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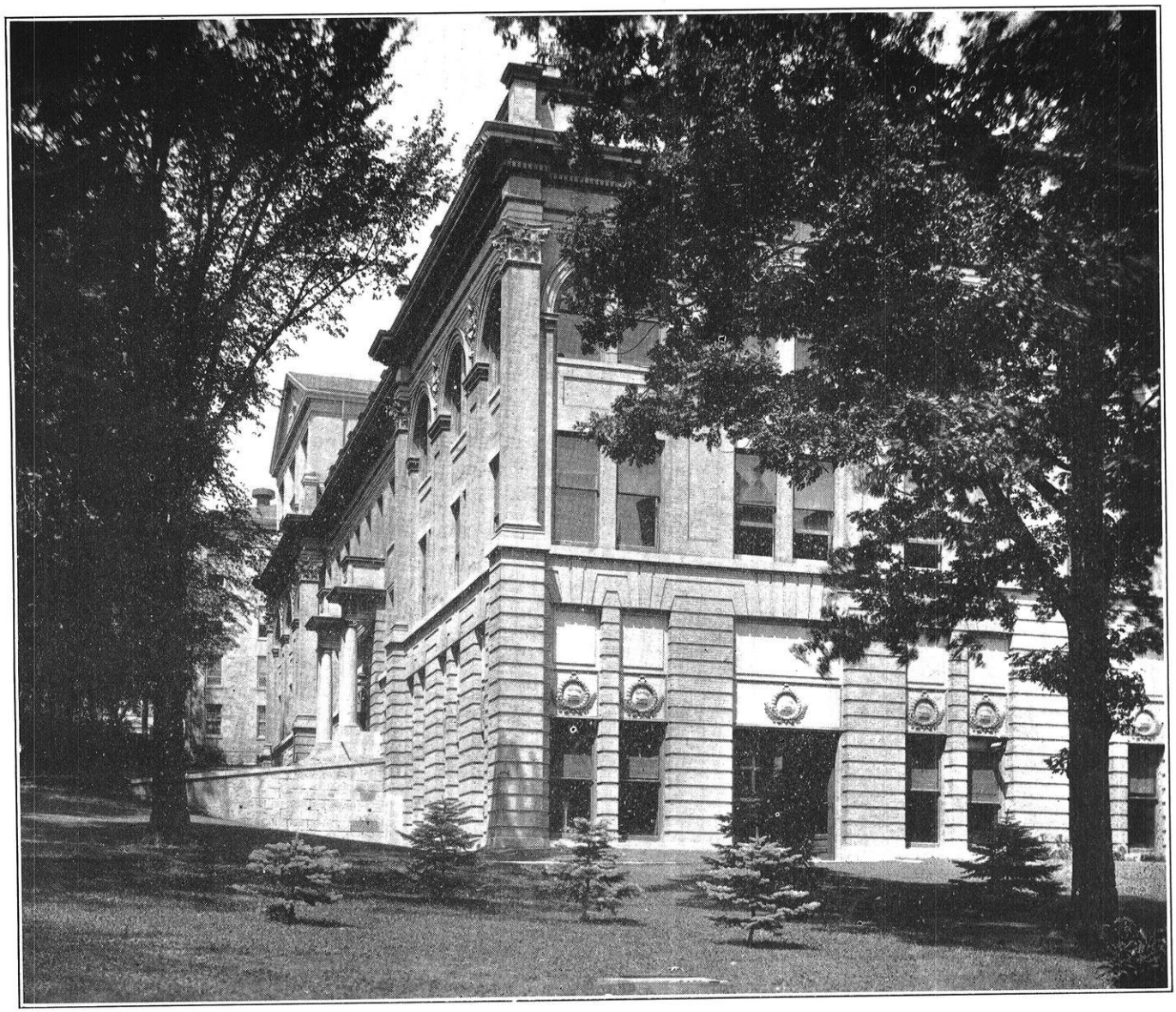

THE

ngineer Magazine Has Many Feature Stories

'The Princess Who Eloped" is title of a story written by an gineer for the December issue of he Wisconsin Engineer", which l go on sale today.

'The Engineer—Trained or Edu-ed?" by Newell E. French '23, tains many valuable points on so-called specialized features of engineering profession.

. J. Markwardt '12, in an arti-on 'Some Side Lights on an A-kan Trip", will give an account his experiences while traveling Alaska. Markwardt, who has re-tly returned from an extensive r through Alaska, is an engineer the Forest Products Laboratory.

'Where do we go from here?" an icle written by Prof. F. P. Woy, of special interest to senior en-neers.

'Patrol Maintenance in Wiscon-", by N. M. Isabelle, is one of a ies of discussions on the high-ys of Wisconsin.

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VOL. 27 DECEMBER, 1922 NO. 3

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The Wisconsin Engineer

UNIVERSITY OF WISCONSIN

VOL. XXVII, NO. 3 MADISON, WIS. DECEMBER, 1922

THE ENGINEER; TRAINED OR EDUCATED

By N. E. French

Senior Electrical

Educators of the old school have long deplored the intensely utilitarian character of modern technical education; and late years have seen evidences, from within the ranks of scientific workers, indicating reversion to a broader, more liberal plan. War arrested this growing tendency; war's aftermath, a wave of gross materialism, stifled it.

But the idea is not lost, and we are again finding writers in the technical press advocating the 'humanizing' of engineering courses. The purpose, then, of this discussion is to present an argument, a plea—if you like—for education through the introduction of a cultural element into the training of the engineer.

There are probably as many definitions of an educated man as there are men sufficiently educated to formulate them. One engineer has said: "An educated man is one who has developed his soul, mind and body harmoniously and fully, with the purpose of doing his work in the world as well as his nature permits."

That is an admirable definition—as far as it goes—but I am selfish enough to believe that there is something in life other than working for the common weal, that we owe something to ourselves, as well as to society. I should like to add to the definition, and say, "An educated man is one who has developed his mind, soul, and body harmoniously and fully, with the purpose of doing his work in the world, *and to the end that he may come to an appreciation and enjoyment of the work of others.*"

One of the finest paragraphs in English prose, remarkable not only for the crystal clearness of its thought but also for the beauty in which the thought is clothed, is Huxley's definition of a liberal education.

"That man, I think," said Huxley, "has a liberal education who has been so trained in youth that his body is the ready servant of his will, and does with ease and pleasure all the work that, as a mechanism, it is capable of; whose intellect is a clear, cold logic-engine, with all its parts of equal strength, and in smooth working order, ready to be turned to any kind of work, and spin the gossamers as well as forge the anchors of the mind; whose mind is stored with a knowledge of the great and fundamental truths of Nature and the laws of her operations; one who, no stunted ascetic, is full of life and fire, but whose passions are trained to come to heel by a vigorous will, the servant of a tender conscience; who has learned to love all beauty, whether of nature or of art, to hate all vileness, and to respect others as himself."

It has been said that the technical man is trained, not educated; that he is taught to do certain things superlatively well, and that outside of his rather narrow province he is deplorably uninformed. In particular, the charge seems to center on the engineer; perhaps unjustly so, for surely there are business men, physicians, —even lawyers and clergymen—whose ignorance of matters beyond the scope of their profession is often ludicrous. Perhaps we are no more at fault than these, but I think you will grant some justice in the indictment.

It is true, of course, that no man can master the sum of human knowledge; he must limit himself to a very small part—must specialize; and ours, therefore, is called the age of specialists. It is worth noting, though, that the value of the specialist to the social order is proportional to the general knowledge which he possesses.

If we were to learn that Galsworthy or Hamlin Garland urged a course in the 'humanities' for engineering students, we might ask, with point, just what qualifications these literary gentlemen enjoy as advisors in a field so foreign to their experience and talents. On the other hand, we would be likely to listen with some respect to the remarks of a prominent engineer upon the same subject.

Quoting, then, from an address by Steinmetz: "Special knowledge, no matter how extensive or intensive, is of very little value unless intelligently directed and applied. This requires broadness of view and common sense which only a broad, general education can give, but which no special training supplies; special training rather tends to narrow the view and to hinder a man from taking his proper position as a useful member of society."

And again, "There have always been educated and uneducated, skilled and unskilled workers. But with the development of modern industrialism a third class has arisen between the skilled and the unskilled, the educated and the uneducated—men trained to one thing only, but to do this very well and efficiently. We call them pieceworkers when working for wages in a fac-

tory, specialists when receiving salaries as professional men."

That is the opinion of one who is probably the foremost engineer of this generation,—a man, confessedly, having but few interests other than those within his profession, yet a man who will never become crustaceous, whose liberal, even classical, education has not only aided him to material success, but has assured for him those "permanent pleasures of the mind."

I do not mean to imply that the engineer should rush about absorbing culture in large chunks to the detriment of his technical training, or that he should prepare for all the fatuous questionnaires of mentally aberrant geniuses. The technical equipment is, without question, the most important aspect of his training. The engineer must be right. A lawyer's mistakes are hidden in prisons and penetentiaries; the physician or surgeon soon buries his; but the engineer is not so fortunate,—a misplaced decimal point may cost him his job, his reputation, his professional career.

Certainly, no one in his sound mind would suggest substitution of "The Lays of Ancient Rome" for "Strength of Materials", or advocate that a course in Elizabethan Drama should supplant "Calc 55". The good workman must have not only good tools, but tools adapted to his trade.

John Butler Johnson, former dean of this College of Engineering, divided all education—which he characterized as "a means of gradual emancipation from the thraldom of incompetence"—into two general classes: Education for competency to serve, and education for competency to appreciate and enjoy.

"By competency to serve," he said, "is meant that ability to perform one's due proportion of the world's work which brings to society a common benefit, and which makes of this world a continually better home for the race, and which tends to fit the race for that immortal life in which it puts its trust".

"By competency to appreciate and enjoy, is meant that ability to understand, to appropriate, and to assimilate those great personal achievements of the past and present in the fields of the true, the beautiful, and the good, which brings into our lives a kind of peace, and joy, and gratitude which can be found in no other way."

It is evident, I believe, that all kinds of elementary education are subservient to both ends, but it is the tendency in so-called higher education to choose between them rather than to include them both. The more restricted higher education which leads to a life of service is known as a professional education, and those professions in which scholarly accomplishments are employed are called learned. Engineering, then, under such a classification, must certainly be a learned profession, but in the past there has been a marked distinction between its learning and that of the other professional vocations; its learning has been, and still is, concerned more with the world of dead matter and force, the inanimate; it has been divorced from life in general, and until recent years has had little in common with the world outside.

The engineer's function was formerly considered to be the planning and carrying to completion of those things which others may have concluded to be necessary or expedient. Those, in a position to dictate what was to be done, seemed to have held it the engineer's duty to do what he was told, when he was told, and because he was told. The feasibility or timeliness of a certain project, its economic aspect, the saneness or prudence of the financial plan, questions of franchise or concession (if such were involved)—these matters were settled by attorneys, promoters, capitalists, or public authorities, and the engineer was not expected, nor was he inclined, to assume responsibility for them.

