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The

WISCONSIN ENGINEER

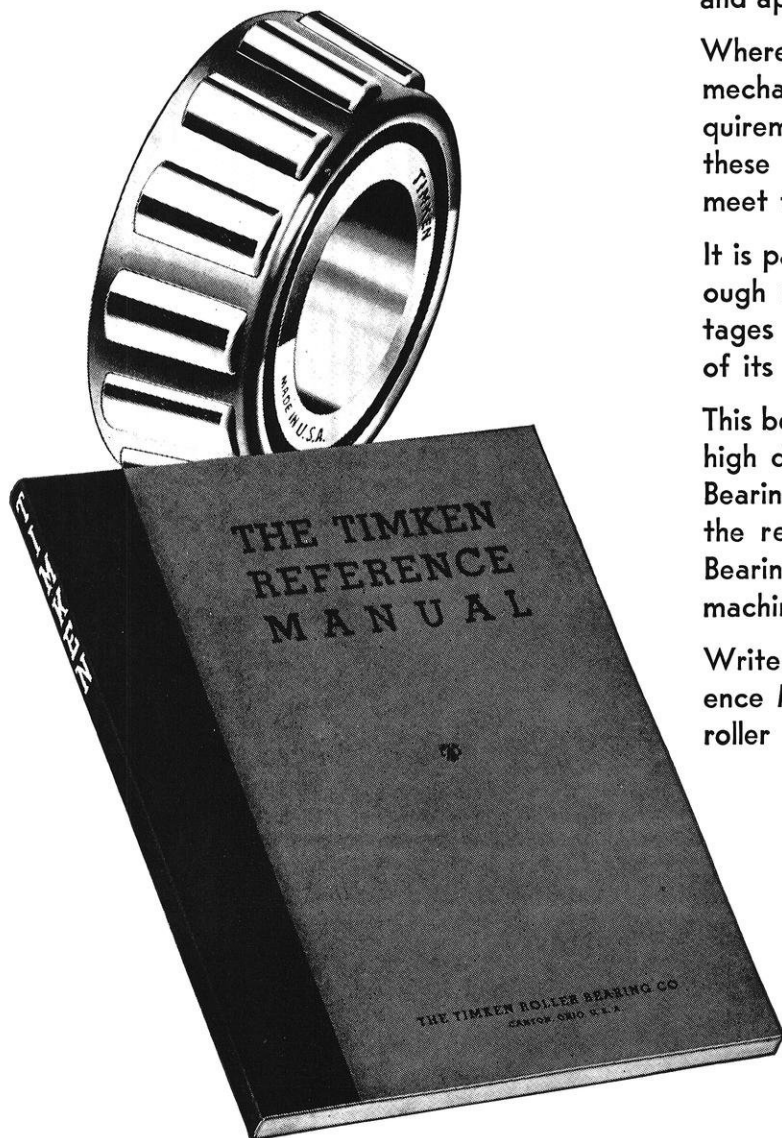


October, 1940

★ National Defense ★ Atom-Smashing ★ Activities

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The WISCONSIN ENGINEER

Founded 1896

Volume 45

OCTOBER, 1940

Number 1

MEMBER OF ENGINEERING COLLEGE MAGAZINES ASSOCIATED

PROF. H. C. RICHARDSON, *National Chairman*
UNIVERSITY OF MINNESOTA
Minneapolis, Minnesota

Arkansas Engineer	Marquette Engineer	Pennsylvania Triangle
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Cornell Engineer	Minnesota Techno-Log	Rose Technic
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Iowa Engineer	North Dakota State Engineer	Villanova Engineer
Iowa Transit	N. Y. U. Quadrangle	Washington State Engineer
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Kansas State Engineer	Oregon State Technical Record	Wisconsin Engineer

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In This Issue . . .

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A squadron of U. S. Navy scout bombers over the coast of California.

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On the Cover

No need to say it's an air view of the campus with our M. E. building in the foreground, but we must admit it's not as late as it might be. Close examination will reveal absence of new Union Wing, additions to Chem and Biochem buildings, Highway Lab (off Randall near Mining building), and, of course Lizzy Waters Hall. However, it does show the expanse of the campus (Engineers and Ags know about this), though the hills look dwarfed as all L. & S. students wish they were.



OFFICIAL U. S. NAVY PHOTOGRAPH

Cut Courtesy Vought-Sikorsky Aircraft

America's Wings

INDUSTRY and DEFENSE

A New Challenge to Our Economists and Engineers

WITH the vast "mobilization of industry" in the program of national defense, America once again calls upon its amazing productive capacity and the engineers behind it. To these engineers falls directly the enormous responsibility for designing and producing rapidly and efficiently the instruments of modern warfare. Creation of new industries, stimulation of old, and the appropriation of billions of dollars for defense—all will have significant effects upon our social and economic life.

The defense program virtually guarantees a higher level of activity in the heavy industries for many months, perhaps years. Certainly the program for equipping the army and building a two-ocean navy cannot stop short of 1942; and it is probable that it will take longer. Already we have some idea of the dollar magnitudes ahead. Congress has appropriated some \$5,000,000,000 for immediate expenditure and by the end of 1941 the ability of American manufacturers to turn out ships, airplanes, tanks, armored cars, cannons, guns, and shells ought to be well established. It is expected that the armament industry will do a yearly business of \$10,000,000,000 because of the necessity of replacing equipment which rapidly becomes obsolete.

To coordinate the tremendous effort of the National Defense program, a National Defense Advisory Commission, consisting of government officials and private individuals representing transportation, communications, finance, labor, industrial production, and consumers was formed.

Heads of two of the largest industrial organizations in the country were chosen for the two most important positions. Edward R. Stettinius, chairman of the U. S. Steel Co., is directing the flow of raw materials and William S. Knudsen, president of General Motors, has the difficult task of coordinating the manufacturing of all ordnance and airplane equipment.



The actual production of munitions, planes, weapons, and other military equipment rests in the hands of American industries. They have been criticized for demanding that the amortization period of new plants be reduced to five years and for asking for too high profits on their products. Big business has also been accused of trying to get America into the European and Asiatic wars.

These charges are answered in a recent talk given by

Philip D. Reed, chairman of the Board of Directors of General Electric Company and electrical engineering graduate of Wisconsin in 1921. Mr. Reed declared that "American industry neither profits by nor under any circumstances desires war" and that industry would be "well satisfied to complete the defense program with no other assurance than that it shall not emerge with a net loss on the materials produced or the investment in special plants and equipment required to do the job.



"American industry recognizes the need for defense rearmament," said Mr. Reed, "and is actively and wholeheartedly cooperating with the Army, the Navy, and the Advisory Defense Council, and will do the job, unparalleled in history, of turning out the enormous quantity of defense equipment and supplies needed to make this nation a factor in the restoration of world peace."

If inflation is to be prevented and American standards of living preserved, Mr. Reed said that industry must at the same time continue to produce useful goods.

"To find ways of continuing the production of useful goods without impairing the defense program is a most important goal," he said. "This may involve the use of a plastic, for example, in place of steel, an unskilled operator instead of a skilled one. But whatever the specific problems, they are well worth careful analysis and vigorous attack. For I am confident that an invaluable by-product of the defense program, and one that may play no small part of it, will be the technological advances it will surely yield."

Mr. Reed said that American industry has "no thought or intention of profiteering" in the rearmament program and that it from the first has favored adequate measures to prevent profiteering.

"When the arduous task of tooling up for these jobs is completed—and this in any case requires months, not days or weeks—the defense materials will stream from America's factories in quantities that will amaze the most optimistic observer. Thus may private enterprise creditably discharge its responsibility to the country and at the same time demonstrate to the American people that business is not the ogre that it has sometimes been painted and that free enterprise is among the most precious assets of the nation."

Low-Cost Equipment, High-Grade Results

Atom-Smashing at Wisconsin

by George Acree and Homer Schneider, e'42

THE Carnegie Institute of Terrestrial Magnetism a few years ago discovered an entirely new fundamental force of nature, and physicists the world over immediately sought to measure and define this new force. Important that discovery certainly was, for to the two fundamental forces of electricity and gravity was added a third, the intra-nuclear force.

We know that an atom is composed of a positive nucleus about which negative electrons revolve, held in their orbits by the attraction present between these oppositely charged particles of electricity. We also know that the nucleus, the mass of the atom, is composed of positive protons and neutral neutrons. But, what force holds the protons together? Should they not repel each other and fly apart, according to all previously known laws?

The discovery of a mutual attractive force between protons, which is stronger than the repelling force at very short distances, was the answer to these questions. It is this force which holds the world together, keeps materials in shape, and prevents their disintegration. Because of its apparent importance, and because no one completely understands exactly what goes on within a molecule or atom, a great deal of work is being done at present on nuclear physics. Through knowledge of intra-atomic forces, the physicist may delve deeper into that unravelled mystery which surrounds the atom.

During the last decade, especially, much progress has been made in the field of nuclear physics. Newspapers and magazines have given much prominence to atom-smashing, gargantuan generators and cyclotrons, transmutation of the elements, and Uranium 235 and the possibility of atomic power. The Physics Department of the University of Wisconsin has played an important role in these investigations, being one of the pioneers in proton bombardment using large voltages with high pressure air as a dielectric. In this field millions of volts must be generated to accelerate the proton bullets to the high velocity needed for splitting or shattering their atomic targets. The

generation and maintenance of high potentials was the physicists' first problem.

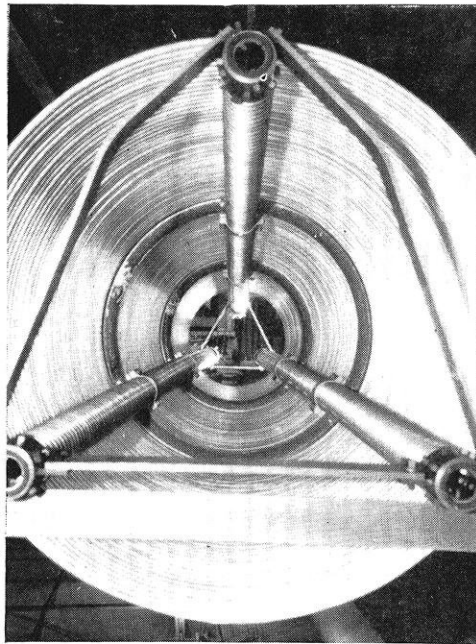
Van de Graaff in 1931 perfected an electrostatic generator, in which a charge was sprayed upon a traveling belt and, in turn, collected and stored on a metal dome. A 750,000 volt generator of this type was displayed by Kappa Eta Kappa in the Engineering Exposition last spring.

Using this principle, Dr. R. G. Herb and his associates at the University Physics Department constructed their first electrostatic generator in 1933. The apparatus consisted of a small Van de Graaff generator mounted in a 3-foot tank.

