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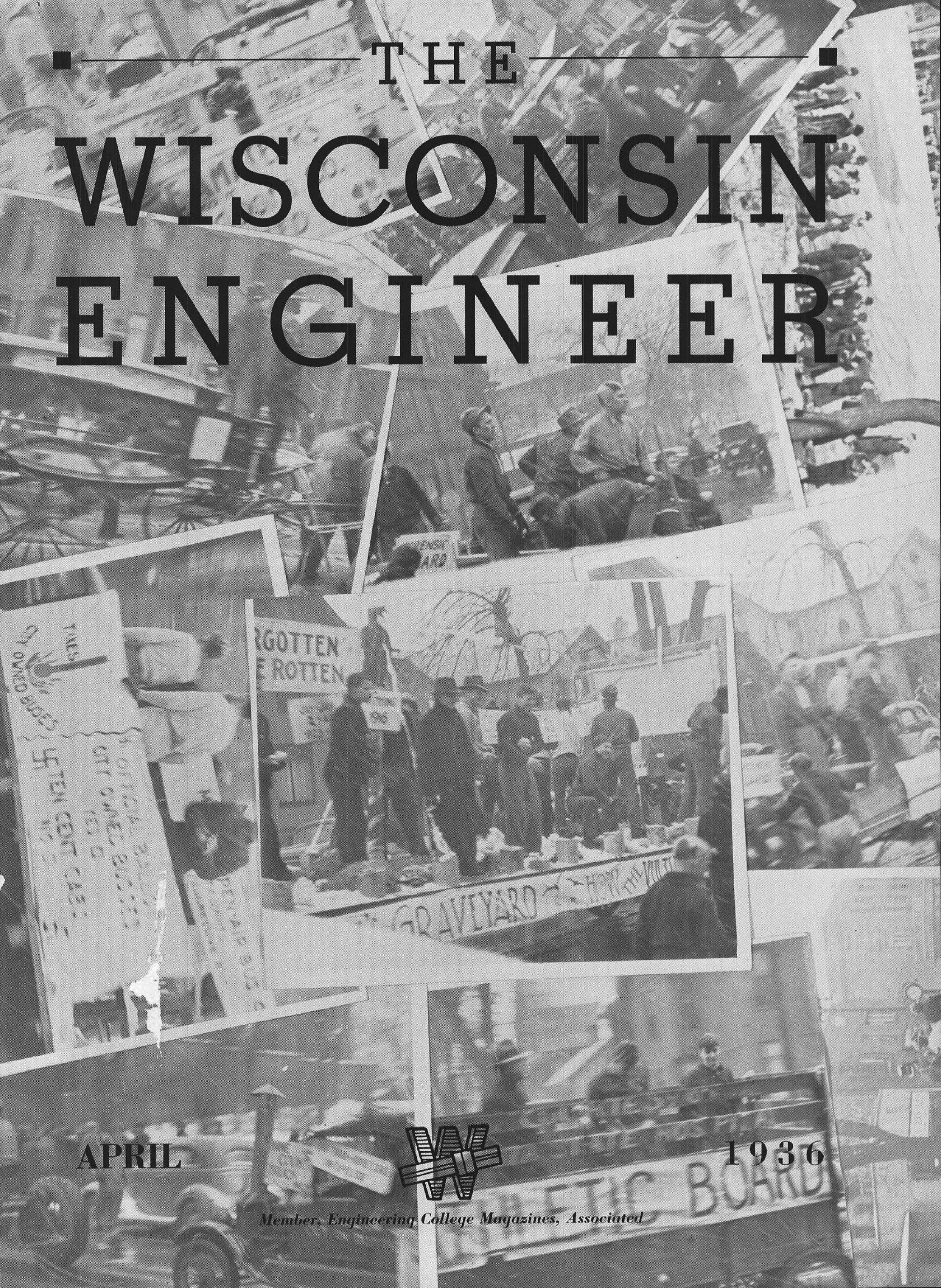
THE WISCONSIN ENGINEER



APRIL 1936

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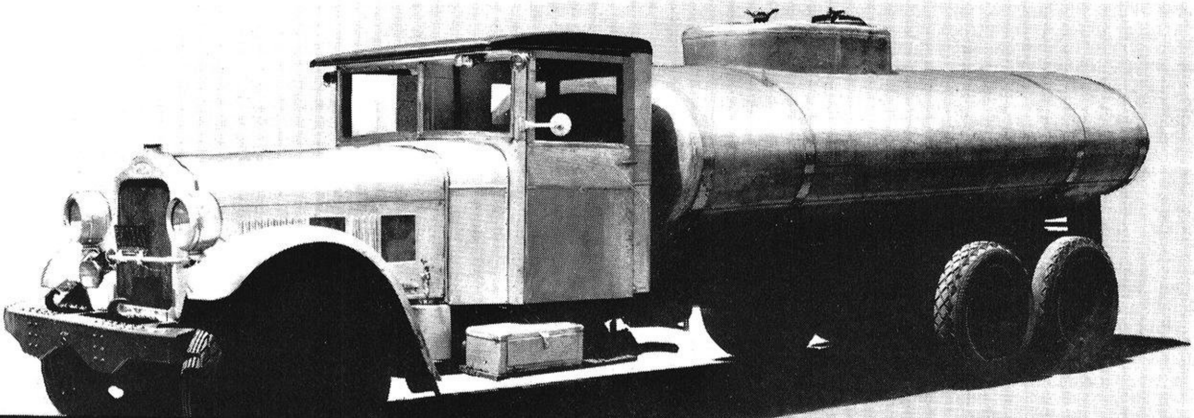

With the Contributors . . .

△ This issue of our magazine might well be called a student issue. Why?—well, read on.

△ Bob Hopkins, c'38, got all those nice pictures on the cover. Boy, that was some parade!

△ And the editor follows his editorials with an article about some of the interviews he's been through lately. Perhaps he can give you some pretty helpful tips.

△ What is dust? Let Walter Liedke, ch'39, tell you everything about it—you can start getting educated on page 125.

△ We're starting something different with this issue—a page for the Frosh. Hope you like it.

△ If you want to find out what is meant by a truly educated engineer, read the tiny biography of the late Magnus Swenson on the Alumni Notes page.

△ No doubt, being an engineer, you realize how wonderful electricity is. But Joe Rice, c'36, can give you some concrete facts. The address is page 132.

△ Are you a true fisherman? Leo Herning, ch'38, will win your friendship when he tells you what's been done to make Wisconsin rivers safe for fish and human beings as well. Turn to page 131.

△ Our humor editor did so well this month that we gave almost all of the last three pages to him.

△ Didn't we say this was a student issue?

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Leonard H. Church, *National Chairman*, 1510 Hanna Building, Cleveland, Ohio

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EDITORIALS

ON THE THRESHOLD

Too often, engineers, like other people, refuse to grow up. As their juvenile illusions vanish, they set up new ones, steadfastly ignoring the very real world into which they are supposedly preparing to enter. Unfortunately for all concerned, the fiction and the scenario writers have set up as their stock engineer, a big, lean, dynamic fellow who wears flannel shirts, boots, and whipcord with careless distinction—who has a delightfully vague (but, oh, so important) connection with a conveniently spectacular bridge or tunnel being whacked together in some remote and romantic corner of the globe. And, with visions of ourselves in similar situations, we fill out our salmon-colored cards each semester and coast along, quite confident that life **will** begin at graduation.

"The question of questions for mankind—the problem which underlies all others and is more deeply interesting than any other—is the ascertainment of the place which Man occupies in nature and of his relations to the Universe of things."

—Thomas Huxley

What a violent awakening we are in for! We are going to discover many vital facts that were wisely left out of our texts. We'll find, in ten thousand drafting rooms, graduate engineers, loaded with honor society keys, glad of the bread-and-butter money they can get as common draftsmen. We'll find the typical engineer to be a tired, toughened man, old beyond his years, wear- a shiny blue serge suit—he'll be up to his knees in mud, with a measuring tape; or else sweating over costs sheets in a tin construction shelter, sizzling under a summer sun. We will find that he is responsible for everything, credited for nothing; that he draws less money than does a good union brick-layer; that his job is less secure than that of a common street-sweeper; that his Civil Service exam rating counts far less than the cordial relations with any ward boss of the party that's "in."

And we will learn a great many other things not taught in school. We will learn to crawl before superintendents, learn how to pass on the buck that has been passed to us, how to humor the boss and all his favorites, how to pack a week's work into a day. We will learn how to lie, flatter, persuade, bribe, threaten, how to move heaven, earth, and purchasing departments in the pinches. That is, we'll learn it if we want to become successful engineers. If we can't, we'll take up clerking. It's a dirty, vile, bitter business, the work engineers do—as cruel and selfish as the methods their competing bosses always have and probably always will use. Engineers are overworked, under-paid, and tossed aside when the job is done, with less consideration than that given by the S.P.C.A. to aged horses. But it is a necessary work, a work that is the backbone of industrialism, the very blood of the civilization that we know.

All of us find this out eventually—most of us during that first tremendous year following graduation. There seems to be no remedy for it; our course is to brace ourselves for it, swallow our illusions, taste a bit of skepticism, and build up thick skins to meet a hostile world on its own terms. When a man discovers this, his education is half accomplished.

Honors

This is the month of honors. Men worthy of recognition have been placed on the rolls of every honor society from Tau Beta Pi down to Phi Eta Sigma. A number of our men have received fellowships. One was awarded a prize in national competition!

But, by far, the great majority of students have received no special indication of merit. No matter, though—for, honor student or not, few men are truly educated!

"That man has had 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, like a steam engine, 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 of 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."

Until you can fit this description to yourself, a million honor keys will be as nothing.

—*The Editor*

HURRAH FOR THE ENGINEERS

Indeed, one of the most successful St. Pat's parades in the school history marched through Madison Saturday afternoon, April 4. We can well be proud of that parade. For one thing, to have a band and 19 floats escorting St. Pat in the snow storm that raged that afternoon — to show such spirit is, in itself, a thing of which to boast.

The set of floats was the cleverest ever. And the shysters had no complaint, for there was no float against the Law School! The deans and the faculty, the students—everybody enjoyed the parade very much.

Again Polygon must be congratulated. This parade is another of their accomplishments. We thank them as well as the city merchants who contributed prizes. Votes of thanks also go to the Madison Police Force, and to the judges of the parade.

INTERVIEWED

by the EDITOR

D URING *the past two months, I, as well as many other senior engineers, have been interviewed by representatives from a host of concerns—such companies as Union Carbide and Carbon, Linde Air Products, New York General Chemical, Proctor and Gamble, American Aluminum, Leeds and Northrup, Goodyear Rubber, Socony-Vacuum, General Electric, et al. Because many students have inquired as to the nature of those interviews, I feel that a series of short descriptions of some of them would be not only interesting to you, but also very helpful.*

A word about the mechanics of the interviews. Notices are posted on the bulletin boards, informing students that representatives from some company will be in a certain room at some particular date. A time schedule is arranged by the office girl, and interested students can sign up for a convenient time.

The day, the hour, the moment arrives—and you stand ready to open the door and walk in!

(Fictitious names have been substituted for the companies and their representatives.)

"Come in, sir. How do you do—my name is Mr. Anslem." (Very nattily dressed, has a nice smile, a deep voice, drips confidence, and has all the personality in the world). "I am from the Skataway Corporation, of which you have undoubtedly heard a great deal. Name? Very pleased to meet you (handshake—warm and vigorous), Mr. Arokin. Won't you sit down?" (Whereupon he places me in the seat **behind** the desk—the one in which I expected him to sit during the interview—while he paces the floor or sits on the desk top!)

"Yessir, thank you."

"Now let me give you a bit of information about our organization, its products, its setup, the kind of work we have for you, etc., etc. (So on, for 10 minutes.) Just what interests you most, Mr. Arokin?"

