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The Wisconsin Engineer

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VOLUME XXXI NUMBER IV

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The Wisconsin Engineer

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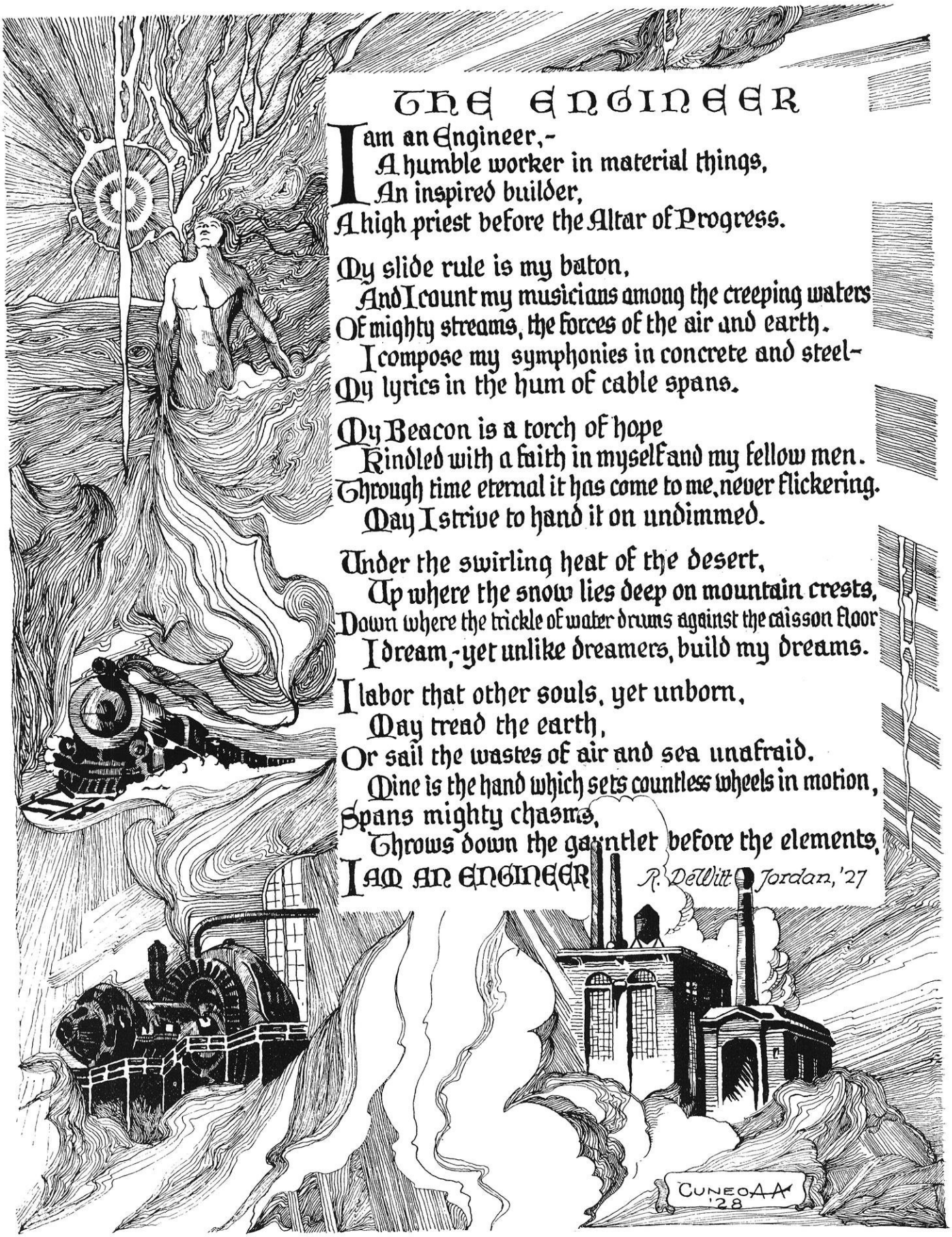


THE ENGINEER

I am an Engineer,-
A humble worker in material things,
An inspired builder,
A high priest before the Altar of Progress.

My slide rule is my baton,
And I count my musicians among the creeping waters
Of mighty streams, the forces of the air and earth.
I compose my symphonies in concrete and steel-
My lyrics in the hum of cable spans.

My Beacon is a torch of hope
Kindled with a faith in myself and my fellow men.
Through time eternal it has come to me, never flickering.
May I strive to hand it on undimmed.

Under the swirling heat of the desert,
Up where the snow lies deep on mountain crests,
Down where the trickle of water drums against the caisson floor
I dream,-yet unlike dreamers, build my dreams.

I labor that other souls, yet unborn,
May tread the earth,
Or sail the wastes of air and sea unafraid.
Mine is the hand which sets countless wheels in motion,
Spans mighty chasms,
Throws down the gauntlet before the elements,
I AM AN ENGINEER

R. DeWitt Jordan, '27

CUNEO AA '28

The Wisconsin Engineer
UNIVERSITY OF WISCONSIN

VOL. XXXI, NO. 4 MADISON, WISCONSIN JANUARY, 1927

SENIORS, JOBS AND OTHER THINGS

By H. J. BURTON, *Consumers Power Company*

IT used to be a matter of profound wonder to me why so many men graduated from college without knowing why. The graduate often cannot tell why he went to college. He has no definite plans as to his future life work.

In reply to a direct question as to what he intends to do, he will answer, "Oh, you know what a college graduate expects." Or he might say, "Anything at the start." Ask him to name the job he would pick if given his choice. You will find that he cannot give anything like a definite account of what he would like to do. He sometimes has an idea of what he expects to do eventually, but he has no plan as to the best way to occupy his time in the interval.

The point I want to make is: *Seniors do not start to think definitely about jobs until after they graduate.* I will agree that a lot of time is put in on the subject before graduation but the fact remains that the average student graduate is far from having a definite idea as to what he intends to try and do as his life work.

I said in the beginning that I used to wonder about all this, now I know from experience that the new graduate's knowledge of the nature and requirements of the field of work he should be most interested in is most hazy and frequently incorrect. He may form an opinion of a job by observation of the behavior of a prominent man whom he may know, — the thought being, "Well, if he can hold a job like that, I should worry." He often does not realize that the case under observation is exceptional, or that the job is not held because of the trait or quality observed, but in spite of it.

H. J. BURTON,
President Consumers Power Company

The question of character is nearly always underestimated by the graduate. He is sure that "hard headed business men" are not interested in personal habits, especially when shop or plant jobs are concerned. There is no question in my mind but that character is a most important factor. Dean Cooley has said that the requirements for a successful engineer are: 98% Character and Honesty, 1% Tact, 1% Technical Training.

Good health is an essential quality for almost any job. The Mann report of the Carnegie Foundation, published some years ago, indicated that the qualifications for the senior job-seeker, stated in the order of their desirability, are as follows: Character, Judgement, Efficiency, Understanding of Men, Knowledge, Technique. Study this list and measure or rate yourself before applying for a job. Are you reliable? A good team-worker? Do you inspire confidence and go out of your way to assist others? Are you willing to do more than is required? Are you accurate, level headed, economical, how about your technical knowledge?

You may ask the question, "Just what is expected of a graduate? What may he expect?" Let's put the matter to a test. An executive is sitting in his office. Some recent graduates are without, waiting to be interviewed. They are senior job-seekers. One is called into the office. He slouches in, hat on head. He does not know what he wants, but he can do anything. He admits it.

The next one is called and starts in by stating that he has just spent four years studying electrical engineering and he immediately hands the executive the

(Continued on page 130)

WISCONSIN'S GIRL ENGINEER HAS "BOTH HANDS" IN STARTING NEW POWER UNIT

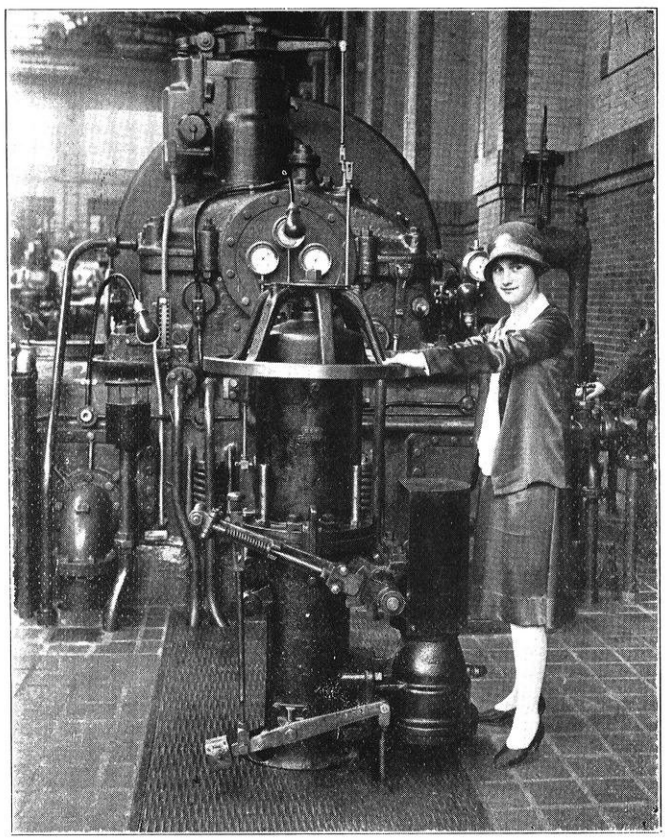
By R. T. HOMEWOOD, *Senior Civil*

WHEN accosted with "We understand you had a hand in turning on the new generating unit at Lakeside," Miss Miriam Anderson replied, "Had a hand in it? I had both hands in it!" And the accompanying photograph will bear out her statement.