Such conditions do not exist now, except perhaps in some branches of public service. No concern engaged, to-day, in floating bond issues for private enterprise will undertake to handle such securities without a report from competent engineers as to the soundness of the project from both engineering and economic points of view. In other words, the nature of engineering practice has so broadened that it is essentially a superstructure built not alone upon a foundation of mathematics and science, but upon a foundation of political economy as well. The increasing scope of the profession is sufficient evidence to justify the inclusion of the liberal element in engineering education on a purely utilitarian consideration.

Entirely apart from any inner satisfaction a study of these liberalizing elements will bring, there are very material advantages in possessing a broad knowledge outside of one's special and necessarily narrow field.

There can be no question that among the so-called cultural studies, English composition and English literature are of greatest importance, and offer the most direct route to a wide range of knowledge, human sympathies, and human understanding. English composition, in particular, is a powerful tool among the other tools of the engineer. We may have no desire to master the violin, the putting of paint upon canvas may hold no thrills for us, but in the use of words we are all performers of necessity as well as of desire. It is too often true that words are a matter of concern only to those trying to hold gay sinners from perdition, or lawbreakers from the oblivion of prison.

The engineer is frequently required to frame reports, both oral and written, upon the work in which he is engaged, and, since he is presumed to be an educated man, suspicion is cast upon the entire range of his learning if he does not speak or write like one. It is almost banal to remark that, to carry conviction, these reports must be not only technically sound, but they must be orderly and logical in arrangement, thorough but concise, and phrased in clear, forceful, clean-cut English.

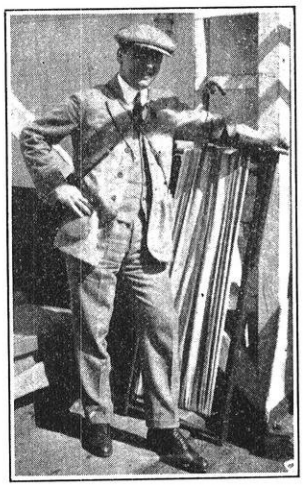
The head of a large industrial corporation is quoted, in this connection, as saying, "We can get plenty of men who are technically competent, who are careful and

(Continued on page 54)

SOME SIDELIGHTS ON AN ALASKAN TRIP

By L. J. MARKWARDT, c '12, CE '22

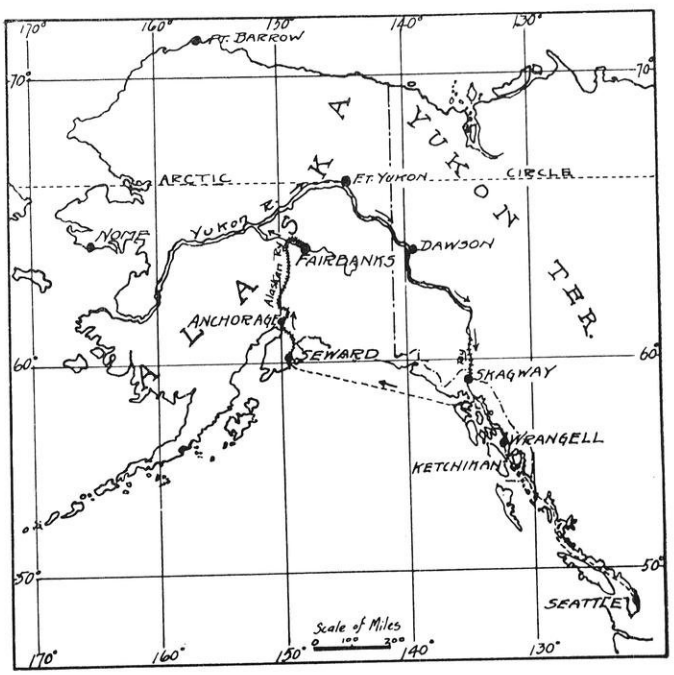
Some years ago, while in Seattle I observed on every hand attractive advertisements of Alaska tours, artistically decorated with wierd totems and charming pictures of nature's wonderland, which created in me a smouldering desire to see that land of which so little is known. Through a chain of circumstances, this ambition burst into reality when on a beautiful day in July of this year I boarded a boat for our most northerly future state.



L. J. MARKWARDT

Alaska has been described by an encyclopedia of the not remote past in the following glowing and enlightening manner: "Russian possessions in North America; vast unexplored regions; snow and ice; polar bears and Esquimo Indians." This obviously is the impression still retained by many concerning Alaska, regardless of the fact that long ago we should have outgrown this imaginative conception. I hopefully examined the map of Alaska in the Eleventh Edition of Encyclopedia Britannica, published scarcely more than a decade ago, for the city of Cordova, which was to be my first stopping point. But to no avail. Even the closest scrutiny failed to disclose Ketchikan, a thriving metropolis of southeastern Alaska. Then the realization came that Alaska is virtually a new country, changing, expanding, and developing to meet new conditions, and setting a pace that out-distances even the map makers. All of which, of course, added to the interest of the trip.

Instructions bade me take passage on the Steamship Mariposa. I can imagine the smile which brightened the day for an agent of the Alaska Steamship Company when he received a wire requesting a reservation on this boat, and can almost hear his chuckle at the return wire advising that accommodations were being held on the Steamship Alameda. Something must surely be wrong to cause a mixup of this kind. But what seemed like grim tragedy in Madison was comedy in Seattle, as practically any citizen there will gladly volunteer the information that the Mariposa has been reposing peacefully in Davy Jones's locker for five years or so, and that in Sumner Strait a certain reef which caused her doom now bears her name.

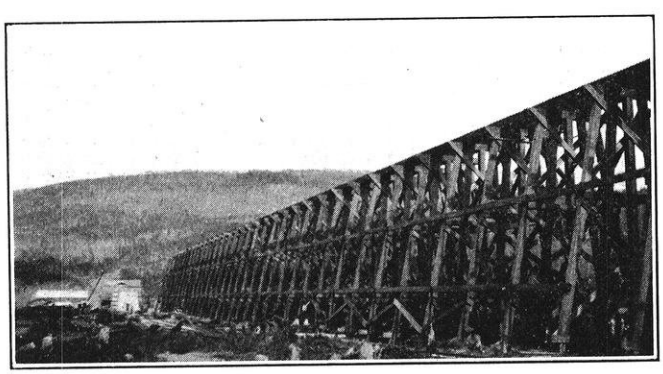


MAP OF ALASKA, SHOWING THE ROUTE TAKEN BY MARKWARDT

The trip to southeastern Alaska is made by what is known as the inside passage. Here, the steamers wind in and out among beautifully wooded islands, whose lofty mountains afford a protection from the ocean proper which makes travel not unlike that of a river; the channel usually calm, sometimes not a ripple on its surface. Here, then, for a thousand miles' stretch may be had sea travel without sea sickness. At Queen Charlotte Sound, Milbank Sound, and Dixon Entrance short glimpses of the Pacific are obtained, with just sufficient of the ocean roll to remind the traveler of his good fortune in having such a protection as this coast affords.

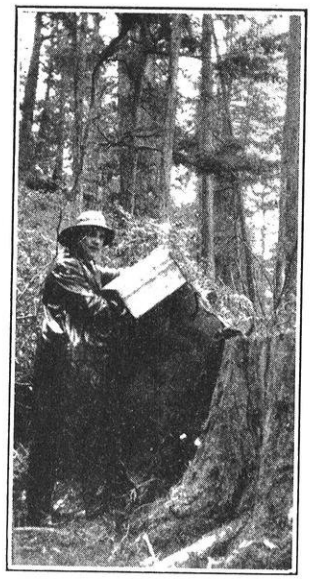
Forty-eight hours' ride from Seattle, through Canadian waters, brings the traveler to Ketchikan, the first port in Alaska. Ketchikan is a thriving city of approximately 3,000 people with most modern stores and residences.

One of the most interesting industries in southeastern Alaska is fox farming. Many of the islands dotting the coast make ideal fox ranches, as the water forms a natural barrier, and no fencing is necessary.



CLOSING THE LAST LINK IN THE ALASKAN RAILWAY. *This is the approach to the bridge across the Tanana River at Nenana, about 57 miles from Fairbanks. The trestle is said to contain a million feet of lumber.*

One hundred twenty-three islands are now leased for fox farming purposes. The foxes are liberated on the islands, where they are fed by an attendant, guarded against poachers, and captured at pelting time. As the foxes multiply rapidly and grow to salable age in one year, the industry bids fair to be a thriving one if pelts maintain a fair market value. A market price of about $125 per pelt is now obtained. The industry has nearly all developed within the last two or three years, and the applicants for islands far outnumber the supply.



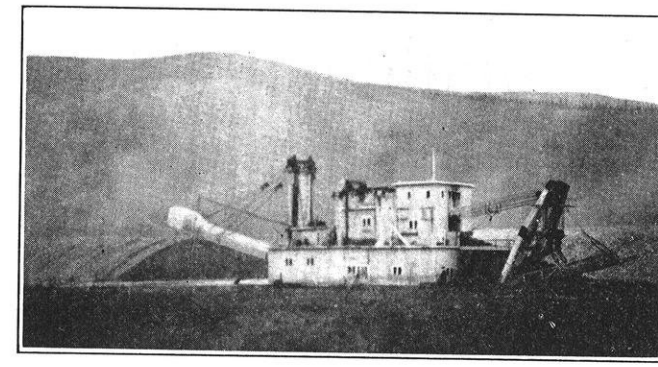
TAKING NOTES IN THE RAIN. *Being obliged to do field work during the rainy season, Markwardt made himself a box with celluloid sides to protect his note book.*

One can not pass along the coast during the summer without many reminders of the importance of the fishing industry. The salmon, in their effort to reach fresh water spawning grounds after four years of seafaring life, afford an ever interesting and fascinating sight to the curious traveler. At Ketchikan they may be seen in countless numbers attempting to climb, or rather jump the falls which are several feet in height, and not without success. No food is taken after leaving salt water, so we are told, and the fact that they find their way hundreds of miles up the Yukon River is ample evidence of their vitality and persistence in following natural instinct. Along the Yukon River salmon are caught by means of large wheels, operated by the current, and in this way some of the winter's supply of food, including that for the dogs, is obtained.

Proceeding along the coast one arrives at Wrangell, which is of particular interest because of its numerous and varied totem poles. The Wrangell Narrows, just beyond, with its crooked and tortuous, but well marked channel, and with a well-pronounced and exceedingly rapid tidal current, together with the confinement of travel principally to high tide periods, affords a scene of intense interest and excitement.

Here and there, a whale lazily drifts on the surface; again, we may catch a glimpse of his huge tail as it flashes above the water when "sounding" out of sight. Next, a school of porpoises playfully adapt themselves to the speed of the boat, and cross back and forth, just before the bow, displaying, as it were, a few lessons in seamanship and maneuvering. This performance may continue indefinitely, or until we lose interest and our attention is directed to a deer swimming the channel, or possibly a bear scampering away up the hillside. Nature thus stages a continuous show, which makes the hours seem like minutes, and the days pass all too soon.