"Steam power plant work, technical journalism, and internal combustion engines. But I'd be willing to try my hand at most anything, sir."

"That's fine. By the way, do you have any interests outside of engineering? Do you do something besides study all the time?"

"Yessir, I am in a number of outside activities, such as . . . ."

"Good! Too often I find capable men who are in the 'engineering rut.' Well, at present I do not see exactly what you could do for us, but would you like to speak with Mr. Great, our personnel manager, who will be in town next Thursday? You see, I do the preliminary interviewing, investigating, and arranging. Then I choose six or seven men to be seen by Mr. Great. It saves his time and yours. That will be all right?"

"Yessir."

"Fine. I will call you Wednesday morning at nine. Good luck to you (very sincerely), Mr. Arokin. Very glad to have made your acquaintance. Hope to see you soon. Goodbye."

"Thank you, sir—and I hope I see you soon, too. Goodbye."

(After a handshake more enthusiastic than the first, I leave him—he makes several notations on a pad, as I exit. Time of interview—20 minutes.)

Phone rings Wednesday, 9 a. m.

"Mr. Arokin? Mr. Anslem. Mr. Great will see you in room 204 Thursday at 9:30 a. m. All right? Fine. Goodbye, and lots of luck, Mr. Arokin."

"I am Mr. Great—this is Mr. Small." (Handshakes.)

"Very glad to know you."

"Our Mr. Anslem has spoken of you to me." (We all sit down. Mr. Great does all the talking—has a gruff voice. Mr. Small sits in silence—yesses Mr. Great occasionally. Both men are rather fleshy. Neither does any writing or note-taking—every so often, they look at each other seriously.) "What is your grade-point average, Mr. Arokin? Hmmmm—very good. Boy, that's a lot better than we did when we were in school, hey, Small? (Both laugh heartily.) Now understand this, Mr. Arokin; you are here to speak for yourself. All we'll ever know of you is what you can tell us in 10 minutes—we don't make it our practice to be looking up information about all our applicants—you've got to sell yourself to us. So go to it."

(After which I do my dead level best to be frank, yet not bragging—have you ever tried to do that? Before 10 minutes are half over, my memory goes blank—good gravy, did I ever do anything?)

"You have a very fine background and training, Mr. Arokin. You ought to go a long way in the business world. (Starts lighting a cigar.) I'm sorry that we cannot use you in any of our departments right now. Will you take one of our application blanks and fill it out, though? We'll keep you in mind. Thanks much for your time. Good day. Our wages?—We pay $110 a month at the start."

"Good day—and thank you." (We shake hands—and the interview is over in 15 minutes.)

"Come right in." (And before me is seated a small, gray-haired man, slumped in a chair behind a table. He smiles amiably—we shake hands and greet each other.)

"Sit down, Mr. Arokin?" (That, in a soft, pleasant voice.) "And now answer a few questions?" (He is taking my name, address, phone number, city, age, and course on a large pad already half full of very tiny writing. The writing is so small that I can't see how he himself will ever be able to read it. I notice that some of the names have a starlike pencil mark next to them. He leans back in the chair, slumps even farther down, squints his eyes—smiles.) "We pay you $110 a month. Now, Mr. Arokin, talk!"

(What in the world? Mannie-o-man! Gulp! —So I **talk**! I don't know about what, but I make the biggest effort of my life. Ten minutes later I am on my way out. Whew!)

"We'll see the four of you at once. This is Mr. Pole—I am Mr. Lodge." (Mr. Pole is a very well dressed, neat individual—he says very little during the course of the interview, but sits quietly and attentively. Lodge is a small, hardboiled fellow — square-jawed, and red-faced. He stands in one corner of the room, cigarette in hand, leaning against the wall. He's "been around.") "Mr. Pole will take your names. If you want, you fellows can sit down. Do you like Chinese people? I suppose I might as well tell you all about this game at the start. You're applying for a he-man's job. You will be working in the least civilized parts of South China, Sumatra, India, or South Africa, after taking a three months' course in New York City. Your whole life is to be devoted to this work —you'll be the only white man in the district—you'll have to learn the language and the ways of the people. We'll give you a salary of $250 a month. Every four years, you get a six months' leave with expenses and salary. Any questions? No, we make no contract. If you decide to quit, we'll pay your way back to the States—we'd never leave a man stranded in those parts of the world. Of course, you must remember there is no competitive system of business in those countries, so any experience gained there would be of no value to you in this country. Any more questions? Well, if you're interested, fill out one of our blanks—if not, please tell those fellows in the hall we're ready for them. Goodbye." (All over in less than 10 minutes.)

"Ah—early, eh? Fine. I'm so rushed with these interviews that I'm glad to have a chance to take my time during one of them now and then. My name's Green. How'-do."

"Mine's Arokin." (Handshake) "Hello. Golly, you must see a good many students. How many so far?"

"Lots of 'em—this is my 28th school this trip. And I'm trying to hire 20 men. Some job. Say, those glasses of yours are pretty strong, aren't they? Ummm, yes—guess I'll have to disappoint you, Mr. Arokin. Our state laws forbid us to employ men wearing glasses. I'm very sorry, but you see there's nothing I can do about it."

(Well, that interview was over in 5 minutes.)

(Upon entering I find two men, well dressed, smiling.) "And you are Mr. Arokin, I believe. I am Mr. Stone—my associate is Mr. Rock. Pleased to meetcha."

"How do you do." (Smiles and handshakes.)

"If you'll be seated, we'd like to tell you something of the corporation we represent. Our company has 50 subsidiaries, having grown from the small place you see in this picture to the large outfit you see there in the short time of . . ." (And so on—during which time I am informed of their locations, hazards, type of industry, products manufactured, laws, and the starting salary of $125 per month. All during this time, I am kept from saying anything. Mr. Stone engages my attention constantly, while Mr. Rock sits at one corner of the table, saying nothing, but watching me and taking down notes all the time. They have already visited 11 universities. They are looking for three men.) "Would you care to work in any particular locality? No? Well, with our concern, you can get yourself placed in any big city in the United States. What? No, we have no definite wage scale—we watch you closely and pay you higher wages as you advance in our company. We start you in the factory and you work up to our production department. How does that sound to you?"

"Very good, indeed. But, so far you've not asked me anything about my studies, activities, nor grades. How is that?"

"Ha ha." (Then, seriously.) "We can always get that information. At the present time we just want you to feel free and easy to talk with us. Are you much of a one for dating girls? What subjects interest you most? Had you ever heard about our concern or its products before? What do you think of the NRA? Of Roosevelt? Do you think the competitive system is a fair one? What gives you most pleasure in life?"

(On and on like this for 40 minutes. Both men finally arise and bid me goodbye, with hearty wishes for best luck.)

"And when will I know whether I am chosen or not?"

"If we've decided upon you, we'll send word within the next two weeks or so. Thank you much, and goodbye."

"Moly hackerel! They've had him in there over an hour! And there are five of us still to go. They'll never finish interviewing by 9 p. m.—it's past 6 now! Hot dog! —they're coming out!"

"Sorry to have kept you fellows waiting. Better have all of you in at one time." (After which follows introductions—we meet Mr. Hevy and Mr. Lite. We sit. Our names are put down on a sheet of paper by Mr. Hevy. He is a tall, well-set man. He does all the talking about their company. Mr. Lite is a small, bespectacled man. He thinks his parts—says little. Finally Mr. Hevy rises, offers us cigarettes, lights one for himself, and leans against the window sill, while he toys with the string on the window shade. He must be a psychologist, I think.)

"Can you do problems in mechanics, thermodynamics, calculus, electrical engineering, etc.? Good—now we'll all be talking the same language." (Singling out one of us.) "What kinds of pumps are there? What is the first law of thermodynamics? Why? What is the second law? Is there a third law? State Bernoulli's Theorem. What does

it mean? Are you sure? Give me an illustration. You're positive? Certain? Does anyone disagree? Well, now lookee here—how can you say that? You know better than that, don't you? Well, then why did you make such a statement before? Enough of that. Here, you, draw me the curves for a centrifugal pump. How would you go about rating a pump that had no name plate? What is power factor? Supposing we had zero head on a centrifugal pump, how great would be the discharge? Why? Did you ever study history? Would you be willing to work anywhere for your company? Why not? Even if you loved your work? How much work does high pressure air do when it leaks through a cracked valve? Prove it! You're positive? Everybody agree? That'll be all, gentlemen."

"What salary do you offer, and when will we know if we've been lucky or not?"

"We are starting our men out at $125 a month—that is, if they have only a Bachelor's Degree. If we've accepted you, we'll inform you in ten days. Goodnight and thank you."

"Goodnight. Whew!"

And so the seniors go on. One company even gave us an intelligence exam. Another wanted a man who could design a good looking streamlined washing machine. And one company would have us start work in their shipping yards at New York City for $80 a month!

But keep a stiff upper lip, boys. There'll be more interviews during the next several weeks. And, to you who will be interviewed next year, I hope the above account has eliminated a bit of the mystery of the interview, so you'll not be green as a new Irish Flag after a rain. Good luck!

Dust In Industry--
--Its Effects, Control, and Disposal

by WALTER LIEDKE, ch'39

Under the N.Y.A., the author was assigned this subject as a library study together with a report thereon. This paper is a summary of that report.

THE deleterious effect of dust upon workers was known by the ancient Greeks; the application of measures to mitigate or remove the evil is, however, an accomplishment of modern times. Poisoning, external irritation, and pneumoconiosis have been traced to dust absorbed through the skin or inhaled into lungs. Silicosis, the worst and most common form of pneumoconiosis, is due to inhalation of sharp silica dust, forming a fibrosis of the lungs.

Besides being humane in protecting the worker, numerous benefits are obtained by preventing and removing dust. It is a logical assumption that a healthy worker has greater efficiency than one who is diseased. A workman who becomes diseased may lose his job, which means a new man must be "broken in" at some loss to the manufacturer.

Dust which settles in the neighborhood of a plant often leads to litigation, as for example that of the fruit growers against the cement producers on the Pacific Coast. Dust which settles in the factory has a tendency to get into machinery and cause excessive wear. In many industries dust which has been recovered from the air is of some appreciable value. If much dust is suspended in the air, as in grain elevators, there is great danger of a destructive explosion.

What is dust? It may be defined as finely divided material which has been thrown into the atmosphere by such operations as grinding, crushing and polishing. Before a dust removing device is installed, everything concerning the dust and the local conditions must be known and very carefully studied. The size, shape, specific gravity, chemical behavior, temperature, concentration in air, method of generation, and total volume of the dust must be known and considered in the plans.

The concentration of the dust in air is an especially important and interesting phase in these determinations. There are various types of dust counters on the market, but the Greenburg-Smith Impinger has proved satisfactory in most cases. The dust and air are drawn into a glass tube and made to impinge at a high velocity on the flat bottom of a flask containing water. A unit volume of water is then put under a microscope, and the particles of dust are thus easily counted. By simple mathematics the number of dust particles per unit volume of air can be readily determined.

Medical supervision and the education of employees concerning dust is necessary for intelligent dust control. Effective dust control can be aided by common sense measures, such as sweeping floors with moist sawdust after working hours, substituting wet for dry processes, using harmless materials for deadly ones, and segregating dusty processes. Where the concentration of the dust in air is comparatively light, mechanical ventilation will remove much of the suspended material.