Miss Anderson is the daughter of John Anderson, vice president of the T. M. E. R. & L. Company of Milwaukee. She and Miss Louise Field, a sophomore electrical hold the distinction of being Wisconsin's only student-girl-engineers. They are not Wisconsin's only girl-engineers, for they were preceded by Miss Emilie Hahn, a mining engineering student, who graduated last year.

The plant whose first work awaited Miss Anderson's touch of the throttle is a 37,000-kilowatt unit costing, complete with boilers and turbines, $1,750,000.

The boilers operate under high pressure of 1200 pounds per square inch. This high pressure innovation requires boilers of special construction with 5-inch walls.



Miss Anderson turns on the new unit at Lakeside

This high pressure steam is used in the new turbines where it is expanded thru twenty steps down to the pressure used by ordinary turbines and at this lower pressure is fed to the regular turbines in the plant.

The boiler evaporates 120 tons of water an hour into high pressure steam. A description in the Milwaukee Journal states that "three large truck loads of coal, finely powdered, will be blown into the furnace each hour."

The furnace is 35 by 23 feet and is 70 feet high. It is almost entirely surrounded by water or steam leaving little heat to be lost to brick walls as in older types of boilers.

The operation of the plant is entirely automatic, only two men are needed to supervise the operation.

As has been suggested, this extremely high pressure operation is an innovation. The Electric Company officials believe that the scheme will be followed in other new plants just as the use of powdered coal has been.

The installation of the new unit brings the capacity of the Lakeside Plant up to 167,000 kilowatts.

Miss Anderson hopes after graduation to get into active engineering practice; she is not taking engineering for the mere novelty of the situation. "You see, it runs in the family," she says, "and I thoroughly enjoy the work."

During the past summer she had some practical engineering experience in Milwaukee in the employ of the Combustion Engineering Company who was carrying on some experiments at the Lakeside plant. The company was experimenting with the coking properties of various coals under various treatments in an effort to determine whether or not it would be practical and economical to extract the bi-products from the coal and then feed the coke to the furnaces.

Having had two years of general work on the hill, Miss Anderson transferred this fall to the engineering school and is rated as a junior mechanical.

CO-OPERATIVE INDUSTRIAL RESEARCH IN ENGINEERING

By GLENN G. WOLFE, *Sophomore Electrical*

IN writing this article, I am reminded of a paper I read some time ago by A. D. Little of the American Institute of Chemical Engineers, entitled "The Handwriting on the Wall," in which he describes Belshazzer, of the Biblical story and his experience with the handwriting which appeared on the wall before him. Daniel read Belshazzer's doom, and was amply paid for his services, but today, "How many of you, after prophesying that a business was headed for a receivership, have been rewarded with a scarlet cloak and a gold chain about your neck and a directorship in the company, all without discount for cash?"

Belshazzer has been dead for about 2500 years, but the handwriting recurs to-day on hundreds of walls about the world. Very few, however, have been able to interpret it, but those who have been able to do so give it this translation: "The price of progress is research, which alone assures the security of dividends."

Many industries and institutions have heeded the handwriting and have broadened their research departments. The University of Wisconsin among others realized its responsibilities in the carrying out of the research, and two years ago, an experiment was started in co-operative research between the University and certain of the industrial plants of the state. Some time ago, a group of men came to the university and requested that they be allowed to work for an advanced degree in engineering and to carry on this work at a place near their factories. The place selected was Milwaukee, most of the men having their business there. "As part of this proposed graduate work would necessitate an experimental research in some technical subject, the proposal seemed to afford an opportunity to demonstrate to industry that co-operative research between industry and the university could be carried on with great and immediate benefit to industry, and that the university was able and willing to assist in the solution of the problems of industry." *

The material in this article was compiled for the benefit of students and alumni who have not heard of the co-operative research being carried on by the university.

References have been taken from Journal A. I. E. E., Canadian Institute of Mining & Metallurgy, a paper by Mr. A. D. Little given before A. I. Ch. E., and information furnished by Dean Turneaure.

—EDITOR'S NOTE

The Milwaukee Work

Thus the coming of co-operative research between the university and industry. Eight men are taking the course, which meets in Milwaukee every Friday night at 7:30, and is carried on as a seminar. The professor goes on Saturday to one or two of the plants which has a student representative, and the methods and results of the student's research are discussed, and suggestions made for the continuation of the projects.

The Milwaukee class work just described has demonstrated to industry that the university could carry on co-operative research to great advantage to both the university and industry. Little was said about this work at first, but the accomplishments were soon spread about and the university found itself successfully advising, assisting, and co-operating with more industries. Here are some of the projects that are being carried on at the present time between the university and the various industries.

The Materials Testing Laboratories is co-operating with the Wisconsin Highway Commission in determining the merits of local sands and gravels in concrete construction, and strength and durability of concrete pavements; also with the American Society for Testing Materials, and other college laboratories, in a study of the strength of structural steel. Professor M. O. Withey is chairman of the Committee in charge of this latter work.

Along with these two projects of the Materials Testing Laboratories are many others which I am unable to mention, due to lack of space.

The Hydraulic and Sanitary Engineering Laboratory has as one of its co-operative projects the study of the disposal of pea cannery wastes and the efficiency of various disposal plants in the state.

In the Electrical Laboratories the research men are co-operating with the Railroad Commission in the work of the Standards Laboratory; with the Wisconsin Utilities Association, which has established two scholarships, two projects now under way are, methods of studying street car noises, and causes of loss and of failure in insulating materials; with the City of Madison in developing a standard testing station for auto headlights.

Professor Kowalke of the Chemical Engineering Department and his assistants in the research department are co-operating with the Wisconsin Gas and Electric Company on use of gas in case hardening work; with the Northwest Paper Company on problems in the chemical conversion of wood into pulp; with the Trane Company of La Crosse on steam regulating devices; and many others.

*** From a talk given by Professor R. S. McCaffery before the Canadian Institute of Mining and Metallurgy.**

The Mining and Metallurgical Laboratory under Professor McCaffery is co-operating with the Engineering Foundation and numerous contributors on the study of blast furnace slag and blast furnace reactions; with the malleable and grey iron foundry industries in extensive program of research on cast iron and alloy steels.

Mr. Scott Mackay has been appointed Associate Professor in this department to carry on the co-operative research between the university and industries. The University of Wisconsin is not the only school that has begun this system of research, but it is about the first to develop it to any great extent.

Advantages

One great advantage of this method of doing research work is the saving of money. The university is better equipped, in some cases, to do the work than is the industry; and on the other hand, the industry is able to do other phases of the work to greater advantage than the university. On the projects handled by the Mining and Metallurgical Department, daily statements and operating sheets are sent into the laboratory from the concern with which the Department is co-operating. These operating sheets are recorded, and some method or methods tried in an attempt to reduce the cost of operation or to enable the company to increase their output. There are hundreds of ways in which the university can be of service to industry, and at the same time industry can be of service to the university. The sooner this is recognized by other concerns and institutions, the more progress will be made by research. There are many manufacturers today who do not have fifty dollars worth of research equipment in their factories. They say: "What's the use of research, — our business will last forever." This kind of a man has not heeded the handwriting on the wall. "Summer follows winter with such regularity that the ice business seems secure. But the ice man has now to reckon with the probability that thousands of electric refrigerators will be installed within the next year."

After watching the progress made by the Milwaukee concerns and the university, many concerns have been convinced of the necessity of co-operative research. In the Fox River Valley, between Fond du Lac and Green Bay, there are about twenty-six grey iron foundries. These concerns are forming a local organization to carry on and finance co-operative research. The plan, which they propose to follow, is: To have research work carried on at Madison and in their own plants, to have a professor regularly visit the plants in the co-operating group to co-ordinate the work at Madison and at the plants, and to consult with them and to advise concerning works' problems and the application and use of research results. In Milwaukee, a similar group has organized, consisting of about twenty or more iron foundries, to carry out a program of about the same kind as the Fox River Valley foundries.

It has been the policy of the university to assist in the development of this co-operation between the industries. The fact that many competing companies have gotten together on this problem, and are willing to assist each other, makes the future research work look more promising than it has ever looked before. The university has freely given its resources and facilities both of personnel and material. All monetary rewards received and all donations received for research are expended only towards the payment of full-time research men and the materials they use. By that I mean men are employed to give their entire time towards research. The university makes no overhead charge whatever.

Financial Advantages

Many of the industrial plants are not able financially to carry on research to any great extent and again there are old time superintendents, as Mr. Little puts it, "who don't need any damned chemist to come down from Boston to teach him the paper business." These men will soon be scratching as best they can with new methods of making paper from hitherto unused woods and with new processes for wood and giving hitherto unheard of yields. Those, who are not financially able to carry on research themselves, will find the co-opeartive method a very conservative one; and they will also find that they will accomplish considerably more either by the method described or by some other similar co-operative method. But those who refuse to pay any attention at all to research will in time, I think, find their concern ready for a receivership.

