, pool and billiard rooms, a large theatre, and a large swimming pool is maintained by the company for its men and the citizens of the community.

Following a day spent at small coal mining operations near Gillette, Wyoming, we moved on to Sheridan, Wyoming, where the large scale operations of the Sheridan Wyoming Coal Company were seen.

The cretaceous coals of eastern Wyoming form an enormous reserve of fuel. The seams are nearly horizontal; in places the thickness is forty feet or more, and the coal beds underlie an extensive area. The ash content of these coals is less than 5%, but the moisture ranges from 18% to 25%, so an immediate market is necessary to enable the operators to produce coal.

Monarch and Carney, both slope mines, and Dietz No. 8, a shaft mine, were visited. Mining is done on a panel room and pillar system. Advancing the rooms are carried to a height of about ten feet. When pillar drawing begins, a large amount of top coal is recovered. Salient features of the operation are undercutting by modern coal cutters, electric haulage in which both trolley and reel locomotives are used, and modern screening plants in which the coal is sized for domestic and power plant consumption or sent as run-of-mine to the railroad which is an important consumer.

At each mine a modern village is developed in which houses, coal, light, and water are furnished at moderate rentals. The Tongue River Trading Company, which is company operated, supplies the necessities and luxuries to the men and their families. The mining villages and the city of Sheridan are connected by good roads and by an interurban trolley line which gives access to the larger city.

On our way to Butte, we passed the Crowe Indian Reservation and the Custer Battlefield. The battlefield is of especial interest in that it is set aside by the Government as a cemetery for those who lost their lives in the battle.

Butte is one of the great copper producing centers of the world, and the mining industry is the real life of the city. Many methods of mining and a great variety of the latest mechanical and electrical equipment used in mining were inspected at the mines of the Anaconda, East Butte, Elin Orlu, and Butte and Superior Mining Companies. In every operation extremely difficult mining conditions are encountered, and the variety of methods used is evidence of the difficulties overcome in mining. The mining of an old fire area, in which the stopes had been filled with slimes from Butte and Superior mills to extinguish the fire, proved an unusual and rather uncomfortable exhibit, for while the fire is extinguished, the ground has not cooled down to any great degree. Advanced safety measures and elaborate precautions against mine fires, which in spite of every effort to forestall them are recurrent in this field, are evident at every turn.

Mine pumping is concentrated through the "High-Ore" and "Leonard" shafts which drain all the mines on the "Hill." In these shafts the necessary pumping equipment to handle large volumes of acid water is installed. The expense of pumping this water, however, is more than compensated by the copper recovered from the water by precipitation with scrap steel and iron. This copper yield amounts to several millions of pounds yearly. The pumps used are generally of the quintuplex, single acting, plunger type, and are equipped with porcelain plungers to resist corrosive action of the mine water.

The engineering features above ground are no less distinctive than those beneath the surface. It is in Butte that the late B. V. Nordberg conceived and successfully developed the plan of converting the steam hoisting equipment of an entire camp to the regenerative use of compressed air. The air is compressed into a common system at several modern stations from which the demands of the hoisting plant, equalized by a water equalizer which allows each hoist to compress air into the system during its period of retardation, are met. Several isolated mines use electrical hoisting systems of advanced design.

The mills of the East Butte Copper Mining Company and the Timber Butte Mill were visited. At Pittsmont, jigging, tabling, and flotation were used to concentrate copper ores. At Timber Butte a portion of the lead concentrates are recovered by tabling, and the greater portion of the concentrates of lead, zinc, and silver are recovered by floatation.

At Anaconda, where we met W. A. Emanuel, min '20, zinc and copper concentration were inspected. The copper smelter uses reverberatory instead of blast furnaces. Matte is blown in convertors, and the convertor copper puddled in a special furnace after which it is cast into anodes for later electrolytic reduction.