One of the best methods of controlling dust at its source is the localized exhaust system, chiefly used in grinding operations. The application of basic scientific principles governing air flow, frictional resistance, velocity pressure, and horsepower is necessary in building an exhaust system. The essential features of an exhaust system consist of a fan, a pipe main, branches of the pipe, and hoods. The fan must be sufficiently large to produce the required velocity and pressure. The velocity of the air in the pipe depends upon the weight of the dust, volume of the pipe lines, and frictional losses. The best type of fan for this purpose has been found to be the low-speed, low-powered type. For most dusts a velocity of from 2500 to 5000 feet per minute is sufficient. The pipe main at any point should have a cross-sectional area of 20 to 25 per cent in excess of the sum of the cross-sectional areas of the branches between the given point and the dead end. The pipe main decreases proportionately in diameter as it departs from the fan so that pressure or suction will be kept nearly constant throughout the system. All piping should be as short and direct as possible with no leaks, since leakage means a loss in power. The main and the branches are made of sheet metal—the gage depending upon the diameter of the pipe. Branch lines should enter the main from the top or sides and form an angle smaller than 45° with the main pipe so as not to oppose the flow. Blast or shut off gates should be conveniently located in each branch, so that by shutting off the branch to a machine not in operation power is saved. The entire system should be cleaned periodically to lessen friction. The hoods are made of heavy sheet metal so designed that particles flying off the machine will go directly into the throat of the hood.

To construct an exhaust system which will perform satisfactorily requires a high degree of engineering skill. Many other details must be worked out and accounted for. Dust which has settled upon the floor or walls of the factory may be removed by a periodical vacuum sweeping. Where it is impossible or impractical to use an exhaust system, workers must be required to wear masks or helmets. An ideal mask must: (1) filter all dust particles; (2) not be cumbersome or uncomfortable; (3) have a tight fit to the face of the wearer; and (4) have a low resistance to air flow so as not to impose an extra effort in breathing. Unfortunately no mask has yet been designed to perform ideally. A helmet fitting over the entire head with mechanically supplied air is used by sandblasters in the foundry.

Obviously the dust from the exhaust or vacuum system must be disposed of in some manner. To accomplish separation of dust from air, various types of dust collectors are available, the choice again depending upon the local conditions and upon the properties of the dust. The centrifugal separator finds its chief use in separating coarse dusts. The dust ladened air enters the cylindrical metal separator tangentially to the side of the cylinder. By centrifugal force the particles of dust are thrown against the sides and then drop to the bottom of the separator. This type of separator with its many variations is simple, compact, and rugged in construction. The initial cost is low, and it can be made to operate at an efficiency up to 80 per cent. The action of gravity upon dust particles is made use of in the settling chamber. The dust ladened air from the exhauster is conducted into a large chamber where the velocity of the dust and air is greatly reduced, allowing the dust to settle. This type of separator, however, is losing favor due to the large amount of space necessary, the low efficiency, and high initial cost. In many cases, cloth screens mounted on metal frames or sewed in the shape of bags may be used to filter the dust from the air. Periodically, the air flow is stopped and the filters are shaken or struck by mechanical means. This separator can be made to operate at an efficiency up to 98 per cent, the temperature of the dust ladened air must be noted to prevent the filter from burning. Spray devices have been used with some success to make dust separations. This separator has many variations; in each spray separator the basic operation is to bring down the dust by a fine spray or a thin curtain of water. The efficiency of this separator is high, and where water is cheap the maintenance cost is low.

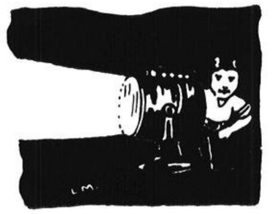
In the cement and sulphuric acid industries the Cottrell Electrical Precipitation Process has proved most useful to remove dust and fumes. The dust ladened air is passed between two electrodes oppositely charged. The dust particles are charged and migrate to the collecting electrode. The discharge electrode is usually a wire hung in the axis of a pipe; this electrode has a small cross sectional area to allow the charge to easily leave its surface. The collecting electrode is the pipe through which the wire discharge electrode is hung. The collector should present as large a surface as possible to catch all the oppositely charged dust particles. A direct current of high potential (15,000 to 75,000 volts) produces a corona discharge toward the negative or collecting electrode. The current is shut off, and a mechanical hammer strikes the collecting electrode and knocks the dust off. In most cases, there are about twenty of these discharge and collecting electrodes. The following advantages are claimed by this system: separation may go on at high temperatures (up to 1000°F.), a high degree of efficiency can be obtained, the maintenance cost is low, and construction in units allows continuous operation during breakdowns.

A combination of any of the above separators may be and often is effected under varying circumstances. A centrifugal separator to remove coarse dusts followed by a cloth screen filter to remove fine dusts is a popular combination. There also are many variations in the equipment itself to meet varying conditions. Experimenting with models often pays handsomely in final results.

What are desirable features of collecting and separating equipment? First, the dust concentration in air must be reduced to a safe level. The equipment should be simple and rugged in construction so that no special skill is necessary for upkeep and operation. Compactness and flexibility of equipment are very desirable features, and by flexibility is meant the ability to operate under varying conditions. Equipment in units permits continuous operation during breakdowns or cleanouts.

Dust removal in many states is compulsory, and specifications for exhaust systems are given by law. No industry can hope to be successful if it demands an undue strain upon the health of its workmen.

THE FROSH IN THE LIMELIGHT



Someone ought to take Herb Sanford in hand and tell him a few facts of life. The other day he was heard asking someone if Lathrop Hall was private "or something," because "I walked through there one day and the girls looked at me so queerly." And he is a member of the exclusive fraternity that has been organized by some of the freshmen! Incidentally, why couldn't the members tell the name of their fraternity to the chem instructor they accepted.

It would take an engineer to think up the one some fellows pulled in Math class the other day. The teacher picked up a piece of chalk and tried to write. Much to his surprise, it wouldn't make a mark. But then, who would expect a stick of wood painted white to write? One of you bright boys ought to try the trick on "Louie."

Ten and six-tenths per cent of the freshman engineers made Phi Eta Sigma this semester. That's over 30 per cent of the total membership of that fraternity. It's a record to be proud of.

Mary Anderson, the last girl surviving in our class, absolutely refuses to be quoted on anything. Can't you fellows bring in something about Mary? We are sure that dent in the fender of her car must have a story behind it.

And here is a little bit of advice for the freshmen by the City Engineer of Milwaukee:

March 9th, 1936.

TO THE FRESHMEN ENGINEERS:

In addressing this letter to the "Freshman Engineers" upon the occasion of the celebration of the Fortieth Anniversary of "The Wisconsin Engineer," I clearly recall the day I entered the University of Wisconsin nearly thirty years ago.

You are now, as first year men, entering upon what will be the most important four years of your engineering education and probably also the most enjoyable years of your life. The full realization of this fact, unfortunately, will not come to you until many years after graduation. You are now laying the foundation for your professional career —a foundation that must be laid well. To that end, make the most of every opportunity, and especially apply yourself to your early studies in engineering to such an extent that you may master them. In so doing, you are laying a better foundation and at the same time making the remaining years of your engineering education and career easier.

You will learn that the faculty of an engineering school has an unlimited amount of scientific material to place before a student body. It is ever a problem to determine what should be taught to bring about a well-rounded course in the four years you are attending the university. Subjects in pure science must be stressed and many subjects that might be taken are omitted because of the lack of time to present them. It is natural, therefore, that engineering students often fail to appreciate the importance of subjects not taught, or given a secondary place in the curriculum. Some of these I wish to bring to your attention because of the bearing they will have upon your work in the future.

Do you know that in a great many instances, business men, not technically educated, as well as engineers, have the province of choosing enginers for employment? Do you appreciate that in such instances these business men and engineers give weighty consideration to qualifications which are not purely engineering? Do you know that personality, appearance, judgment, ability to get along with and handle men are deemed important qualifications? Do you know that the ability to properly and clearly express yourself in speech and writings will have a decided bearing upon your success as a well-qualified engineer? Speaking frankly, it is my opinion that the fullest measure of professional reputation and success comes only to the engineer that possesses these qualities. Do everything in your power to cultivate them whatever your chosen specialty in engineering may be. Their value cannot possibly be overestimated.

Would that I could relate to you some of the problems and experiences that I have encountered during my professional career, and I may state that they have been interesting and at times difficult, but such a relation could not possibly apply to every individual. Such problems and experiences will naturally be encountered by some of you as engineers later, but you should not be greatly concerned at this time with the experiences and problems you may encounter in later life. If you have laid your foundation well, there is no question but that you will successfully meet any situation that arises.

Many analyses have been attempted in trying to establish the future of the professional engineer. Whatever may have been the result of these, I believe there will always be room in this world for the well-qualified engineer. Do not be satisfied with the feeling that you will be a good engineer, but strive with every effort to place yourself in the class of the better engineer and there will be no question about your future.

In closing allow me to wish you well and success in your chosen career.

—J. P. Schwada

Class of 1911.

ON THE CAMPUS

ROTC ENGINEER UNIT ESTABLISHED

As requested by the university, the War Department will establish an Engineer ROTC unit here beginning next fall. It was thought that the work offered by this unit would be more attractive to engineering students than that offered by the Infantry or Signal Corps courses.

Any physically able male student who is a citizen of the United States may enroll in the basic engineer course. However, only students who are pursuing a course leading to a degree from the College of Engineering are eligible to enroll in the advanced engineer course. For this reason, it is expected that practically all engineer cadets will be from the College of Engineering. While electrical engineers are eligible for the Engineer unit, it is expected that they will enroll in the Signal Corps because their work coincides more nearly with that branch.

The engineer courses for sophomores and juniors will be so arranged for the year 1936-37 that students who have completed one or two years of the basic course with other arms may transfer to the engineers without losing credits or foregoing completion of any of the subjects required for an officer's commission in the Engineer Reserve. Due to the wide divergence between the advanced course subjects of the Engineers and other branches, it will not be possible for students who have completed one year of the advanced course with another unit to transfer.

The engineer course will carry the same number of credits as the infantry and signal corps courses, and will have the same number of hours of work. It is anticipated that the unit may, by the school year 1937-38, reach a strength of 250.

One regular army engineer officer has been on duty at the university since February 20 to handle the details preliminary to the organization of the unit. Another engineer officer and an engineer non-commissioned officer are expected to be detailed to the unit next summer.

DRAWING CONTEST

The **Wisconsin Engineer** Drawing Contest, sponsored by Alpha Tau Sigma, national honorary engineering journalism fraternity, is in full swing. According to the latest reports it promises to have more entries than the other two contests sponsored by the **Engineer** put together.

The prizes will be:

First—One Kodak Bantam Camera, donated by Photocraft, 305 State Street.

Second—One Automatic Pencil, donated by Rider's Pen Shop, 605 State Street.

Third—$1.50 in trade at the Netherwood Printing Company, 519 State Street.

To those who are competing: Remember, your drawing must be into the Drawing Department by 3:30, April 29.

To those who have delayed entering: You still have time to complete your drawing if you start now . . . there is the whole spring vacation before the time the contest closes.

To everyone: Don't forget that one of the drawings submitted for the **Engineer** contest will be selected and entered in the National Drawing Competition sponsored by the drawing division of the Society for Promotion of Engineering Education with the possibility of receiving national recognition for the drawing.

A. I. E. E. COMMEMORATES ESTABLISHMENT OF ALTERNATING CURRENT

A joint meeting of the Madison section and the university student branch of the A. I. E. E. in commemoration of the 50th anniversary of the establishment of alternating current systems in America was held in the Old Madison room of the Memorial Union March 25. After dinner, the Alpha Chi Omega girls' quartette, winners in the recent "Wiskits," rendered a group of songs.

Robert Oetting acted as toastmaster, and Harry Wilson, e'36, presented a paper on the technical development of alternating current in this country as pioneered by George Westinghouse and Westinghouse engineers. Following this, Joseph Rice, e'36, read a paper on the social and economic aspects of the development of alternating current, and Theron Brown, e'23, distribution superintendent of the Madison Gas and Electric Company, gave a very interesting talk on the problems and troubles attendant with the growth of Madison's alternating current system.

After the regular meeting, the students remained to discuss the nomination of an electrical candidate for St. Pat, and the building of a float for the parade.