The potential from the generator was to accelerate protons, which bombarded a target at the end of the tank. By operating with greater-than-atmospheric pressures voltages of 500,000 volts were obtained. This generator demonstrated the advantages of using high pressure air for insulation, so Dr. Herb, Dr. D. W. Kerst, and Dr. D. B. Parkinson made plans for a larger generator with the idea of obtaining higher voltages and velocities.

The second generator, the immediate predecessor of the latest one, was mounted in a tank twenty feet long. Since these experiments were carried on in the basement of Sterling Hall the diameter of the tank was carefully calculated at five feet, six inches, the windows of the

high voltage laboratory being five feet, six and one-half inches wide. Hydrogen protons were shot through a specially designed accelerating tube along which a potential drop of two and a half million volts was maintained, the first time that such a high potential had ever been successfully used in this type of work. With this generator much work was done on the intra-atomic forces, and it was found that there was a strong attracting force between protons when they become as close as 10^{-13} inches to each other, although at any greater distance there was a strong repulsive force due to their like charges. It is evident that the newly discovered force must be very powerful and of a non-electrical and non-gravitational nature, and that the new force depends only upon the mass of the protons.



Looking into the generator with the accelerating tube removed. Visible are the aluminum hoops and Textolite tubes.

Other experiments included studies of gamma ray excitation on various elements. Altogether this generator was used for three years, but the need was felt for a larger generator, so a new one was designed, using the same tank.

This generator is the one pictured on these pages. As can be seen from the accompanying diagram, it consists of a Van de Graaff generator and an accelerating tube equipped with an ion source and magnetic analyzer. On rollers revolving at a rate of 3,000 r.p.m., the 16 inch woven cotton belt conveys the electrostatic charges back into the tank, where the charges accumulate to create the enormous potential of the inner dome. The potential decreases in a uniform gradient towards the target at the end of the accelerating tube in the center. The ion source at the beginning of the accelerating tube shoots hydrogen protons into the tube, where they are steadily accelerated towards the target by the uniform potential gradient. The high positive potential at the entrance of the tube creates a large repulsive force on the protons, which are therefore accelerated towards the low potential end of the tube where the repulsive force is zero. At the end of the tube, when the protons, traveling with a velocity of 20,000 miles per second, strike the target they penetrate its atoms to split or shatter them. These effects are studied to determine the intra-atomic forces and other mysteries of the atom. Further investigation of the forces between the components of the atom's nucleus is one of the objects of the research of Dr. Herb and his associates at the University of Wisconsin, as well as of scores of research staffs throughout the world.

The construction of the generator presented an intriguing engineering problem. Though generously financed by the Wisconsin Alumni Research Foundation, Dr. Herb, by careful planning, built the generator for only \$3,000. True, it is not as spectacular nor photogenic a piece of apparatus as many of the gilded mammoths of other institutions, but in effectiveness Wisconsin's generator is an outstanding example of careful engineering and practical compactness.

The entire apparatus is mounted within a $5\frac{1}{2} \times 20$ foot steel tank in which an air pressure of 100 pounds per square inch can be maintained. The increased pressure, plus the addition of freon (CCl_2F_2), increases the dielectric strength of the air by a factor of 4. However, in the accelerating tube a vacuum is maintained to provide a better path for the proton stream. The tube itself consists of a series of 62 corrugated porcelain cylinders interspersed with metal rings which focus and guide the proton beam. (See illustration)

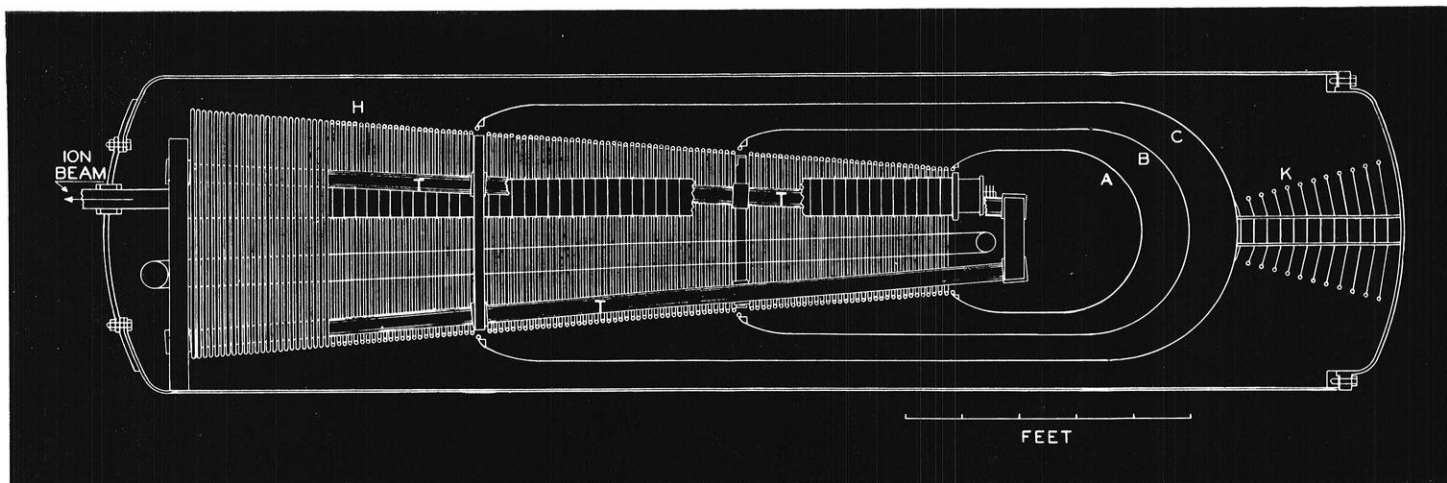
The charge of the generator is distributed along a series of 126 large aluminum hoops which surround the accelerating tube and are uniformly spaced and supported on three Textolite tubes. These tubes are $3\frac{3}{4}$ inch outside diameter, $\frac{3}{4}$ inch thick, have a tensile strength of 10,000 pounds per square inch, and support the entire mechanism within the tank. A needle point gap system is provided for the distribution of potential along the hoops. So strong is the supporting system of Textolite tubes that the noteworthy mass Physicist H. B. Wahlin applied to the end of the supports caused but a 0.375 inch displacement. This great strength is necessary to withstand the electrostatic forces caused by the tremendous voltage.

A special innovation is the triplicate shell in which the electrostatic charges accumulate to create the high potential. The innermost shell, at the end of the charge-carrying belt, carries the highest potential; the middle shell, connected one-third of the distance down the hoop system, carries two-thirds as high a potential; and the outer shell, connected two-thirds of the distance down the hoop system, carries but one-third as high a potential. The purpose of the concentric shell is to provide a graduated decrease in potential to prevent undesirable flashovers to the wall of the tank. An insulator is mounted at the end of the tank to help support the outer shell.

A few tests have been made on the new generator, using a potential of four million, eight hundred thousand volts. This is the highest usable potential in the world at present, and is made possible largely through the use of high pressure air as the dielectric rather than through large-scale equipment. With such resources Wisconsin may well proceed in the "blitzkrieg on the atom."

CROSS SECTION OF GENERATOR

A, B, C, high voltage domes; T, Textolite supporting tubes; H, potential distributing hoops; K, supporting insulator.





Know the why and wherefore of your extra-curricular engineering activities? For a guide to fun and fame—if not fortune—read below what goes on . . .

OUTSIDE THE CLASSROOM

SUBJECTS of great importance to be discussed by all University students, engineering or otherwise, at the beginning of the school year, are the nature and value of the many extra-curricular activities existing on the campus.

The primary aim of every engineering student should be, of course, to obtain a sound technical education because such training is needed by engineers regardless of the type of engineering work in which they become engaged. But to provide more than professional training, the schools, often in conjunction with groups actively engaged in the engineering profession, have seen fit to sponsor many extra-curricular activities which offer a very free and unrestricted opportunity for the development of the non-technical background so necessary for successful professional life.

Campus activities are usually the best means for an engineering student to branch out, contact life, meet people, and develop his personality. Despite the fact that his profession is necessarily technical, the engineer, when he is working on a job, uses many things besides his formulas. He has to utilize his initiative, his individuality, his knowledge and appreciation of music, books, and art, his grasp of people and the human equation, his understanding of world events. He must develop a philosophy, a way of life and, above all, he must adjust himself to a compatible relationship with his fellow men. In all of these things, his existence as an engineer is overshadowed by his being as an individual.

Thus it is not a question of the absolute value of outside activities, but rather a question of the relative values of various activities to the individual student. Each student must decide for himself how much time he can profitably devote to such activities, and since it is obviously impossible to engage in all of them, he must decide carefully which ones will be of most value to him. To present to engineering students a complete picture of the extra-curricular activities at Wisconsin, the Wisconsin Engineer has com-

plied the following information concerning engineering organizations and other campus groups in which engineers take an active part. The classifications given are not rigorous, but have been used mainly for the sake of clarity and convenience. In addition to general discussion, two charts have been included—one to give ideas as to some of the values to be found in engineering activities, the other to present in compact form specific information about each organization. For further information about a particular group contact the chairman or faculty adviser as given in the table on the opposite page.