Help to the university

This idea of co-operative research has done a lot in helping the university. Research has always remained a side issue, something very desirable and highly creditable to our technologic institutions, but not to be taken seriously as an essential factor in the training of engineering students. The number of students entering college has increased at a greater rate than has the material wherewithal. In the author's view-point, it is very necessary for the engineering student to come into contact with research work during his college training, but heretofore this could not be done due to the inadequate funds set aside for research. However, the coming of co-operative research will eliminate this lack and the student will be able to watch and possibly take part in some of the various research projects going on. It would be better for both the students and the institutions, if successful research could be made a requirement for all members of the faculty, and that in rating our engineering colleges more emphasis be made on the number and quality of engineering bulletins and scientific papers published, than on the size of the buildings, number of students or the available laboratory equipment. There can be no question that much more research must be done in our engineering colleges than is being done at the present time. "Attempting to solve new problems is the best means for developing initiative and the ability to think." It is a very expensive process to properly train engineers, and to obtain satisfactory results our engineering colleges must be given greater financial support in the future than has been done in the past. It is a great

advantage to the industrial organizations to have engineers that are properly trained to make investigations and to develop new ideas. If the service rendered by these successfully trained engineers is of any value to the industrial organizations, then let them assist in providing adequate means so that this work can be carried on. They can easily do this with very little cost and at the same time profit themselves by carrying on the co-operative work which I have attempted to describe in this article. Dean C. E. Magnusson of the Engineering Experiment Station of the University of Washington gives a few suggestions in trying to bring about co-operative research between the university and the industries which are as follows: *

1. Industrial organization should establish numerous research fellowships in engineering colleges, not as gratuities but as necessary investment against their own future need of properly trained divisions to their staffs.

2. Co-operation between research departments of industrial organizations and educational institutions should be greatly increased.

3. Some form of bonus system should be established by which engineering colleges would receive financial returns from industrial organizations for having discovered and trained exceptionally successful engineers.

4. Let educational institutions take up patents on new ideas of commercial value, originated by faculty members; that is, expand and make effective the plan recently adopted by the Columbia University.

5. Establish research foundations as integral parts of engineering colleges.

6. Let a larger share of the normal income of educational institutions be expended on investigational work. This would be in accord with the policy adopted by the industrial organizations. Twenty or thirty years ago the budgets for research were insignificant in most of our industrial organizations, while to-day the research divisions in several manufacturing and operating companies expend millions of dollars annually.

7. There should be instituted an exchange of engineers between engineering faculties and engineering staffs of manufacturing companies and other industrial organizations, the plan might be somewhat similar to the exchange of professors between European and American universities. If a man for man exchange could not be effected, let the manufacturing company donate the services (Sabbatical year) of some of their engineers, who should devote all their time in selected engineering school during a whole academic year.

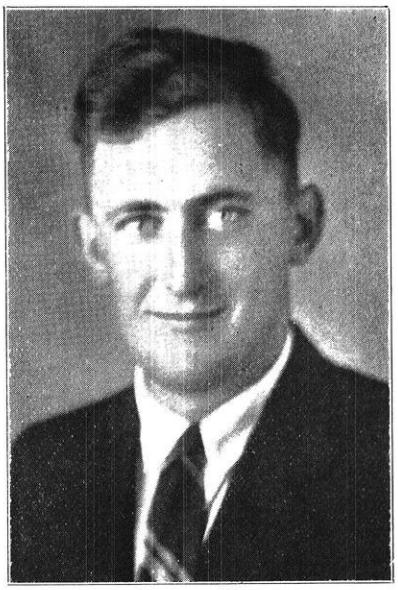
*** Reprinted from Journal of A. I. E. E.**

Solve problems and then problems and then more problems. No student can get a good working knowledge of mathematics in any other way, and without such knowledge you would be a cripple in the higher fields of engineering. —*Virginia Journal.*

A TRIBUTE TO CHARLES HARTLING

By SELDON CLARK '28

Charles Hartling, a senior in the college of engineering was killed December 8th while crossing the College Hills railroad crossing. He was returning from a picture-taking expedition and drove his car directly in front of a fast moving passenger train, and so ended a most unusual personality and brilliant intellect.



CHARLES HARTLING

Charlie Hartling was keenly alert and fearless both mentally and physically. He won a legislative scholarship during his freshman year in spite of a large amount of outside work. Hard work held no fear for him.

On a recent trip to the underground river, Styx of Mammoth Cave, Ky., the guide mentioned that but one person had ever swam this river. Charlie requested permission to try it and was incredulously told to go ahead. After swimming the black mysterious river he told the guide that in the future when telling tourists about the river he should mention that two people had swam the river — one a University of Wisconsin student.

At the end of his sophomore year he returned home to help his mother on the farm. Returning to school a year later he obtained employment at the Electric Plant. This was interesting work for him as he was studying electrical engineering, but does not detract from the admiration we must feel for his working an eight-hour day, seven days a week and successfully carrying on his school work.

Surprising to all but his most intimate friends was his appreciation of music, poetry and good pictures. The beauty of the university campus after a snow fall, with snow and ice clinging to the branches and sparkling out with jewel like radiance from the dark foliage of the evergreens lured Charlie to his death. For he cut all classes that morning and set out with his camera to try and catch the beauty of the sunlight on the icy branches. How well he has succeeded may be observed by our cover photograph, developed from a film taken from the smashed camera. This picture is really a monument with epitaph upon it for in it we may read the true character of Charles Hartling.

"How still the plains of the waters be!
The tide in his ecstasy.
The tide is at his highest height:
And it is night." — *Lanier.*

SENIORS, JOBS, AND OTHER THINGS

(Continued from page 125)

copy of his school record and references. The executive asks, "What did you do during vacations?"

"Worked in the old man's store, canvassed a little, made pretty good money."

"Do you wish to get a job as a salesman?"

"No."

"What practical experience have you had along electrical lines?"

"None, outside of my work at college."

In reply to further questions he implies that although he has no definite idea of the job under consideration, he expects to reach an executive position soon and with little effort on his part.

The next man called in says he wants work and wants it badly and that he is willing to do anything, and he adds, "Of course, within reason." He is a good talker, sold books during two vacations, played in a band at a resort one summer. When tentatively offered a certain job he "frankly does not want that kind of a job." He knows why he went to college and it was chiefly to get away from such work. He does not say just what kind of a job he does want and it may or may not be because he is too modest. The executive wonders why he went to college and studied engineering and also why he applied at an engineering concern for a job.

The next man is called. He is asked to be seated. In answer to a question he states simply and to the point that he is a recent electrical engineering graduate. He gained some little experience as a substation operator and as a trouble shooter. On being questioned further it is learned he also has had some transmission line construction experience, having worked during one summer vacation as a "ground-man." He would like very much to get some steam plant experience, both in the turbine and boiler room. "What branch of the work do you expect to follow as a life work?"

"When I have had enough experience I would like to be a designing engineer."

"Will you be content with that all your life?"

"I hope some day to become a public utility executive."

When questioned further regarding his desires and ambitions it is learned he has consulted not only the professors at college but some of the leading engineers in the country, either by correspondence or in person when they had visited the college.

The college records of the applicants interviewed were pracically identical and they all "applied for" the same job. Who got the job? No, it does not matter what the executive had to offer. You can bet your bottom dollar he did not let one of the boys slip through his fingers.

What is to be done about all this? The answer is fairly simple. It is, start as soon as possible to have a goal in sight and train for it. The man who persistently aims at the bull's eye learns sooner or later to hit it, he will not continue to shoot all over the lot. You do not think of trying to make the team without practice. You would be laughed off the field. Work and play for the final result. Don't worry too much about it. Don't be afraid of making a wrong choice. A definite goal is better than none. All winds are unfavorable to a ship without a definite port in sight.

Actions speak louder than words. Sometimes you can hear neither, because of clothes. Pay attention to details, shoes, finger-nails. This does not mean that you have to put on a false front, and affected manner. Deal with facts. Should you make a misstatement in your eagerness to make a favorable impression, immediately correct it, even if apparently unnoticed. Remember the boss has interviewed graduates before, possibly a thousand or more. Also remember he often has had plant or shop training as a foundation for his job. The time to think of what you are going to do or say when starting out to land your job is now, whether you are a freshman, sophomore, junior or senior. It is true jobs are often a question of supply and demand, but the right kind of a man can land one almost anytime. Such a one came into my office some years ago, during a severe industrial slump. He appeared very much discouraged. Because of conditions we could not put on another man. I helped him prepare a list of ten industrial concerns who were likely to have jobs according to his specifications, which were definite. It was about 8:00 o'clock when he left my office and I bet him he would land the job he wanted before he had tried the tenth place. About 2:00 o'clock he telephoned me that I had won the bet.

You can bank on this statement. If the graduate has character and an objective he need not worry. The fact that he is a graduate is sufficient evidence his technical training is, or should be, taken care of. Work we must, whether we have a college education or not. If we do not work with our hands we must toil in some other way. Should you get a job and find you do not like it, don't get dissatisfied with the job, get dissatisfied with yourself and look ahead and plan the next step of the journey toward your goal.

I WOULD RATHER

I would rather believe many things that are not true — that will not come to pass, than to fail to believe many things that add to my happiness and peace of mind.

I would rather believe that there is a God who rules the universe, than to believe in a hit and miss program where nobody is responsible.

I would rather keep still than to try to air my disbeliefs when by so doing I might take from some man an honest hope.