One hears much of the fascination of the North, its spell, and its lure. Each ship usually has its quota of "sourdoughs" returning to the land of their dreams, disillusioned regarding the States they once knew. Nor, is it only in story that this is true. The truth came



A GOLD DREDGE ON THE KLONDIKE

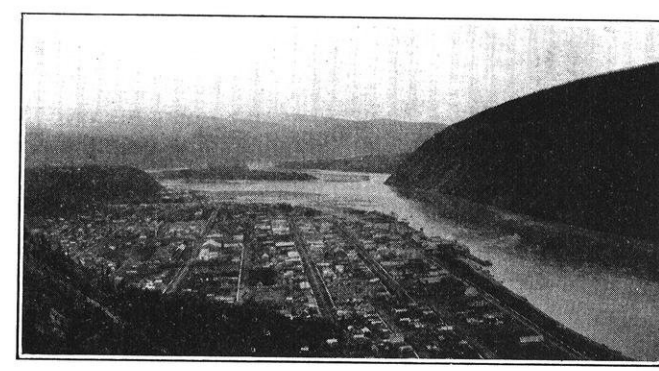
forcefully when I learned that my state room companion was one such. Years of experience in Alaska, antedating the gold rush days, had won his heart, and after two years of pining on his fruitful ranch in Oregon, he was proceeding to make his home again in the Northland. Service caught the spirit of such pioneers when he said:

"It's the great, big, broad land 'way up yonder,
It's the forests where silence has lease;
It's the beauty that fills me with wonder,
It's the stillness that fills me with peace.

* * *

I'm trapped like a fox and I fear for my pelt,
I cower in the crash and the glare,
Oh, I want to be back in the avalanche belt,
For I know that it's safe up there!

Glaciers in abundance may be found in Washington, or Montana, yet we sometimes consider them as sole attributes of the Arctic regions and Alaska. In few



A VIEW OF DAWSON

places, however, are glaciers as accessible for general inspection as in Alaska, and the accommodating captain, during the tourist season, digresses a little from his course and brings one face to face with his glacial titanic

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PATROL MAINTENANCE IN WISCONSIN*

By N. M. Isabella, c '14

Assistant Maintenance Engineer, Wisconsin Highway Commission

Previous to 1918 little was done in the line of highway maintenance in this state. In fact, most of the states had done little maintenance work on a systematic basis. In 1917 the Wisconsin legislature passed a law known as the State Trunk Highway Law, wherein it provided for the laying out of a 5,000 mile state trunk highway system and for the maintenance of this system. This system was to connect all the county seats in the state, and all other cities of 5,000 population or over. While there had been some maintenance done on very short stretches of highways in various sections of the state, there had been nothing done in a systematic way whereby through routes were maintained during the travel season. The State Trunk Highway Law provided that the system of 5,000 miles was to be maintained adequately during about seven or eight months in the year.

The Wisconsin Highway Commission adopted what is now commonly known as the patrol system of maintenance. Rather than to operate with the state as a unit, they decided to carry on this maintenance work through each of the 71 counties. The system was divided into sections varying from six to ten miles in length. During the first year there were 561 sections on the 5,000 mile system . Each of these sections was placed under the supervision of a patrolman. This man was responsible for the condition of his section for the entire season. The patrolman in each case was obliged to sign a contract for the season and furnish a bond of $500 to insure proper care of equipment turned over to him by the county. Each patrolman furnished his own team and wagon. The grader, planer, and other tools were furnished by the county. Counties having a large number of patrolmen placed a man in charge of the patrolmen and it was his duty to see that the maintenance work was properly carried on in the county. The work of the county was checked by the division office of the Highway Commission. In each division office a man in charge of maintenance made regular inspections of all patrol sections in the division and reported the condition to the main office. These reports in turn were tabulated and a record was kept of the condition of each and every patrol section during the maintenance season.

In order to provide adequate funds for the maintenance of this system, the legislature provided that approximately 75 per cent of the total automobile license fees be turned into a fund called the State Trunk Highway Fund, and that this amount be set aside for the maintenance of the State Trunk Highway System. The funds were allotted to the various counties in proportion as the mileage contained in each county was to the total mileage in the state. In 1918 this averaged $175 a mile. To this amount many of the counties added special appropriations for more extensive work than could be done under the amounts allotted from the State Trunk Highway Fund. Shortly after the beginning of the 1918 state trunk highway maintenance operations, many of the counties adopted county trunk systems which were to be maintained under the same plan as the state trunk highways. The sentiment for maintained roads grew to such an extent during the first year that a little over 2,000 miles were taken over by the counties for patrol maintenance.

The state trunk highway act also provided for the marking and signing of the 5,000 mile system. This was done early in 1918. The routes were numbered consecutively, beginning with 10. The beginning of the routes was either in the eastern or southern section of the state, and they extended northerly and westerly. Markers designating the routes were placed on telephone poles and culvert end walls; also at each mile there was erected a standard mile post bearing the standard marker and mile number. The marking system has probably given Wisconsin more publicity as a good roads state than has any other thing and many states have adopted similar systems. Through this marking system and patrol maintenance, Wisconsin has attracted people from practically every state in the Union during the summer months.

At the beginning of the maintenance work in 1918 most of the highways were narrow and had very little improvements on them, other than the state aid construction work done since 1912. These parcels of construction work were distributed scatteringly over the state and did not help the situation much from the standpoint of through travel. At the end of the 1918 maintenance season a great mileage of the state and county highways, which in previous years were merely trails, had been widened and, through patrol and gang maintenance, made fairly safe for travel. The first year of maintenance made a strong impression upon the people of this state as well as upon the people of other states.

In 1919 the legislature added 2500 miles to the State Trunk Highway System. By this addition practically every town of any size was connected with other towns by a state trunk highway, and, because of the well maintained highways, it was possible to travel from one town to another with a fair degree of comfort. The county systems also were increased by the various county boards throughout the state. During the year 1919 about 3,500 miles were added to the maintained county systems, making a total of about 5,000 miles of county trunks. The roads taken over by the various

(Continued on page 45)

* This is the second of a series of three articles dealing with the problem of financing highway work in Wisconsin.

EDITORIALS

TRAINED OR EDUCATED

Elsewhere in this issue an article raises the question of whether the engineering student is trained or educated, of whether he is in a position to do only what he is told, when he is told, and how he is told, or whether he is able to direct others.

The question immediately comes to one's mind: Is there a deficiency in our educational system that allows such a question to arise? Or does the question arise because the students do not properly use the educational advantages set before them? Or is the question entirely unjust and out of place?

We do not believe that the question is out of place, for there are cases which we believe show that the engineering graduate is often trained, or believes himself to be trained, to do what he is told when he is told, and is not placed in a position where he can do the most good for his fellows or for himself. We do not believe that the present day professors and instructors are in themselves responsible, but that the condition, where it does exist, is the result of a popular though ignorant demand for extreme specialization. We believe that the student often becomes so lost in his specialty that he loses track of events and believes that his type of work is all important, or that he suddenly awakes to the presence of other fields but believes himself so far behind that he cannot catch up and gives up in despair.

You may not agree with us, or with the article, and it is entirely possible that you are right and we wrong. But the matter deserves your thought and attention, for if the engineer is only directed and does not direct, there is something very wrong with engineering and engineers.

"Much of that which passes for success is a miserable failure, because no man is a success who has debauched himself in the process; who has lost the best part of himself on the way to fortune; who has dropped his manhood; who has swapped his integrity for dollars or some other material advantage. There is a tremendous difference between being a success as a dollar chaser and a success as a man."

A SENSE OF VALUES

Sometimes the strongest faith wavers. We have chosen the engineering profession as a life work because it appealed to us as a useful and satisfying occupation. But when the gloomy moments come, doubt creeps in and we wonder whether we have made a wise choice. We see ahead of us a long vista of hard work with little to be won but the satisfaction of well doing. Other fields of endeavor seem more alluring. We fain would be a politician, a middleman, or a movie star. We hone for the applaudits of the public and the emoluments of worldly success. When such doubts assail, it is a tonic to have someone compare the work of a lowly man of science, like Dalton, the Quaker school teacher, and that of a king, like Joseph of Spain. The story is well told in the General Electric advertisement in this issue. It is a "broadening" little story that will buck you up, old top.

"Even a young man can rapidly acquire what may be termed second-hand experience, and can make it almost as readily available for his purpose as first-hand or personal experience. To do so, he must read systematically and continuously, and he must winnow out and make readily available the printed facts that will probably be of greatest use to him."—H. P. Gillette.

HOLIDAY THOUGHTS

We venture to suggest to the members of our faculty that a vacation can be completely ruined by the specter of a tough assignment to be prepared for the first day after vacation. Have a heart this year, and consult the calendar before you dish out the work for that first cold morning in January.

* * *

One of the advertisements in this issue makes a point that strikes a responsive chord in our souls. The glee club man is urged to warble for the old folks at home, the football man to put up a few high ones for kid brother, and the snakes to wrestle a round with the sister. The engineer, we suppose, might recite the table of logs for mother, and show dad how the slide rule works. But, jokes aside, there is an idea in the suggestion that is worth mulling over a bit between now and a week from now. Some years ago, John McCutcheon drew a cartoon of the college boy at home during the Christmas vacation. When the young fellow wasn't dashing off to keep some date, he was pounding the pillow; Pa and Ma didn't get anything but a glimpse of him. Someway that doesn't seem just right.

* * *

While you are home, see that your college doesn't suffer in the esteem of your friends and neighbors. Of course you will want to give the natives an earful and make them sit up, but don't give the university a black eye in the process.

Special knowledge, no matter how extensive, is of very little value unless intelligently directed and applied.—Charles P. Steinmetz.

HOW THE WORLD WAGS TODAY

Clemenceau, former Premier of France, is in the United States for the purpose of winning us to the side of France. He is off to a bad start and has managed to arouse sharp criticism both of himself and of his country. There is a bitter struggle for power going on in Europe and every faction desires the active support of America. The uproar and confusion arising from the efforts of these factions to bring our country "into line"—their cajoleries and their denunciations—are added to and complicated by the outcries of those of our citizens who have brought with them direct from Europe, or inherited from their parents or grandparents, a deep-rooted affection for one of the contending parties or an equally deep-rooted hatred for another. Meanwhile, those Americans who neither favor nor dislike one European nation above another, are sitting pretty in the midst of the clamor awaiting the time when the uproar shall die down and sanity return. Certainly we shall not rush in with financial aid for countries which state brazenly that they do not intend to make their budgets balance, which are running their printing presses till they smoke, turning out paper money for the support of a top heavy governmental machine, and which spend what little substance they have in warfare.. We are waiting to see these European nations pull up their belts a notch or two, roll up their sleeves, and set to work to make a living in the proper way. Then we may expect the U. S. to extend the assistance and credit to which a steadfast man or nation is entitled.

* * *

Thomas Edison has submitted to Roger Babson a plan to relieve the crisis which exists today among the farmers of this country. In spite of plenteous crops of all kinds, the farmer has no money. He had difficulty in marketing his crop due to transportation troubles and got little return for what he did market. Edison's plan involves the establishment of government warehouses, the stabilizing of prices by the use of a 25-year average price, and the establishment of a flexible currency system which will expand when money is needed to handle crops and contract as the crops are disposed of to dealers. Economists have not yet expressed their opinions of Edison's proposal. Meanwhile the country faces another year of industrial restriction. If the farmer cannot buy, the manufacturer cannot sell. Edison's plan may or may not be sound, but we must hope that somehow and soon a way will be found to do the things he is attempting to do.