STUDENT SOCIETIES

There are six large national engineering societies whose purpose is to advance the theory and practice of their particular branches of engineering and of the allied arts and sciences. These societies have established student branches in nearly all of the leading engineering schools in the country. Students should become members of their student branches, not only for immediate advantages, but also because employers are apt to consider membership and interest in such societies as important factors in qualifying for jobs. The programs of the societies consist largely of talks by professional engineers, faculty mem-

ACTIVITIES	SOME POSSIBLE BENEFITS TO BE GAINED									
	ORAL EXPRESSION	PERSONALITY DEVELOPMENT	PROFESSIONAL KNOWLEDGE	WRITING AND EDITORIAL ABILITY	BUSINESS EXPERIENCE	MEETING PROFESSIONAL MEN	ADMINISTRATIVE EXPERIENCE	LEADERSHIP	SPECIAL RECOGNITION OF ABILITY	FUN—ENJOYMENT
STUDENT SOCIETIES	X	X	X			X	X	X		X
HONORARY FRATERNITIES	X	X	X			X	X	X	X	X
WISCONSIN ENGINEER			X	X	X	X	X	X		X
TRIANGLE		X								X
KAPPA ETA KAPPA		X	X			X				X
POLYGON BOARD	X	X			X			X		X
ENGINEERING EXPOSITION	X	X			X	X	X	X		X
SMOKERS AND DANCES	X	X	?		?	X	?	?	?	XX

TYPE OF ORGANIZATION	ORGANIZATION	ENGR. GROUP	ESTAB.		CHAIRMAN Name	FACULTY ADVISER	INIT. FEE	Local DUES		MEMBERSHIP
			Nat'l	Local						
Student Societies	A.I.C.E.	Chemical	1901	1923	John Eckstein	ChE 4 Kowalke			\$1	Local—Attendance of Meetings
	A.I.E.E.	Electrical	1884	1919	Bob Thomasgard	EE 4 Benedict		\$3		
	A.I.M.E.	Min. & Met.	1871	1916	Bill Goodier	Min 4 Shorey		\$2		
	A.S.C.E.	Civil	1852	1907	Glenn Finner	CE 4 Lenz			\$1	
	A.S.M.E.	Mechanical	1880	1909	Roger Wright	ME 4 Hanson		\$3		
	S.A.E.	All	1904	1938	Dan Lamb	ME 4 Schneider		\$3		
Honorary Fraternities	Tau Beta Pi	All	1885	1898	Paul Fluck	CE 4	\$25			Election on fulfillment of certain requirements
	Chi Epsilon	Civil	1922	1925	Fred Werren	CE 4 Cottingham	\$20			
	Eta Kappa Nu	Electrical	1904	1910	Dan Miller	EE 4 Watson	\$25			
	Pi Tau Sigma	Mechanical	1915	1915	Tony Choren	ME 4 G. L. Larson	\$20			
	Alpha Tau Sigma	All	1928	1928	Phil Desch	EE 4 Van Hagan	\$5			
Publication	Wisconsin Engineer	All		1896	Bennett-O'Neill	EE 4 Kommers				Open to engr.
Executive Council	Polygon Board	All		1923	Ray Erickson	ChE 4 Wendt				Elec. by societies
	Engineering Expo	All		1940	Ray Erickson	ChE 4				Interest
Social Fraternities	Triangle	All	1907	1913	Charles Borchert	ChE 4	\$25	\$4 yr	\$4 mo	Elections
Prof. Fraternity	Kappa Eta Kappa	Electrical	1927	1927	Lee Day	EE 4 L. C. Larson	\$10	\$2 yr	\$2 mo	Elections

bers, and students, motion pictures, inspection trips, and social events.

2 HONORARY FRATERNITIES

The primary aim of these societies, which are chapters of national organizations, is to recognize through membership outstanding scholastic and special abilities of students and offer them social and professional programs during the year. Membership in these groups is through election after fulfillment of certain requirements and is an honor—something real and worthwhile towards which to work.

3 OTHER ENGINEERING ACTIVITIES

Polygon Board is the central committee in charge of certain special activities of the engineers, such as smokers, dances, and the Engineering Exposition. Its members, who represent each branch of engineering, are elected by the members of the student societies.

The **Wisconsin Engineer** is the official student publication of the College of Engineering, and its purpose is to furnish students, faculty, and alumni with news of the campus and other appropriate material. The **Engineer** offers students excellent opportunities to develop and make use of literary and editorial interests, as well as experience in business and advertising problems. Indirectly associated with the **Engineer** is Alpha Tau Sigma, national honorary journalism fraternity, which originated here at Wisconsin.

To those of you who were here last year, the **Engineering Exposition** should be an old story. But for the benefit of new students and those who may have forgotten, the Expo has come to replace the historic St. Pat's Parade. It

is under the sponsorship of Polygon Board but has its own officers and committees. Ray Erickson, last year's secretary, has been chosen this year's general chairman. Further announcements and information concerning the Expo will appear in coming issues of the **Engineer**.

Triangle is a social fraternity whose membership is open only to engineers. It has the usual advantages of social fraternities plus close association with fellow engineers.

Kappa Eta Kappa is a professional electrical engineering fraternity which was formed here at Wisconsin. This group maintains its own chapter house and in some respects performs the functions of a social fraternity.

4 ALL-UNIVERSITY ACTIVITIES

Membership in these organizations is open to all University students; however, engineers are to be found active in all of them.

University Publications—Engineers are eligible to staff positions on the Daily Cardinal, campus newspaper; Octopus, campus humor magazine; and the Badger, University yearbook.

Miscellaneous—Intercollegiate and intramural athletics, musical organization (band, orchestra, and chorus), literary and forensic groups, the Dorm Radio Club, social fraternities. Three all-university honorary fraternities to which engineers are elected are: Phi Eta Sigma, freshman scholastic; Pi Mu Epsilon, mathematics; and Phi Kappa Phi, scholarship and activities. In addition there are many positions in student self-government, in activities connected with the Union, and in campus cooperatives.

With Facilities for Training and Research

U. W. Contributes to Defense

A SPECIAL faculty committee has been appointed by President C. A. Dykstra to evaluate what the University of Wisconsin is doing and should be doing in connection with the National Defense Program.

The prime function of this committee, whose representative from the Engineering College is Prof. R. A. Roark, is to establish connections with and obtain essential information from science research investigators of the University that may be of some assistance in America's defense plans. The University, through its Military Science department and its Civil Aeronautics Authority pilot training course, is already taking an active part in this work.

The Reserve Officers' Training Corp unit, which has been on the campus for 73 years, will be more important now than ever before. It prepares its student members for commissioned ranks in the reserve corps of the army so that the United States in case of national emergency will have trained men to call upon. With the forthcoming expansion of the army, large numbers of students, who have completed four years training in the R.O.T.C., will go on active duty as second lieutenants. This year the local unit will have an enrollment of 1,400 students, an increase of 85 percent over that of last year. The unit is divided into the infantry corps, engineers' corps, and signal corps; engineering students are usually members of one of the last two.



Cut courtesy Wisconsin Alumni Association
Five of the trim Aeronca Chief training ships used by the CAA at the Madison Municipal Airport.

It is not generally known that instruction in military science and engineering was started at the University at the same time and both were taught by the same man. When the state of Wisconsin accepted the land grant of the U. S. Congress for the establishment of a College of Agriculture and Mechanical Arts, it was also required of the University to furnish military training. Col. W. R. Pease was

the first instructor of military science and civil, mechanical, mining and metallurgical engineering.

Last November, as a part of the government's plans to train 50,000 pilots, a pilot training course was started at Wisconsin. This course, subsidized by the Civil Aeronautics Authority, and administered by the University Extension Division, prepares students for the examinations required for private pilot's or limited commercial pilot's license.

Ground school instructions are given in the Mechanical Engineering Building by Profs. R. A. Rose and G. C. Wilson of the engineering faculty. Captain H. A. Morey and four government-approved assistants are in charge of flight instruction at Madison's new municipal airport.

The flight training consists of a minimum of 17 hours of flying with the instructor and 18 hours of solo work. An advanced secondary course of 145 hours of ground school and 49 hours of flight instruction is open to students who have completed the primary training with high ratings.

This fall 50 primary students and 30 advanced students will be trained at Wisconsin. The following engineers are among the 109 students who completed the primary course in the past year: John Bates, William Bates, Jerome Baird, Herbert Borer, Lloyd Brown, Donald DeMunck, Howard Dorward, Russel Goedjen, Philip Greer, Charles Hobart, David Krause, Verne Lampiris, Paul Mathison, Robert Meyer, Lyn Moths, Raymond Patterson, Ben Rowe, Calvin Royston, Warren Sommer, Harris Van Sickle, Carl Wulff, Bennett Tolefson, Howard Hegbar, Don Keefe, Doug Osterheld, Sig Rishovd, and James Smith. Three engineering students, August Heldt, Bill Muehl, and Jack Richards, were among the 10 who finished the secondary course this summer.

Thus it is very evident that the University of Wisconsin is doing its share in this important work. It is probable that our Engineering College will be called upon for additional help as soon as the newly appointed Committee on Engineering Defense Training completes its plans. The importance of engineering colleges has been very definitely summed up in the following statement by John Studebaker, U. S. Commissioner of Education.

"Our 1,200 trade and engineering schools with an investment of more than a billion and a quarter dollars constitutes a tremendous reserve of training facilities immediately available to our country for its national defense program. They are a federal, state, and local community investment in equipment and in experienced personnel that can readily be adapted to serve the nation's work."

ENGINEERING NEWS

by Acree and Schneider, e'42

SENATOR O'MAHONEY PROPOSES . . .

IN A new method of attacking the problem of continuing unemployment, Senator O'Mahoney of Wyoming has introduced a bill to amend the tax laws so as to impose a new levy upon manufacturers who use less than the "normal" amount of labor, to be offset by potential bonuses to those using considerable labor.

Details of the plan are not final, but the general idea is that the imposition of a percentage tax upon gross income after the deduction of payments for materials, supplies, and labor, and the allowance of a credit against this tax of an agreed-upon percentage of the labor cost alone. The two rates would be adjusted so as to penalize the manufacturer using large amounts of machinery, while permitting a bonus to be paid to those with high labor costs.

The purpose of the measure is not to forbid the use of machines but to balance their contributions to production. It is pointed out that although the current index of manufacturing is high in recent years, fewer persons are employed than could be, and there is also a recent increase of 600,000 in the number of employable workers.

PENNSYLVANIA TURNPIKE FINISHED . . .

Super-highways, and super-complex highways have been in the news for the last few years. In Pennsylvania, engineers have done something about it in a big way—the completion of the Pennsylvania Turnpike.

The Turnpike is a 160 mile highway of two twenty-four-foot concrete lanes separated by a 10-foot grass strip. It starts at Middlesex, twenty miles from Harrisburg, and ends at Irvin, about twenty miles from Pittsburgh. But this is not an ordinary 160 miles—it is the historic route over the Appalachians, which, because of its steep grades, winding course, storms and fogs, was almost as much of a barrier as a link between the East and the developing Midwest. The railroads started a hundred years ago to build a satisfactory route through the mountains, but even the Vanderbilt millions couldn't smooth out the way. The Pennsylvania Turnpike is expected to be the ultimate, as well as the immediate, solution to this transportation problem.

Ballyhooed as deathproof, the road has all the safety features that modern engineering can provide. For its en-

tire length, the Turnpike has no cross traffic, no pedestrians, and no parking on any of the lanes. There are only nine curves with a radius less than 1,432 feet. The sharpest curve is a six degree curve (955-foot radius) on which a speed of ninety miles an hour is still perfectly safe. The grade is nowhere greater than 3 per cent, which represents a very important factor in saving time and fuel, especially to the trucks and busses. This required enormous cuts and fills, such as the million dollar cut at Clear Ridge, 2,500 feet long and 150 feet maximum depth. Seven miles of tunnels and 299 bridge structures are included. Access to the Turnpike is either by interchanges at the terminals or through any of eight nine foot accelerating lanes along the way.

The road was financed through a PWA grant and RFC loans, the total cost being \$70,050,000. This necessitates the charging of tolls, ranging from \$1.25 for pleasure vehicles to around \$10 for trucks. More than just another highway experiment, the Pennsylvania Turnpike is important for the nation's defense.