At Anaconda the hot gases and dusts from roasters, reverberatories, and converters are all lead through a common flue to the largest stack in the world. This stack, which is 585 feet high and has an inside diameter of 60 feet at the top, is situated high above the surrounding plains. In their travel through the flue the gases are cooled, and at the stack they are passed through elaborate Cottrell precipitators which cast out most of the solids from the effluent gasses. The solid particles are treated in a special reverb. The gases from it are largely volatilized arsenious oxide (As_2O_3) which is precipitated on cooling and is later refined. The matte from the furnace is sent back to the copper circuit. In addition to the processes, the group inspected Anaconda's sulphuric acid plants, foundries, and phosphate plant.

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ATHLETICS

G. H. ABENDROTH

BASKETBALL

Before the basketball season had begun, when the varsity was having a little trouble now and then, "Doc" Meanwell predicted that the Badgers would find themselves in the vicinity of the fifth place at the end of the conference chase.

Despite Doc's statement to the contrary, it looks as if we have a team which will make the other conference teams hustle to take first place away from us. Meanwell has the reputation of turning out championship teams and we would expect it of him if he had to work with wooden soldiers. Doc had a tough proposition on his hands this year. He had to find men to fill the shoes of Gibson, last year's captain and center, and Farwell, the engineer who played a sensational game at forward. Nevertheless, we expect to see the Badgers flirting with "Miss Championship" rather than fighting to keep from hitting the cellar.

Although Wisconsin's team has not had an opportunity to exhibit its ability against conference teams, the games against Wabash, Butler, and Depauw have demonstrated that we have the making of a real team. In the Wabash game Martell showed up very well and "grabbed the game out of the fire" by some neat shots during the last few minutes of the game. With Wabash about seven points to the good, Martell, taking Merkel's place at forward, shot four baskets and put us out in front. He was the main reason for the 22-21 victory when the final whistle blew. His work in this game makes its unnecessary to continue the search for a successor to Farwell.

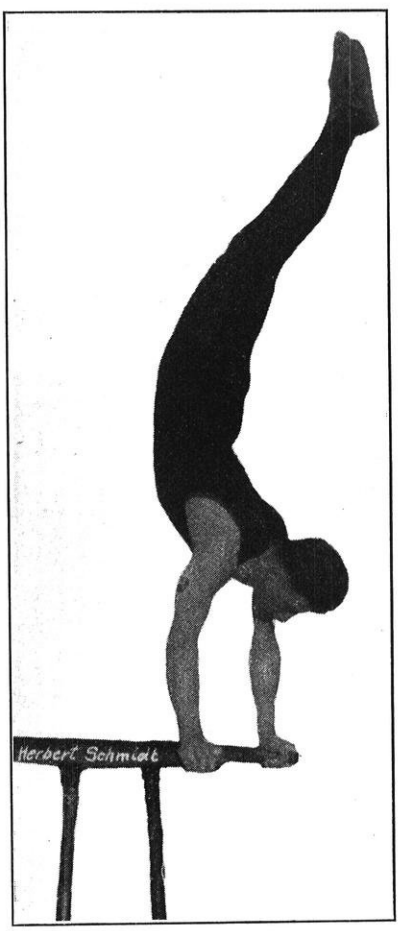
The work to build up a championship team for Wisconsin was made harder by Spooner's ineligibility due to his three years of participation in college sports. Merkle, Martell, Varney, and Wackman are now playing the forward positions, — Wackman being shifted from guard to forward, while Diebold and Barwig take care of the guard positions.

Butler, A. A. U. champions, came to Madison after having given Iowa a sound beating. Just as Pat Page's men were successful in administering a defeat to Iowa, they were again successful in beating us. Although the Badgers were ahead 10-5 at the end of the half, Butler came from behind and emerged from the battle a victor by the score of 21-17. However, the Butler game should not be taken as an indication of weakness, because Butler has been leaving most conference teams on the small end of the score.

In the De Pauw game, which we captured by the score of 27-22, Varney and Wackman were sent in at the forward positions. Brooks took charge of the center of the floor while Barwig and Captain Diebold played at guard positions. Brooks, playing a good game at center, dropped in quite a few of the baskets which helped to accumulate our total of 27 points.