PATROL MAINTENANCE

(Continued from page 43)

counties for patrol maintenance have increased in mileage each year until at this time there are approximately 10,000 miles in the county maintained systems. The State Trunk Highway System still comprises 7,500 miles, but it is probable that this will be increased to approximately 10,000 miles in the near future.

One of the best indications of what the maintenance work has done is the rapid increase in the motor vehicle registration and the traffic on the highways. In 1918 there were approximately 200,000 motor vehicles registered in Wisconsin. Today there are approximately 400,000. In other words, the motor vehicle registration has doubled in the past four years, due largely to the fact that various points in the state are easily accessible by highway and that a good share of the railroad transportation has been shifted to the highways in the state.

In 1918 there was expended on both the county and state trunk highways a total of about $1,500,000. This system comprised a total of about 7,000 miles. In 1922 there is being expended approximately $5,000,000 on both the state and county trunk systems, which now comprise a total of about 17,500 miles. The average expenditure for maintenance per mile in 1918 was about $250. During the 1922 season it will average about $300 per mile. This increase is largely due to the fact that traffic has increased enormously since 1918, and also to the fact that a great share of our highways are being surfaced with light coats of gravel, shale, and other types of surfacing, these surfacings being carried on as maintenance work.

When the system of 5,000 miles was taken over, approximately 1,700 miles, or about one-third, was surfaced in fairly good shape. The remainder of the mileage was unsurfaced earth roads, some of which were in very poor shape. Today, only a small mileage of roads falls in the "poor" class. Of the 7,500 miles on the State Trunk Highway System, approximately 6,000 miles are surfaced with concrete, gravel, macadam, and other surfacings. The remainder consists of unsurfaced earth roads, either of the heavy clay, sand, or sand-loam type.

It is believed that proper maintenance of our highways has brought about a betterment in social and economic life. This is especially true of the farmer. It has brought him closer to the city and to the market. In the past few years there has been a noticeable increase in the tonnage hauled over the highways from the farm to the market and also from the manufacturer in the city to the farmer. Thus, it may be seen that good highways have shortened the barrier between the city and the farmer.

During the five years of experience that Wisconsin has had in maintaining the state and county trunk systems, many things have been learned in regard to this matter of maintenance. New ideas have been developed that have lessened the work and have brought about better conditions with less effort. The great lesson learned is the fact that if the present day traffic is to have adequate service the highways must be properly maintained. With the ever increasing traffic on the highways and the constantly increasing size in the type of motor vehicles, it can be plainly seen that the matter of up-keep is a very important one and should be studied seriously by all highway officials.

ALUMNI NOTES

H. K. VON KAAS

After two days of handshaking with the old timers were over with, "The Notes" hied himself to a deep and dark retreat, and drowned his football sorrows in a compilation of the following list of alumni who dropped in to climb the old "E. B." stairs again, and see if the Steam and Gas lab was still there:

N. C .Richardson, m '22; **C. F. Watson,** c 10'; **Walter O. Zervas,** c '22; **Leon Chase,** c '22; **L. H. Kessler,** c '22; **A. F. Frederickson, m** '18; **M. K. Drewry, m** '22; **C. F. Moore,** m '18; **O. A. Richter,** m '12; **C. L. Erickson,** m '22; **C. P. Parsons,** e '22; **Horace K. Drau,** m; **J. B. Wilkinson,** m 16; **Ben Zelonky,** c '22; **A. Maldaner,** c '96; **F. C. Hornibrook,** e '22; **H. Margoles,** c '21; **C. R. Oestreich,** c' 17; **E. Anderson,** m '18; **"Bill" Rheingans,** c '20; **H. G. Lindner,** e '21; **C. W. Zachow,** m '15; **D. V. Slaker,** Min '20; **C. A. Balch,** e '19; **Frank Karger,** c '20; **C. W. Hejda,** e '07, c '08; **V. R. Anderson,** m '08; **A. F. Buchholtz,** m '18; **W. W. Schilling,** c '12; **A. E. Cummings,** c '21; **A. H. Hoppe,** m '17; **C. C. Douglas,** m '03; **J. Donohue, c. 07; A. A. Ort,** c 12; **E. A. Kaumheimer,** e '16; **E. K. Fanta,** m '17; **G. Barland,** e '22; **F. A .Buese,** m '22; **W. G. Hansen,** m '20; **A. P. Gerhardt,** m '21; **A. Larsen,** m 0'5; **R. Wood,** e '17; **R. L. Paulus,** e '22; **W. C. Thiel,** c '22; **O. Pfeffer,** Min '22; **A. J. Liebert,** m '20; **C. M. Lewis,** m '16; **J. O. Merrill,** ex '18; **A. J. Huegel,** ch '22; **D. S. Dewire,** e '22; **O. Wallman,** m ,22; **A. H. Gruppe,** c '22; **G. F. Schubring,** c '22.

CIVILS

Max L. Rather, c '13, is president of the Wisconsin Alumni Club at Cincinnati.

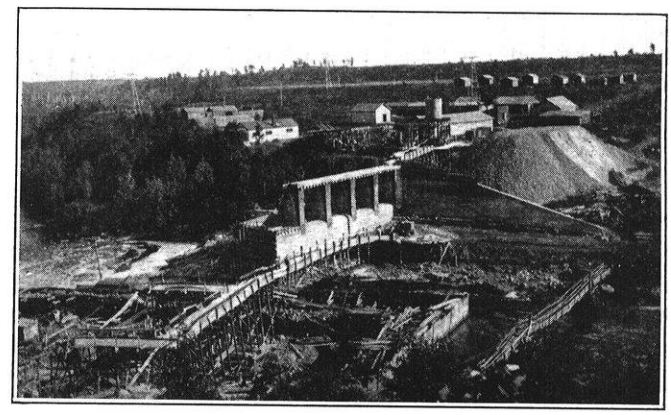
Herbert O. Lord, c '20, writes from Johnson's Falls, Crivitz, Wisconsin, under date of November 23, as follows: "As for dope, I am up here in what is left of the wilds of Wisconsin as resident engineer for Mead & Seastone, who, as consulting engineers for the Northeastern Power Company, have designed and are supervising the construction of a 4400-kva hydro-electric plant. The site is about 15 miles west of Crivitz (the nearest town), and four miles downstream from High Falls on the Peshtigo River. The dam is about 550 feet long and builds up a head of 43 feet. The station will be automatically operated with the control at High Falls. One operator will be required whose chief duties will be oiling and inspecting. The power will go over the lines of the Wisconsin Public Service Corporation at Green Bay and surrounding territory. The construction was begun the first of last March and will be completed before next March rolls along.

HERBERT O. LORD

"Bill Rheingans, c '20, writes: "Enclosed you will find the price of another year's subscription which I am gladly forwarding. I could send in enough money to cover about ten years' subscription but I wouldn't have the fun each year of sitting down and making out a check to the magazine. Kind of keeps a fellow in touch with the old days, and reminds him that there still is an engineering school at Madison."

Harry Margoles, c '21, is in the construction department of the Inland Steel Co., at Indiana Harbor, Ind.

A "round robin" has been started by six of the '22 civils, Barnes, Christianson, Kessler, Moehlman, Rove, and Thiel. The letter has made the rounds once and is on its second trip. A convenient envelope has been designed by Barnes so that postcards, clippings, and photos may be included with the letters.



DAM ON PESHTIGO RIVER, ABOUT FOUR MILES DOWNSTREAM FROM HIGH FALLS, WISCONSIN. *Designed and supervised by Mead and Seastone.*

C. B. Christianson, c '22, underwent an operation on October 3. He spent three weeks in St. Michael's Hospital in Stevens Point, Wis. He expects to be back at work at the American Bridge Co., in Gary, about December 15.

A. H. Gruppe, c '22, is in the Way and Structures department of T. M. E. R. & L. Co., Milwaukee. Address: 47th and National Ave., Milwaukee.

W .F. (Bill) Moehlman, c '22, who is with the Highway Commission in the northern part of Wisconsin, has been observing the ways and habits of the well known insect that makes night hideous in the average small hotel. He gives the following receipe for dealing with them: (1) Look over the bed and walls before turning out the light. If you find eight (8) or less, just go to bed and bear with them until they have taken their share of your blood and then scratch yourself to sleep. This will take 1+ hour. (2) If there are from 8 to 20, take off all night clothes and put on your socks. The socks will keep them off your feet as it is hard to scratch your feet and back at one time. If one has no clothes on they can find good handy spots to bite which are easily scratched. Let them bite at will, but at intervals of fifteen minutes get up, light the light, and kill as many as you can. This process taken from 2 to 4 hours before sleep is to be had. (3) If there are more than 20 you are out of luck. Either go out and sleep under the skies, or set fire to the hotel and leave town.

CHEMICALS

John J. Oberly, ch '20, is with the International Harvester Co. in the gray iron foundry. Address: 3210 Arthington St., Chicago, Ill. *(Continued on page 52)*

"WHERE DO WE GO FROM HERE?"

By FRANK P. WOY, e '03

Assistant Professor of Engineering Administration

The engineering graduate of today has a more serious problem to face than has been the case in recent years. The industrial depression has increased competition for the fewer attractive positions which naturally results in a lowering of the wages offered and a stiffening of the specifications which must be met by the applicant. This conservatism of the employer is a natural result of the business retrenchment following the preceding reckless expansion. Industrial activity and development must keep pace with all progress and temporary sub-normal conditions will be followed by improvement. During the interim the opportunity of the technical graduate may appear to be handicapped as to early prospects, but the immediate future should be viewed as only incidental to the ultimate ambition and this intervening period should be utilized to its best advantage by acquiring experience, improving ability and preparing to take full advantage of the earliest opportunities even though at a temporary sacrifice.

The lack of familiarity with the various lines of engineering work and the inability to ascertain what they offer as an ultimate goal are handicaps to be overcome. Interest naturally centers in the salary or earnings which may be expected but this interest is later extended to include the social standing and home conditions which such future work offers, the degree of confinement it demands, the weight of responsibility it involves and many related characteristics. Other qualifications of this ultimate position which will sooner or later present themselves must satisfy the desire for the esteem of others, self-development, power, provision for the future, and a rising plane of living all resulting from our modern environment. A study of others who have approached this idea may reveal means utilized by them in its attainment.

Ultimate success is realized most quickly and completely by having at all times a fixed ambition properly analyzed, planned for and striven after. Pre-planning implies as thorough knowledge as is obtainable regarding all characteristics of the problem and utilizing this knowledge to its best advantage. The most important job of the engineer approaching the end of his "scholastic" period is to apply scientific preplanning in laying out his "experience" period which leads most directly toward the selected goal by using the same methods as he would apply in preplanning a construction job.

