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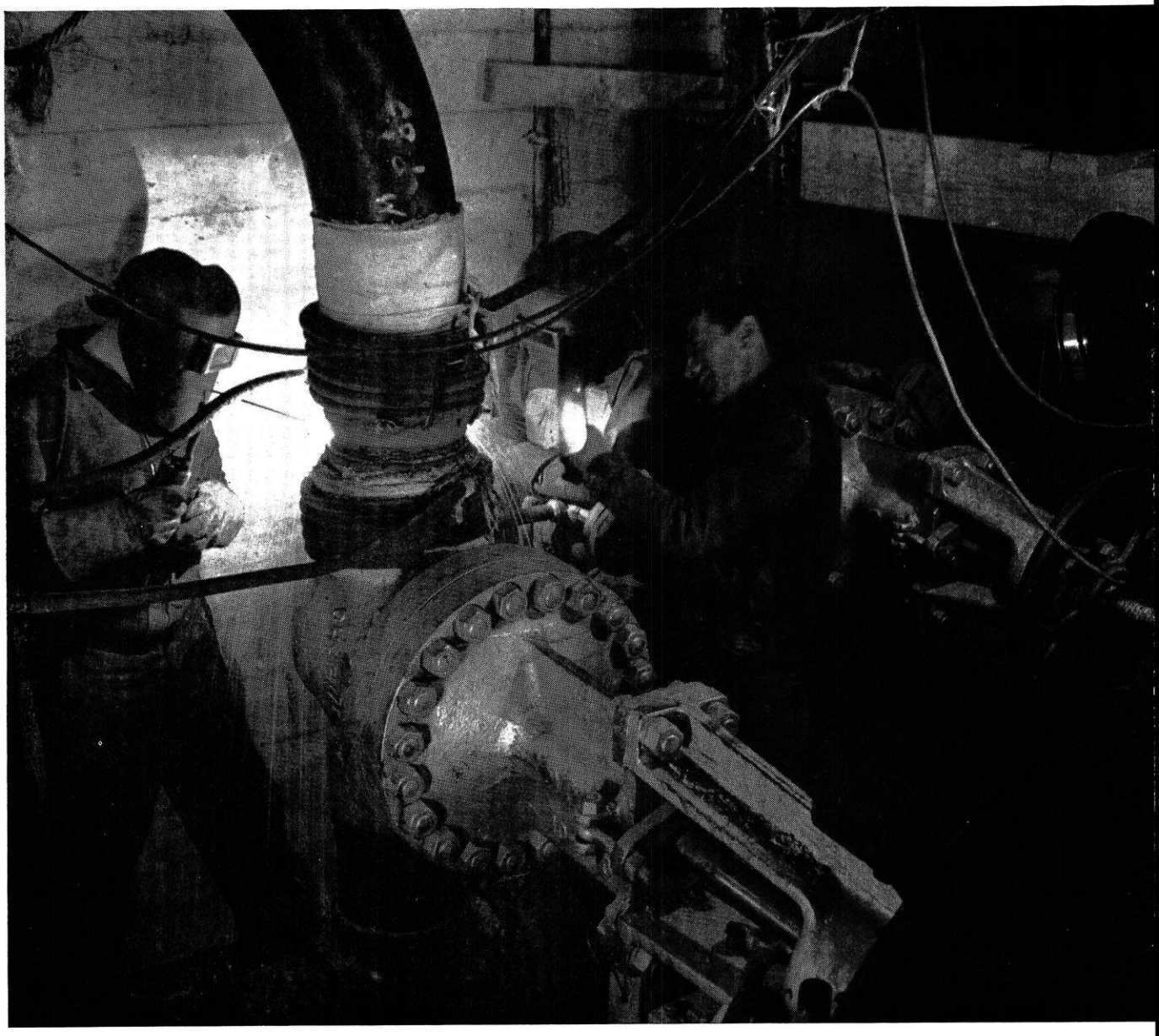
The

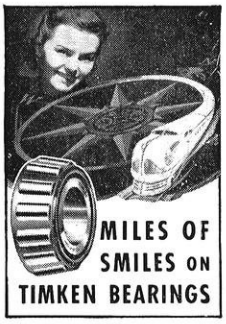
★ WISCONSIN ENGINEER



December, 1940 ★ Observatory Hill ★ Bricks ★ Education Abroad

MEMBER ENGINEERING COLLEGE MAGAZINES ASSOCIATED

HERE'S WHY THE TIMKEN BEARING SUCCESSFULLY MEETS EVERY MODERN BEARING REQUIREMENT . . .



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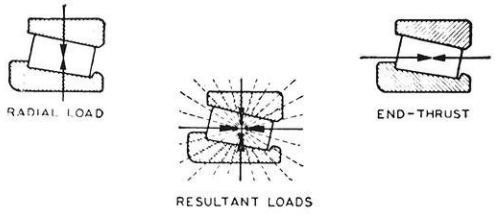
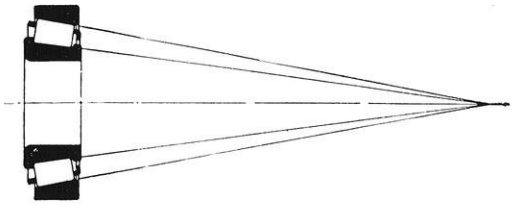
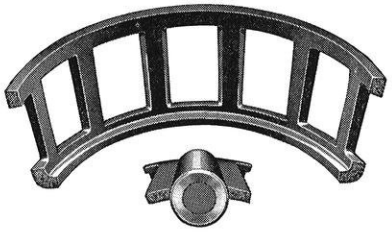


The most important feature of the TIMKEN Bearing is its basic tapered principle, introduced by Timken in 1898 and never superseded. This enables the bearing to carry all types of loads—radial, thrust or both together in any combination —without auxiliary supports of any kind, (such as thrust plates or thrust washers).