FCC SHOWS ITS TEETH . . .

Radio hams in the United States, some 55,000 of them, have had their activities curtailed by the Federal Communications Commission in several orders recently. More fortunate than most of their foreign members of the radio amateur fraternity, U. S. hams have been instructed as follows:

First, no more "DX" or foreign contacts. With war in Europe resulting in the cessation of amateur activities there, it was hoped that such an order would not be necessary here. But foreign governments started propaganda stations on the ham bands, so the FCC passed the "DX" ban to prevent fifth column activities.

Second, no more portable operation. One of the privileges of American hams was the operation of portable equipment without the necessity of a license for each specific location. However, foreign spies, using portable stations, are rather hard to track down, so the FCC cracked down again.

Third, all present and applying amateurs must be fingerprinted and must present birth certificates or other satisfactory evidence of citizenship, to prevent aliens from using the amateur bands for possible subversive activities.

The radio hams have taken these restrictions with a smile, since they are intended as national safeguards. Anyhow, a half cake is still much better than nothing.



ALUMNI



by Joe Keating

NOTES

Miners and Metallurgists

BECK, JOSEPH J., '38, is in the metallurgical engineering department of the Carpenter Steel Co. in Reading, Pa.

CHRISTENSON, JAMES O., '38, is engaged in metallurgical engineering work in Milwaukee with the A. O. Smith Corp.

ADAMS, ROBERT E., '39, is engaged in metallurgical research with the Battelle Memorial Institute in Columbus, Ohio.

EICKELBERG, HENRY L., '39 is a metallurgist for the Globe Steel Tube Co. in Milwaukee.

KILDSIG, JOHN R., '39, has a position with the Youngstown Sheet and Tube Co. in Youngstown, Ohio.

LYONS, JOHN, '39, is employed in Walkermine, Cal., by the Walker Mining Co.

OZANICK, ANTHONY, '39, is with the Milwaukee Steel Casting Co.

SCHMIDT, CHARLES W., '39, is employed by the American Steel Foundries in Chicago.

Mechanicals

DICKIE, JOHN A., B.S. '34, M.S. '35, is now employed with the Lockheed Co. in Burbank, Cal. He transferred from the Allis Chalmers Co. in West Allis, Wis.

BOGUE, DAVID L., '38, who was formerly employed with the Jem Hardy Co. in Detroit, has returned to the General Motors Corp. and will be at the New York Exposition in the General Motors Research exhibit starting April 1, 1941.

JEDEKA, L. W., '38, a former instructor in our engineering drawing department, is now attending the Lockheed school at Burbank, Cal.

LAUGHNAN, T. T., '38, is employed with the Barber Coleman Co. in Rockford, Ill. He came to this job from the Commonwealth Edison Co. in Chicago.

VOLKMANN, H. W., '38, has changed employment from the Van Brunt Manufacturing Co. in Oregon to the Ladish Drop Forge Co. in Cudahy, Wis., as a time study engineer.

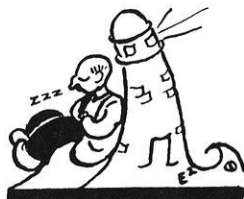
GREENWALD, DALE, '39, is production engineer with Ladish Drop Forge Co. in Cudahy, Wis. He previously worked with the Brant Automatic Cashier Co. in Watertown, Wis.

LEACHNITT, F., '39, has transferred his aviation activities from the U. S. Flying Corps to the Lockheed Co. in Burbank, Cal.

ANOFF, S., '39, is working on air conditioning equipment with DeVry and Co., in Chicago.

Electricals

WINTHER, ROBERT O., '33, is engaged in design work for the Signal Electric Manufacturing Co. in Menominee, Mich.



HUTTON, ROBERT W., '30, is engineer with J. C. Basten, general contractor of Green Bay, Wis.

WICKESBERG, ALFRED W., '31, who was defeated by a narrow margin for re-election as city engineer of Appleton last spring, is resident engineer on a water works project at Port Edwards, Wis.

AFFLECK, HERBERT J., '34, is an engineering draftsman in the U. S. Navy Yard at Washington, D. C.

BARTEL, AUGUST O., '34, is employed in the laboratories of the Automatic Products Co. in Milwaukee.

KETCHUM, PAUL M., '38, is working in the high voltage engineering laboratory of the General Electric Co. in Pittsfield, Mass.

BOWKER, IRA H., '39, is in the relay department of the Adams and Westlake Co. in Elkhart, Ind. Ira assisted as instructor in the electrical engineering laboratory last year.



Civils

The expanding program of the makers of airplanes has created a demand for more aeronautical engineers than are available. The companies have been forced, therefore, to set up training courses and have been recruiting trainees actively all summer. Among the civil graduates who have gone to the Lockheed Aircraft Corp at Burbank, Cal., are **ELMER F. BECKER**, '31; **LLOYD DYSLAND**, '34; and **CLARENCE F. EWALD**, '31.

VOLK, WAYNE N., '34, holds a fellowship in traffic engineering at Yale University. He is on leave of absence from the Wisconsin Highway Commission.

VAN HAGAN, CHARLES E., '36, holds a fellowship in traffic engineering and transportation at Yale University. He is on leave of absence from the Wisconsin Highway Commission.

ZWETTLER, ROBERT F., '38, has returned to the Kimberly-Clark Corp. after a year of graduate study in hydraulics. He received his master's degree in June.

DOLGIN, ZEA, '39, is draftsman with the National Survey Service of Milwaukee.

Chemicals

NEUMEISTER, CARL L., '22, has left the sales division of the Celotex Co. to become the vice president of the American Rock Wool Corp. of Chicago.

WEIMER, B. A., '24, is in charge of development work in a Brazil plant of the DuPont Co. in South America.

MANTERICH, FRED, '32, has established his own textile laboratory in Jersey City, N. J., specializing in photomicrography.

NIENOW, FLOYD W., '34, has a position with the Pennsylvania Salt Manufacturing Co., Philadelphia, which does considerable research for the paper industry.

WOODS, WALTER S., Jr., '34, is in the Paint Sales Division of the E. I. duPont Co., with headquarters in Chicago.

NORTON, HORACE W., '35, left London, England, Sept. 3, flew to Lisbon, Portugal, and then arrived in America by boat. He has spent the last two years lecturing in genetics at the University of London. He has a position now with the U. S. Department of Agriculture at the University of Chicago, working in conjunction with the latter and with the U. S. Weather Bureau.

MERRIFIELD, KENNETH, '38, is in the maintenance division, engineering department, of Standard Oil of California at El Segundo, Cal. He was married to Alice Bell Oct. 21, 1939.

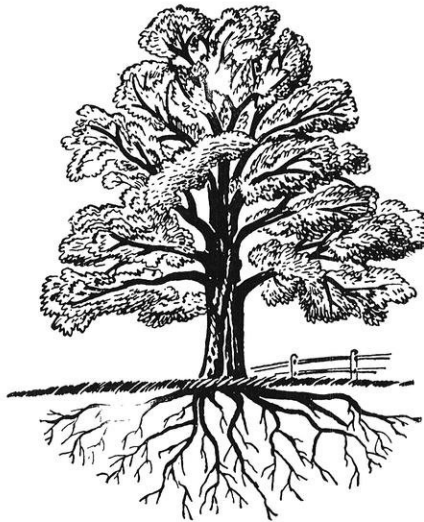
KOEHLER, JOHN, '39, M.S. '40, is with the Howard Geisse Co. at Wausau, Wis., engaged in the production of clay products.

WEYKER, ROBERT, '39, is employed with the Arkansas Co. in Newark, N. J., in the production of sulfonated oil.

WIESE, WILLIAM, '39, is with the Monsanto Chemical Co. in St. Louis, Mo.



IT'S MIGHTY LIKE A TREE



Though it spreads across the entire nation, the Bell Telephone System is simple in structure. You can think of it as a tree.

BRANCHES

The 24 associated operating companies . . . which provide telephone service in their respective territories.

TRUNK

The American Telephone and Telegraph Company . . . which coordinates system activities, advises on telephone operation and searches for improved methods.

ROOTS

Bell Telephone Laboratories . . . whose

functions are scientific research and development; Western Electric . . . manufacturer and distributor for the system; Long Lines Department of A.T.&T. . . which interconnects the operating companies and handles Long Distance and overseas telephone service.

* * *

With common policies and ideals, these Bell System companies work as one to give you the finest, friendliest telephone service . . . at lowest cost.



ON THE CAMPUS...

with John Erwin, m'42

MOREY, NORRIS TALK AT SMOKER

More than 250 engineering students, attending the engineers' smoker held in the Union theater, enjoyed talks by Capt. H. A. Morey and Pat Norris and the refreshments later served in Great Hall.

Captain Morey, flight instructor for the CAA pilot training course, gave a description of the government's training course and then answered questions asked from the audience. The highlight of the program was the jokes and takeoffs on the engineering faculty by Pat Norris, prominent Madison industrialist.

Ray Erickson, president of Poly-

gon Board, was announced as general chairman of the Exposition.

• • •

ENGINEERS GET RESEARCH SCHOLARSHIPS

Seven engineers are among the 20 seniors who have received the newly established Wisconsin Alumni Research Foundation scholarships of \$250.

These scholarships, first of their type ever given to undergraduates, were presented to students whose major field is in the natural sciences. For the past five years the foundation has awarded only graduate scholarships; these new ones were established for the development and encouragement of outstanding students who previously have been

forced to abandon their education at an early stage.

Selections for the scholarships were made from students recommended by science department heads and from applications submitted by individual students. Members of the committee administering them are Profs. L. E. Noland and I. S. Sokolnikoff, representing the graduate committee on scholarships, and Asst. Dean I. L. Baldwin and W. J. Harris, representing the undergraduate committee on scholarships.

The 1940-41 recipients are students who have proven their outstanding ability in scholarship, research, future promise, and are in definite financial need. The engineers chosen and the departments in which they will work are: Paul Fluck, mechanics; Fred Webber, metallurgical engineering; Charles Gould, chemical engineering; Raymond Erickson, chemical engineering; Bert Zarky, radio; Frank Roberts, mechanical engineering; and Milton Suckow, steam and gas.