This preplanned experience period may be limited by available opportunities but personal inconvenience and financial sacrifice may remove some obstacles. Even though the future develops conditions and revised ambitions which tend to change the ultimate goal, such modifications will be the outgrowth of the progress then attained and consequently little lost motion may be experienced. As advancement takes place it becomes more and more evident that diversified knowledge increases the opportunities for progress, business administrative and executive knowledge becomes more important and each experience adds confidence.

The preplanned ambition at all times acts as an incentive toward constant progress, overcomes discouragement and removes any permanent satisfaction from the intermediate jobs that carry with them comfortable wage.

Early years spent in specialist engineering work as detail "machine design" are of scarcely any ultimate assistance toward the goal of the "financial engineer", detail "analytical engineering" of many technical kinds may not be the most effective stepping stone to "executive management," and "sales engineering" may not offer the shortest road toward "expert professional engineering."

Too often the first progress marked by shorter hours and slight salary increases tend to dampen ambition and satisfy immediate desires. The regular monthly pay check impersonally issued by an unknown paying teller erroneously implies a secure berth and continues to be accepted in preference to the risks of new endeavors and sacrifices which may offer commensurably higher ultimate remuneration. The characteristics of the "rolling stone" are as much to be condemned as the lack of ambition to progress. The intent is to emphasize the fact that each period of unreasonable delay in progress and advancement if not irksome and conducive to greater endeavor tends to increase the inertia which is all too easily accepted.

Where do we go from here, is a question which will bear all the thought and investigation which can be given to its answer otherwise it may not be possible to take fullest advantage of the preparatory work accomplished up to the date when the choice must be made.

The employer expects whole-hearted co-operation. Success is not measured by a 70 passing mark, and advancement is secured under strongly competitive conditions. Good physical condition, properly moderated sporting instincts, open faced, genial personality, dependability and other character qualifications are all incidentally but essentially important to personal advancement. The large sized head-gear of the senior must be replaced by the small apprentice cap but this does not imply that very often the technically trained mind of the inexperienced recruit may not often be able to greatly improve on the methods and practices of the older experienced "non-com.," and it is only necessary to guard against "showing up" his shortcomings and psychologically hold his good will when maintaining your position in order to win his respect (advancement is swiftest when there are no knockers and many boosters).

We frequently have an inflated conception of another's success when intimate acquaintance and close contact are lacking. Appearances are very deceptive and this is never more true than when sizing up the other fellow's

job or receiving from others their outline prospective of available positions in line with our ultimate ambition. This is especially true in the lower rungs of the large corporation ladders. Employment supervisors are frequently too prone to lead the applicant to expect more personal attention to his interests than is possible when he becomes almost lost among his contemporaries in the night shift, on test floor, in the office boy group, or in the apprentice classes. The good intentions of even the most conscientious student director may frequently be upset by alterations in his plans caused in the interest of the company's welfare to which everything is unfortunately subservient.

Many large corporations make a practice of placing technical graduates in training courses at their factories with the idea of later augmenting their staff from these classes. The student is seldom required to enter into a term contract as his written application (on prescribed form or by letter) usually leaves both parties free as to subsequent action. Almost invariably an interview record is made by the company following a personal meeting which not only covers the applicant's personal history, education, experience and references but frequently includes a rating sheet which grades his qualifications as noted by the interviewer along the following lines (for example):

1. Physical qualities as to physique, neatness, energy and impression on men.

2. Intelligence, accuracy, ease in learning, ability to quickly grasp a situation and express himself.

3. Leadership—initiative, force, decisiveness, tact, ability to inspire men, and win loyalty and co-operation.

4. Personal—industry, loyalty, dependability, responsibility, co-operative, charm, freedom from conceit and selfishness.

5. Value to Company—talent (mechanical, commercial, mathematical, executive), result getter, works well in organization, special interest, training, experience, will develop.

6. General impressions—work best suited for, etc.

These training courses usually extend from 12 to 18 months, the first 6 months being devoted to intimate acquaintance with the product as testing, shop assembly, inspection, etc., the next period being more closely related to technical problems of a productive nature and the subsequent time to expert preparation in selected departments leading toward design, factory operation, product erection, commercial sales and other specialist fields. In utilities the training course varies from the above because of its inherent characteristics but the intent is to develop a group of able staff employees who are: (as one company states)

1. Able to finish what they start successfully.

2. Able to think independently and try out new methods.

3. Adaptable to business and commercial practice.

4. Able-bodied, active and sound physically.

5. Able to meet the public, show tact and build good will.

While the student employee is expected almost invariably to bear the transportation expenses in reporting for work, it is customary for the company to pay expenses of subsequent transfer to other factories and jobs while in the employ of the company.

The wages paid the student employee when first entering the service in the training courses of these companies are a close approximation of economical living expenses, and today they approach $25.00 per week or $110.00 per month although some quote 50c per hour at start based on 48-hour normal week: (subject to shorter hours if work is sub-normal). There is usually a raise of say $5.00 per month or possibly 5c per hour after 6 months' service.

The earnings of the engineer following such a training course cannot be anticipated for purposes of this discussion nor will the limits of this article permit a resume of the characteristics and remunerations found in innumerable other lines of work open to the graduate engineer. While all business is becoming more standardized, favoritism and the "man higher up" appear to delay the progress, it is well to remember that the fields of endeavor are broader, personal merit will receive reward and there is always room at the top.

Recent investigations of salaries paid members of the engineering professions may prove of interest in concluding the above discussion. Individual extremes are omitted. This data applies to many branches of engineering and does not reflect only the wages of training course engineers discussed in preceding paragraphs.

Yrs. of Professional Experience	Av. range of Normal Net Earnings
1 year	$1000.00 to $1400.00 per year
3 years	1800.00 to 2500.00 per year
5 years	2000.00 to 3000.00 per year
10 years	2500.00 to 4000.00 per year
15 year	3000.00 to 6000.00 per year
25 years	3500.00 to 10,000.00 per year

Note:—Senior engineers who are interested may obtain a description of training courses and some limited general information as furnished by a number of characteristic companies by applying to F. P. Woy.

Mr. John C. White, State Power Plant Engineer, recently told the following story to explain the difference between politeness and tact,—two qualities which he thinks every engineer should cultivate: A colored captain of bell boys was instructing a new colored boy as to his duties in the hotel. He emphasized the need for politeness and tact. At the end of the instruction, the new boy said he understood everything but one thing,—he didn't know just what the difference was between politeness and tact. "Well, now, boy, I'll explain that point," said his mentor. "Just suppose that some day you accidentally steps into a bath room and sees a young lady in the tub. Don't you get all fussed and back out and fall over something and embarrass that young lady. You just bows and says 'Excuse me, suh,' as you backs out. The 'excuse me,' that's politness; the 'suh,' that's tact."

CAMPUS NOTES

Earl L. Caldwell

HEAR YE! HEAR YE! ENGINEERS!

A Christmas gathering of *all* engineers, to instill the *Yule-tide Spirit,* will be held in *Music Hall,* the night before you start journeying to the *Old Home Town,* Tuesday evening, December 19, from 7:15 to 8:00 p. m. It will be a *family gathering*—the professors and their families, the frosh, sophs, juniors, seniors grads, fellows, and scholars are *all to be present.* *President Birge* will speak; *Professor Gordon* will lead the singing. For forty-five minutes Music Hall will ring with the spirit of *Christmas.* Don't forget the date; it's the night before you go home.

Ralph A. Smith, of Wauwautosa, a sophomore in the civil engineering course is the winner of the slide rule awarded each year by Tau Beta Pi, honorary engineering fraternity to the man who obtains the highest scholastic average during his freshman year. Smith made an average of 93.84 and earned 85 grade points. The following is the honor list of last year's freshmen:

	Name	Course	Weighted Average	Grade Points
1.	Ralph A. Smith	C. E.	93.84	85
2.	Clement P. Lindner	C. E.	93.53	87
3.	Arno M. Weise	E. E.	93.18	90
4.	Alfred T. Huehlenbrock	M. E.	93.12	91
5.	Robert B. Webb	C. E.	92.24	93
6.	Millard B. Smith	C. E.	91.84	85
7.	Harvey C. Thayer	E. E.	91.56	78
8.	Frederick K. Leisch	E. E.	91.53	82
9.	Frank Maresh	Ch. E.	91.40	84
10.	Louis C. Alk	C. E.	91.12	81

Following the highbrows, come new candidates for *THE DUMB BELLS*:

The engineer in geology who thinks that a hade is the singular for Hades.

The penguin who thinks mechanics is a shop course.

The bantling who thinks the Crouching Venus represents a female crap shooter.

And now someone wants a name to be inscribed on the E. B. That takes deep thought, but if they ever want a name for inscription on the Hydraulics Lab. we suggest the fellow who can carry a 20-5ths course and pull an Ex in hydraulics at the same time, ought to have his name written all over the place.

TAU BETA PI ELECTS

Tau Beta Pi, all-engineering honorary fraternity, announces the following elections. These men have scholastic records which place them in the upper one-fourth of their class, except the high junior who stands at the head of his class on the basis of the grades of the first two years.

Robert C. Nethercut, civil '24, *High Junior*

William T. Ennor, Chemical '23
Charles A. Silver, Chemical '23
Theodore Votteler, Chemical '23
Ralph Shaw, Civil '23
Lemore W. Clark, Electrical '23
Peter J. Burelbach, Electrical '23
William A. Gluesing, Electrical '23
Robert W. Groot, Electrical '23
Clarence F. Rasmussen, Electrical '23
Arnold S. Rufsvold, Electrical '23
Archie F. Bowers, Mechanical '23
Anthony J. Nerad, Mechanical '23
Rufus S. Phillips, Mechanical '23
Werner I. Senger, Mechanical '23

The Fog Rises

Instructor (in calculus)—"Eddy, if theta is the angle whose tangent is x, what is the tangent of theta?"

Eddy (licked before the game starts)—"I dunno."

Instructor—"Well, if this is a book whose volume is one, what is the volume of this book?"

Eddy—"One."

Instructor (greatly encouraged)—"That's it. Now how did you get it?"

Eddy—"Why, its says 'Vol 1' right there on the back."

We were bragging about the increasing popularity of our side of the hill as evidenced by the extra strip of concrete walk that has been laid recently, when a low-down, despicable lawyer suggested that it was necessary to accommodate the engineers' big feet.

The co-eds, on the other hand, think the extra strip of walk has been provided so that they can walk five abreast instead of four abreast as heretofore.

Cruel and Inhuman

A student in mechanics lab reports that "The briquettes were removed at the end of two days and were placed in the water closet."

Where the senior civils get the words they turn in each week in Engineering English:

Plumber	*Source of Vocabulary*
Cliff Bruden	Motion Picture Review
Ben Mariategui	Confessions
Ken Wicker	Horatio Alger, Jr.
George Steinmetz	Jim Jam Jems
Bunny Rabbitt	Police Gazette
Art Rabuck	Woman's Home Companion
Ev Mackie	Doris Blake's Advice to Lovers
Sherm Green	Ten Nights in a Bar-room
Tommy Niles	Boccaccio
Lionel Tschudy	What Every Woman Should Know

WHEN IS A BEAM LIKE A COW?