GYM

Even though Wisconsin may not win the conference title in gymnastics this year, we are positive that "Huck" Schmidt will again repeat his victory of last year and be proclaimed the king of all conference gymnasts. "Hucks" a hard working engineer, is captain of the gym team besides being a star performer. It would be difficult to mention just where "Huck" excells, because he is good on any apparatus and has the reputation of being the best all-around gymnast that Wisconsin has ever produced.



"HUCK" SCHMIDT

Schmidt should have more support this year than he had last year. Hiemke, a junior chemical engineer, is working on the parallel horizontal bars and on the horse and should prove a valuable asset to the team. Coach Schlatter also has several other men who will blossom out this year after their experience on last years' squad.

Hicks, who is working on the rings and the horizontal bars, should come out better than he did last year. A gymnast cannot be developed in a few months, and last years experience should prove valuable to Hicks. Dale is swinging the clubs for the varsity this year

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CAMPUS NOTES

ENGINEERS HOLD FOURTH ANNUAL SONG FETE

On the evening of December 17 more than five hundred engineering students, and engineering faculty and their families assembled in the Lathrop concert room for the fourth annual Christmas get-together of the College of Engineering. For the first time since the inauguration of these gatherings, the Freshman Class, thru a voluntary collection on its own part, took it upon itself to furnish Christmas trees and decorations for the occasion.

The Correct Christmas Spirit for a Student was the subject of the Christmas message delivered by President Birge. After the address, Prof. E. B. Gordon of the Extension Division led the engineers in singing Christmas carols. The group singing was accompanied by a twenty-piece orchestra composed of engineers and children of the engineering faculty. Engineers who played in the orchestra were:

M. S. Cook '26, E. H. Ballard '28, Robert Zinn '27, Ralph A. Smith '25, James K. Manning '28, H. P. Robinson '27, Millard B. Smith '25, L. W. Heise '26, Russell A. Nelson '26, Matthew Hass '27, John B. Seastone '26, and John A. Rabbe '26. Professor Jimmy Rood's violin, too, found its voice during this evening of good cheer.

Mrs. M. O. Withey gave a vocal solo, *Birthday of a King*, accompanied by Mrs. J. W. Watson on the piano and Russell A. Nelson, '26, on the violin. After a song by Mrs. E. E. Watson, accompanied by R. A. Nelson, the engineers' choir joined with these two in singing Christmas selections.

Dean A. V. Millar, under whose guidance this gathering was carried out, expressed the hope that similar mixers uniting the engineers in a Christmas spirit might become a tradition of the College of Engineering.

A. S. C. E. HEARS PROF. TERRY TELL OF HIGH VACUUMS

"It was only a few years ago that the high vacuum was considered possible," declared Professor Terry of the physics department of the University in a lecture before the student branch of the A. S. C. E. in room 229 of the Engineering Building at seven-thirty o'clock Wednesday evening, November 19. A high vacuum, it was explained, is one where the pressure is one-tenth of a millimeter or less as it would be measured on the ordinary barometer if that were possible.

The latest and most successful vacuum pump works on an entirely novel principle. It consists of a flask for boiling mercury and a condenser for the mercury vapor. The tube to the container which is to be evacuated is connected to the one that carries the mercury vapor. The air is diffused into and swept along by the vapor, and thus the vacuum is created.

A new vacuum tube is being developed in the physics department, said Professor Terry, which will be used in the University radio sending set. This new tube, which is expected to have eight times the capacity of the present tubes, is made possible by the introduction of new methods of creating and maintaining high vacuums.

ELECTRICAL DEPARTMENT GETS NEW EQUIPMENT

The Electrical Department has recently become the recipient of some very valuable telephone testing equipment which was donated by the Wisconsin Telephone Company. This gift includes a telephone interference-factor meter, a wave analyzer, and a noise standard. These instruments are used to determine the nature and magnitude of the harmonics in power circuits which may cause interfering noises in telephone systems. A demonstration of this new equipment was given at the A. I. E. E. meeting by H. R. Huntley, e '21, Harold R. S. Day, e '21, and W. C. Lallier, e '22.