REGISTRATION, COLLEGE OF ENGINEERING — 1938-39, 1939-40, and 1940-41

	Chemical			Civil			Electrical			Mechanical			Mining and Metallurgy			Totals		
	1938-39	1939-40	1940-41	1938-39	1939-40	1940-41	1938-39	1939-40	1940-41	1938-39	1939-40	1940-41	1938-39	1939-40	1940-41	1938-39	1939-40	1940-41
Freshmen	88	98	105	53	45	44	89	68	58	168	140	197	18	9	20	416	360	424
Non-Prom. Freshmen	7	24	9	13	18	10	13	20	8	31	30	30	4	5	9	68	97	66
Sophomores	90	81	101	51	46	33	86	64	77	146	140	127	30	29	24	403	360	362
Juniors	76	52	73	57	41	40	80	93	83	108	127	128	23	17	21	344	330	345
Seniors	49	72	50	39	54	50	64	61	63	92	92	98	22	21	14	266	300	275
Total	310	327	338	213	204	177	332	306	289	545	529	580	97	81	88	1497	1447	1472
Graduates	12	8	13	7	12	8	9	8	7	6	3	6	7	14	14	41	45	48

TOTAL REGISTRATION

1917.....	510	1920.....	1166	1923.....	1100	1926.....	926
1918.....	856	1921.....	1240	1924.....	1032	1927.....	962
1919.....	1084	1922.....	1163	1925.....	953	1928.....	962
1929.....	1039	1932.....	922	1935.....	1020	1938.....	1497
1930.....	1086	1933.....	833	1936.....	1163	1939.....	1447
1931.....	1084	1934.....	915	1937.....	1371	1940.....	1472

Smallest freshman registration: 181 in 1932; largest, 523 in 1937.

SOPHOMORE HIGH HONORS

Civil Engineering

	Crs.	Ave.
Ingersoll, Alfred C.	75	2.640
Ree, Melvin C.	75	2.600

Mechanical Engineering

Boller, C. William	72	2.653
Borchardt, Robert E.	60	2.767
Bossart, Donald J.	66	2.868
Bosser, Robert P.	72	2.667
Schmook, Edward Jr.	68	2.706
Schroeder, Kenneth A.	69	2.696
Wulff, Carl E.	75	2.693
Zoellner, Robert E.	68	2.824

Chemical Engineering

Arvold, William V.	72	2.750
Brann, John W.	72	2.653
Burczyk, Casimir A.	71	2.662
Nussbaum, L. G. Jr.	71	2.648
Peterson, Merlin H.	67	2.836
Wright, William N.	75	2.667

Mining and Metallurgical Engineering

Bemm, Robert A.	79	2.835
Phillips, Charles W.	68	2.676

SOPHOMORE HONORS

Civil Engineering

Bertle, Fred A.	69	2.594
Elliott, John F.	72	2.486
Green, Richard C.	72	2.305
Peters, Roger W.	66	2.346
Schutz, Howard W.	64	2.234
Tice, Clifford J. Jr.	68	2.529

Mechanical Engineering

Atkins, Thomas R. Jr.	68	2.250
Frank, Donald F.	68	2.294
Harris, George N.	71	2.239
Heffernon, Culver A.	70	2.157
Jirucha, Lester L.	73	2.151
Koehne, Anthony J.	72	2.500
Parduhn, Ewald H.	68	2.500
Prinz, Frank J.	69	2.348
Reuschlein, Clifford J.	67	2.424
Richards, Jack M.	66	2.652
Schindhelm, Robert M.	68	2.294
Smith, Newell L.	72	2.194
Thies, Harry L.	69	2.333
Wege, Ervin C.	68	2.515

Electrical Engineering

Deerhake, William J.	69	2.217
Ellis, Homer N.	73	2.466
Elmergreen, Lester G.	69	2.391
House, Joseph P. Jr.	74	2.149
Imm, Ruben A.	71	2.577
Lind, Anthony H.	62	2.387
Pfeiffer, John W.	69	2.406
Schmitz, Norbert L.	73	2.123
Schneider, Homer J.	70	2.629
Smith, Leon D.	65	2.569
Yount, George R.	72	2.222

Chemical Engineering

Bates, John D.	68	2.338
DeByle, George A.	72	2.264
Hoekstra, Irenus A.	69	2.275
Kleist, Erwin H.	71	2.268
Knipfer, Frank P.	67	2.478
Lufter, Carl H.	71	2.535
Millonig, Lawrence E.	63	2.413
Morley, Frank G.	68	2.529
Ranfil, Joseph W.	73	2.260
Schmalz, Henry H.	73	2.425
Szelonski, Mitchell E.	71	2.183

Mining and Metallurgical Engineering

Buswell, Donald P.	73	2.356
Lochen, Robert E.	71	2.155

FACULTY CHANGES

Three major changes have been made in the administrative staff of the Engineering college during the past summer.

Promotions in the chemical engineering, the electrical engineering, and the mining and metallurgical engineering departments have promoted Profs. O. A. Hougen, J. W. Watson, and Joseph Oesterle to chairmanships of their various departments.

They succeed Profs. O. L. Ko-

walke, Edward Bennett, and E. R. Shorey, who resigned to devote more time to research work.

Other changes in engineering faculty personnel are the appointments of Prof. Lloyd F. Rader as professor of highway engineering, to replace Prof. H. F. Janda, who died during the summer of 1939; and the resigning from the staff of Lloyd W. Jedeka, instructor in the drawing department, to accept a position with the Lockheed Airplane company.

SUCCESS STORY

SAW BREAKAGE
Drastically Reduced

Sales, customer good-will and profits jumped when a smart band saw manufacturer tried Ampco Metal for troublesome saw guides. Hardened steel had been galling and sticking, causing excessive breakage of blades. . . . AMPCO METAL reduced breakage drastically and improved performance.

How can AMPCO METAL Serve You?

ARE there places in either your product or your production tools where *metal failure* is causing trouble? . . . If so, AMPCO METAL can help you . . . as it has helped an impressive number of prominent manufacturers. There's no other bronze like it. AMPCO METAL is unequalled in its resistance to wear, impact, fatigue, and corrosion. It can be supplied in a wide range of properties and forms.

WRITE FOR DATA

Tell us what you're up against, and we'll send complete data sheets and recommendations.

AMPCO METAL, INC.

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MILWAUKEE, WISCONSIN

AMP CO METAL

The Metal Without An Equal

MUTTERINGS

Well, freshmen, how do you like the carefree gay college life now? Oh, changed your minds some, eh? If you think you've an awfully rugged schedule now, just wait. And that goes for you, too, my superior upperclassman friends. When you start grinding out eight long ones every day, every week, this nightmare you're going through now will look like mighty easy going, so let's enjoy it while we may.

We think this is about the best season of the year in Wisconsin. Just a brisk snap in the air, Monday morning skies, and all the colors of a feminine wardrobe brightening the landscape. It's good to be back in this wonderful institution, greeting friends, and missing a few of those who were inquiring the whereabouts of the Dean's Office last June. We're always mildly surprised to find, on returning, that the old Engineering building is still standing, the carillon still sounds like a loose nut inside of a piano, that instructors actually expect us to polish off the mountains of homework they assign, and that here we are (put in your own classification) in the University already.

Last Friday night several engineers made their annual foray into Langdon street, just to look the situation over. Among other things they found: (a) it was still there;

WANNA BE A LAWYER?

Of course not. But if you wanna have a lotta fun and hang another accomplishment on your record and show off your talents, drop around to the Engineer office next to the Library and get acquainted. Whether it's writing or business you like, you need the Engineer and the Engineer needs you.

So watch for staff meeting-announcements and stop in at room 356 some day soon. If there's no one there—well, we have classes, too. But, anyhow, we'll be seeing you!

(b) sororities were having "open houses" (c) engineers were welcome only at the service entrance; (d) they were able to enter and gape at the pledges only by tying handkerchiefs under their collars (they had no sox); (e) once they were in, they couldn't get out if they wanted to (and how they wanted to!). There's one consolation to this dreary tale: we don't have to look at the pledges on the Hill every day.

In the old cigar box that is set aside as our very own we note a wee bit of paper with a loving message from the editor-in-chief, Ben Bennett, quote: "Mention in Campus News that there are index's (Ben-

nett, Bennett, where were you brung up? That word is indices. You make Webster a whirling dervish) in the office for the past few volumes of the Engineer. OK, Benny?

If you're one of those persons who reads a magazine by starting from the rear and working forward, as opposed to the best theories on the subject, you may have noticed a page more or less filled with cartoons, used humor, and flagrant distortions of the King's English. It is titled "Static," although those who have perused it have more descriptive terms that cover the situation much more accurately. The following is our impression of a usual page of "Itzyisms":

Flash!

We hear Pat King calls his new bride "Weatherstrip," 'cause she's guaranteed to keep him out of the draft. (Many thanks to Ed Wynn.)

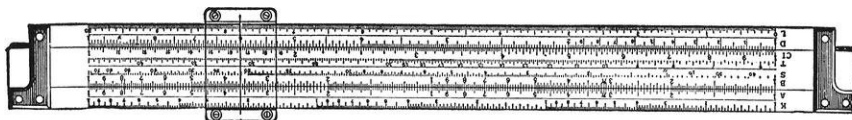
Extra!

'Tis rumored that Prof. Rose is attempting emulation of Jack in the Corner—he stuck his hand into an old flowage tank—and pulled out a handful of squirming baby mice.

Yowsah, that was a mighty fine game against Marquette—it makes us feel really "back at school" to get our annual case of "bleacher's back," or "stadium spine" again. What a place for a chiropractor!

Our Motto of the Month:

"Every day is lady's day with me."



Slide Rules for Engineers

FIVE DIFFERENT LOG-LOG MODELS CARRIED IN STOCK
Our expert clerks will help you select the proper rule for your work

THE UNIVERSITY CO-OP

"For the benefit of students . . . not for profit"

Why Anti-Friction Bearings?

BECAUSE wherever wheels or shafts turn in modern machinery, anti-friction bearings do these 10 things:

1. Reduce friction



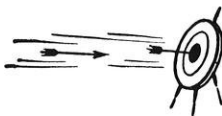
2. Reduce wear



3. Prolong life of machinery



4. Increase accuracy



5. Reduce maintenance



6. Resist loads from all directions.



7. Permit high speed operation



8. Simplify design



9. Allow accurate inter-changeability.



10. Give assured performance



These are the reasons for using anti-friction bearings . . . for using ball bearings . . . for using New Departure ball bearings.
New Departure, a Division of General Motors, Bristol, Connecticut, U. S. A.

NEW DEPARTURE



BALL BEARINGS

Nothing Rolls Like a Ball



What The '40 Grads Are Doing

by Joe Keating

University of Wisconsin engineering graduates are working in North and South America in every type of industrial engineering. We wish them success in their present and future work.

CHEMICALS . . .

BAST, WALTER H., is with the Aluminum Company of America in Kensington, Pa.

BROWNE, WILLIS G., is employed by the Madison Gas and Electric Company in Madison, Wis.

BURSTEIN, VICTOR, is a Fellow in the Institute of Paper Chemistry at Appleton, Wis.

BUTENHOFF, M. W., has a position in the Ammonia Department of the E. I. duPont de Nemours & Company, Belle, W. Va.

CARLIN, ROBERT W., is employed by the J. O. Ross Engineering Corporation in Chicago, Ill.