I would rather be looked upon as a very ordinary individual who was rather slow of wit, than to be constantly rubbing somebody on the raw because of my brilliant and cutting repartee. —*Quills*

Campus Notes

ENGINEERING STUDENT COMMENDED FOR HEROIC EFFORT

Victor W. Randecker, a student in mechanical engineering and registered from Stoughton, has recently received a letter from the Secretary of Navy commending him officially for his efforts to rescue the occupants of a seaplane which fell into Lake Michigan near the Great Lakes Training Station last summer while he was there in training. The letter reads in part as follows:

"In reviewing the record of the board of investigation to inquire into the crash of the seaplane on August 17, 1926, the Department notes with pleasure the heroic part you took in attempting to rescue the two occupants of the plane.

"The declarations before the board reveal that you and Russell Irvin Burne, seaman second class, V-5 USNR, immediately after the crash voluntarily dove from the seawall and swam to the wrecked plane some three hundred yards away through a sea too rough for others to succeed. Arriving at the wreck, you immediately set to work to release the bodies of the two officers. You, together with Burns, were able to effect a prompt recovery of the body of Ensign Stone before you yourself became exhausted.

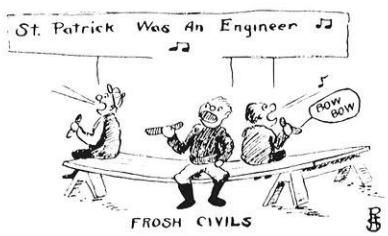
"It is the opinion of the Department that the duty performed by you on this occasion under existing conditions was hazardous and at times dangerous to your safety.

"The Department commends you for your conduct on this occasion."

Randecker is something of an athlete, having earned his numerals in wrestling. He is specializing in aviaiton and plans to take further training in flying at Great Lakes and Hampton Roads.

PROFESSOR OWEN ENTERTAINS FROSH CIVILS AT BUNGALOWEN

Forty freshmen Civils graciously accepted Prof. Ray S. Owen's invitation to visit his cottage, Bungalowen, on Lake Monona, December 11, and swooped down upon it at 3:30 o'clock in the afternoon all set for a good time.



After the hardy engineers had satisfied their lust for baseball in the snow, everybody trooped into the cottage, learned how to sing "St. Patrick was an engineer," and played cards. Just before supper was announced, it was decided that in the interests of fair play, each one would be allowed to loosen his belt only two inches. Of course, the hot dogs, beans, and rye bread, coupled with an enjoyable act staged by the Owen girls, more than satisfied the forty healthy appetites that were brought to Bungalowen.

We know a frosh Civil who is so dumb that he thinks an English survey course is a course in the T. E. department.

FROSH ENGINEERS WRITE PSYCHOLOGY QUIZ

A psychological fill-in examination, sponsored by the National Research Council, was given to the freshmen of the Colleges of Engineering, Agriculture, and Letters and Science, December 4, under the direction of Prof. L. L. Thurstone, University of Chicago, who is chairman of the committee on personal research of the National Research Council.

To furnish a basis of comparison with the actual work of each student taking the test, which would indicate whether the student was fit to continue with college work and in what subjects he was most likely to succeed, was the principal purpose of the test, according to Prof. A. V. Millar, assistant dean of the College of Engineering. The test, however, is not an infallible criterion of a student's ability, but if wisely interpreted can be used to guide the student in his choice of studies.

PROFESSOR SMITH ENJOYS SOJOURN IN JAPAN

Prof. Leonard S. Smith, of the department of highway engineering and city planning, who is on leave of absence this semester, wrote as follows recently to Dean F. E. Turneaure concerning his trip to Japan:

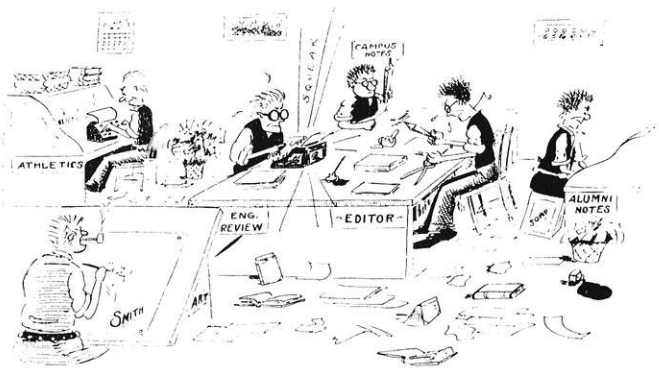
"The month's stay in Japan has been most profitable and pleasant. I have made detail studies of town planning of Yokohoma, Tokyo, Osaka, Kobe, and Kyota. Everywhere I have been received, much to my surprise, as a national guest. The Government Railroad Minister has given me a pass on all the railroads, and the Tokyo Institute of Municipal Research has sent an expert with me on my trip around the country, who has made all arrangements and introductions. I have lectured at Osaka, the largest city in Japan, and at Kobe, besides lecturing twice in Tokyo.

In every case I have had splendid interpreters and a most intelligent audience.

"Zoning here is as widely used as in U. S. and the widening of streets and the building of new streets very much more common than in the United States. In fact, city planning is on a much more expert and practical basis than in most American cities. I have secured a valuable supply of maps, pictures, and lantern slides for my Wisconsin students, most of which I am expressing directly to the university."

Professor Smith has received an offer from a California concern to act as consulting engineer at a salary of $10,000 a year. He has not accepted, however, and he will return to his classes at the university.

THE "ENGINEER" IN THE MAKING



The above photograph of the *Engineer* staff at work was snapped by our art editor, R. R. Smith. "Out of chaos comes order?"

ENGINEERS HOLD SUCCESSFUL CHRISTMAS SING

The annual Christmas get-together of the College of Engineering was held in Music Hall on December 15, under the direction of Prof. E. B. Gordon, of the School of Music. A twenty-piece orchestra and a mixed chorus of over thirty voices assisted in the singing.

The main floor of Music Hall was filled by an appreciative audience which responded whole-heartedly to the singing of the favorite Christmas carols. The musical program was concluded with a violin solo, "Elegie" (Massenet), by Miss Louise Rood, daughter of Prof. J. T. Rood. Dr. E. A. Birge, president emeritus of the university, delivered the Christmas address on the meaning of Christmas.

FIVE EXTRA CREDITS AND PROBATION

Soph Engineer (to frat brother): "Bill, can you help me with this mechanics problem?"

Junior Frat Brother: "If I did that, it wouldn't be quite right."

Soph: "No, I don't suppose it would, Bill; but take a try at it anyhow."

CHI EPSILON INITIATES SEVEN NEW MEN

Chi Epsilon, national honorary civil engineering fraternity, initiated the following men at the University club, December 15: honorary members, E. E. Parker, city engineer of Madison, and E. R. Maurer, professor of mechanics; G. J. Heimerl '27, J. Levin '27, K. F. Wendt '27, A. T. Lenz '28, and H. S. Merz '28. After the presidential welcome by G. F. Liddle '27, G. J. Heimerl responded on behalf of the initiates. Professor Maurer addressed the society on "The Trend in Civil Engineering Curricula." Prof. C. I. Corp was toastmaster of the evening.

Soph Engineer: "I've worked this problem ten times already."

Calculus Instructor: "Good enough; you ought to see it clearly then."

Soph: "Yes — here are the ten answers."

SHORT COURSE FOR FOUNDRYMEN TO BE GIVEN AT UNIVERSITY

The announcement of a short course for foundrymen to be held at the College of Engineering, Feb. 1 to 4 inclusive, under the auspices of the department of metallurgy and the extension division, was recently made by Prof. E. R. Shorey, professor of mining engineering, who has charge of the registration for the course.

The course will provide an opportunity for foundrymen of the state to pursue short courses of instruction covering the fundamental and basic principles of the foundry; to learn of the many new metallurgical discoveries and researches that concern the foundry; and to learn something about the possibilities of the great foundry industry of the state.

Three luncheons will be served at which prominent men of the state will talk. Prof. R. S. McCaffery will review the recent metallurgical developments which have a bearing on foundry practice.

ENGINEERING ECONOMICS CLASS DEVELOPS EMBRYO ORATORS

An opportunity to deliver critical talks on the economic phases of various engineering problems and projects of today was given to the members of Prof. L. F. Van Hagan's class in engineering economics (Railways 105) during the latter part of the present semester. Besides acquainting the members of the class with current engineering problems, these talks gave the men some much-needed practice in public speaking. Among the subjects presented before the class were the Inland Waterways, the St. Lawrence Waterway, Aerial Transportation, Land Colonization Projects in California, and the Economic Possibilities of Tidal Power.

WHO ARE THE ENGINEERS? In days of yore, it was a common supposition among campus folk that if a man wore a flannel shirt and a week's growth of whiskers it was a safe bet that he had never been farther up the Hill than the Engineering Building. It was reasonable to believe that if the Law School were mentioned to such an individual he would curl up and begin to exude an all-enveloping blue fog of profanity than which there was none whicher.

But times have changed. With fur bennies, hard-boiled derbies, rent-a-cars, and golf bloomers corrupting us, and with the medics, the ags, the lordly legal luminaries, and the dormitorians approving and adopting our styles in haberdashery and facial decoration, it is becoming impossible to identify the engineer who sallies forth without a slip stick for a badge.

The *Engineer* has recently received a suggestion, from the head of one of our student technical societies, which seems very sound and which is here passed along for the consideration of Wisconsin engineers.