FINAL RESEARCH CONFERENCE

The last research conference of the present school year will be held Tuesday evening, May 5. Any one interested is cordially invited to attend. The program will include papers on "The Operation of an Experimental Converter," by Philip McCaffery; "The Drying of Granular Solids," by Norman H. Ceaglske; and "The Relation Between the Helix Angle and the Efficiency of Worm Gearing," by Thomas P. Colbert.

ENGINEERS JOIN PHI ETA SIGMA

Wednesday, April 15, 107 freshman men, including 36 engineers, will be initiated into Phi Eta Sigma, national freshman honorary fraternity.

To be eligible for Phi Eta Sigma, the student must make at least a 2.5 grade point average during the first semester or during the whole freshman year. Engineers hold a wide margin over other freshmen in the university in numbers eligible for Phi Eta Sigma. Last year, 10.4 per cent of the freshman engineers joined, while only 5.5 per cent of the rest of the freshmen in the university fulfilled the requirements. Again this year, 10.6 per cent of the freshman engineers were eligible as compared with 6.1 per cent of the rest of the freshmen.

At the initiation banquet, the principal speaker will be President Glenn Frank. The initiation arrangements and banquet plans are being taken care of by the present officers—who were elected last year, all of whom happen to be engineers —Henry K. Voigt, Carl P. Walter, Robert H. Berg and Richard J. Lohr.

Those engineers who will be initiated Wednesday are: Edmund H. Albrecht, George R. Amery, Fred F. Bartolowitz, Edward E. Bauer, Melvin N. Bondehagen, Leo E. Brodzeller, Thomas K. Christianson, Allan H. Eron, Karl E. Forsgren, Leo J. Fuchs, John M. Grindrod, Richard L. Hamacheck, John E. Heuser, Conrad H. Hoeppner, William E. Hood, John J. Huppler, Anniset A. Jankus, William J. Kommers, Harvey W. Kutchera, Walter A. Liedke, Richard W. Metter, Marshall P. Neipert, Raymond E. Novy, James G. O'Leary, Robert J. Parent, John S. Rezba, Robert C. Ring, Herbert B. Sanford, Roger E. Schuette, Glen A. Thompson, William L. Thorkelson, Arnold W. Voss, Stanley F. Wadell, Robert G. Webb, John W. Weseloh, and Hugh W. Wright.

ENGINEER MADE CADET COLONEL

Engineers received their portion of the appointments as cadet officers of the ROTC this year. Some of the engineers selected and their positions are:

Cadet Colonel: Preston W. Simms, e'37.

Cadet Lieutenant Colonel: Eldon C. Wagner, c'36.

Cadet Major: James J. Cadwell, m'36.

Cadet Captains: Chester C. Busch, c'37; Arthur B. Gurda, c'36; William M. Senske, c'36; Frank H. Stone, c'36; Ralph H. Vogel, c'36.

THREE WIN FELLOWSHIPS

The engineering faculty, on March 23, voted fellowships for the year 1936-37 to the following men: Alvin O. Lund, e'34, fellowship in electrical engineering; Joachim Liebmann, senior civil, fellowship in mechanics; John P. Thomas, senior mechanical, fellowship in mechanical engineering.

RECOGNITION FOR YOUNG ELECTRICAL ENGINEERS

The hononary electrical engineering society, Eta Kappa Nu, has just announced a plan of recognizing outstanding young electrical engineers for "meritorious service in the interests of their fellowmen." The achievements which will be considered in making the selections are very broad, giving considerable weight to the recommendations of the Committee on Professional Training of the Engineers' Council for Professional Development. Each candidate's career will be studied under three headings:

(a) Achievements in his chosen professional work.

(b) What he has done for his community, state or nation.

(c) How he has shown his cultural development.

As far as practicable the young engineers' accomplishments of whatever kind will be examined for an application of basic engineering methods.

Members of Eta Kappa Nu, sections of the American Institute of Electrical Engineers, and heads of electrical engineering departments of American colleges and universities are eligible to propose candidates for this distinction. Nominees must have been graduated from a regular four year course in electrical engineering not more than 10 years on April 1, nor be more than 35 years of age. The men selected in 1936 will head what is contemplated will become an envied list of Outstanding Young American Electrical Engineers.

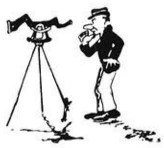
GOOD WORK, BUXTON

E. Brewster Buxton, senior mechanical, was awarded second prize in the seventh annual W. E. Boeing aeronautical scholarships contest. Competition in the contest was limited to undergraduates in regular attendance in a college, university or junior college in the United States or Canada; and each contest entry consisted of a technical or non-technical treatise on some subject connected with the field of aeronautics. Buxton wrote on "The Air Mass Method of Weather Prediction."

As his award, Buxton will receive the Boeing amateur pilot course plus his choice of the Boeing airline technician course, the Boeing operations course, or the Boeing airline mechanic course.

THESE ENGINEERS! . . . TSK! . . . TSK!

Alfred W. Johnson, freshman civil, has had an N.Y.A. job all winter over in the Extension building, protected from winter's icy blasts by a nice, warm office and with a bunch of pretty girls to keep him company.



Now that spring is here he has been bitten by the bug that brings about spring fever . . . and has requested a transfer to the surveying department so that he can get out in the wide open spaces with one of the N. Y. A. field parties.

ALUMNI NOTES

Chemicals

BAMBAS, LOUIS, '32, will obtain his Ph.D. this summer at Pittsburgh. He has been a research fellow in chemistry and bacteriology at the Institute of Pathology, West Pennsylvania Hospital, Pittsburgh.

BERRY, GRAFTON, '34, has a position with the International Printing Ink Corporation of Chicago.

FRITZ, NICK, '32, holds the position of a chemist with the Morton Salt Company of Manistee, Michigan.

HANSEN, RALPH, '32, writes that he is holding down a strenuous job in the Container Corporation's paper board mill and is very elated over the fact that he is on a self-supporting basis.

KEHL, GEORGE, '34, has been attending Lehigh University on a New Jersey Zinc Company fellowship. This fellowship is for two years, ending in an M.S. degree. At the present time he is doing research work on the fatigue of steel.

LEA, WILLIAM, '31, has been working for the Du Pont's Repauno Works at Gibbstown, New Jersey, as a chemist in the powder laboratory, although for several months he has done the graveyard shift as a night supervisor.

MAX, ABRAHAM, '34, is here at the University working as a research assistant. He is working under Dr. Watts on corrosion.

OSTRANDER, RONALD, '35, who is with the Proctor and Gamble Company of Ivorydale, Ohio, works in the textile research department. At present all his work is confined to work in the laboratory on applications of products to textile processes and research in the same line.

WATSON, JAMES, '32, is connected with the Wisconsin Wire Works as an engineer. His address is 542 N. Meade Street, Appleton, Wisconsin.

WOODS, WALTER, '34, is engaged in sales service laboratory work for the Formulator-Finishes Division of the E. I. Du Pont Company's Chicago plant.

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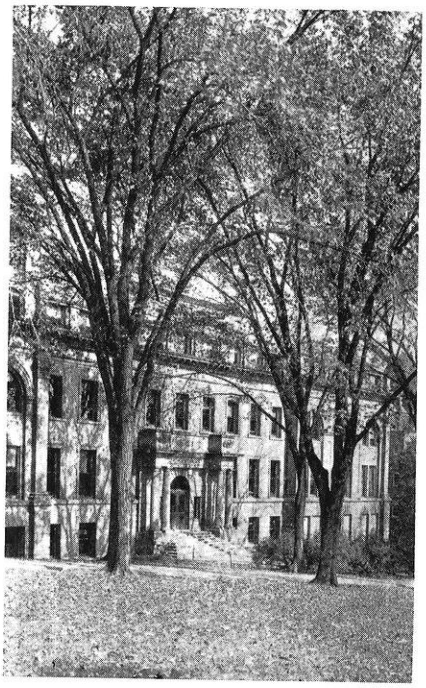
Miners and Metallurgists

BICKELHAUPT, W. V., '11, operates a contracting firm in Richmond, Virginia, under the name of W. V. Bickelhaupt, Inc. Mr. Bickelhaupt is a member of the first graduating class of the mining department, this department being established at the university in 1911.

HEYDA, CHARLES W., '33, has been completing his research work in metallurgy and geology at Stanford University.

YUNDT, E. R., '27, was recently promoted to assistant superintendent of blast furnaces five and ten of the Carnegie Illinois Steel Corporation of South Chicago. As a result **WECKMUELLER, GERALD J.,** '32, was also promoted. He now occupies the position of blast furnace practiceman for the same company.



Electricals

AUSTIN, ERIC W., '09, acts in a responsible engineering capacity with the New York Telephone Company.

ILKER, ELMER C., '31, serves in the capacity of an electrical engineer with the Chicago Transformer Company of Chicago.

LIVINGSTON, J. KING, E.E.'13, holds the position of vice-president of the American Express Company with offices at 65 Broadway, New York City.

LUECK, IRVING B., '28, is connected with the Bausch and Lomb Company of Rochester, New York, his position being with the scientific staff.

RUSCH, HUGO L., '23, acts as vice-president of the Northern Pump Company and is in charge of their New York office.

SPECHT, WILTON K., '33, has been working in the heat-treat department of the Case Tractor Works at Racine, Wisconsin.

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Mechanicals

BANKS, CHARLES T., '36, has accepted a position as an assistant engineer with Kimberly-Clark Company at Neenah, Wisconsin.

CLINE, JEROME F., '35, formerly with the Fairbanks Morse Company, is now employed as a junior engineer at the Jeffery Manufacturing Company of Columbus, Ohio.

McMAHON, WILLIAM RUSSELL, '35, corresponds that he is a junior engineer at the Modine Manufacturing Company of Racine, Wisconsin.

OTIS, CHARLES K., '33, who was formerly a camp superintendent in the Soil Conservation Service, is now teaching at the Kansas State College of Manhattan, Kansas.

PFANKU, HARLAN, '36, writes that he is employed as a design engineer at the Cleveland plant of the American Aluminum Company.

SICKERT, GENE D., '36, is engaged in engineering development and design in the manufacture of heating units at the Perfex Corporation of Milwaukee.

SMITH, RONALD R., '28, is now situated as a design engineer at the Beloit Iron Works.

TRASKELL, TONY R., '36, is employed by the Douglas Aircraft Company, Inc., of Santa Monica, California.

WILSON, RUSHEN A., '25, formerly with the Gisholt Machine Company, is now located at the Allis Chalmers Manufacturing Company, where he is an assistant engineer in the power plant maintenance department.

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Civils

FRAGANTE, VINCENTE, '08, heads the Philippine Engineering Record, a technical publication devoted to the advancement of engineering and allied professions, published by the P. S. C. E. At present he is also chief constructing engineer of the Bureau of Public Works.

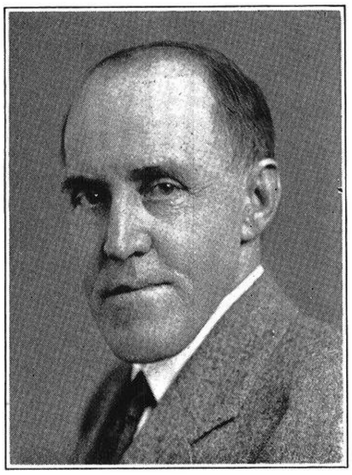
JAKISCH, JOHN R., '11, who is working on the Pine View Dam in Ogden Canyon, Utah, has been advanced to the rank of construction engineer.

JOHNSON, A. PAGE, '29, was appointed city engineer of Fond du Lac in May last.

LA CHAPPELE, MERLE P., '27, has

the position of district manager for the Armstrong Cork Company at Detroit.