CASCIARO, A. L., is with the Chicago Rubber Clothing Company in Racine, Wis.

CICHOCKI, CLARENCE, a former instructor in the chemical engineering department, now has a position with the National Aniline and Chemical Company, Buffalo, N. Y.

COX, MARTIN, is employed by the Carnegie-Illinois Steel Corporation at Gary, Ind.

CROSLAND, HOWARD C., is in the Sales Service division of the National Starch Company of New York.

DARROW, WENDELL, is with the Youngstown Sheet & Tube Company, Youngstown, Ohio.

DODGE, FRED, is working on the drying of gases under Professor Hougen as a part of the National Defense Program in Madison, Wis.

DONALDSON, GEORGE R., is doing chemical engineering work with the Universal Oil Products Company, Chicago, Ill.

DRAEGER, A. F., is an employee of the Victor Chemical Company in Chicago Heights, Ill.

ECK, CHARLES F., is a Teaching Assistant at Virginia Polytechnic Institute, Blacksburg, Va.

ERICKSON, JOHN M., has a position with the Proctor and Gamble Manufacturing Company, Chicago, Ill.

ERMENC, EUGENE D., is a Fellow at the Georgia Institute of Technology, Atlanta, Ga.

FAUST, WAYNE J., is in chemical engineering work with the Universal Oil Products Company of Riverside, Ill.

FEERICK, AUBREY A., is employed by the A. O. Smith Corporation in Milwaukee, Wis.

HARRISON, DONALD C., is an employee of the Connecticut Coke Company, New Haven, Conn.

HASLANGER, ROBERT U., is situated in the Plastics Division of the Monsanto Chemical Company, Springfield, Mass.

HIGLEY, HUGH C., is a chemical engineer with the Ansul Chemical Company in Marinette, Wis.

ISBERNER, WILBUR, is employed by J. E. Seagram and Sons, Louisville, Ky.

ISERMAN, DONALD A., is a member of the Sales Department, Macwhyte Company, Kenosha, Wis.

KNUDSEN, RAY, is employed by J. E. Seagram and Sons, Louisville, Ky.

KOESTER, RALPH E., is with the Goodrich Company at Akron, Ohio.

KUPFER, JOHN, has a position with the Vilter Manufacturing Company in Milwaukee, Wis.

KUREK, FRANCIS L., is with the Continental Can Company in Chicago, Ill.

LAUCK, FRANCIS W., is employed by the A. O. Smith Corporation, Milwaukee, Wis.

Le DAIN, H. J., is with Cutler-Hammer, Inc., Milwaukee, Wis.

MAYLAND, BERT J., is a Fellow at the University of Illinois, Urbana, Ill.



McCARTER, ROBERT J., is with the Universal Oil Products Company at Riverside, Ill.

McCAULEY, HARRY, has a position with the Union Carbide and Carbon Corporation Patent Department in New York.

McCONAHAY, HOWARD, is in the Turbine Division of the Allis Chalmers Company at West Allis, Wis.

MERCK, RAY, is engaged in chemical engineering work with the General Chemical Company in Buffalo, N. Y.

RADKE, HAROLD H., is with the Goodrich Rubber Company at Akron, Ohio.

SANDERSON, T. J., is working with Williams, Bradbury, and Hinkle, in the Board of Trade Building, Chicago, Ill.

SCHUELER, L. E., is a Second Lieutenant in the Chemical Warfare Service in Puerto Rico.

SCOTT, J. F., is employed by the Globe Steel Tube Company, Milwaukee, Wis.

SEELow, JACK W., has a position with the Youngstown Sheet and Tube Company, Youngstown, Ohio.

SEIDL, ROBERT J., is an employee of J. E. Seagram and Sons, Louisville, Ky.

SENFT, JOHN, who started in February with the Sinclair Oil Company, is now engaged in marketing work for the Shell Oil Company, Chicago, Ill.

SMITHWICK, GEORGE D., is doing chemical engineering work with the Container Corporation of America, Chicago, Ill.

STELLMACHER, E. R., is with the DuPont Company, Kearney Point, N. J.

STUEBER, CURTIS C., is with the Continental Can Company, Chicago, Ill.

TESSMAN, HUBERT R., is with J. E. Seagram and Sons, Louisville, Ky.

WIBERG, EDGAR L., is employed by the Central Paper Company in Muskegon, Mich.

WOERFEL, JOHN B., is in the Refinery Pilot Plant of Armour and Company, Chicago, Ill.

ZIMMERMAN, M. W., is in the Products Laboratory, A. O. Smith Company, Milwaukee, Wis.

CIVILS . . .

BARTZ, ELLWOOD L., is with the U. S. Engineer Office at Detroit, Mich.

BARTEL, FRED F., holds the Stanton Walker Fellowship of the University of Maryland, College Park, Md.

BEDORE, CLIFFORD J., no report.

BOLSTAD, JAMES W., is salesman with the Missoula Hardware and Plumbing Company, at Missoula, Mont.

BULLEN, PAUL W., is instructor in drawing at the University of Minnesota.

CHALDEK, KOLAR B., no report.

DAVY, WALTER E., is structural engineer with the Northwest Engineering Company of Green Bay, Wis.

DENT, PHILLIP B., has a temporary place as operator of the waste treatment plant of the Nieman Canneries at Cedarburg, Wis.

DETTMANN, HAROLD H., is county surveyor for Waushara County, Wis.

DIETZ, JESSE C., is research assistant in civil engineering at the University of Wisconsin.

DOLLHAUSEN, JOHN L., is engineer with the Soo Line Railway at Minneapolis, Minn.

FOELSCH, GEORGE D., no report.

GOODIER, ROBERT D., is assistant engineering aide in maps and surveys division of TVA at Paris, Tenn.

HANCOCK, WILLIAM F., is training for sales work with Jos. T. Ryerson and Son of Chicago.



HARRISON, CHESTER J., no report.

HERRIED, IRVIN C., is assistant engineering aide in maps and surveys division with TVA, at Rockwood, Tenn.

HOLGATE, THOMAS A., is engineer with the Glenn L. Martin Company at Baltimore, Md.

KING, FRANK S., is draftsman with the Lockheed Aircraft Corporation at Burbank, Cal.

KRYSHAK, JOSEPH S., is draftsman with TVA at Chattanooga, Tenn.

LAIRD, CARLTON W., planned to study law at Wisconsin.

LEAMAN, DONALD D., no report.

LEY, HERBERT H., is draftsman with the Chicago Pump Company, Chicago, Ill.

LINDQUIST, DURWARD L., is NYA supervisor at Camp Wawbeck, Wisconsin Dells, Wis.

MIELKE, JOHN H., is with the engineering department, City of Waukesha.

MILLER, MALCOLM A., is engineer with the Standard Steel Works at North Kansas City, Mo.

MONSON, LYLE E., is with Jos. T. Ryerson & Son, Chicago, Ill.

MOORE, ARTHUR, is in the research department of Gimbel Bros., Milwaukee, Wis.

NESTINGEN, STANLEY R., no report.

NOTH, MELVIN J., is research assistant in civil engineering at the University of Wisconsin.

PETERSEN, ARTHUR H., is superintendent of construction on a school building for the school board at Phillips, Wis.

PLATE, JOSEPH K., is timekeeper with Charles D. Smith, general contractor at Fond du Lac, Wis.

PLOG, CHARLES B., holds a scholarship at Cornell University.

RAESE, GEORGE P., is in training as a safety engineer with the Employers Mutual Insurance Company, Wausau, Wis.

RALL, LLOYD L., was with TVA for a short time but left for army duty in California.

SANDERSON, JOHN A., is estimator in the engineering department, Fabricating Division, Bethlehem Steel Company, Chicago, Ill.

SCHUETTE, EVAN H., holds the Royal Victor fellowship in civil engineering at Stanford University.

SMALL, ALVIN L., is with Sam Hart, consulting engineer of Madison, Wis.

SODERSTROM, VERNE A., is with the WPA planning office at Kenosha, Wis.

TOOLE, WILLIAM D., is inspector and chief of party for the Washington Suburban Sanitary District at Hyattsville, Md.

VROMAN, GEORGE M., is a graduate assistant in civil engineering at Penn State College. He spent the summer with the Wisconsin Highway Commission at Eau Claire, Wis.

WARD, WILLIAM P., is with the Wisconsin Highway Commission at Madison, Wis.

WERNER, BENJAMIN F., is an engineer with the Boeing Aircraft Company, at Seattle, Wash.

WESLEY, JOHN, is operator of the water works plant at Williams Bay, Wis.

ZOVNIC, ANTHONY J., is senior project engineer with the Planning Division of WPA in Milwaukee, Wis.

ELECTRICALS . . .

ANDERSON, R. E., is employed by E. I. duPont de Nemours, Clinton, Ia.

AUSTIN, N. C., has a position with the Kimberly-Clark Company, Neenah, Wis.

BAIRD, R. A., is an employee of Scientific Lighting, Inc., Fond du Lac, Wis.

BODOH, A. G., is working with Underwriter's Laboratory, Chicago, Ill.

BONCYK, CLARENCE J., is associated with the Interstate Power Company, Dubuque, Ia.

BORNSTEIN, F., is an employee of the Lucas Service Station, Milwaukee, Wis.

BRACKEY, J. A., is employed by Westinghouse E & M Company, Pittsburgh, Pa.

BURTON, L. A., has a position with the General Electric Company, Schenectady, N. Y.

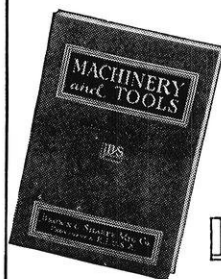
DAY, LEROY N., has returned for study in Law School.