In other Big Ten engineering colleges, notably Iowa, the engineers wear a small identification button on the lapel which is peculiar to the school from which they come. In no case are the badges elaborate or expensive, but in all cases they are distinctive and engineers from the same school can readily identify each other while in college and after graduation.

It would not be difficult for some such a plan to be put into execution at Wisconsin. Let the members of Polygon meet with a representative of some reputable manufacturing jeweler for the purpose of designing a badge which will be simple, distinctive, inconspicuous, and will identify at once the engineer and the Badger. The cost should be kept as low as possible and the buttons should be sold at manufacturers' prices through some convenient agency so as to be within the reach of all our engineers.

Suggestions are in order and this department of the *Engineer* would like to have some expressions of opinion from readers, together with ideas for a good design which will fill all the qualifications set forth above. Let's get this thing under way and have our badges this Spring!

ENGINEERING GET-TOGETHERS The Engineers' Christmas sing has become established as a school institution, and a noteworthy one. The sing this year was better than ever before and the Freshman class is to be congratulated upon its ability to do things and get results. And there is a lesson to be derived from this exhibition of college spirit.

Did it ever occur to you how really seldom we engineers get together, as an all-college group, for any purpose? Outside of the Christmas sing and the St. Pat's parade most of our gatherings are of specialized groups, — the civils get together, the mechanicals have a meeting, or the chemicals act as a group, but very rarely is there an all-college activity.

There is Polygon, of course, which includes representative men from each branch of the profession and which undoubtedly accomplishes real good, but what we need is an all-embracing activity that will bring together the rank and file of our student body in the various phases of the engineering field and will get civil to know chemical and mechanical to know electrical and so on around the circle. When this is accomplished a great step forward will have been taken toward the development of a profession-consciousness in the College of Engineering.

Just what the solution of this problem may be is not entirely clear, and it is referred to the heads of the various technical societies and other interested parties for their thought and consideration, in hope that there may be a definite movement seen in the near future.

ARE WE TOO TECHNICAL? The following are the chief reasons for attending college:

1. To find out what we do not know.
2. To attack problems methodically and without fear.
3. To learn how to behave among our fellow men.

A working knowledge of the fundamental principles of any subject is all that any college course can give, and in this respect the technical courses adequately fulfill this requirement. In the matter of attacking new problems, a technical training proves superior. It teaches the student to think straight and appreciate the necessity of forming judgment only on a foundation of facts, and in the light of reliable past performances, and not on things taken for granted. This continual analytical training gives the student a type of mind which is more apt to prove successful in the solving of new problems than one not so trained, no matter what field is followed. To be able to approach a problem methodically and without fear is to successfully apply a college training.

Further, we go to college to meet and solve problems of social behavior. When we entered high school, we faced new conditions. In the university we face entirely different social conditions. Competition is keener and the struggle for superiority is more exacting. When

(Continued on page 150)

Alumni Notes

The nominating committee of the Madison Technical Club has nominated three Wisconsin grads for office which are:

Markwardt, L. J., c'12, C. E.'22 was nominated for vice president.

Cadby, J. N., e'05, E. E.'07 for the board of directors.

Kowalke, O. L., ch'09 also for the board of directors.

CHEMICALS

Drake, Ronald I., ch'20 is chemical engineer with the W. F. Hall Printing Company of Chicago. Mr. Drake was in Madison recently visiting his parents, Dr. and Mrs. F. I. Drake.

CIVILS

Bennett, J. Gardner, c'18 was recently appointed professor of civil engineering at Lewis Institute, Chicago. His home address is 3848 Wilcox Street, Chicago, Illinois.

Breivogel, Milton W., c'24 after a period in Florida, is again with the city planning commission of Milwaukee.

Cahill, Walter D., c'26 is working with Rand McNally, Map publishers. His address is 4641 Kenmore Avenue, Chicago, Illinois.

Chase, Leon E., c'22 is working for the Illinois Highway Commission in the bridge department. He may be addressed at 317 West Jackson St., Springfield, Illinois.

Moehlman, Wm. F., c'22 recently returned to the Wisconsin Highway department. He gives his address as Room 12, First National Bank Building, Superior, Wisconsin.

Older, Clifford, c'00 is a consulting engineer in Chicago. While he was state highway engineer of Illinois he conducted some practical tests of concrete and other types of road surfaces upon which the highway department spent a quarter of a million dollars. These are known as the Ames Bates Road tests often referred to by other highway engineers.

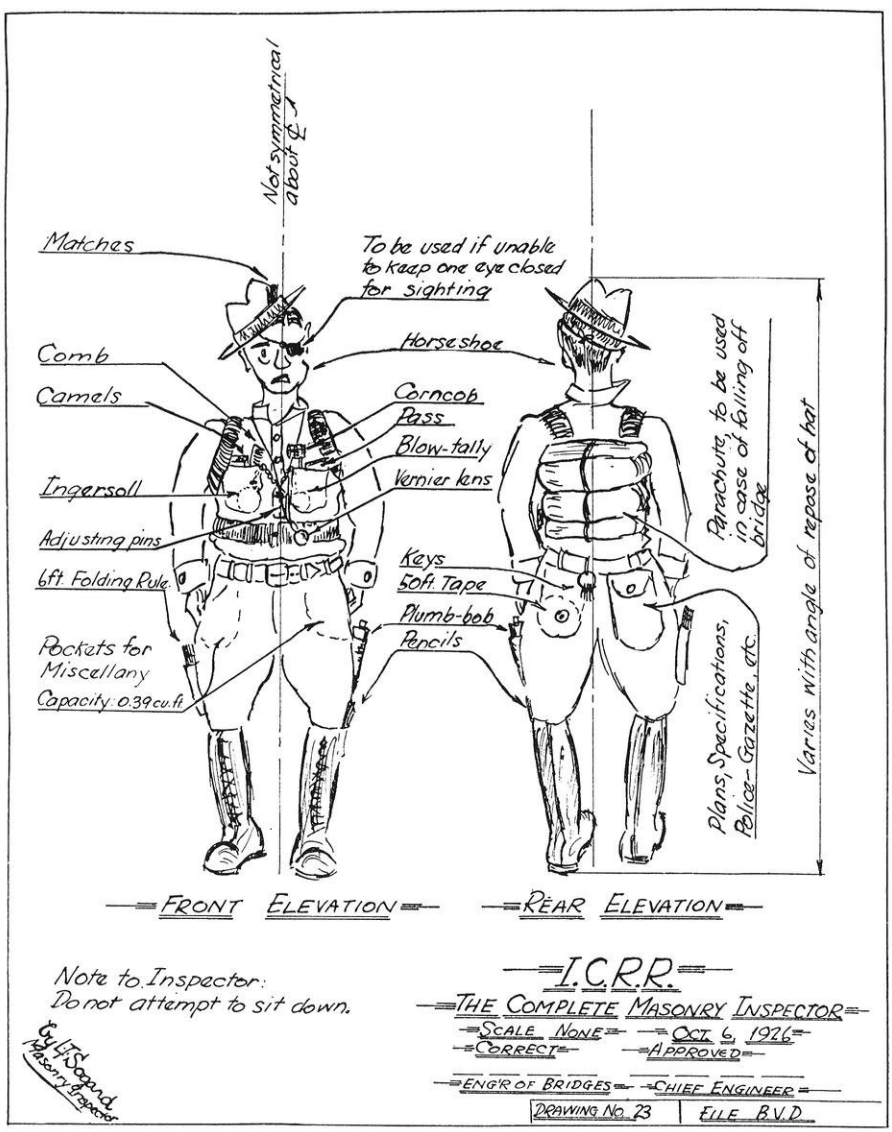
Piez, A. H., c'08 is president of McMullen & Piez, of Manitowoc, Wisconsin. His address is 512 Water Street.

Rogers, W. A., c'88 president of the Bates & Rogers Construction Company has just sent us a copy of a 25th anniversary volume. The book shows many of the important construction jobs which have been done by his company. The company is located in Chicago and is to be congratulated upon its remarkable achievements during the first twenty-five years of existence.

Schad, James A., c'16 is engineer for the Gypsum Industries, a promotional bureau located at 844 Rush Street, Chicago, Illinois.

Schuyler, Philip K., c'21, has returned from Mexico to take a position with the U. S. Bureau of Public Roads, at Washington, D. C.

Stivers, Charles P., c'13, Captain, U. S. Army, writes: "After thirteen years, I am again a student, this time in the advanced course at the Infantry School, Ft. Benning, Ga. This fall marks the completion of my tenth year as an officer in the U. S. Army."



This diverting draftsman's design of the complete masonry inspector was prepared for the magazine by L. T. Sogard, c'24, bridge department, Rockford, Ill. Mr. Sogard should be an authority on this subject as he is a masonry inspector as well as a clever artist.

A masonry inspector, says Mr. Sogard, is of necessity a complete engineering organization in himself. He is a whole drafting office and instrument room combined. Each piece of equipment on his person must have its particular place, else he may loose two or three hours in a search for a red rubber eraser or his "Prince Albert." With the idea in view of standardizing all this, the accompanying drawing is submitted. Its publication will serve a twofold purpose in (1) helping other m. i.'s getting organized; and in (2) aiding other railway employes in distinguishing the masonry inspectors from the Boy Scouts of America and old clothes men.

—*Courtesy Illinois Central Magazine.*

Tate, **Stanley A.**, c'26 has gone into business for himself in his home town of Bear Creek, Wisconsin. He is building concrete walks and doing other similar jobs and reports that he is keeping busy.