DANNY MEAD'S HOUND DOG STORY

"As between the genius who lacks stability and the slower man who is determined and persistent, give me the latter," said Prof. D. W. Mead to the Tau Beta Pi initiates at a recent banquet, and to illustrate the point he told about Bill Hokum's deer hound. "Yes," said Bill in reply to a stranger who was praising the fine looking hound, "Yes, stranger, he's a fine deer hound but he has his faults. He can start out nearly any morning and find a deer and he'll chase that deer for quite a while, until maybe a fox crosses the trail. Then he forgets the deer and takes after the fox, and he and the fox play hide-and-seek until a rabbit comes along. He will chase the rabbit for a while and then take after something else. Along about sundown I'll find him at the foot of a tree barking at a chipmunk."

HYDRAULIC LAB ACQUIRES NEW ROTARY PUMP

A new piece of apparatus has found space in the maze of cast iron and rambling pipe on the first floor of the hydraulics laboratory. It is a new Viking universal rotary pump with a 10 H. P. direct-current motor mounted on its base. The Viking is designed to operate with high efficiencies under varying loads

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CAMPUS NOTES

(Concluded from page 74)

and speeds. This pump, which may be termed an irrigation pump, has a capacity of 200 gallons per minute.

The motor was purchased by the University, but the pump and mounting was a gift to the laboratory from the Viking Sales Company, Milwaukee. The unit at present is being tested by two senior civils who will make it their business, as a thesis requirement, to determine the various efficiencies and economies of the unit.

Delta of Kappa Eta Kappa, professional electrical engineering fraternity, announces the formal initiation of Harley Gibson '25, George Rateike '25, Henry O. Walker '25, William Churchill '27, Lyman Holder '26, Greay Hurtly '27, Lawrence Ratke '27, and Robert Scorgie '27.

With the completion of a new 220 yard straightaway at Camp Randall in preparation for the Minnesota dual track meet on May 23, Wisconsin will join the ranks of Pennsylvania, Iowa, and Ohio in having a track of Olympic dimensions.

The old Hausmann mahogany bar which saw so many years of faithful service in Hausmann's establishment at State and Gilman streets, has been presented to the Memorial Union by the heirs of Carl H. Hausmann, proprietor of the former brewing company. When the Union building goes up, this 40-foot bar will grace once more the place where cheerful souls assemble — the taproom.

Wenzel Fabera, '25, is in charge of the Engineering exhibits in the general University exposition. The exhibits will present a realistic cross-section of the work being carried on by the students in the university. The various chairman are starting work immediately and have arranged conferences with the heads of their respective colleges in order to develop plans and possibilities for the exposition.

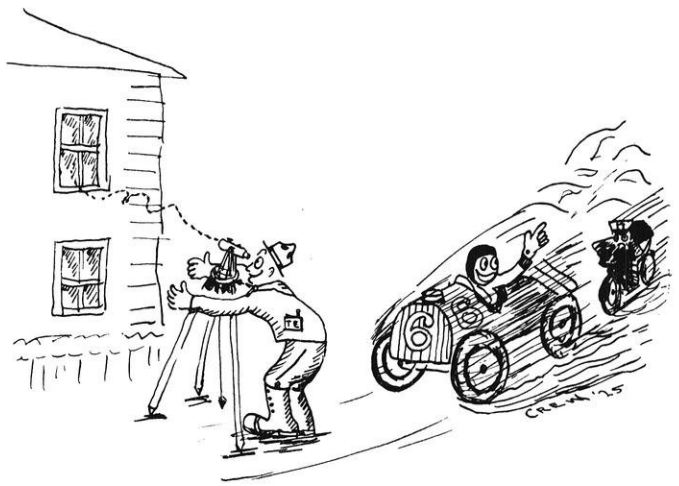
THE MINERS ARE RESTLESS, TOO

Roll call at 4:35 a. m., December 4, 1924, at the Northwestern station, Madison, was the lucky, or unlucky ordeal for the six miners and Professor McCaffery who were leaving Madison for Chicago on their inspection trip. We wonder what story Mac had early this morning — we wonder.