According to a student in Mechanics 3, there are points of resemblance between a beam and a cow. As he explains it, "The capacity of a beam is not the the load it happens to be supporting at any given moment, but is the greatest load it can support, just as the capacity of a cow is not the quantity of milk it happens to be giving, but the greatest quantity it could be made to yield." Not so bad, not so bad.

A. S. C. E.

The Civil Engineers side stepped from the usual grind on Wednesday night, November 22, and jumped into the world of good fellowship. There was music in which jazz predominated and Tommy Niles shook a wicked hoof.

Professor Corp forgot "pipe" courses for the time being, and told of Chiropractic Experiences—many there were, and "thumping." Danny Mead related some of his engineering experiences, and spoke in praise of the organization, pointing out the value to young men of getting up on their feet in such societies and expressing their opinions and views.

Fensel got a drag with some Home-Ec and changed the usual diet of cider and doughnuts to cider and roast pork sandwiches. To say the least, they were very good to eat. The old members are going stronger than ever, and the membership is swelling. It is now more than one hundred strong with more than fifty per cent attendance at meetings. The meetings are open to any alumnus who may be in town.

The following men were elected to the Student-Faculty Committee of the College of Engineering on November 29: Seniors—Lloyd M. Johnson (m), Hugo L. Rusch (e), Willard J. Tesch (ch); Juniors—Bowman Breed (m), Charles Gary (ch), Lawrence Hunsader (min), Robert C. Nethercut (c), Earl Plettner (e); Sophomores—William Beatty (min), William Giles (ch), Arno Wiese (e). There were tie votes between the following: Sherman Green and Lionel Tschudy, senior civils; Everett Jones and Joseph Woschutz, senior miners; Philip Niederman and Robert Whitten, sophomore mechanicals; Roman Brumm and Carroll Robb, sophomore civils.

THE PRINCESS WHO ELOPED

A Bed Time Story for the Faculty, Broadcasted by "Louie" Schmidt

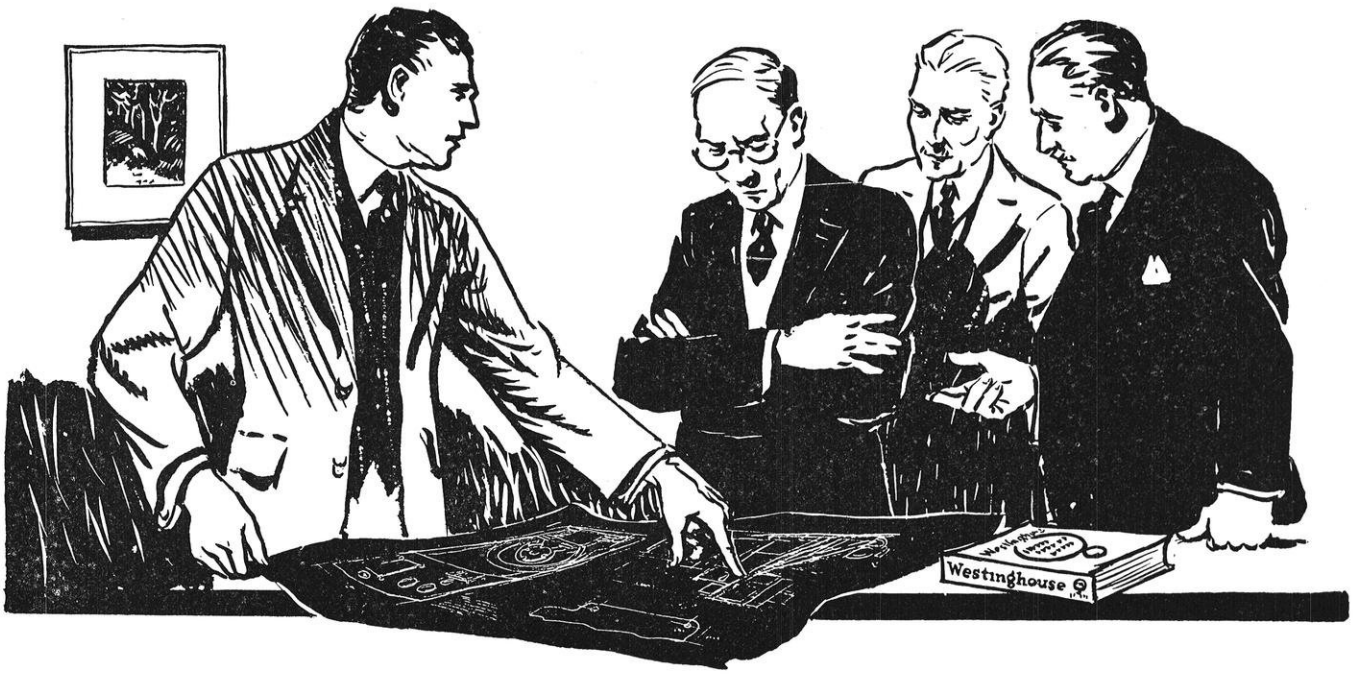
Once upon a time, when *Wise* King *Peters* of *Hartwig* was *Fuller Mead* and playing *Scott* with the *Doke* of *Keck,* he lost heavily. At last the king threw down his cards. "That hand looks like *Kelso* I won't play any more," he said. "I am *Owen* you many *Rubles* which I cannot pay, but you shall have the hand of my *Ward,* the princess, in marriage. "That's fair *Neff,"* answered the *Doke;* so the king summoned the princess. *"Watson* your mind? inquired the princess when she stood before him. "You are to marry the *Doke,"* announced the king. "Prepare a wedding feast and invite all the *Goude Volk* of the village."

So the feast was prepared and all the villagers came. The wife of the *Smith Anderson* were first to arrive. The *Cooper,* and the *Miller,* who were new *Kommers* in the vassalage, were prompt, but the *Schuman,* who had *Bennett Whitney,* a neighboring village, arrived late and breathless and announced that he had met the princess, dressed in *Longeneckers,* eloping with a *Lehman.*

"Woy!" yelled the king, when he heard the news. "Great *Scott!* that's grand *Larson*-y. *Hougen* he do such a wicked thing? He shall not *Raube* me of my *Ward. Watts* ho! Send *Aagaard* of four *Rood* soldiers. Arm them with guns and plenty of *Beebes* and let them make *Spieth* and overtage the fugutives. Bring her back and I'll *Puerner."* Where *Withey* retired to his castle in a rage.

Meanwhile the fugitives had fled across the *Hyland.* The rocks were sharp, and the princess feared that she would *Barker* shins. The brambles soon left them clothed in rag coats and *Ragatz.* A short distance away the *Lehman* saw a large lake and running down through the *Meyers* to the *Shorey* jumped into a motor boat which chanced to be there. An *Oesterle* wind whipped the water to a foam. He made a *Strong* effort to crank the engine. "Oh, *Kinne Turneaure* over," the princess murmured as she watched her lover's efforts. "It's mere *Giles* play for me," he bluffed gallantly; but, before he got a kick, the pursuers came in sight.

"Werrell we hide?" cried the princess, wringing her hands in despair. The *Lehman* was *Kohler.* He kept his *Head* and *Rose* to the occasion, leading the princess on the run to a nearby *Woods* where he hoped to be able to *Shiel(s)* her from harm. Just then, without any thing to *Warner,* the princess met death, for a hungry *Lyon,* sprang upon them with an awful *Roark,* and killed them both. When the pursuers came up they found only the lifeless *Corp* of the *Lehman* and the princess, whom they knew the king loved beyond *Price.* "It's *Clare* that they are dead," announced the leader of the guards. "Leave *Malone."* Sadly they returned, and saluting the king said, *"Wiepking,* for the princess is dead."



Engineering Sells, Too!

A whole lot of the make-believe has been eliminated from selling operations in the past ten years. The old idea that salesmen were born to the sample-case, that they carried some sort of a special diploma from the University of Pooh, has had to break camp, along with the other exploded theory which insisted that a salesman must be a "good fellow", a man of strange habits, tremendous stories, and unquestioned qualities both as a mixer, and as an assimilator.

Now we believe—nay, we *know*—that the best salesman is the man who knows most about his goods, and can talk most *interestingly* about them.

This being the proven case, it isn't so queer that engineering should find a real and effective application in the selling field, especially if the merchandise marketed is an engineering product that is bought and operated by engineers.

Every engineer who now engages in the sale and distribution of Westinghouse products feels that he is doing work worthy of his training—for he is carrying Service and Sincerity to Industry, and to mankind! He is out where the fighting is often the fiercest, and he is putting up a battle for the things that he believes are right. And a man can't expect, nor ask, a bigger chance than that!

Sixty percent, approximately, of the engineering graduates who come to Westinghouse find their way eventually into some phase of selling. And we are proud to have them there—and they are glad to be there!

Westinghouse

ACHIEVEMENT & OPPORTUNITY

WESTINGHOUSE ELECTRIC

Kindly mention The Wisconsin Engineer when you write.

ATHLETICS

By L. T. SOGARD

When the Badgers bucked up against the Wolverines at Ann Arbor on the 18th of November, they failed to score until the last three minutes. From the fifteen yard line, Shorty Barr tossed the oval, and, behind Michigan's goal, Polaski gathered in the pigskin for the first score of the season against the Wolverines. Of course, you say, it's easy enough to make a touchdown when the ball is tossed right into your hands; but, then, lots of yardage has been lost by those who didn't catch the ball, and the fact remains that Polaski did. In the Chicago game, Polaski again proved his worth by his consistent playing. He made the longest gain of the game when he dropped back from his own end, took the ball, and circled back of the line, sweeping around the opposite end for 38 yards.

Polaski, who hails from Nashotah, Wisconsin, is a sophomore mechanical engineer. He attended St. John's Military Academy, playing end on their powerful prep eleven. He entered the University in 1919, but dropped out and did not return again until last fall. He captained the 1921 frosh team, and returned this fall for the varsity. He played in both the Indiana and Illinois games, alternating with Irish, but it was not until the Michigan game that he stirred the comment of the sporting press. His teammates describe Polaski as a "fighting devil" and say that with another year of conference football he will rank with Weston, Meyers, and Tebell.

THE CLOSE OF THE BIG TEN FOOTBALL SEASON

Today the cold wind whistles thru the empty bleachers and across the gridiron at Camp Randall; the 1922 football season is a thing of the past. Moleskins, pads, and jerseys have been stowed away until next fall, and the janitor has locked the dressing room door. All that remains of football is the re-fighting of the grid classics around the fireside.

On November 25th, the last games of the season were played, every Big Ten team getting into action. While Wisconsin and Chicago battled to a scoreless tie at the Midway, Michigan and Minnesota fought for the famous brown jug at Minneapolis; Ohio won its only conference game, defeating the Illini, 6 to 3; Iowa swamped Northwestern 37 to 3; and Purdue and Indiana divided honors, 7 to 7. Not till the last whistle of the last game blew, was the championship of the Big Ten a certainty. Three teams, Michigan, Chicago, and Iowa boasted clean slates and all had hard games slated, with the possible exception of Iowa. Michigan emerged the victor 16 to 7, and together with the Hawkeyes, claimed the conference championship. Because she was held to a tie by the Badgers, Chicago lost her claim to what promised to be a triple division of honors. Michigan played only four conference games, while Iowa played five, but the Wolverine's schedule was much the harder, so both teams have equal claim to the football crown.