Thiel, Walter, c'22 is an assistant in the Engineering department of the City of Long Beach, California, and resides at 3032 E. 5th Street.

Tschudy, L. C., c'23 writes: "Since July 1, 1926, I have been employed by the Feather River Power Co. at Storrie, Calif. The project calls for a rock filled storage dam, two conversion dams, two tunnels, penstock, and power house. I have charge of the engineering for the survey and construction of tunnel No. 1. The project is located in the Sierra Nevada Mts. at 4500 feet above sea level. There are deer and bear here. I had a chance to use my rifle on a bear who visited our garbage pit for the last time."

Wicker, Kenneth R., c'23, has recently been employed on some surveys for the Light House Service of the Great Lakes. His present address is Route Six (6), Waukesha, Wisconsin.

Wisner, John C. Jr., c'26 is employed by the Wisconsin Highway Commission on the construction of the Keeler Street bridge at Beloit. His present address is 1543 Keeler Street, Beloit, Wisconsin.

Gustin, Glen H., c'21 died at the Edward Hines Jr. Hospital, Maywood, Ill., on November 23. Mr. Gustin was taken ill in Shelby, Mont., where he was employed as a civil engineer. During the world war Mr. Gustin served as a first sergeant overseas and was awarded the croix de guerre for extraordinary heroism in the battle of Blanc Ment Ridge. Burial was at Wautoma, Wisconsin.

ELECTRICALS

Benedict, Ralph, e'25 is engaged in research work at the University under a fellowship granted by an official of the General Electric Company. This is the second year that Benedict has done this work since graduation.

Cadby, John N., e'05, E. E.'07 was elected President of the National Association of Public Utility Secretaries at its annual meeting in New Orleans. Mr. Cadby is Secretary of the Wisconsin Public Utilities association and of the Wisconsin Motor Coach Association. He read a paper on "Budgets" at the convention.

Gregg, Hendrick J., e'24 is with the Toledo Electric Railway Company, Toledo, Ohio.

Johnson, Irving B., e'23, is the proud father of a son, Clinton Kresge, born November 21. Mr. Johnson is engineer for the John Peterson Manufacturing Company, Madison, Wisconsin, manufactors of heating equipment and water softeners. He lives on Nakoma Road, in the suburbs of Madison where he recently purchased a home.

Kohl, Oliver, e'02 is in charge of the merchandising department of the Superior Light, Power, and Water Company, at Superior, Wisconsin.

Krippner, Arthur, e'04 is located in Denver, Colorado, where he is engaged in the machinery and supplies business.

Lindner, Herbert G., e'21 was in Madison December 16th in connection with the broadcasting of the Foot Ball Banquet. Mr. Lindner is in the Plant & Transmission Department of the Wisconsin Telephone Company, at Milwaukee. His address is 1118 Hayes Avenue, Milwaukee, Wisconsin.

Muth, Herbert, e'21 was recently married to Miss Gladys Clark of Milwaukee. They will be at home in Milwaukee where Mr. Muth is employed with the Allis-Chalmers Co.

Millspaugh, J. W., e'14 formerly assistant works manager of the Chain Belt Company of Milwaukee, was advanced to the position of works manager to succeed J. C. Merwin who was elected second vice president. Mr. Millspaugh became affiliated with the Chain Belt Company in 1916.

Nelson, Leslie V., e'17 has changed his address to 1967 Alfred Avenue, St. Louis, Mo.

Skinner, M. E., e'15 was recently elected first vice president of the Pennsylvania Electric Association, after serving during the past year as treasurer. He is commercial manager of the Duquesne Light Company, one of the largest units of the Byllesby group of public utilities His headquarters are in Pittsburg.

West, K. A., e'24, is with the Westinghouse Electric and Manufacturing Company of East Pittsburg, Pa., and is in the Radio Engineering Department. Mr. West was in Madison on business just before Christmas.

MECHANICALS

Cox, Edward L., m'22 visited the college on December 2. He renewed his subscription to the "Engineer" and informed us that he is traveling for the Monarch Metal Products Company of St. Louis, Mo. His address is 5020 Penrose Street.

Fletcher, Freeman, m'15 is operating engineer for the Missouri Power & Light Company, with offices at Kansas City, Missouri.

Lindemann, W. C., m'08 president of the Milwaukee Engineering Society, has been elected a member of the nominating committee of the American Society of Mechanical Engineers. Mr. Lindemann is secretary of the A. J. Lindemann & Company.

Zimmerman, O. B., m'96, M. E. '00 who has just completed a year as Commander of the Hiram J. Slifer Post No. 135 of the American Legion, was honored recently by election to the presidency of the Harvester club, an organization of the Chicago district employees of the International Harvester Company. Mr. Zimmerman has for several years been engaged in experimental work for the International Harvester Company, his official position being assistant to the Manager, Experimental and Engineering Department.

MINERS

Beatty, William G., min'24 recently spent several days in Madison before continuing his trip west to Denver, Colorado. While in Madison, Mr. Beatty enjoyed the hospitality of Professor A. V. Millar's home. For the past eight months he has been connected with the Tennessee Coal, Iron and Railroad Co. at the Muscoda Division of the Iron Ore Mines near Birmingham, Alabama. Upon his arrival in Denver he will continue his work with the Denver Rock Drill Manufacturing Co. in their various departments. After a period of six months, more or less, he expects to return to Alabama and follow this training work in the maintainance of rock drills and tempering of steel in the Iron Ore Department of the Tennessee Coal, Iron and Railroad Company.

Pardee, Franklin, min'15, Lansing, Mich., is mining engineer for the Mining Geological Survey. He is doing special work among the copper mines of upper Michigan, near Houghton.

Athletics

SWIMMING

Early in the season the swimming squad began its series of daily workouts in preparation for the season of 1927. To make the team requires true natatorial ability and much hard work. None of the positions go by default; on the contrary, competition is brisk and the men are fighting for places. Coach Joe Steinauer, assisted by Mac Simpkins, is heading for another successful season via the route of intensive training. Last year's team placed third in the conference meet at Michigan and in addition won four of the six dual meets in which it participated. A good quota of veterans left over from this successful team are forming the nucleus of the 1927 squad.

Engineers are well represented by a number of first class swimmers. Stanley Post, senior electrical, is captain of the water polo team, and besides, swims in 440-yard race. He was one of the outstanding men last year, and has shown up well this year. The sophomore civils may well be proud of Donovan Dean, one of the best swimmers Rockford High has ever produced, and who made a name for himself at the Phantom Lake Y. M. C. A. camp. He is proving his worth in the 40-yard and 100-yard swims. Emil Abendroth, senior civil, who hails from Milwaukee, is one of the experienced men on the team, and this year will no doubt equal or better his good work of the past seasons. Benton Wiechers, junior electrical from Racine, also did excellent work on last year's aggragation, and is one of the strongest contenders in the back stroke and 100-yard swim. Lincoln Frazier, senior electrical is another engineer who is doing good work.

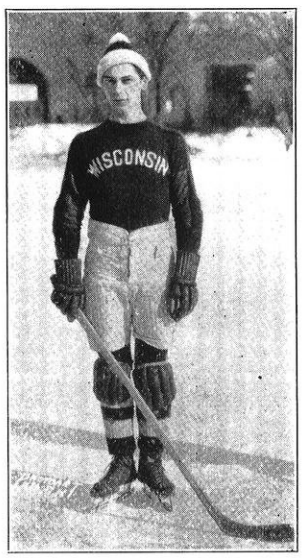
Other engineering candidates for the fish squad are found in Wesley Bliffert, soph civil; Jack Bond, Burt Guenthe, Robert Koehring, and John McGovern, soph mechanicals; Richard Cody, junior chemical; Gordon Hillyers and Lester Ludwigson, junior and sophomore respectively, in electrical engineering. To judge from the practices held so far and the quality and quantity of men turning out this year's team should be just as good as the 1926 squad; it is hoped that they may, thru their intensive training, better that team's performance.

HOCKEY

Favored by a spell of cold weather early in the winter, the hockey squad began to get into shape for the coming season. Though Wisconsin has turned out some very creditable teams in the past, the men here are handicapped by being dependent upon the whims of the weather man. Some teams, such as those of Minnesota and Michigan, have indoor artificial rinks and can get an early start, but the Badger squad, using an outdoor rink, can seldom do much before December, and that leaves little time to practice before the heavy conference games.

As there was no regular hockey coach at the beginning of the season, the squad worked out under the direction of coach Tom Lieb, who was well able to fill the position, for he had been hockey mentor at Notre Dame before coming to Wisconsin. Directly after the Christmas recess, however, the pucksters were supplied with a very capable mentor in the person of Coach Willis ("Rube") Brandow of Duluth, Minnesota, who not only is a very good player himself, but is well able to instruct the team.

Hockey, like wrestling, seems to have a strong attraction for engineering students, for there is always a goodly number of them on the squad. This year they are proud to include in their number the able captain, Bill Lidicker, senior civil. Besides playing a whirlwind center game on the rink, he is also a student of no mean ability, as is shown by the honor keys he wears. No one is better fitted to lead the team than he, and Bill may be relied upon to bring in the points for the Cardinal. Harold Ruf, star varsity goal guard of last year, has been doing excellent work in the defense position, and is one of the strongest representatives of the engineering college. He is a junior civil. Don Britton, junior electrical is another promising defense man; he, too, had experience in the game last year. Roger Cahoon, junior mechanical and experienced puckster, is a strong candidate for the wing position. To complete this list are Gus Maasen, junior civil and Jim Larson, sophomore civil.