A day was spend at the Wisconsin Steel Mills, South Chicago, where the superintendent took the liberty of consulting Prof. McCaffery on subjects which were miles above the heads of the student miners. In fact, at every plant which we visited, the superintendents asked Professor McCaffery for advice about their furnaces.

At the Indiana Steel Company, Indiana Harbor, we were guests at the banquet which the company tendered us. Professor McCaffery did most of the speech making at the Youngstown Sheet and Tube Company where, for over an hour, we watched a battery of Bessemer converters in action.

Saturday, the last day of the trip, was spent at the U. S. Steel Corporation in Gary, Indiana. Here the miners investigated the methods of charging and operating the huge blast furnaces.



"The engineer with an inquiring mind shall rise to great heights."

A new edition of *Technical Mechanics* by Professors E. R. Maurer and R. J. Roark is being published by John Wiley and Sons. It is a rewritten and reset edition embodying changes in subect matter and in presentation.

Prof. Charles I. Corp will speak upon *The Flow of Liquids in Pipes* before the Engineers Society of Milwaukee at the Athletic Club on February 18.

Leo Shapiro, Missouri School of Mines, '24, is enrolled as a graduate student in metallurgy. He is also teaching in the mathematics department.

Speaking of humor, it is quite interesting to note how it creeps into our daily life. For example, not so long ago the morning's mail brought to Professor Owen a letter from a woman who owns a tract of land in the western part of the state. This woman is afflicted with a certain degree of insanity, and also with a blind husband. She is eternally quarrelling with her neighbor over a line fence which separates the neighbor's land from her own. To settle the argument once for all, she sent the following request to Prof. Owen:

"Come over and survey me. I have been surveyed twice already."

ATHLETICS

(Concluded from page 73)

after winning his numerals on last year's frosh squad.

Huxley, Kress, and Weiss are also working out regularly with the squad and will contribute their share to the total points. Coach Shlatter has a stiff schedule drawn up for his team. Among the teams which will be met this year are Milwaukee Y. M. C. A., La Crosse Normal, Chicago, Purdue, Minnesota, and Iowa.

TRACK

Although the long line of engineering track captains has been broken, our chances on the cinder path look very bright. Of course there are a few places that will be hard to fill, — especially the place left vacant by the graduation of "Bill" Hammann, C '24, who captained last year's track squad. Bill, for two successive years, captured second place in the penthalon at the conference meets and always placed high in the pole vaults.

The men who brought the conference title to Wisconsin in cross country will help to make the Badgers a conference contender in track. With men like Bergstresser, Kubly, and Piper from the "hill and dale" squad, we should be especially strong in the mile and two mile. Hilberts and Vallely should take care of the half mile. Veterans like Tuthtar and Flueck promise to make the high jump and quarter mile interesting.

THE PUBLIC UTILITY AS A FIELD FOR THE ENGINEER

(Concluded from page 66)

tion shows that the number of graduates of engineering and technical schools is not sufficient to fill the executive places in industry, even granting that all of them were fitted for administrative work. It must be recognized, however, that a good technical expert does not always develop into a good executive, and while there is need for technically trained men, there is greater need for technically trained men with executive ability; that is, men possessing besides a college degree, character, energy, personality and, above all, human qualities. There is no course guaranteed to impart these qualifications to the student. They must be acquired outside the classroom, but lacking them, material success of the highest order is not easily attainable. Character is essential to leadership, and students should be impressed with that fact."

MECHANICAL EQUIPMENT OF A MODERN NEWSPAPER PLANT

(Concluded from page 63)

width of the printed page. The length of the plate, which is measured around the circumference, is equal to the length of the printed page. The outside radius of the plate is approximately 7½ inches. There is no fixed standard for this because there is no standard of length for a newspaper page.