(continued on next page)

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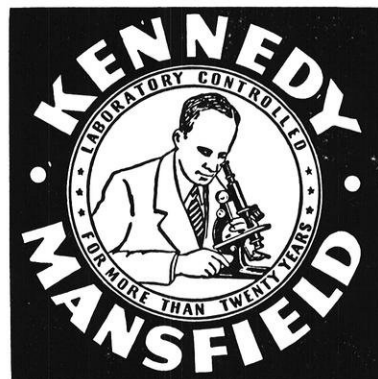
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DERUS, H. M., no report.
 DOYLE, J. F., no report.
 DREWS, R. P., is employed by the Wisconsin Telephone Company, Milwaukee, Wis.
 EXTROM, C. G., is with the Wisconsin Power and Light Company, Janesville, Wis.
 FITZGERALD, U. W., has a position with the Babcock and Wilcox Company, Barberton, Ohio.
 FRIHART, H. N., has a position with the Galvin Manufacturing Company, Chicago, Ill.
 GLASSOW, F. A., has a position with the Commonwealth Edison Company, Chicago, Ill.
 HEGG, R. C., is employed by the Wisconsin Telephone Company, Milwaukee, Wis.
 HOLTZ, R. F., who has been working with the Barber-Coleman Company of Rockford, Ill., now holds a Fellowship at the University of Wisconsin.
 HUBBELL, R. S., is an employee of the Allis Chalmers Company, Milwaukee, Wis.
 JEPSEN, H. G., has a position with the Line Materials Company, Milwaukee, Wis.
 KAISER, H., no report.
 KAISER, L. O., no report.
 KEEBAUGH, D. R., is an employee of the Wisconsin Electric Power Company, Milwaukee, Wis.
 KENNEL, B., no report.
 LAMPİRIS, V. E., is with the 332nd Signal Corps Company, Selfridge Field, Mich.
 LIETZKE, VICTOR A., is working in Pittsfield, Mass., on power transformer testing, meanwhile enjoying the "graveyard" shift (12 to 8 a. m.).
 LOWE, M. H., has a position with the Allis Chalmers Company, Milwaukee, Wis.
 MEDROW, K. R., is a radio operator for the U. S. Navy, USS Paducah, Duluth, Minn.
 MOLDENHAUER, E. W., is working with the Rural Electrification Commission, Washington, D. C.
 MORRISSEY, WILLIAM H., has entered Law School.
 NELSON, WILLIAM A., has a position with the Interstate Power Company, Winnebago, Minn.
 NEWBURY, K. H., is employed by the West Bend Aluminum Company, West Bend, Wis.
 O'LEARY, J. G., is with the Adams and Westlake Company, Elkhart, Ind.
 OSTERHELD, D. C., is working with the Westinghouse E. & M. Company, Pittsburgh, Pa.
 PECK, D. F., is employed by the Wisconsin Power and Light Company, Baraboo, Wis.
 PETERSON, A. H., is an employee of the Koppers' Coke Company, St. Paul, Minn.
 PILZ, OTTO, no report.
 PINARD, A. J., is employed by the General Electric Company, Schenectady, N. Y.
 RATHSACK, no report.
 REULING, K. W. is employed by the Wisconsin Telephone Company, Milwaukee, Wis.
 RICE, D. A., has a position with the Allis Chalmers Company, Milwaukee, Wis.
 RICHARDSON, R. H., is an employee of the General Electric Company, Schenectady, N. Y.
 SCHEIBE, E. H., has been working with the Allis Chalmers Company, Milwaukee, Wis., and is holding a Fellowship at the University of Wisconsin.
 SCHLAWIN, R. G., has a position with the General Electric Company, Schenectady, N. Y.
 SIEBEN, D. W., is an employee of the Hevi-Duty Electric Company, Milwaukee, Wis.
 STIEBEL, D. R., is an employee of the Allen-Bradley Company, Milwaukee, Wis.
 STRUCK, D. W., has a position with the Perfex Corporation.
 SURPRISE, C. P., is employed by Adams and Westlake, Elkhart, Ind.



VAN SICKLE, H. L., is employed by the William Wrigley, Jr., Company, Chicago, Ill.
 WARNEK, R. G., is an employee of the Wisconsin Telephone Company, Milwaukee, Wis.
 WARTINBEE, W. J., has a position with the General Electric Company, Schenectady, N. Y.
 WELCH, H. J., is employed by the Allis Chalmers Company, Milwaukee, Wis.
 WOJCIECHOWSKI, A. J., is employed by the Wisconsin Power and Light Company, Fond du Lac, Wis.
 WOLF, E. J., has a position with the General Electric Company, Schenectady, N. Y.
 WOLF, F. C., is employed by the Wisconsin Power and Light Company, Fond du Lac, Wis.
 ZACCONE, S. L., is an employee of the Empire Fuel Company, Madison, Wis.

MECHANICALS . . .

AMERY, GEORGE R., has a position with the General Electric Company, Schenectady, N. Y.
 ANDERSON, C. VAUGHN, is with Cleaver Brooks Company, Milwaukee, Wis.
 ARENS, HERBERT C., is employed by Lockheed Aircraft Company, Burbank, Cal.
 BALZER, FRED A., is with the Crane Company, Chicago, Ill.
 BATES, WILLIAM E., is employed by the Curtis Wright Corporation of Patterson, N. J.
 BORER, HERBERT, is with the Fairbanks-Morse Company, Beloit, Wis.
 BOWERS, GEORGE F., is an employee of the Ampco Metal Company, Milwaukee, Wis.
 BRECKENRIDGE, WILLIAM L., has a position with the Inland Steel Company, Chicago, Ill.
 BROBERG, LEONARD E., is with the Allis-Chalmers Company, West Allis, Wis.
 BUCHBERGER, LEO J., is an employee of the Flambeau Paper Company, Park Falls, Wis.
 BUSKE, GILBERT, has a position with the Taylor Instrument Company, Rochester, N. Y.
 CALDWELL, JAMES R., is in the army at Fort Logan, Cal.
 CASSADAY, GEORGE K., is employed by Nordberg Manufacturing Company, Milwaukee, Wis.
 CHRISTMAN, MATT V., is associated with the J. D. Wilson Company, Milwaukee, Wis.
 CLARKE, MARY JANE, is employed by the Rochester Button Company, Rochester, N. Y.
 DECOT, HAROLD T., has a position with the Koehring Company, Milwaukee, Wis.
 De MUNCK, DONALD S., is with A. H. Arnold and Company, Chicago, Ill.
 DENNING, LOREN G., has a position with the Sinclair Oil Company, Chicago, Ill.
 DETTMANN, CHARLES E., has a position with Kearney Truck-er, Milwaukee, Wis.
 DIEMAN, CHARLES, is an employee of Sears Roebuck, Chicago, Ill.
 DISBROW, FRANK J., is with the Universal Winding Company, Providence, R. I.
 DUNWIDDIE, JAMES F., is employed by Socony Vacuum Company, New York City.
 DYKEMAN, FRED E., has a position with the Mundet Cork Company, Newark, N. J.
 EGGER, RAY H., has a position with the Mack Company, Allantown, Pa.
 ERON, ALLAN H., is with Sinclair Oil Company, Chicago, Ill.
 EVANS, GLENN H., has a position with Massey-Harris, Racine, Wis.
 FARIN, WILLIAM G., is employed by DuPont, Charlestown, W. Va.
 FEDENIA, JOHN, is an employee of Bucyrus Erie, Milwaukee, Wis.

(continued on page 20)

"STATIC"

with Nathan Itzkowitz, c'41

Hello, Everybody . . .

a hearty welcome to all our subscribers, non-subscribers (gnats to you), faculty members, and anyone else who happens to read our literary nonsense (column to you Greek scholars), and may this next semester be blessed with success, happiness, prosperity, and plenty of Steam and Gas reports . . . ough . . . ough . . .



now before I submerge you in the pool of my inane mutterings, let's take time off and get acquainted . . . now to you veterans of this column, you survivors of our antiquated jests and feeble follies, we merely say . . . abide with us . . . but to the newcomers . . . let us briefly state our policy . . . now this author sincerely believes that one of the finest qualities in a human being is a good sense of humor . . . now we don't mean that you have to laugh when you read this page . . . that's asking too much (you can smile . . . darn you) . . . but we want this column to be an outlet for the more humorous and human aspects of our profession . . . so let's make it just that . . . with your cooperation . . . and you certainly can cooperate . . . perhaps we can get together and really have a good time this year . . . did anybody pull a boner? . . . well, let us know . . . have you got a gripe? . . . we'll air it . . . got trouble with your gal? . . . we'll take care of that, too . . . we're very proficient in the latter . . . and so on and so forth . . . so look us up . . . we are always home to everybody . . . and we'll appreciate the news . . .

Tid Bits . . .

our candidate for the hall of fame . . . Sol Resnick . . . out at Devil's Lake, Solly invented the speechless after-dinner type of speech . . . very appropriate, we think . . .

Professor Kessler related a story of a student who, in forecasting the population of La Crosse, went astray and predicted that in 1960 the population will be nix . . . quite a tragic situation . . . however, with the Senior Civils passing through there every year on their Senior Trip perhaps things won't look so bad . . . quit snickering, you Mechanicals . . . you'll be big men like us some day . . .

Ole Danny Cupid . . .

sure must of used a harpoon this last summer instead of a bow and arrow, for two of our instructors, Mr. Joe Liska and Mr. Jim Caldwell of the Mechanics department are now possessing those well fed, self satisfied looks of married men . . .

and we hear that Pat King, last year's associate editor, and Bob Goodier, Civil grad and brother of Miner Bill, have also cast off the cloak of freedom for the shackles of matrimony . . .

and the reason that Phil Rice, senior Miner, stays home nights and between classes is a beautiful blonde called Mrs. Rice . . . it happened this last summer . . . and Phil says everything is working out pretty nice . . .



it is our opinion that the engineer, of all professional men, stands the best chance of not being a hen-pecked mate, for with his extensive study of mechanics, he ought to be able to torque back to his wife . . . foooo . . . nuff said . . .

however, best of luck, gentlemen, and many wishes . . .

'Tis Thesis Time . . .

and all good seniors are scurrying around looking for a thesis subject . . . perhaps we can offer some suggestions . . . some enterprising Civil ought to investigate the Elasticity of a Girdle . . . John Riley would like that . . . or how about the Viscosity of an Osculation? . . . of course, that would involve quite a bit of hydraulics, but if you didn't lose your head, everything would be all right . . . or how about finding the Thermal Electro-Potentiality (no kinetic energy need be involved) of the Kappa house during a blackout . . . some enterprising Electrical like Johnny Moses might tackle that one . . . Ernie Tremmel should be able to give you some help . . . he works there . . . Ernie's a sort of handy man . . . whenever a fuse blows out, he goes upstairs and looks around for a live wire . . . Mr. Trauxe of the Soil Mechanics Dept. has an interesting subject in the offing . . . The Physical, Chemical, Dynamic, Hydraulic, Thermic, Biologic, and Pathogenic Behavior and Characteristics of Soil on the Shirt Collar . . . and we can mention many others . . . but now that we have your fertile minds rolling along, we will offer a prize for the best thesis subject submitted during the month . . . just submit your entry accompanied by any buxom blonde (or a reasonable facsimile thereof) and who knows . . . you, too, can be a winner . . .

Preview

next month we shall present . . . a stirring tale of the Northwest . . . Four Nites in a Barroom . . . or . . . the Senior Engineers take an Inspection Trip . . . learn the unadulterated truth of why . . .

did that blonde waitress in Oshkosh pass up all the boys to wait on "Wild Bill" Cottingham? . . .

did Ed Kuenze design a column for that Inn in Chipewawa? . . .

did Carl Hessler rush those rushees at the sorority party? . . .

are the latent mechanicals devising new heat of combustion experiments? . . .

for the answers to these questions and to many, many more, read the next issue of Static and revel in the intimate details . . .