After Wisconsin had swamped the Hoosiers, 20 to 0, and backed Minnesota into a 14 to 0 defeat, Badger championship hopes loomed up exceedingly bright. Illinois had won but one of four conference games and was looked upon as a cinch. Odds were as high as 2 to 1 on the Cardinal and an expectant, confident, Homecoming crowd of over 25,000 sallied forth to Camp Randall to see the Suckers bite. But something went wrong; Wisconsin used the wrong kind of bait and the Suckers refused to be caught. Playing an uphill game, with all the breaks in their favor, the Illini put a drop kick between the Wisconsin goal posts for a 3 to 0 victory. The first half was scoreless though the Illinois goal was seriously threatened several times. Luck was all with Illinois; when Shorty Barr undertook a pass it generally landed in a pair of yellow clad arms instead of the cardinal for which it was intended. Wisconsin's second half "come-back" was not forthcoming until the last five minutes of play when a downfield march to a touchdown was halted by the timekeeper's whistle. A dazed and dumbfounded crowd sat in their seats for fully a half minute before they could realize that Wisconsin had been beaten by Illinois. Deep gloom pervaded the town and old J. Pluvius joined in the sorrow, refusing to stop until the following Tuesday.

Coach Richards then pointed all efforts to the Michigan game. With a squad of Cardinal warriers, he set out for Ann Arbor determined to ruin Wolverine championship hopes. Another scoreless first half and Wisconsin hopes soared high—the invincible Michigan had been held. But the tide turned and the Wolverines scored twice. In the last three minutes Wisconsin plunged thru the enemy's line and shot a short pass across Michigan's for a lone touchdown. The game ended 13 to 6.

It has long been a Badger boast that "There are no quitters at Wisconsin"; the annual Chicago-Wisconsin scrap verified that tradition when the Cardinal battled the Maroons to a 0-0 tie. With two defeats and a

"batting average" of .500, the Badgers went to the Midway on November 25th, to play an unbeaten team that was out for the Conference championship. But Chicago met a new team, a team that played them off their feet and forced them to a hard defensive fight to save themselves from being scored upon. Outpunted and outplayed during the entire game, Chicago was stopped; even their trump card, John Thomas, saved until the last quarter, was unable to get thru the Badger line. Again the breaks went against the Badgers; several times Barr failed on drop kicks and line plunges, and fumbles were not infrequent. For Wisconsin it was a moral victory; Chicago's hopes were shattered and an old rival played to a standstill.

CROSS COUNTRY

The Badger Cross Country team, running for the first time of the season over a five-mile course, showed its heels to the Gopher harriers on November 4, and won the race by a score of 39-16. Tschudy, Badger star who has showed up so well this fall, came in first. The time was 27 minutes, 23 3-5 seconds.

Wisconsin had the whole race to itself, four of the Badger runners leading the field at the finish. Wade of Wisconsin led until the finishing sprint when Tschudy overtook and passed him. Vallely, another Wisconsin man who has shown great possibilities during the fall practice, placed third in the meet, while Moorhead came in fourth.

While grid warriers waited, primed for the contests of the afternoon, the western conference cross country meet was run off at Lafayette, Indiana, on the morning of November 25th. The Michigan harriers again displayed their superiority by winning the meet, but Wisconsin's united strength placed the Badgers second over the more favored Ames and Illinois teams. While three men crossed the line before a Cardinal runner finished, the bunching of three Wisconsin men in the fourth, sixth, and eighth places gave Wisconsin her advantage. Wade, the Badger veteran, finished fourth, close behind Scott of Illinois. Tschudy finished sixth and Vallely, eighth. Ames, winner of the Missouri Valley Conference, tied the Illini for third. Wisconsin's finish came as a fitting close to a successful cross country season; the only meet lost went to Michigan by a single point.

ALUMNI NOTES

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John C. Potter, e '04, EE '09, is secretary of the University of Wisconsin Alumni Club, at Cincinnati.

R. C. Grimstad, e '21, writes as follows: "Am now in the electrical drafting room of Sargent and Lundy, Consulting Engineers, at 72 West Adams St., Chicago." His address is given as 4426 Grand Blvd., Chicago, Ill.

MECHANICALS

Berger Hagen, m '21, gives us some interesting facts about some of the other mechanicals of his class: **"Paul Kurtz, Al Gerhardt,** and I are still with the Western Electric. I am in the Development Branch, doing experimental work on submarine cable manufacture. Paul Royer is staying at Sears and Roebuck Y. M. C. A., but changes jobs so often that I wouldn't venture to say where he is employed."

Howard M. Posz, m '21, is with the Chicago Screw Co. doing production work on screw machines. Address 3210 Arthington St., Chicago, Ill.

R. L. Meyer, m '20, is in the drafting room of Sargent & Lundy, of Chicago. Address: 1454 Belle Plaine Ave., Chicago, Ill.

A. P. Gerhardt, m '21, has finished his training course with the Western Electric Co. and is in the development division of the Hawthorne Plant doing experimental work on cable. Address: 3210 Arthington St., Chicago, Ill.

Carl Casberg, m '16, is an instructor in the Continuation department of the High School at Rockford, Ill. Address: 309 Grand Street.

E. K. Morgan, m '13, has resigned as general superintendent of the Rockford Drilling Machine Co., although he is still a stockholder and director. He is associated with the Ingersoll Milling Machine Co., of Rockford, in charge of the design and manufacture of all special drilling and boring machines. Address: 962 N. Church Street.

O. B. Zimmerman, m '96, ME '00, of the International Harvester Company, has been appointed Assistant to the Manager of the Experimental and Engineering Department.

Bernard W. Huebner, m '22, was recently married to Miss Martha Mauer. The couple will reside at 42 North Walker Ave., Chicago, Ill.

Gustav Slezak, m '22, who is studying manufacturing methods with the Western Electric, was married to Miss Vlasta Sis, on October 28, 1922.

Two engineering students were discussing electric batteries in the presence of a commerce man. "In Chicago," announced one engineer, "they have a three million dollar battery." The commerce man pricked up his ears at the mention of money. "My word!" he exclaimed, "Are they paying Faber and Schalk that much now?"

The following engineers were successful in the recent class elections:

Hugo L. Rusch, senior electrical and manager of *The Wisconsin Engineer,* was elected treasurer of the senior class.

Herbert Hentzen, senior chemical engineer and former member of the staff of *The Wisconsin Engineer,* was elected to the student senate.

Walter Plewke, junior chemical engineer, was elected sergeant-at-arms of the junior class.

Dean Turneaure pulled a rough one on his class of seniors who are learning to design concrete structures. In a quiz he assigned a problem with instructions to "use a common-sense method in solving this." It was a knock-out.

The following letter, just received by the Mining Department, is typical of many that come in from discoverers of gold in paying quantity in Wis. "I don't know how to handle it. Also I am sick old poor. Can you tell me or do it for me. Paying me enough for comfort the rest of my life." The letter is signed by a woman and dated from a town in Missouri.

BRINGING MORE DAYLIGHT INTO INDUSTRIAL BUILDINGS.

Dr. George M. Price, writing on "The Importance of Light in Factories," in "The Modern Factory," states: "Light is an essential working condition in all industrial establishments, and is also of paramount influence in the preservation of the health of the workers. There is no condition within industrial establishments to which so little attention is given as proper lighting and illumination. Especially is this the case in many of the factories in the United States. A prominent investigator, who had extensive opportunities to make observations of industrial establishments in Europe as well as in America, states: "I have seen so many mills and other works miserably lighted, that bad light is the most conspicuous and general defect of American factory premises."

"My own investigations for the New York State Factory Commission support this view. In these investigations it was found that 36.7% of the laundries inspected, 49.2% of the candy factories, 48.4% of the printing places, 50% of the chemical establishments, were inadequately lighted. There was hardly a trade investigated without finding a large number of inadequately lighted establishments."

Inadequate and defective lighting of industrial buildings is not confined to the establishments in New York State alone. The same conditions prevail in most sections of the country.

Such conditions as mentioned above are entirely opposed to the laws of health, sanitation and efficiency. Wherever poor lighting conditions prevail, there must be a corresponding loss of efficiency and output both in quality and in quantity. American industry is not using nearly enough daylight and sunlight in its buildings. Every endeavor should be made to use as much as possible of daylight for lighting purposes. To obtain this it is of course necessary that the rays of daylight and sunlight are permitted to enter the interior of the buildings as freely as possible, with the important modification that the direct rays of the sun must be properly diffused to prevent glare and eyestrain. A glass especially made for this purpose is known as Factrolite, and is recommended for the windows of industrial plants. Windows should be kept clean if the maximum amount of daylight is to pass through the glass, but the effort will be well repaid by the benefits secured.

In the presence of poor lighting, we cannot expect men to work with the same enthusiasm as when a well lighted working place has been provided. The physical surroundings have a deep effect upon the sentiments of the employes, and where bad working conditions are allowed to prevail, there is invariably a lessening of morale and satisfaction created thereby. Neglecting to utilize what nature has so bounteously provided, daylight, and which is so essential toward industrial efficiency, we have an instance of wastefulness, but now that the importance of good lighting is becoming recognized, undoubtedly more attention will be given by progressive industrial employers to furnishing the means which are essential for their workers to secure and maintain the efficiency, which counts for so much in the success of any industrial concern in this competitive age.

If you are interested in the distribution of light through Factrolite, we will send you a copy of Laboratory Report—"Factrolited."

MISSISSIPPI WIRE GLASS CO.,
220 Fifth Avenue,
St. Louis. New York. Chicago.
No. 3.

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painstaking in their investigations, whose conclusions we know to be sound, but who cannot make a favorable impression before a board of directors. We can get plenty of lawyers who, coached by our engineers, can glibly, and even convincingly, talk to this same board of directors until some question is asked which has not been covered in the process of coaching, when they, too, will flounder about. If we can secure a man who possesses the conscientious thoroughness and accuracy of the engineer, and also has the facility of expression and persuasiveness of the lawyer, what is a salary of twenty-five or thirty thousand dollars to us for such a man?"

The ability to appear before a group of hard-shelled business men and bankers and "sell" your idea, your project, perhaps yourself, is no mean accomplishment. To enjoy such ability one must have a command of English, some knowledge of the art of effective speaking, and that indefinable something called Personality. If you will run over, in your mind, the list of your friends and acquaintances, I think you will find, almost without exception, that those who are said to have pleasing personalities are people essentially 'human', people of broad sympathies and interests. Without this ability to "sell", the engineer may find great difficulty in convincing his hearers, especially if the gentlemen of the board are at all antagonistic,—or hail from Missouri.

The quality of imagination, which we all possess in varying degree, may mark the boundary between excellence and mediocrity. To the artist it is indispensible, to the engineer it is scarcely less so. We are all born with this divine fire, but it generally sinks into desuetude as we are molded into what we are pleased to term a "useful member of society." Could Ericsson have conceived the Monitor were he not endowed with imagination? Did not Tesla dream of a motor without brush or commutator long before he put into mathematical form the theory of the revolving magnetic field? Too often the narrowness of our training obscures our vision; we sadly need that breadth of knowledge which will stimulate, develop and direct that intangible asset—Imagination.