The development of the modern newspaper with its large number of pages and immense circulation has warranted the development of improved machinery for the manufacture of stereotype plates. The first great step was the introduction of the Autoplate machine which was developed in the early years of the present century by Henry A. Wise Wood. This machine was almost entirely automatic in its action. The matrix was held in place by means of specially designed clips, these clips serving also to automatically strip the matrix from the plate after the metal had solidified. The metal was forced into the box by a cam operated pump and all of the subsequent operations on the plate were performed by the machine. The machine was capable of turning out four plates per minute, but it seldom was operated at more than three or three and one-half plates per minute. But even at that it had an output more than three times that of an ordinary hand operated outfit. It required less men to operate it and the work was far less laborious and exhaustive.

The Autoplate has, however, been superseded by the Junior Autoplate and Autoshaver. This combination is a very much simpler mechanism than the old standard Autoplate and is consequently somwhat more reliable in operation. Many of the features of the old machine have been retained. The casting cylinder is in a vertical position instead of horizontal as in the old machine and the metal is pumped to the box by a hand operated pump. The metal in the box, however, is not under any pressure but that of its own weight. The matrix is held in clips and is automatically stripped and held in a position that allows the casting cylinder to rotate. During this rotation the tail is cut off and returned to the pot. The plate is then lifted by hand to the Autoshaver through which it passes by gravity, and during its passage through the machine, it receives the remainder of the finishing operations which include the final cooling.

Editor's Note: A continuation of the article on "Mechanical Equipment of a Modern Newspaper Plant" will appear in the next issue.

THE WESTERN MINE INSPECTION TRIP OF 1924

(Continued from page 72)

The final step in our journey was a visit to the Couer d 'Alenes around Wallace and Kellog in Idaho. Situated in northern Idaho, the Couer d' Alene region is not only the most important lead and zinc producing camp in America, but it is also a region of wonderful scenic beauty. The mines are located at various distances from Wallace which is the center of mining activity.

The "Hecla", at Burke, which lost its entire surface plant on the last day of our 1923 visit in the district, "Tamarack and Custer" at "Nine-Mile," "Morning" at Mullan, and "Bunker Hill and Sullivan" at Kellog were inspected. At the last three named mines the development is made by long adit-tunnels two miles or more in length which are driven into the mountains until the ore bodies are reached. In the earlier stages of operation, ore from the upper mine levels was

(Concluded on page 78)

BETTER LIGHTING NEEDED IN INDUSTRIAL PLANTS.

In a paper read before the Illuminating Engineering Society, February, 1920, entitled, "A Survey of Industrial Lighting in Fifteen States," R. O. Eastman submitted some very interesting data regarding the lighting conditions in industrial institutions The survey comprises some 446 institutions, in which lighting was considered by 55.4% as being vitally important, and by 31.6% as being moderately important, and by 13% as being of little importance. Practically 58% considered that lighting was as important as power in the operation of the plant, and a small proportion would give more attention to lighting than to anything else.

In considering the present condition of lighting as found in the various plants, only 9% ranked as excellent, about ⅓ ranked as good, 29% fair, 18.8% poor, 3.5% very poor, and 7.8% partly good and partly poor. It was found that the lighting in the offices was far superior to that in the shops; 19% being excellent, 36% good, 31% fair, and only 13% poor and none very poor.

On consulting the executives regarding what factors were most important in considering lighting, the following facts were revealed: Increase of production 79.4%, decrease of spoilage 71.1%, prevention of accidents 59.5%, improvement of good discipline 51.2%, and improvement of hygienic conditions 41.4%. Manufacturers who have good lighting appreciated its value largely from the standpoint of its stimulating effect upon output.

There is no question that any intelligent man who carefully considers the necessity for good lighting in an industrial plant, will agree that it is impossible for a person to do as good work, either in quality or quantity, in poor light as in good light, but yet the result of a careful analysis discloses the fact that only about 40% of industrial plants are furnishing good light to their workers and 60% are operating under poor lighting. It is hard to understand why such a proportion of concerns can be satisfied with a condition which is universally admitted to be a curtailer of efficiency and a prolific causer of accidents. The principal cause of this condition is that those in charge of such establishments have not given the attention to lighting that it demands. They do not know what constitutes good lighting, and in their absorbing interest of other factors of production have overlooked a vital one.