'40 ON THE JOB . . .

(continued from page 18)

FISCHER, JOHN A., is employed by the Danly Company, Chicago, Ill.

FISCHER, RAYMOND C., has a position with Allis Chalmers, LaPorte, Ind.

GRANT, MAURICE E., is with the West Bend Aluminum Company, West Bend, Wis.

GUIS, ROBERT A., is employed by the Standard Oil Company, Chicago, Ill.

HALBERG, ROBERT W., has a position with Chrysler Motor Corporation, Detroit, Mich.

HEGGE, EDWARD N., is employed by Universal Winding Company, Providence, R. I.

HENRY, JACK, is working with the Ampco Metal Company, Milwaukee, Wis.

IMMERFALL, RAYMOND A., has a position with the Wright Aeronautical Corporation of Paterson, N. J.

JANES, JOHN J., is working for the Standard Foundry Company, Racine, Wis.

KETNER, VIRGIL, is an employee of Lockheed Aircraft, Burbank, Cal.

KINAST, ALBERT J., is with Barber-Coleman Company, Rockford, Ill.

LAGERGREN, JONAS M., is employed by the General Electric Company, Schenectady, N. Y.

LARSON, WILLIAM M., Jr., is with Phillips Petroleum, Detroit, Mich.

LEIDEL, FREDERICK O., has a position with Hamilton Propeller, East Hartford, Conn.

LEITGABEL, KENNETH A., is employed by Modine Manufacturing Company, Milwaukee, Wis.

LENZ, ERWIN, has a position with American Locomotive, Schenectady, N. Y.

LOEHRKE, JOHN E., is now engaged in aviation work.

LOSSE, PAUL, has a position with the Connecticut Coke Company, New Haven, Conn.

LOWEY, FRANCIS J., is an employee of the Carbon and Chemical Company, Cleveland, Ohio.

LUTZEN, WILLIAM C., has a position with the West Bend Aluminum Company, West Bend, Wis.

MARSHALL, JOHN M., is with the Hasco Valve and Machine Company, Milwaukee, Wis.

McCUAIG, DOUGLAS E., is employed by Massey Harris, Racine, Wis.

McGRATH, FRANKLIN J., has a position with the American Aluminum Company, New York City.

McNIESH, ROBERT J., is with the Wisconsin-Michigan Power Company of Iron Mountain, Mich.

MERGEN, JOSEPH M., is an employee of Hamilton Propeller, East Hartford, Conn.

METZIG, HARVEY F., is employed by the Jennings Machine Company, Sheboygan Falls, Wis.

MILHAUPT, EDGAR A., is with the Shell Company, Tulsa, Okla.

MORRIS, GLENN L., is with Babcock and Wilcox, Barberton, Ohio.

MULDER, HOWARD M., is with Hamilton Propeller, East Hartford, Conn.

NEWTON, DON L., is employed by the American Aluminum Company of New York City.

PELZ, JOHN, is associated with the Koehring Company, Milwaukee, Wis.

PETERSON, CARL H., is with Phillips Petroleum Company, Detroit, Mich.

PIKE, KENNETH R., is employed by Allis Chalmers, West Allis Wis.

PRESTON, ALBERT L., has a position with Linde Air Products, New York City.

RUTKUS, HAROLD V., is an employee of the Kimberly Clark Company, Neenah, Wis.

SAFFORD, JOSEPH F., is with DuPont in Philadelphia, Pa.

SARAP, OSWALD L., has a position with the Jennings Machine Company, Sheboygan Falls, Wis.



SCHEIN, HENRY, is employed by Allis Chalmers, West Allis, Wis.

SCHWANTES, HERBERT A., is an employee of the Beloit Iron Works, Beloit, Wis.

SENF, JOHN H., is an employee of the Shell Oil Company, Chicago, Ill.

SMITH, HARRY O., has a position with Gehl Brothers, West Bend, Wis.

STIEG, ROBERT W., has a position with Four-Wheel Drive Corporation, Clintonville, Wis.

STUPICH, CHARLES J., is an employee of General Electric, Schenectady, N. Y.

UECKER, EDWARD, is employed by the General Electric Company, Schenectady, N. Y.

VALLIER, RAYMOND G., has a position with the Western State Envelope Company, Milwaukee, Wis.

VOSS, KENNETH J., is with Massey Harris, Racine, Wis.

WITZEL, HOMER D., has a position with Gehl Brothers, West Bend, Wis.

WRIGHT, ROBERT E., is an employee of the Monsanto Chemical Company, St. Louis, Mo.

MINERS AND METALLURGISTS . . .

ALBERS, FRANCIS, is a metallurgist at the Timken Roller Bearing Company, Canton, Ohio.

ANDERES, JOHN R., has a position with the La Salle Steel Company, Hammond, Ind.

BEYER, JACKSON H., is a Research Metallurgist at Battelle Memorial Institute, Columbus, Ohio.

BLACK, ERROLL V., is an employee at the Belle City Malleable Iron Company, Racine, Wis.

DOUGLAS, JOHN E., is with Wisconsin Steel, Chicago, Ill.

GUBBINS, RUSSELL C., is with the Allegheny Ludlum Steel Company, Breckinridge, Pa.

HARVEY, EDWARD J., is a mining engineer at the Braden Copper Company, Rancagua, Chile, S. A.

HILLE, GUENTHER H., is an employee of the Ladish Drop Forge Company, Cudahy, Wis.

HIPSKIND, GEORGE O., is with the Carnegie-Illinois Steel Company, South Chicago, Ill.

KLAPKA, KARL J., is working as Junior Engineer at the Shell Oil Company, Inc., Midland, Tex.

KRENZKE, FRED J., is employed as mining engineer at Cerro de Pasco Copper Corporation, Maracacha, Peru, S. A.

LAYMAN, LAWRENCE P., is Junior Engineer at Shell Oil Company, Houston, Tex.

MELCHER, NORWOOD, is employed by Columbia Steel Company, Provo, Utah.

NEUREMBERG, OSCAR D., is doing graduate work in metallurgy.

OAKLEY, DONALD B., has a position with Bethlehem Steel Company, Bethlehem, Pa.

PRANGE, ROGER W., is working as a metallurgist at Inland Steel Company, Indian Harbor, Ind.

RAESCHEN, FRANK J., is with the Carnegie Illinois Steel Company, South Chicago, Ill.

ROBERTSON, ALMON T., is a Mine Superintendent for the Wright-Hargreaves Mining Company, Kirkland Lake, Ontario, Can.

SCHUKNECHT, GEORGE G., is a mining engineer for Cia Huanchaca de Bolivia, Pulacayo, Bolivia, S. A.

SELTZER, DAVID, is employed by the American Brass Company, Kenosha, Wis.

SPENCER, LESTER F., has a position with the Republic Steel Corporation, Canton, Ohio.

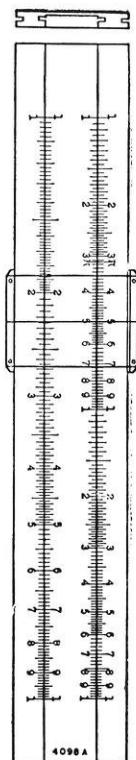
SWANSON, DARWIN E., is a Flying Cadet in the United States Army Air Service, Spartan Air School, Tulsa, Okla.

SWARTZ, GRANT L., is employed by the Ohio Seamless Tube Company, Shelby, Ohio.

SWENSON, WILLIAM T., is a mining engineer for the Walker Mining Company, Walkermine, Cal.

ZAMBROWICZ, JOHN L., is employed by the Cutler Hammer Company, Milwaukee, Wis.

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G-E Campus News



SUICIDE LAMPS

DID you ever take up a newspaper and read that someone committed suicide by jumping off a bridge? That's what high-intensity street lamps have been doing, too—not jumping off bridges, but committing "suicide."

Certain smooth-surface street-light reflectors reflect heat back to the lamp filament, thus raising the filament temperature to the point of early "suicide" or burnout.

In an attempt to do something about this, G-E engineers developed the stepped reflector. The inner surface of the reflector is broken up into small steps in such a way that light and heat rays reflected back from the steps just miss the vital lamp stem. Tests showed that, with a 500-watt lamp, the temperature at the lamp stem was 275 F less with the new reflector than with the old one.

The engineers who developed the stepped reflector are graduates of the General Electric Test Course, open to selected graduates of recognized engineering schools.



CHASING SHADOWS

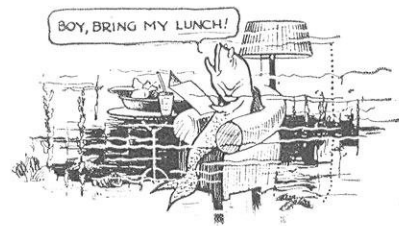
HOW would you like to see carbon dioxide pour out of a beaker and snuff out the flame of a candle, or cold water from floating ice flow to the bottom of a glass? By accident two General Electric scientists recently discovered a comparatively simple way to force these and other ordinarily invisible things to show themselves.

It all began one day when a searchlight shining through the windows of the G-E Research Laboratory at Schenectady, N. Y. started the scientists on an investigation, resulting in

equipment which gives the inside story of supposedly invisible happenings.

By holding transparent substances in a beam of light from a water-cooled mercury lamp, variations caused by changes in the index of refraction show up plainly on a screen. It's something like seeing heat waves rise from a hot pavement in the summer. Gases, liquids, or transparent solids cast strange shadows, revealing characteristics unseen to the naked eye. Although this has been done before with arc lights, the new method has many advantages.

The two G-E scientists identified with this accomplishment are Dr. R. P. Johnson, U. of Richmond, '29, and Dr. N. T. Gordon, Princeton, '13.



PISCATORIAL UTOPIA

INSECT laboratories have been air conditioned, rivets for dirigibles have been refrigerated so they can be driven better, and there is even a case where telephone books have been cooled mechanically to speed the hardening of the glue. But it was only recently that the first automatic heating installation designed specifically for the comfort and health of tropical fish was put into operation.

Devilfish, sharks, rays, the only porpoises in captivity, and thousands of other unusual specimens caper gaily around in their adopted home in the Marine Studios at Marineland, Fla. There, in huge tanks, the pampered fish live the "life of Reilly" (the porpoises are fed by hand) in water that is not only filtered and aerated but is also held at a temperature of 70 F.

Five General Electric oil furnaces do the heating job, holding the 500,000-gallon "oceanarium" at a temperature just like home for the transplanted tropical specimens.

At G.E.'s Bloomfield (N. J.) plant, where air conditioning equipment is manufactured, is a division of the General Electric Test Course. Here young student engineers gain practical experience in this branch of engineering.

GENERAL  **ELECTRIC**