LAURGAARD, OLAF, '03, for many years city engineer of Portland, Oregon,



and recently with the U. S. Reclamation Bureau at Denver, has been appointed general office engineer for the TVA at Knoxville. He will have charge of the organization of the Authority's engineering offices, technical personnel, and budgetary control on engineering projects.

LIDICKER, ROGER K., '33, is an instructor in civil engineering at Lewis Institute in Chicago.

McDONALD, WALTER E., '31, has been transferred to the Cleveland office of the U. S. Army Engineers.

McGRAW, VINCENT G., '20, is engineer with the Public Service Commission of West Virginia on the appraisal of power plants and structures. Since graduation he has spent most of his time at structural design and erection. His work has covered apartments, floating equipment, and coal tipples.

MILLER, PHILIP S., '33, who is working for the Rosoff Subway and Tunnel Construction Company of New York City, has been making an investigation of the effect on various structures of the vibrations caused by blasting.

MOEHLMAN, WILLIAM F., '22, is chief engineer for the Tennessee Metal Culvert Company at Knoxville, Tennessee.

MORITZ, ERNEST A., '04, acts as construction engineer for the Bureau of Reclamation at the Parker Dam in California.

NAGTEGAAL, GERRIT P., '33, is working for his father, who has the contract for building the sewage disposal plant at West Bend, Wis.

PAPE, VICTOR G., '35, is working on the preparation of a building code and zoning ordinance for Milwaukee County.

PELESKE, LEO W., '30, was appointed city engineer for Superior in May last.

PIVOVARNIK, JOHN L., '34, acts in the capacity of junior highway engineer with the Illinois Division of Highways and is located at Springfield, Ill.

SAUNDERS, HENRY J., '03, is with TVA at Knoxville as consultant on railroad relocation in the reservoir areas.

TRIER, ROBERT S., '25, is connected with the Department of Interior-Indian Service for whom he acts as road supervisor. In this capacity he supervises the building of roads and bridges. His address is Knight Hotel, Ashland, Wisconsin.

WEBB, ROBERT B., '25, has recently gone to work for the Charles Bruning Company of Chicago, a firm that specializes in inter-office communication and handles various engineering supplies. Bruning is also a Wisconsin graduate.

Three Badgers on TVA Board

Three Wisconsin graduates were recognized as authorities in the field of dam design when they were appointed to a Board of Consulting Engineers that met during the first week in April to review and discuss plans for the construction and design of twelve proposed dams for the Tennessee Valley Authority. Dr. John L. Savage, '03, is chief designing engineer for the U. S. Reclamation Bureau; Dr. Warren J. Mead, '06, was formerly professor of geology at Wisconsin and is now head of the department of geology at M. I. T.; L. F. Harza, '06, is a consulting engineer and has been advisor for TVA on a number of projects. He is president of the Harza Engineering Company of Chicago. There are three other members on the Board.

On April 13, a second board met to discuss and review hydraulic and flood control features of the proposed dams. Dr. D. W. Mead, formerly head of the department of hydraulics and sanitary engineering at Wisconsin, is one of the four members on this board.

Magnus Swenson Dies

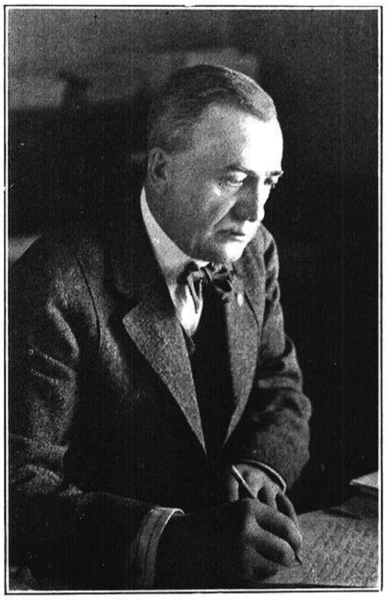
The death on March 30 of Magnus Swenson of Madison removed one of the oldest graduates of the college and one whose career was both colorful and useful. He was one of that superior rank of men who are endowed with energy and intelligence and an ambition to use them fully to the benefit of society.

He was born on April 12, 1854, in Larvick, Norway. In 1868 he came to America on a sailing vessel that took 12 weeks in crossing and lost 22 out of 60 passengers due to starvation and exhaustion. Alone and unable to speak English, he made his way to Wisconsin and found work in the shops of the Chicago and Northwestern Railway at Janesville. The experience of working on a steel bridge stimulated him to get a college education. He was graduated from the course in metallurgical engineering in 1880.

For three years following his graduation he was instructor in chemistry at the university. Then he won a prize of $2,500 for a paper on the chemistry of sugar and as a result became engaged in sugar manufacture in Texas. In 1889 he began to manufacture machinery and continued in that field for 11 years. In 1900 he returned to Madison which has been his home ever since. He financed and built the Kilbourn and Prairie du Sac power plants, organized the Norwegian American Line of which he was director and chairman of the advisory board, and served as director of the First National Bank.

His public services include membership on the board of university regents of which he was president and chairman of the executive board, chairmanship of the executive committee of the Capitol Commission which was in charge of the building of the present capitol, chairman of the Wisconsin council for national defense during the war and federal food administrator for Wisconsin. After the armistice, while he was in Europe as a member of the Hoover food relief commission, he was awarded a medal by the National Institute of Social Science for distinguished non-military service.

No brief statement can do more than hint at the activities that filled his eighty-two years of life with action and service and shed a reflected glory upon the college that trained him. He was one of Wisconsin's greats.



MAGNUS SWENSON

Electricity As A Factor In Social And Economic Advancement

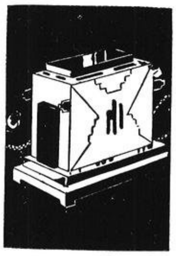
by **JOSEPH B. RICE, JR., e'36**

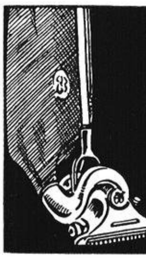
NATIONAL progress is ordinarily measured by the increase in population, wealth, production, and similar statistical data. The growth in population and greater material resources are not the only factors that affect human welfare. Other factors are also important. Of what, then, does true progress consist? It is an increase in both the material and spiritual welfare of the great majority of people. The average man today is advanced beyond the last generation because he obtains more necessities, comforts, and pleasures as the result of his day's work, and he lives in accordance with higher ethical standards, than did his father.

To achieve progress of this nature, the productivity of a given amount of human effort must be increased, thereby gaining more material things and more leisure to devote to intellectual and moral advancement. History proves this fact, for during the 2,300 years from 500 B.C. to 1800 A.D. little real progress was made. However, since 1800 A.D., true progress has been extremely rapid. This progress has been due mainly to the introduction of means for increasing the amount of power under the control of man, thereby permitting him to increase his production without a corresponding increase of his own labor.

Today, as economists point out, the wages and standards of living in the United States are the highest in the world largely because the workmen in this country use more power than those of other countries. The abundant supply of cheap electricity is primarily responsible for this greater use of power.

The contributions of electricity to humanity are spiritual as well as material and they cannot all be measured in dollars. It has been one of the most influential factors in advancing the standards of living and working. The great quantities of electrical energy available at low prices are bringing the luxuries,





comforts, and necessities created by modern science into the daily lives of people who never before had access to them. Approximately 95 per cent of the families in urban communities now enjoy these benefits.

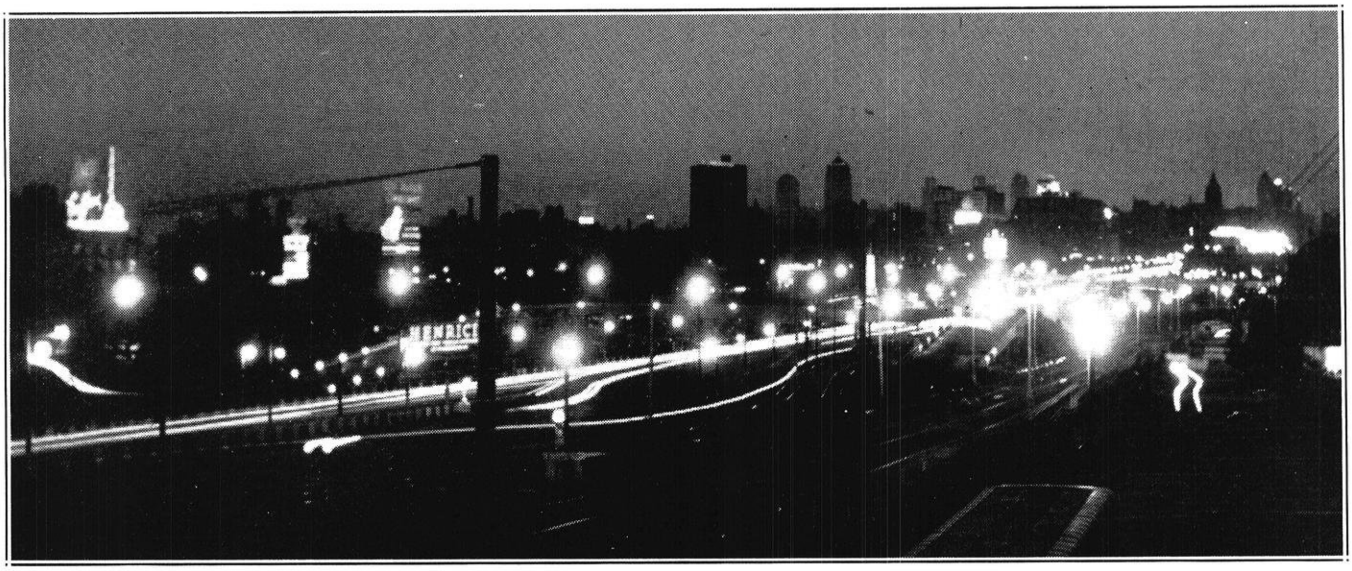
The industrial growth of the nation has been brought about very largely because of the cheap, abundant supply of electrical power. A generation or more ago our great industries were built in proximity to the coal mines, since coal was the principal source of power. Today, however, electricity has made it possible to secure cheap power at a great number of points far removed from the coal mines. The hydro-electric plants have been tied together with the steam plants, making a network of transmission lines to form a supply of power always ready for instantaneous use. The small independent industry profited very greatly from this source of cheap power, for now it has a much better chance to compete with the larger industries.

Electricity has also been a factor in reducing the concentration of population in the congested areas of large cities. During the past generation, there has been a marked tendency toward rapid increase in urban population. In 1930 this tendency reached a peak when people began to shift slowly from the city to the outlying districts. Relatively small factories were constructed outside the metropolitan areas to give employment to these workmen. Cheap electrical power has facilitated the establishment of these factories.

The working conditions are not the only conditions which have been improved by electricity. It has also added to the comfort and enjoyment of home life. The part of a housewife is no longer one of drudgery. This cheap power now does a great part of her work and gives her opportunity for recreation and culture. No longer is it necessary for her to spend many hours in a hot kitchen. Instead, she simply prepares her meats, vegetables, and other edibles at any convenient time, places them in the oven of an electric range, sets a time-controlled switch, and then forgets all about cooking until it is time for the meal.

She also uses electricity for sweeping, washing dishes, washing and ironing clothes, sewing and for other housework. Thus she has been released from much of her former toil.

But abundant electricity does more than give the housewife leisure and comfort—it also helps her pocketbook. In producing food, the farmer pays a great deal for labor. Electricity is an ideal form of cheap power which can do a very large part of his work for a few cents a day. His radio gives him warning of storms, frosts, and floods; and his family, benefiting even more from electric household devices than does the city family, is less likely to leave the farm. These things have gone a long way toward making



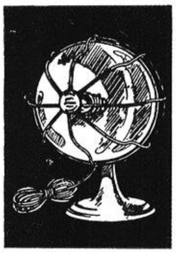
farming more profitable and more attractive, and toward producing cheaper food products. But the use of electricity on the farm has just begun.