In an essay on "Engineering and Art" by Julian Chase Smallwood, a mechanical engineer, may be found this paragraph: "Men of science, your faculties are weakened by the exactitude which is your pride. You measure and weigh, and you are surrounded and overwhelmed by the limitations imposed by the experiences of your senses. If you had been Newton, observing the apple fall, you would have thought, 'The reason it fell was because its stem was too weak to hold it.' Newton, however, had an imagination, and thereby he discovered the law of gravitation."

I have confined myself largely to a discussion of the material value of the humanities, believing that, to the engineer, this aspect is the more important. The engineer's justification is his service to society, and I have tried to show that the engineer who is truly educated

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is in far better position to render that service—and exact due compensation for it—than he who is merely trained in the technique of his profession.

I have presented no brief for Art for Art's sake, have pictured not at all the rich, full-flavored satisfaction that comes with a competency to appreciate and enjoy, nor have I exalted the transcendent capacity to really LIVE as an individual, rather than to exist as an atom of the social mass. These matters, I believe, are beyond the province of this paper.

It is unfortunately true that materialistic science and all creations generalized under the name of art are often thought to be diametrically opposed, so, in closing, I would like to mention one or two instances where the artistic and scientific temperments have been joined in one man, making of him a better scientist, by reason of his art, and a better artist, by reason of his science. One can but regret the passing of an educational regime than enabled Poe to produce "The Raven" in spite of one of the keenest mathematical minds of his generation. If the solid truths of science and the imagery of fancy are irreconcilable, one wonders at Charles Ludwige Dodgson, author of brilliant mathematical treatises,—and of the chimerical "Alice in Wonderland"; at Benjamin Franklin—patriot, statesman, scientist, inventor, author—whose homely inventions and tremenduous scientific discoveries exist side by side with "Poor Richard's Almanac."

AN ALASKAN TRIP

(Continued from page 42)

majesty. Taku glacier, which is most commonly visited, presents a spectacle long to be remembered, with its numerous fissures, its blue-green ice wall glistening in the sun, towering more than a hundred feet above the water, and its numerous small icebergs standing by to watch the unending chain of others as they, too, are launched to sea. Then, if one is fortunate, the resounding sound waves of the whistle will break the thread that loosens an iceberg, which comes crashing down with a roar and a splash, impressive in its bulk and stateliness.

After crossing the Gulf of Alaska to Cordova and seaward no doubt exists as to the extent to which distance has been traveled to the westward as well as northward, for the time is here two hours slower than at Seattle, a time change equal to that between Madison and Seattle.

The new Government Railroad, extending inland from Seward to Fairbanks, a distance of 468 miles, affords an up-to-date means of travel which bids fair to play an important part in the development of Alaska, as it taps a country of both mining and agricultural resources. One finds a convenient dining car service, together with the customary sleeping car with its negro porter, to cater to the needs of the traveler on our government owned road.

Leaving Seward, the train crosses the divide, and then, rapidly descending, unwinds itself from a double loop, passing several glaciers and streams as it again approaches sea level. Traveling along Turnagain arm perchance a tidal "bore" may be seen, particularly if the wind is willing to lend its assistance by opposing the incoming tide, for here, we are told, is found the second highest tide in the world. Then on a clear day as Anchorage is approached, Mount McKinley, 20,404 feet in height, may be seen rising snow clad and majestic in the distance, towering over the county as if master and guardian of all it surveys. After crossing another divide as the interior is penetrated deeper and deeper, the cities of Nenana and Fairbanks on the Tanana River are reached.

The construction of the Alaskan railroad has been replete with problems which only the engineer can appreciate. The bridge across the Tanana River at Nenana is now the only unfinished link of this important highway. Nor is the final task unworthy of note. This bridge, now under construction, will have a span of about 705 feet with a 45-foot water clearance, and a height of about 100 feet. Almost a million feet of timber have been required for the approach, which is approximately one-half mile in length.

It is hardly fair to write about the interior of Alaska without mentioning the farming in the Tanana and Matanuska valleys, which is aided by the work of agricultural experiment stations. There has been a gradual and positive development in agricultural lines. A flour mill at Fairbanks, for instance, now produces flour from Alaska-grown wheat. Potatoes are grown in abundance. Tomatoes, celery, and lettuce, as well as other produce, should be mentioned, and then, just after the strawberry season has waned in our native State, we reach Alaska in time to enjoy another delightful berry season. The long summer days are effective in crowding into the shorter growing season sufficient light to do marvels in plant growth.

Baseball furnishes a field of wholesome amusement in Alaska, just as it does with us. The distance between towns, however, is somewhat of a handicap to frequent competition, but does not prevent seasonal encounters. And, even in baseball, we find some features of especial interest. The season of continual daylight can be no better appreciated than by attending the annual Fairbanks baseball classic, where the game is started at the hour of midnight on the longest day of the year. Then, too, at least one more or less unique ball field may be found in Alaska: At Latouche, an arm of the sea was pointed out as the ball ground. Had we arrived at low tide, however, we would have seen a practically level flat, with hard bottom, forming an excellent playing field.

A trip on the Yukon River through the interior of Alaska is now possible since the completion of the Alaska Railroad enables one to reach Nenana and Fairbanks with facility. Here, for hundreds of miles, one passes through a changing panorama of country, on comfort-

able river steamers of the type so common along the Mississippi River. In fact, many of the boat officers have had experience in steamboating on the Mississippi, so well described by Mark Twain.

It requires but little imagination to picture an ever-increasing number of tourists visiting our wonderland of the North. Two streams of travel, one entering via Skagway and Dawson, along the old gold stampede route, and passing down the Yukon, over the Alaska Railroad to Seward and thence back, the other just reversing this direction, are attractive possibilities. On the Yukon River the Arctic circle is crossed, and the opportunity of seeing the midnight sun in June is an experience never to be forgotten.

The traveler, on the other hand, who is fortunate enough to make the late season Yukon trip may have in store a display of northern lights unequalled in their brilliancy. On two separate nights in late August of this year it was my good fortune to witness this phenomenon, which reminds me of the darkey's definition of this word:

"You see dat donkey," said the darkey . "Well, dat ain't a phenomenon."

"You see dat thistle? Well, dat ain't a phenomenon."

"You see dat canary bird? Well, dat ain't no phenomenon," said the darkey.

"But if dat donkey ate dat thistle and sang like a canary, dat am a phenomenon."

But the northern lights seemed almost as remarkable as the old darkey's definition, and to be worthy of the term phenomenon. In the "Ballads of the Northern Lights we read:

"And the skies of night were alive with light,
with a throbbing, thrilling flame;
Amber and rose and violet, opal and gold it came.
It swept the sky like a giant scythe, it quivered
back to a wedge;
Argently bright, it cleft the night with a wavy,
golden edge.
Pennants of silver waved and streamed, lazy banners unfurled;
Sudden splendors of sabres gleamed, lightening
javelins were hurled.
There in our awe we crouched and we saw, with
our wild uplifted eyes,
Charge and retire the hosts of fire in the battlefield of the skies."

Even a description of this kind is inadequate to express the splendor of such a display as the marvel of their softness, beauty and color beggars description.

Probably no question is more frequently asked than "What is the climate of Alaska?" And, it can be no more adequately answered than "What is the climate of the United States?" There is a wide difference in the climate of different parts of Alaska, just as is true of the United States proper. Along the coast of southeastern Alaska, for instance, Sitka enjoys an average temperature but two degrees colder than that of Puget Sound. The rainfall along the southeastern coast region is comparatively heavy.

In the interior the rainfall is only about 12 inches per year, while summer temperatures approach the 100 mark in certain sections. Stefansson, the arctic explorer, points out that the lowest temperature ever recorded in over 40 years at Point Barrow, our northermost point on the Arctic Ocean, is —54°, whereas, near Havre, Montana, temperatures as low as —67° have been recorded. Obviously, he continues, a native of Montana could leave some of his clothing at home while wintering at Point Barrow. Saranac Lake, New York, a winter resort, has temperatures as low as —45°. Why not consider Point Barrow as a winter resort? This conjecture may lead on indefinitely. Suffice it to say that it is quite likely that most conceptions of Alaska's continuous frigidity have been somewhat exaggerated.

The possibility of swimming in Alaska may bring a shudder with the thought. But, here again, we are privileged to unlearn some of our cherished thoughts regarding this fair land of ours. Spenard Lake near Anchorage is a favorite bathing resort during the summer, provided with a modern bath house, while along the coast, warmed by the Japan current, the boys indulge in their patronage of the "old swimming hole" just as naturally as do their brothers in the States.

Roads are not yet very extensive in Alaska, although considerable work is now in progress. The road projects there are unlike those "outside," as the States are referred to, where some definite lines of travel already exist, which usually require only extension or improvement. In Alaska, much of the need for road project locations must be anticipated without such a guide, and it is of interest to note that settlement quickly follows the road construction development along the coast. The Richardson Highway, connecting Valdez with Fairbanks, a distance of 372 miles, is the longest single piece of construction attempted.

The people of Alaska and the Yukon are as a whole extremely cordial, friendly, and hospitable. The long winter evenings afford an opportunity for reading and study, which is reflected on every hand by those who take advantage of it. It is of interest to note that practically all the important cities have daily papers, which contain up to the minute news of the world outside. The population of Alaska is given by the 1920 census as 55,000—whites 30,000, natives 25,000, and bids fair to increase steadily.

Too often Alaska is thought of as a mere possession of the United States, when in reality it is one of us. Let us regard it, then, not as a coat which is only a possession; but as an arm which is an integral and essential part of us. It is not amiss to unlearn some of our associations of Alaska with polar bears and Eskimos, and think of it as our forty-ninth star of the not distant future, supporting a thriving population on agriculture, mining, fishing, lumbering, and other important industries.

PORTRAIT OF J. DALTON BY JOHN LONSDALE

The Quaker *who made* Chemistry a Science

CAVENDISH had shown that two volumes of hydrogen and one of oxygen always combine completely to form water and nothing else. Proust, a Frenchman, had proved that natural and artificial carbonates of copper are always constant in composition.

"There must be some law in this," reasoned Dalton (1766-1844), the Quaker mathematician and school teacher. That law he proceeded to discover by weighing and measuring. He found that each element has a combining weight of its own. To explain this, he evolved his atomic theory — the atoms of each element are all alike in size and weight; hence a combination can occur only in definite proportions.

Dalton's theory was published in 1808. In that same year, Napoleon made his brother, Joseph, king of Spain. This was considered a political event of tremendous importance. But Joseph left no lasting impression, while Dalton, by his discovery, elevated chemistry from a mass of unclassified observations and recipes into a science.

Modern scientists have gone beyond Dalton. They have found the atom to be composed of electrons, minute electrical particles. In the Research Laboratories of the General Electric Company much has been done to make this theory practically applicable so that chemists can actually predict the physical, chemical and electrical properties of compounds yet undiscovered.

In a world of fleeting events the spirit of science and research endures.