LIDICKER,
Senior Civil

Practice on the new rink, slightly smaller than last year's in accordance with the conference ruling, has been brisk and the squad is fast developing into top notch playing form. Besides these experienced engineers there are a number of other veterans back, enough so that no positions will be filled without stiff competition, and prospects for a successful season look good. With a real able coach as Wisconsin has, and a number of sturdy fighting engineers, a first class team may be expected.

Engineering Review

HUGH CRUSHERS TO TAKE 70-TON CARLOAD OF COPPER ORE

What are claimed to be the largest ore crushers ever built are now being shipped from the plant of the Allis-Chalmers Mfg. Co. in Milwaukee. In designing these machines, the engineers were not only confronted with the problems of designing a crusher larger than any other yet built, but they had to take into consideration the question of shipping them over 5,000 miles under very unusual conditions. The crushers were built for the Chile Exploration Co., a subsidiary of the Anaconda Copper Mining Co., for installation at Chuquicamata in the Andes Mountains of Chile. Each machine weighs 500 tons and is built almost entirely of steel. Two hopper openings each five feet across permit a load of ore weighing 70 tons to be dumped into the crusher at one time. The crusher will handle pieces of ore weighing as much as 7 tons. The ore will be reduced to a twelve inch product. Each crusher's capacity is estimated at from 2,000 to 2,500 tons of ore per hour.

Shipping these machines will be a problem in itself. The largest pieces weigh about 60 tons each. Shipment by rail to New York will be taken care of by 25 freight cars. At New York, the Chile Exploration Co.'s steamer, "Chilcop," especially equipped with heavy derricks, will take the crushers and transport them through the Panama Canal to Mejillones, Chile, where, because of lack of harbor, the crushers must be transferred to lighters, towed onto the beach, and placed on cars on a 30-in. narrow-gage railroad. The mine is at an altitude of 9,500 ft.; and because of sharp curves, special railway cars have been built to handle the machines.

— Engineering News-Record

ARMY ENGINEERS OPPOSE GREAT LAKES-TO-HUDSON CANAL

The adverse report upon the Great Lakes-to-Hudson Canal, which was submitted recently to the Committee on Rivers and Harbors of the House of Representatives by the chief of Engineers, was the result of a request from that committee to the Chief of Engineers that the Board of Engineers for Rivers and Harbors extend the scope of an earlier investigation of the proposed canal across the state of New York to consider evidence submitted by the proponents and to add estimates of a canal depth of 30 ft. The earlier report gave consideration to a waterway for vessels of 20 and 25-ft. drafts. This was also an adverse report. The Board of Engineers, after considering reports on both the proposed St. Lawrence and Great Lakes-to-Hudson waterways, is of the opinion that the expenditure of public funds on the St. Lawrence route would bring the greater economic returns per dollar spent. To this the Chief of Engineers adds:

"The route from the Great Lakes to the Hudson River is feasible from an engineering standpoint, and its construction by the United States government would probably be justified in the near future, if the plans for the improvement of the St. Lawrence River do not meet the joint approval of the legislative branches and executive heads of the two governments. The cost for navigation alone of the St. Lawrence waterway from the Great Lakes to the ocean for vessels of 25-ft. draft is estimated at $173,520,000, to be born jointly by Canada and the United States, as compared with $506,000,000 for the Great Lakes-to-Hudson River route. Also the former will afford better relief to the Middle West and is a better investment for the United States as a navigation proposition if mutually satisfactory arrangements for its construction can be consummated."

A comparison of the respective routes indicates the following facts. The cost of the New York route, as indicated above, would be approximately three times that of the St. Lawrence route, and, moreover, the cost of the former would have to be born entirely by our own country. The number of locks on the St. Lawrence route would be from 7 to 9 as against from 18 to 20 for the route across New York State, and the number of bridges would be 8 on the former and 54 on the latter, only 17 of which could be fixed high-level structures. About 25 miles of the St. Lawrence waterway would consist of restricted channels as compared with 128 miles of such channels on the waterway through New York State. The New York waterway has no appreciable advantage in length of navigation season over the other waterway, but it does have an advantage in the matter of fogs and icebergs..

— Engineering News-Record

POLAR SEA WATER RICH IN GOLD

At the annual meeting of the Verein Deutscher Chemicker, held at Kiel, Professor F. Haber gave the results of a research which he and Dr. J. Jaenicke had been following for many years. Earlier investigators found that the gold content of sea water was from 5 to 10 mg. per metric ton, but the above-mentioned research on 5,000 samples collected from many seas and from different depths showed that the amount present was smaller. Water from the South Atlantic contained less than 0.01 mg. per ton; water from the

(Continued on page 146)

bay of San Francisco a little more, and samples from the Polar seas four or five times this amount. Melted ice from the Polar seas was often considerably richer in gold. The form in which gold occurs in sea water is not, as previously supposed, dissolved aurichloride, but a mineral slime or a constituent of the plankton organisms. Its separation is effected quantitatively by adding a minute amount of alkali polysulphide and a trace of copper, and then filtering through fine sand charged with sulphur. This process is not, however, practicable on a commercial scale.

—*Engineering and Mining Journal*

LARGEST MINE VENTILATING FAN

The largest mine ventilating fan in the world is being installed at the British Government Mines in South Africa. The fan and engine are designed to give a maximum discharge of 900,000 cu. ft. of air per minute under a 7-in. water gage. The fan is 30-ft. in diameter and will run at 125 r. p. m., which is equivalent to a peripheral speed of 196-ft. per second. The engine develops 1,500 hp. at rated speed and is of the tandem compound condensing type.

8,000 HP. D. C. MOTOR

What is claimed to be the largest d. c. motor in the world has just been completed. It is rated at 8,000 hp. and weighs 625,000 pounds. The shaft is 26-ft. 8-in. in length and the outside diameter of the frame is 20-ft. Three 50,000-lb. flywheels are used to equalize the load peaks. Power for operating the motor is obtained from two 3,500-kw., 700-volt generators running at 375 r. p. m.

THE BALCH HIGH-HEAD POWER PROJECT

The Balch hydro-electric development on King's River in California, during the past summer, was at the peak of construction with work under way on dam, penstock, and power-house. The project is the first of a series of plants to be built on this river by the San Joaquin Light & Power Corporation, which has plans for developing a total head of 7,290 feet in nine plants on two branches of the stream with a total capacity of 500,000 hp. The series of plants will involve four reservoirs, fourteen dams of various types, and about 40 miles of conduit, chiefly in the form of pressure tunnels. The Balch plant, scheduled for completion by the first of next year, will begin operation with a 40,000-hp. impulse wheel operating under a head of 2,243 feet. King's River region was little known before 1917, so that complete triangulation surveys and thorough mapping of the territory were required preparatory to any real construction. An indication of the nature of this region is given by the most important part of this preparatory work. In building 45 miles of roads an expense of $750,000 was incurred. One stretch of 20 miles of 6 per cent grade had to be built for much of its length along the face of granite rock slopes so steep

and smooth that it was necessary for drillers to work from ropes that were, in some instances, more than 200 feet long. In March, 1925, authority was given to start work on the first unit of the Balch plant and $3,764,000 was made available for the work. By the first of April, 1926, work on this development was about 30 per cent completed. Only the first 40,000-hp. unit is to be installed at present; later three duplicate units will be added to the same plant.

—*Engineering News-Record*

TESTS ON 15,000-H.P. HAMBURG DIESEL

Much public interest has been aroused concerning the 15,000-hp. Blohm & Voss Diesel installed in the Hamburg municipal light plant. It has nine double-acting two-stroke-cycle cylinders of 33.86-in. bore, and 59.05-in. stroke, and normally runs at 94 r.p.m.. The height from the crankshaft center to the top of the valve spindles of the upper cylinders amounts to about 35 feet. The engine is coupled to a 13,000-kva., three-phase, 50-cycle, 6,000-volt alternating-current generator which was furnished by the Siemens-Schuckert Works.

The installation was started early in the summer of 1926 and was subjected to acceptance tests from the first to the fourth of September. The following results were obtained:

The time required for starting from complete rest until taking up the full current into the line could be reduced to three minutes.

Upon being suddenly unloaded from the full load to idling, the speed momentarily increased by 14.5 per cent, to be regulated almost immediately, and after a lapse of 32 seconds to settle down to the equlibrium condition at no load.

The consumption of fuel, not including the electrically driven scavenging blowers, was determined according to the following table:

B. Hp.	I. Hp.	Fuel Consumption B. Hp.-Hr., Lb.
14,640	17,450	0.371
11,280	14,120	0.363
7,740	10,460	0.366
3,780	6,400	0.457

At the normal load of 14,640 b.hp. the power input to the scavenging blower amounts to 728-hp.. According to this, the mechanical efficiency of the Diesel engine, disregarding the blower horsepower, amounts to 0.84, and with its inclusion, 0.80. The consumption of lubricating oil for the entire Diesel engine, which is lavishly lubricated as a safety measure, amounted to only 0.0015 pound per b.hp.-hr. at full load.

PAGE THE SNAKE CHARMER OF BENGAL

First Student: "Is he a good chemistry student?"