In 1932, it was estimated that one million farms in this country were electrified. Seventy per cent of the energy used was supplied by electric utilities. Today the estimated total number of customers in rural districts served by utilities is two and one-half millions. While these figures are encouraging, it is apparent that our rural sections are lagging far behind the rest of the nation in electrical comforts and advantages. Almost one-third of the country's total population is without electric service, and most of these people live on farms.

According to the U. S. Department of Agriculture Bulletin No. 1348, the average cost to the farmer of the miscellaneous array of energy he uses from stationary gas-engines is about 19 cents per horsepower-hour. The bulletin further states that the central-station farm customer can buy a horsepower-hour in the form of electricity from the average small utility for 15 cents and from the larger utilities for 5 cents.

There is a growing appreciation, by the farmers, of these economies and advantages of electric service in farm work. The percentage of time and labor saved by electric milking alone runs from 55 per cent to 95 per cent. Farmers are only awaiting an economic recovery which will open up a market of almost $1,500,000,000 of additional electrical equipment, estimated to require energy of the order of 4,000,000,000 kilowatt-hours annually.

However, a too-rapid development in rural electrification would lead to economic conditions in which not only the farmer would suffer but many others as well. Thus far, the policy in the United States has been to expand rural service only when it was estimated that the farm customer would use sufficient energy to justify the expansion. If this policy is continued, the expansion of rural service will follow somewhat the course of other developments, thereby insuring a stable growth over a reasonable period of time.



Farm products are not the only things that have been made cheaper. Electricity has facilitated mass production, making it possible to produce manufactured goods at a lower cost. The modern automatic, electrically-operated machine enables a man to turn out many more articles in a given time than he could without such machinery. This greater output of a product per workman per day means lower cost. This lower cost enables the lower classes not only to buy the necessities of life but also the products which will add more to their comforts and pleasures.

At the 1929 industrial peak 42,931,000 horsepower were used by American industry. Of the total, 82 per cent was electrical. Utilities served 22,775,664 electrical horsepower, and industry produced for itself 12,376,376 electrical horsepower. Power sold by the utilities under these conditions was 44,326,000,000 kilowatt-hours, at an average wholesale rate of 1.4 cents per kilowatt-hour.

The immediate electrical power market in industry is found in the motorization of the remaining 18 per cent, replacement of obsolete equipment and adding to the rapidly expanding use of electric heat. For the total industrial market, based upon a 10 per cent expansion in two years, electrical equipment and wiring sales would amount to $199,600,000; the added energy use would be 4,755,000,000 kilowatt-hours; the added revenue would be $42,895,000.

No matter how cheaply and abundantly goods can be produced, they are useless unless they can be conveyed to those who want them. People, also, must be transported from place to place. At the present time there are 220,000 miles of railroads and 31,500 miles of street railways in this country. Only 5,200 miles of these railroads are now electrified, but traffic conditions already warrant electrification in many more localities.

Diesel-electric locomotive units have had wide acceptance for switching and

yard service and for high-speed passenger traffic. The trolley bus is coming to the front rapidly, and subway extensions are being made. The transportation market is an electrical market that offers great possibility for stimulating capital-goods industries. An example of recent electrification is the $68,000,000 expenditures of the Pennsylvania Railroad.

At present, transportation uses about 7,000,000,000 kilowatt-hours a year and has an investment of about $6,000,000,000. A study of the possibilities of electrification in the immediate future, based upon a 10 per cent expansion in two years, shows a market of $1,000,260,000 for electrical equipment and wiring; an added energy use of 6,500,000,000 kilowatt-hours; and an added revenue of $49,500,000,000 for energy. An expansion in the mileage of electrified railroads would involve very large supplemental expenditures on bridges, terminals and right-of-ways that would involve thousands of man-hours of labor as well as the production of heavy equipment in the capital-goods industries.

During 1935 all the public utility plants generated 93,575,000,000 kilowatt-hours as against a corresponding total of 85,970,000,000 in 1934. This is an increase of almost 9 per cent. The 2,000,000,000 kilowatt-hour output per week during the latter part of 1935 points to a much greater increase in energy use during 1936 and an appreciable increase in earnings.

For 1935 the energy sales totaled $1,923,500,000 as against $1,837,046,000 in 1934. This is a gain of about 1½ per cent.

The utility customers increased 2.1 per cent in number during 1935. At the end of the year the total number was 25,341,203, while at the end of 1934 they numbered 24,808,537. Of this total number now being served 21,204,354 are domestic and rural, 3,772,007 commercial, and 364,842 wholesale or industrial. The largest gain was made in rural customers, the number increasing from 743,954 in 1934 to 793,977 in 1935, a gain of 12.6 per cent.

Capital expenditures by public utilities amounted to $237,463,487 in 1935 and maintenance expenditures $92,886,745. Budget estimates for expenditures in 1936 are $371,557,774 for capital and $100,947,105 for maintenance. The necessity to add capacity and strengthen facilities to carry the largely increased loads and the large program for rural electrification makes this large contemplated increase necessary.

The domestic business for the electrical industry was very good in 1935 and is expected to increase in 1936. At the end of 1935 there were 20,987,563 domestic customers, representing a gain of 503,331 customers during the year. These customers used 13,993,000,000 kilowatt-hours of energy, as contrasted to 12,798,000,000 kilowatt-hours in 1934. In 1935 the revenue from these sales amounted to $709,200,000, while in 1934 the corresponding revenue was $677,697,000. This shows that while the energy increased near 10 per cent, the revenue increased less than 5 per cent.

The number of commercial customers (or main street businesses) was 3,772,007 at the end of 1935, a gain of 44,529 over 1934. The energy use increased from 13,151,000,000 kilowatt-hours in 1934 to 14,053,000,000 kilowatt-hours in 1935. The revenue from these sales increased from $511,682,000 to $536,600,000. The three major activities to cause an increase in this business were modernizing lighting, commercial electric cooking, and air conditioning.

Industrial business increased steadily for the last few months of 1935. The total industrial customers numbered 364,842 at the end of 1935 and they used 41,184,000,000 kilowatt-hours of energy as compared to 36,919,000,000 kilowatt-hours in 1934. The revenue from energy sales increased from $495,657,000 to $532,500,000.

In 1935 the total expenses of the light and power industry amounted to $1,400,000,000. Of this total, taxes amounted to $260,000,000. This was an increase of almost $14,000,000 over the year of 1934. In Wisconsin, alone, $7,000,000 was paid in taxes during 1934. During this year the electric industry in Wisconsin generated 1,888,000,000 kilowatt-hours, which brought $37,000,000 revenue.

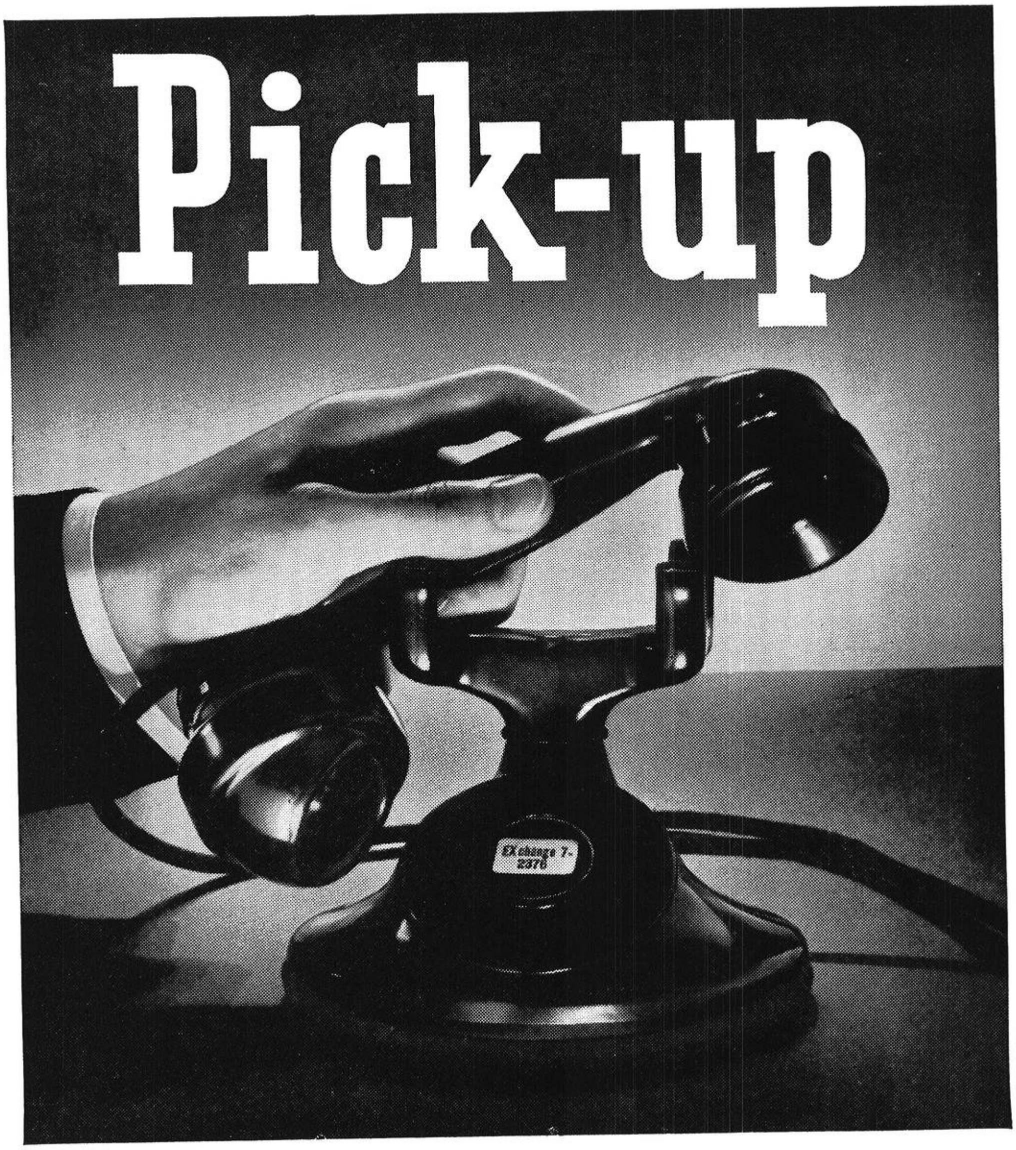
During the depression every statistical item relating to the electric power industry receded—with one exception, taxes. In 1935 the taxes paid by electric utilities were equal to four-fifths of the payments to employees. The taxes paid by private companies were 14.2 per cent of the total revenue.

In 1902 the taxes of private companies absorbed 3.44 cents of the dollar received from the customer. By 1917 the portion had almost doubled and in 1932 nearly redoubled. Today one dollar in every seven the customer pays for electric service is really a tax payment, with the company acting as a tax collector.

The average American family, by its conduct in retaining some commodities and dropping others, showed that the value of electric service was very high, for, throughout the period of depression, the consumption of electricity for domestic use increased, while the consumption of other commodities dropped off. During this same four year depression period, users of electricity had invested in electrical appliances the tremendous sum of $2,173,000,000.

In the United States, electric service has come to be regarded as one of the category of the telephone, the grocery store, and the gasoline station. It is a retail business dealing with 25,000,000 customers who must have service continuously and in unlimited amounts. The cost of this service averages 10 cents a day to the home owner, which is only 2 per cent of the family budget. Electric power cost to the manufacturer is an item that averages about 5 per cent of total manufacturing costs. The greater part of the power generated is power used by industry, whereas the major portion of the revenues comes from domestic services.

All these great advancements which have been brought about in the last 50 years sound like a Jules Verne novel. Billion dollar industries have been developed; electric lights have been invented; and the radio, most miracle-like of all, has been created. What will be developed in the next 50 years no human being knows.