Every safety official should deeply interest himself in the lighting of his plant and insist upon good lighting as much as good goggles, good guards and other necessary accident prevention equipment. Every production manager should insist upon good lighting because the efficiency of the working force is increased by the condition of the lighting furnished. The plant physician should examine the lighting, for eye strain and eye fatigue are directly affected by poor lighting, as is the hygienic condition. Well lighted plants are invariably cleaner than poor lighted places. Plants equipped with Factrolite Glass in all windows are well lighted.

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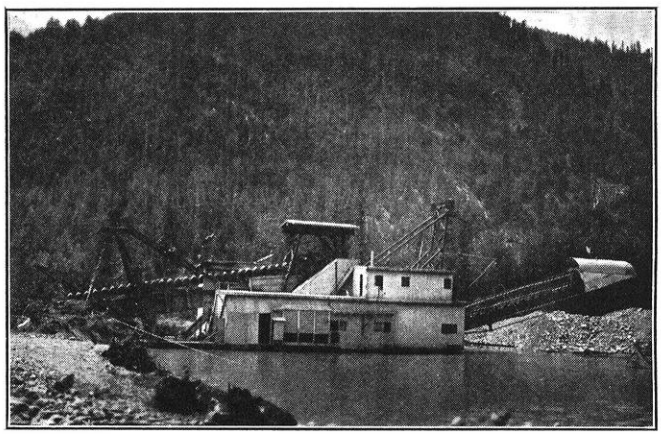
drawn through chutes to these tunnels and trammed to the portals. These upper levels have been exhausted and now the ore is all hoisted from shafts located at the ends of the tunnels. The hoists are of elaborate design, — embodying such features as automatic stop and over-speed devices and the regenerative use of electricity with the necessary motor-generator sets. The motor-generator sets are located in large chambers cut in solid rock in the heart of the mountains. Electric haulage by large trolley locomotives is employed in these tunnels and controlled by block signal systems. The trains deliver the ore to crushing plants near the portals of the tunnels where the ore is crushed to the size desired for the first stage in concentration and then sampled. In some cases the mills are located near by, while in others the ore is hauled by rail or by aerial tramway to mills more conveniently situated.

Zinc is an important secondary mineral, and considerable tonnages of zinc concentrates are recovered. Most of the zinc mineral is smelted outside the district. Lead concentrates from several mills are smelted at the Bunker Hill Smelter located at Bradley, and our visit in this section was fittingly closed by a trip to the last named plant. Lead blast furnace smelting followed by the removal of silver in zincing kettles, the concentration of antimony into small volumes of antimonial lead, the recovery of the zinc, parting of the doré metal, and the refining of gold, silver and copper sulphate were the chief operations witnessed here.



GOLD DREDGE OF THE YUKON GOLD COMPANY
Murray, Idaho

Our visit to this region also included a trip to Murray, some twenty miles from Wallace, to a gold dredging operation of the Yukon Gold Company. The trip by motor was one of the most beautiful and at times one of the most hair raising that we experienced. The road winds over the mountains, and sheer drops of great distances are in evidence at many points along the edge of the roadway. The gold dredge handles some 6,000 yards of gravel daily. In early days the region was a populous mining camp, but now it is practically deserted, — only the dredge crew and a few scattered ranches being left in the neighborhood.

Our trip was disbanded at Wallace. Some returned to Madison directly; others took advantage of the low fare privilege and returned more leisurely by the southern route. Verhaeghe, who went back to Belgium, left the party at Butte. A few of the group remained to work in the Couer d' Alenes where we were pleased to meet Wolverton '23, Taynton ex '21, and Johnson ex '24.

It is due to no lack of appreciation of the warm welcome and many courtesies extended to us at all points visited that suitable acknowledgement has not been made here. It is rather that the list of friends made by this group of young men, and by those who have preceeded them, is too long for such recital. Let it suffice to say that everyone, everywhere, extended himself to make our stay a pleasant and instructive one.