Second: "Good! I should say he is! He's got the acids eating right out of his hands."

Koehring Re-mixed Concrete

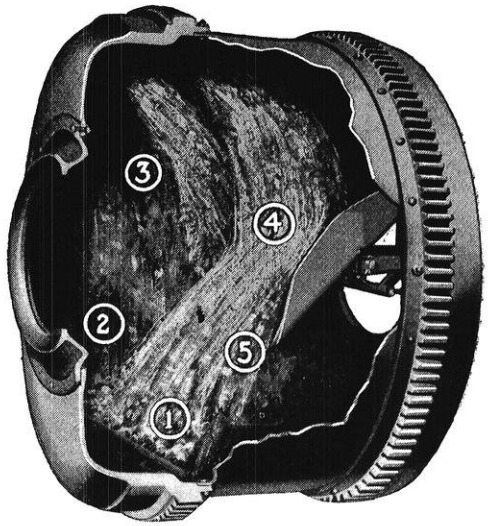
is Dominant Strength concrete

IN addition to the use of proper aggregates, positive control of the thoroughness of mix and the correct amount of water accurately timed, there is finally, an essentially important factor in the production of standardized concrete of Dominant Strength. It is the proper mixing action.

The raw materials—cement, sand, stone and water—must be so combined and mixed that the resultant concrete will be of maximum strength and quality. The drum of the Koehring concrete mixer has been designed to produce a re-mixing action which coats every particle of aggregate thoroughly with cement. Tests have proved that the Koehring five action re-mixing principle accomplishes this most completely.

Koehring supremacy inside the drum goes even further. With the Koehring re-mixing action there is no separation of aggregate according to size—it is uniform to the last shovelful of every batch.

"Concrete—Its Manufacture and Use" is a 210 page treatise on the uses of concrete, including 26 pages of tables of quantities of materials required in concrete paving work. To engineering students, faculty members and others interested we shall gladly send a copy on request.



(1) Blade cuts through materials with churning action. (2) Blade carries materials up, spilling down again against motion of drum. (3) Materials hurled across diameter of drum. (4) Materials elevated to drum top and cascaded down to reversed discharge chute which (5) with scattering, spraying action, showers materials back to charging side for repeated trips through mixing process.

KOEHRING COMPANY
MILWAUKEE WISCONSIN

Manufacturers of Pavers, Mixers—Gasoline Shovels, Cranes and Draglines

EDITORIALS

(Continued from page 134)

we enter the world of industry, the difference is vastly greater. We become nothing but a drop in the bucket. We meet no sentiment; and nobody is sorry for us. Pull may secure a job, but it requires ability to hold it. We cannot expect to succeed in life by pure knowledge alone, or by the influence of acquaintances, but must have at our command certain necessary social qualities and an agreeable manner of putting things across, and not depend only on an intimate knowledge of the subject itself.

It is in this respect that a purely technical course fails. Our education is so overwhelmingly technical that we have little time for commercial, social, and philosophical studies. We constantly deal with cold facts and forces, and with static inanimate objects, and do not apply ourselves enough to such all-important things as the correct use of the English language. By neglecting this we discount our efforts, since many leaders of industry are non-technical men. The college engineer should let no opportunity slip by him to delve into those subjects which we, as engineers, are apt to consider non-essential to the completion of our college courses.

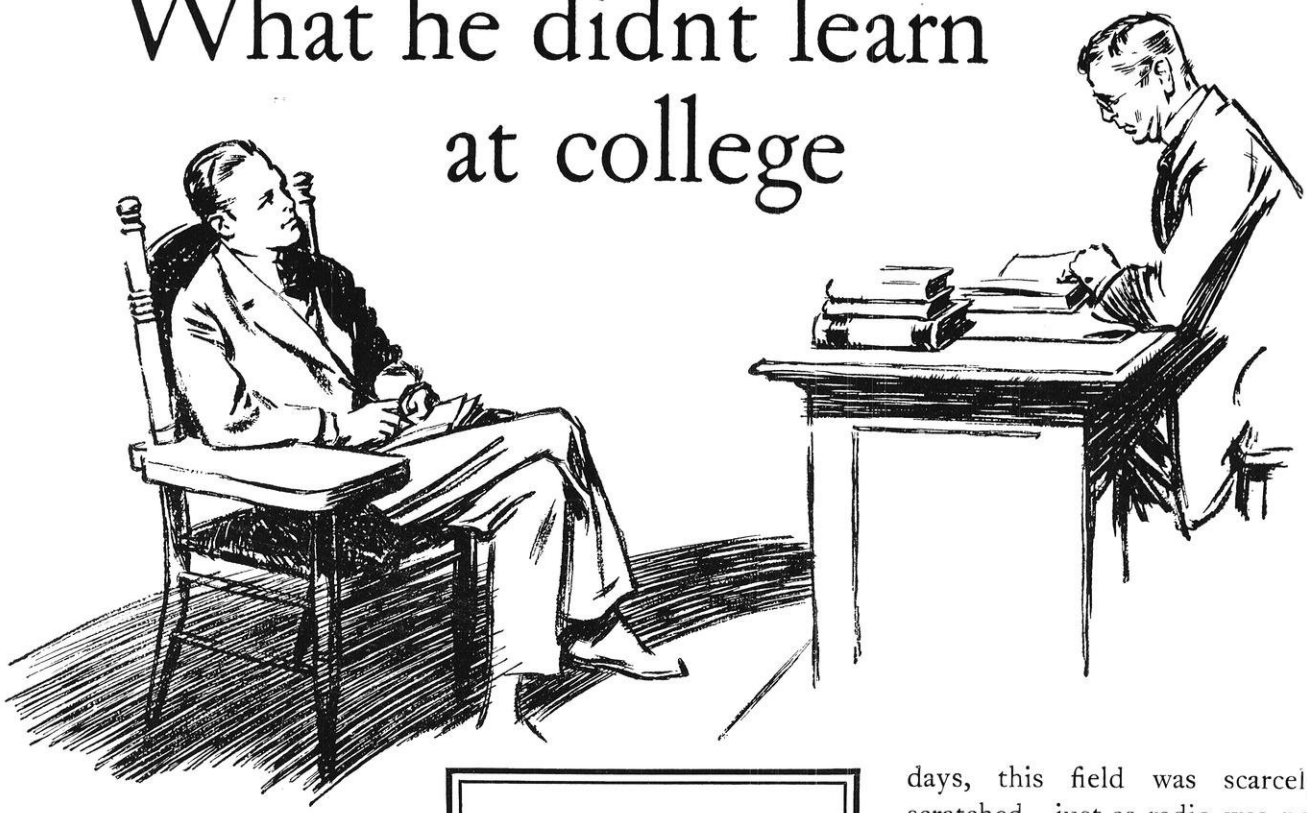
INVENTION The down-at-the-heel inventor, walking the wintry streets without an overcoat and with a model tucked under his arm, has ceased to be. In his place we have, not a single man working alone on an idea, but a huge laboratory established for no other purpose but for the invention of new machines and devices.

In the old days, people grubbed along with the implements they had until some bright soul, who may or may not have had technical knowledge of the subject at hand, constructed a more or less workable apparatus for performing a given task more efficiently or easily than it had hitherto been performed, and in many cases the invention came before the need for it was discovered. But nowadays the process is reversed, — the need is discovered and a huge scientific organization is put to work to devise a machine to meet the need. The day of the professional inventor is at hand.

When a certain department of a large manufacturing organization needs a new device in its work, it places the order and in a short while the device is delivered in working order and perhaps with a few extra features that had not been requested. Even here at our own university, when a device for timing football games was required, one was produced, when a device for timing runners on the indoor track was needed, the order was placed and the need filled, and when the telescope at the observatory kept falling behind the star it was following, a device was perfected to speed up the works properly.

This is a real engineering field, — ideas are wanted and the skill to put such ideas into concrete form is essential.

What he didn't learn at college



LAWRENCE DAY HOWELL

In his class work, Lawrence Day Howell, Princeton, Litt. B. '13, E. E. '19, never heard of marine applications for electrical equipment. In fact, they were practically unknown. Yet he now is in charge of the Marine Section, Transportation Division, of the Westinghouse Sales Department, located at New York.

When Howell came from college to the Westinghouse Graduate Students' Course, he had twelve months of thoroughgoing work in the shops at East Pittsburgh. Then he decided he wanted to enter the field which seemed most undeveloped and perhaps most promising of broad expansion. This was marine engineering.

"What's the future with a large organization?" That is what college men want to know, first of all. The question is best answered by the accomplishments of others with similar training and like opportunities. This is one of a series of advertisements portraying the progress at Westinghouse of college graduates, off the campus some five—eight—ten years.

Not five per cent of the present opportunities on the water have been opened for electrification. Yet there is more horsepower, in prime movers, on the ocean than there is on the land.

In Howell's undergraduate days, this field was scarcely scratched—just as radio was not known to many young engineers when they were in college. A college man's opportunities are not limited to the electrical developments now in existence.

In marine applications an order may assume large proportions. A single installation, negotiated by Howell recently, of the newly-developed Diesel-electric drive for a yacht, totaled $175,000. Such sales are not made overnight. They result from understanding fully a customer's needs.

To men with the knack of taking the other fellow's point of view, a career as Sales Engineer at Westinghouse brings returns in personal satisfaction as well as in worldly reward.

Westinghouse

WESTINGHOUSE ELECTRIC