...that leads to sales pick-up

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Stream Pollution In Wisconsin

by **LEO HERNING, ch'38**

A HUNDRED years ago—in the days of our great grandfathers—there was no such thing as stream pollution in Wisconsin. Many of our rivers that now carry the industrial wastes and sewage of cities and factories along their banks then were lined with virgin forests. Now rivers in which the Indians canoed, in which they could see the fish life silhouetted against the sands of the bottom, are dark and filthy. Fish float dead or gasping for air on the surfaces.

Wisconsin has 12,000 miles of navigable streams and rivers, not to mention the countless thousands of miles of lake shore line and small streams. In 1933, Wisconsin's tourist trade supplied the fourth largest state income. In the face of these facts, something had to be done to protect our natural resources. People will not come to see fish die in polluted rivers. Nor will they come to swim and canoe on filthy streams. Wisconsin is a riparian state, and each individual has a right to clean water from the stream past his property. But he has no right to defile it, so that it is not fit for use by his neighbor below him.

In compliance with the public demand for clean streams, the 1925 legislature made an appropriation of $10,000 annually to inaugurate a comprehensive program for abatement of stream pollution. Under the initial act of the legislature, the Conservation Commission and the State Board of Health were jointly charged with the development of a suitable program. But it became evident from the initial activities that other departments were involved, and the best results could be accomplished by coordination of effort through one administrative agency. Because of this, the State Committee on Water Pollution was established by an act of the 1927 legislature, the Bureau of Sanitary Engineering of the State Board of Health being made the administrative agency. General policies and procedures subsequent to 1927 have been established by this committee.

The first step taken was to ascertain facts concerning the degree of pollution of some of our major streams and to find ways and means for abatement of such pollution. Attention has been given to both municipal sewage and industrial wastes. While effective treatment processes were available for domestic sewage and some trade wastes, it has been necessary for the Bureau of Sanitary Engineering to conduct scientific studies to find out how some wastes could be utilized or disposed of in such a manner as to prevent serious pollution of our lakes and streams. Samples were collected and tests were made with the aid of the technical personnels of the paper mills along the rivers, the paper mills being one of the major industries concerned in the stream clean-up activities. Facts, made known by a study of pollution conditions along a number of the larger streams, have given a definite basis for the present clean-up activities.

During the past few years, through financial assistance extended by the federal government under various work relief programs, considerable impetus has been given to the work of the State Committee on Water Pollution. Grants and loans extended to various municipalities made it most advantageous to carry out necessary improvements along the water courses where previous conditions had shown that there was need for abatement of pollution. The Rock River Clean-up Program started in 1931. It called for at least primary treatment for all the sewage from the 33 sewered cities located along the stream and its tributaries above the state line at Beloit. It now is almost finished. The only remaining plant that is not completed under this schedule is one under construction at Jefferson. Beloit, while not yet provided with sewage treatment facilities, is conveying the sewage through interceptors to the state boundary line. There tentative arrangements have been made with South Beloit, Illinois, for the construction of a single plant to take care of the local problem.

Similar progress has been made in the Illinois-Fox River drainage area. Completion of the treatment plant at Burlington in May, 1935, was the last step in securing at least primary treatment for all municipal sewage discharging into this stream. Completion of the modern sewage treatment works, now under construction at West Bend, and the ultimate connection of the village of Barton to this system, will complete a similar program in the Milwaukee River drainage area. The sewage interception and treatment system being installed at Sheboygan and construction of an intercepting sewer to convey the sewage from Sheboygan Falls to the plant at Kohler, complete the work of at least securing tank treatment for all sewage being discharged into the Sheboygan River.

The Fox was another river which, surveys showed, was polluted by sewage and industrial wastes to the point where fish life was destroyed and the public health endangered. Experience elsewhere had shown that, where cities are grouped together, as they are from Neenah to Kaukauna, the establishment of a single sewer district was most efficient. Legislation was enacted in 1927 to permit the establishment of metropolitan sewerage districts. Numerous meetings were held with individual municipalities concerned and with the Fox River Valley of Wisconsin Municipalities Association. In keeping with the procedure recommended, the association retained a firm of consulting engineers—Pearse, Greely, and Hansen—to make an engineering survey and to report upon the sewage interception and treatment problem. This report, under the title "Joint Report on Sewage Disposal, Lower Fox River—

Neenah to Kaukauna, Wisconsin," was submitted in January, 1932. It recommended formation of a metropolitan district and advocated installation of three unit interception and treatment systems for the Neenah-Kaukauna area.

No immediate action was taken to establish a metropolitan sewerage district in the Neenah-Kaukauna area, but a district was created to take care of the Green Bay problem. The initial program undertaken at Green Bay was a stopping of pollution of the East River, a tributary entering the Fox River in Green Bay. It received about 45 per cent of the sewage dumped into the stream at Green Bay. The intercepting sewers and sewage treatment facilities for this initial project have been completed. The district is now proceeding with a PWA grant and loan to complete the program for intercepting all of the sewage being discharged directly into the Fox River at Green Bay.

While some effort was made to establish a metropolitan sewerage district in the Neenah-Kaukauna area, it was finally decided by the municipalities concerned that they would rather proceed independently. In the case of Neenah-Menasha, it became apparent that the most economical procedure would be for the cities to cooperate in building a single plant to take care of their problems. Suitable legislation to accomplish this purpose was enacted by the 1935 legislature.

Neenah, Menasha, Appleton, Little Chute, and Kaukauna are now proceeding with necessary improvements to clean up the Fox River. They have the aid of 45 per cent grants under the PWA program of the federal government. It is believed that all possible assistance has been extended so that treatment activities will be carried to completion without any unnecessary delay.

The industries involved have tried to reduce their wastes to a minimum. In some situations this has been accomplished to the economical advantage of the industry. In other cases it is necessary to dispose of the wastes from the plants by the most effective and practical method available. The primary objectives to be accomplished in the utilization of wastes and treatment of the sewage are (1) to remove solids responsible for odorous sludge deposits and other offensive conditions, (2) to prevent serious depletion of the oxygen content of the stream, and (3) to destroy disease germs or bacteria endangering water supplies, bathing or recreational areas, and otherwise affecting the public health.

Developments in the field of sanitary engineering during recent years have provided a number of satisfactory methods or processes and equipment for accomplishing these objectives. The modern chemical treatment systems proposed for the cities in the Neenah-Kaukauna area are flexible in operation and are considered to be best suited to meet local sewage disposal requirements for a considerable period in the future. It is thought that, when the contemplated improvements are carried out, the Fox River will be restored to a reasonably clean condition. Then the public interests involved will be properly safeguarded.

"STATIC"

by ENGIN EARS

● The following is an actual reply received from a student on the ChE. final at Michigan:

Q. At present a boiler plant is burning coal in stoker fired units. The coal costs $4 per ton, etc., etc. A salesman of powdered coal equipment guarantees complete combustion of this coal with 25 per cent excess air . . . Would you accept the salesman's proposition?

A. No, and that salesman would receive a pretty good speech!— Behold the glory that was Greece. Demosthenes and Euripides; Socrates and the hemlock. Alack! Gaze at the splendor of the Parthenon, the temple of Athena. Did they have powdered coal units? No!! All Greece cried out against powdered coal units. Now look to Rome and the splendors of the Caesars. What splendor, ah, what splendor—wine, women, and song. But no powdered coal units!! Look even to Nero, who fiddled while Rome burned. Was Rome burning powdered coal? Hell, no! If Rome had been burning powdered coal, can you imagine at what rate it would have been burning? Nero wouldn't have had time to fiddle! He wouldn't have wanted to fiddle! Indeed, a damning piece of evidence right there. As Rome burns, so burns the nation. And so Rome passes and we forget the Italians until Mussolini shows us that a black shirt on the chest is worth two powdered coal units in the bush.

And you still want to sell us powdered coal units? Young man, we have figured and connived, calculated and integrated, we have been down to the very depths of hell with your damned coal units. Do they burn powdered coal down there? Do they? No! You know and I know it. They don't and they never will because the system they use now is doing powerfully well, powerfully well, my son.

And with these parting words, my son, pick up your powdered coal unit and be off, and may God rest you merry gentlemen.—**The Michigan Technic.**

»» ««

Tired of the pseudo-witticism of Octy and the swooning puerility of the Cardinal poets, we Let Ourself Go and come out so:

THE ENGINEER BIRD

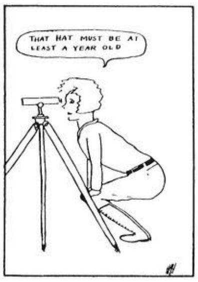
I would I were a chickadee;
No Mechanics, no E.E.
I'd flit about and preen and gab,
And laugh at guys in Hydro Lab.;
I'd sneer a bit, as chickadees do,
At Civils and the Mining crew;
I'd never toil on Steam and Gas,
Nor do my Calc. on way to class;

Instead I'd perch above the Law Shop door,
Terrorize the shysters, get them sore;
With fiendish glee I'd make 'em flee,
They'd dare not even look up at me—
(the last two lines were far the best
but the editor censored them, the pest.)

»» ««

THE VOICE OF EXPERIENCE
on
Home Remedies for Spring Fever

● Spring, beautiful Spring, is here again. (Ed. Note: this is being written during a snow storm.) Eric Miller has his East window open again, the chalk-throwers of North hall are limbering up cramped muscles, and the Civils have set up their guns on the terrace, pretending to sight industriously but stopping now and then to target on the blonde in green coming up State or some babe leaning against the base of Lincoln's (sitting) statue. Even the M. E. building seems closer these mornings, while shysters and other reptiles crawl out of their holes and look for big, flat rocks on which to bask in the warmth of the sun. This is the season when chilblains (whatever they are) give way to spring fever. This virulent disease is one of the many things that this university is a hot-bed of. Since all Frosh get it sooner or later, let us describe the symptoms.



It comes on at the first sign of warm weather, often just before a "one-thirty." It is accompanied by pallor, dullness of eye, inflammation of the imagination, and acute hardening of the conscience. The pulse becomes slow and in some extreme cases (noted among the Ch.E.'s), the victim falls into a state closely resembling slumber. Though a violently contagious disease, the Department of Student Health is quite unreasonable about issuing excuses for it. There is no anti-toxin known which can produce lasting immunity to it; each attack must be dealt with as it arises. However, there are many simple home remedies, varying in effectiveness, now in use on the campus.

The faculty, approached on the subject, confided that it put its faith in longer assignments, drier lectures, and more frequent quizzes, though one member held out for sulphur and molasses. Many campus celebrities recommend three beers and an aspirin, though the aspirin need be used only in extreme cases. For lawyers a good tonic, preferably a Mickey Finn, is suggested. Personally, we have always found that the sight of an unfinished E.E. report is an instantaneous if disagreeable cure. We always keep a stack of same on hand for just that reason, and have noticed that many others do the same. The majority opinion was, however, that the disease is not fully under control until the victim can spend an afternoon amongst the birds and the bees, letting Nature do the healing. Exercise of any kind is considered dangerous, especially that involved in writing quizzes. Always remember that if the affliction is left unchecked, serious complications may set in, even to the extent of making it necessary for the victim to leave school for a semester for his health.

»» ««

● As they say in the L. and S. school: Electricity is some stuff that flows in pipes called wires.

»» ««

THE ENGINEER'S WHISKEY TEST

● Connect 20,000 volts across a pint. If the current jumps it, the whiskey is poor.

If the current causes a precipitation of lye, tin, arsenic, iron slag, and alum, the whiskey is fair.

If the liquor chases the current back to the generator, you've got good whiskey.—**Pelican.**

»» ««

● Art Gervais, soph E.E., soaked up some potent stuff the other night (in case of snake bite, of course), but they were steel springs, not pink elephants, he saw all night. The phenomena bothered him no end till came the dawn and he found that he was stretched out under rather than on the bed. Original, these E.E.'s.

»» ««

● Eager Frosh: What makes a locomotive run?

Clever M.E.: Say, if you had hot coals in your pants, you'd run, too!

»» ««

● John (Romance on a Higher Plane) Van Vleet's Hell-on-wheels hasn't been seen in action lately. It is rumored that the Ford people felt it better business to take it out of circulation for good. His place is now filled by Burroughs, M.E. 3, the cab company's friend, with his muffler-less whatzit.

● We saw in an Eastern engineering magazine the other day a quote from, of all things, our "Octy." Of course, the undernourished intellects which guide Old Eight-Legs aren't above lifting ideas from us good rags, but even engineering magazines should draw the line somewhere. As everyone knows, the octopus is a creature not overly endowed with brain, but mostly appetite (and not too squeamish in that way, either), a sticky chap who sulks on the ocean floor and is of no particular value to anyone, though he has, no doubt, a most excellent opinion of himself.

»» ««

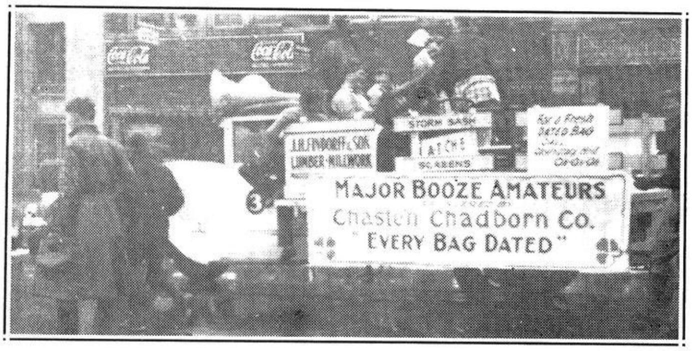
● The March issue cow is back, with a musical note this time. It seems friend cow swallowed a bottle of ink and . . . "Mood Indigo." (We think that's pretty lousy, too.)

»» ««

"—AND SUDDEN DEATH"

● More people killed! More blood in the gutters! It was stupendous, colossal! Through snow, sleet, and hen-fruit into the Valley of Death rode the loyal sons of St. Pat, into the valley and out again, a little the worse for wear but still victorious, all-conquering, masters of not only the wily shyster and his barbarous allies but even Ol' Man Winter himself.

Two hundred and fifty strong, the fighting Engineers move off— the band, St. Pat. (Koller's the name on his quiz papers), and royal carriage, knights on plugs, floats, more floats, the "hearse," the "Varsity Shell," "Coaches' Graveyard," "Fallon's Cocktail Hour," "Chaste'n Chad-



bourne," the "Dane County Truck," and, fighting a magnificent rear guard action, the noisy "Bell Tower" with its deadly fire hose. Up Langdon they go, hampered by a snow-ball barrage laid down by seemingly half the town, including the Veterans of Future Wars and the American Peace Alliance. Near the square, they meet the first eggs. Skirmishers deploy. The parade moves on, leaving shysters, hors de combat, in its wake. Sinister figures appear on State Street roof-tops; the hostile barnyard brigades begin their Rain of Terror. The parade slows judiciously while G-man Toellner and his flying squads of extermination experts go into action. Doors, windows, and excited owners give way before the avengers. The condensation of aged chicks from the atmosphere lets up, ceases, then begins from other vantage points. Crates of hen-fruit, smuggled in to the paraders, under the noses of their police escort, are opened and the defensive artillery opens up with telling effect. The hose units point their streams skyward with no effect except to send the crowds of watchers scurrying for shelter. So, matching egg for egg, bespattered but defiant, the Engineers move across the lower campus, set up their precious Blarney Stone, and conclude their reverent ceremonies with only minor interruptions, these being quelled via the water cure.

Thereupon Saint Patrick concludes his annual visit and his loyal sons return home to clean clothes, slip-sticks, and Monday's assignments, while the emerald flag floats triumphantly from the highest peak of the shyster stronghold, a symbol to the town and to all the world that St. Pat still presides over this fair campus, by might and by right!

»» ««

● Yeah verily, there hath been a griping and a wailing of readers over the aridness of this column. Ye are hereby reminded of the contribution box in the lower hall of this Engineering citadel, a box which doth seem to gather naught but dust. Methinks it would improve ye page and gladden the heavy heart of ye dear olde editor to find it oft filled full with campus dirt of another variety.

»» ««

● When Pat Hyland's Machine Design class walked in the other day, they were greeted by the blackboard notice: "Hyland's class will meet in 301." Since Mechanicals are pretty gullible, the boys proceeded to 301. In case one is not familiar with the M. E. building, 301 is the little room with the glazed window, bearing the word "Men" in plain black letters.

● Our illustrious editor received a letter (in French) last week from a Paris technical journal suggesting a mutual exchange. The staff has now instructed the business manager to cable a similar proposition to the editors of "La Vie Parisienne."

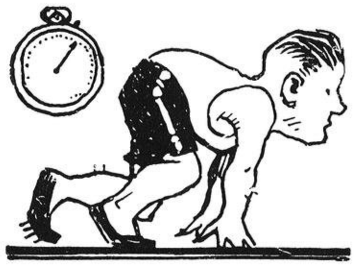
»» ««

● Professor Wahlin, the human conversion factor, illustrates the conversion of heat to mechanical energy to his silly sophs by reference to the consequences of his own appetite—transformation of "calories" to "jowls."

»» ««

● The Chemicals chalked up a new record when Phil Winter, Boston strong boy, called eight consecutive dolls for a Tripp hall dance date, the answer being no soap each time. Does the name "Winter" put the chill on, or is it that Back Bay accent? He finally went blind, proving at least that the Chemicals are perservering.

»» ««



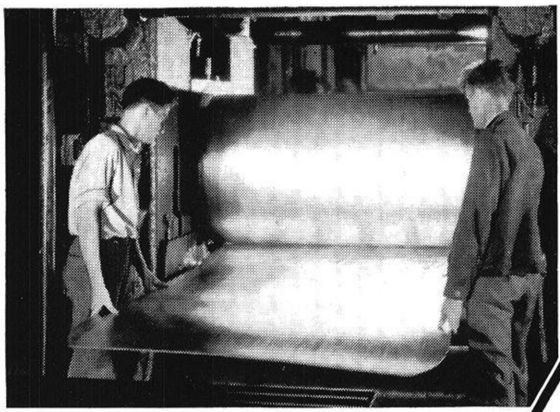
J. Reiley B e s t, m'39, the track star who took two firsts in the recent meet with the varsity, lives on Speed Avenue, in Louisville. What's in the name?

»» ««

● Have you ever heard about the time that Prof. L. C. Larson, while demonstrating artificial respiration, told his victim to cease breathing while he worked on him, then finished the demonstration and walked away without granting him permission to begin breathing again. Remembering it some time later, he ran back in some anxiety, only to find that our hero had resumed respiration on his own initiative, all of which goes to discredit the rumor that electricals are dumb.

»» ««

Almost two weeks have passed since the engineers planted their Green Flag over the shyster shack—and it still floats easily and gloriously there. Boy, what a complete victory! But then, an Engineer's Green is a lot better than a Chapple Red!

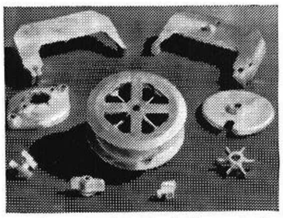


Dowmetal

A TRIUMPH OF CHEMISTRY

MORE than a century has passed since magnesium was first recognized as an oxide of metal and later produced as a metal.

It is also a matter of record that out of Germany came the first large scale production of magnesium alloys—a development of the World War.



A group of typical Dowmetal castings

But, should the history of this lightest of all structural alloys be written, The Dow Chemical Company of Midland, Michigan, would occupy a singular and honored place.

For, aside from being the sole producer of magnesium alloys in this country, it is to the everlasting credit of Dow chemists and technicians that this valuable metal is now produced at a price making it available to all industry.

Today, under the trade name of Dowmetal, Dow magnesium alloys are bringing the great benefits of lightness combined with toughness and strength to countless products.

Being a full third lighter than aluminum and only a quarter the weight of steel, it is obvious that the aircraft industry became its first big user. Engine crankcases, landing wheels and many other parts, large and small, are made of Dowmetal. The recent stratosphere explorations were made in Dowmetal gondolas.

Beginning there, the list broadens from machinery to household appliances—from truck bodies to camera parts, portable power tools, typewriters and a host of other applications.

In addition to producing a range of alloys, Dow offers a complete pre-fabrication service covering castings, forgings, sheets, plates and extruded shapes. In addition, an engineering and technical staff is available to cooperate with users in the practical and efficient application of Dowmetal to their products or equipment.

The commercial development of Dowmetal symbolizes and parallels the successful 45-year history of The Dow Chemical Company.

Manufacturing 250 separate and distinct products, The Dow Chemical Company has risen to a respected leadership through constructive and original research and the fundamental objective of applying chemistry as a means of making valuable materials cost less.

THE DOW CHEMICAL COMPANY, MIDLAND, MICHIGAN

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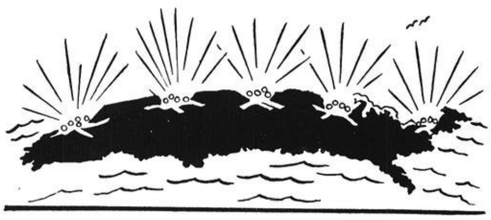
G-E *Campus News*



MORE BRIGHT SPOTS ON THE GLOBE

THE mellow, golden-orange glow of sodium lighting is springing up all across the continent. The latest installation, the largest in the United States, is located in the state of Washington. Here sixty-six 10,000-lumen General Electric units line almost three miles of the four-lane Pacific highway between Tacoma and Fort Lewis.

Less than three years ago the sodium lamp made its first American appearance on a highway near Schenectady. Today the largest installation is on the Pacific coast, and the second-largest is at Lynn, Mass., on the Atlantic. In between, highways, bridges, traffic circles, and underpasses are being lighted for safety with these new luminaires, and G-E sodium lighting units have been installed in Canada, Hawaii, India, Spain, South Africa, Dutch East Indies, and Brazil.

X-RAY FOR ART'S SAKE

IS there a portrait of Great Uncle Ezra gathering dust in the attic? It may pay to x-ray Uncle before handing him over to the junkman, for behind Ezra's imposing whiskers may be hiding the sister of the Mona Lisa.

Not long ago, a portable G-E X-Ray Corporation unit disclosed a valuable canvas by the seventeenth-century artist, Goya, concealed under an apparently worthless picture. More recently a New Orleans painter and art expert has used the x-ray to discover a genuine da Vinci signature beneath layers of paint applied by a later and less-capable artist. A sister painting to the newly found da Vinci recently sold for a quarter of a million dollars.

The x-ray does more than discover lost Old Masters; it tells how the great artists of the past worked. A series of radiographs can disclose the full story of their brushwork from the first rough sketch to t last correction and afterthought. The art student of today, by an intelligent use of the x-ray, is in a position to take lessons from the geniuses of the past.

NO CLICK!

THE life of the party, coming home with the milkman, need no longer fear the betraying click of the light switch if his house wiring includes the latest electric switch developed in the G-E Research Laboratory.

Two shallow chrome-steel cups, sealed together with a strip of glass, form the two contacts. A ceramic disk with a hole in it, and a few drops of mercury, partly fill the enclosure between the cups. The device is filled with hydrogen and sealed by welding. In the "off" position, the hole in the disk is above the mercury level. A rotation of twenty degrees to the "on" position permits the mercury to flow through the hole and make the electric connection.

The time-honored click of the switch is abolished. In the laboratory in Schenectady, one of these mercury switches has turned a 200-watt lamp on and off some 65 million times in the last two years, and there are no signs of wearing out or failure.

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GENERAL ELECTRIC