To assure true rolling motion and thus provide maximum anti-friction efficiency in operation, the bearing is so designed that lines projected along the tapered surfaces of the rolls and races meet at a common apex on the axis of the bearing.

Rolls are kept in exact alignment with respect to the races by two area contact of the large roll ends with the undercut rib of the cone (inner race).



A scientifically-designed and accurately-perforated cage keeps the rolls properly spaced around the cone so that each roll carries its proper proportion of the load.

For more than 41 years a constant process of engineering refinement has been going on, resulting in the perfected TIMKEN Bearing of today—a product of one of the world's largest and most famous engineering-manufacturing organizations.

THE TIMKEN ROLLER BEARING COMPANY, CANTON, OHIO

Manufacturers of TIMKEN Tapered Roller Bearings for automobiles, motor trucks, railroad cars and locomotives and all kinds of industrial machinery; TIMKEN Alloy Steels and Carbon and Alloy Seamless Tubing; and TIMKEN Rock Bits.

TIMKEN
TAPERED ROLLER BEARINGS

The WISCONSIN ENGINEER

Founded 1896

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Next Month . . .

WELL, freshmen, you've nearly put in your period of apprenticeship, and Dean Goodnight is about to allow you to participate in "outside activities." Many of you have indicated a desire to work on the Engineer staff, so to let you in on the ground floor, we are starting in the January issue the new Freshman Department, "of the Freshmen, by the Freshmen, and for the Freshmen."

It may be well to dwell for a moment upon your doings as staff members. Shortly there will be held the annual Engineer banquet, complete with speeches, party food, and tall stories. There, the Engineer Service Keys will be awarded and the new editors inducted into their important offices. Later you will hear about the yearly trip to the E.C.M.A. convention, this year held at the University of Arkansas.

Also there are scholastic credits; memberships in Alpha Tau Sigma, honorary engineering journalism fraternity; wider acquaintance with students and faculty; chances to learn the inside details of magazine make-up; and a lot of fun to be gained from association with the Engineer.

A general Freshman Get-Together will be held Thursday evening, December 19, at 7:30 in the Engineer office, Room 356, Mechanical Engineering building.

The Cover . . .

WELDING a ten-inch diameter, 0.718-inch thick, carbon-molybdenum steam line in the construction of the recent addition to the generating plant of the Madison Gas and Electric Company. This line carries steam from the newly designed, 200,000 pounds per hour steaming capacity, pulverized-fuel-fed boiler, to the 825 pound, 825°F., 20,000 k.w. turbo-generator unit.

Before a welded joint is started in this carbon-molybdenum material, the pipe on each side of the joint is preheated to a temperature of 600°F. and held at or above this temperature until the weld is completed, by means of coils connected to a transformer. The coils can be seen in the picture.

After the weld is completed the temperature is slowly raised to 1200°-1225°F., and maintained for a period of 1½ hours per inch of thickness of pipe weld. After this time has elapsed, the joint is wrapped with sheet asbestos and allowed to cool at such a rate that the weld reaches room temperature in three hours.

This picture is from the M. G. & E.'s collection showing all the various phases and particulars of the plant construction—used as reference for future work, or, in case of unsatisfactory operation or damage to equipment, to show details of construction.

DIESEL STREAMLINERS

"pH" Control in Clays

by Robert Short, mme'42

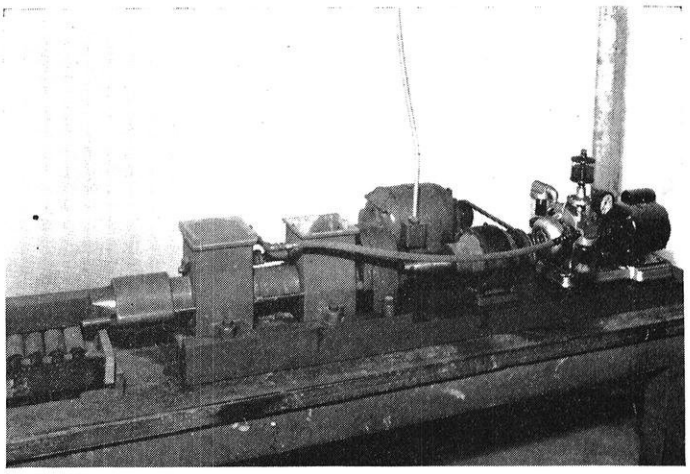
ONE OF the most recent processes developed in the College of Engineering at the University of Wisconsin is the Barker-Truog Process, named after the two men who developed it. Through the use of this process, it is possible to control the hydrogen ion concentration in clays used for the manufacture of brick, tile, and other clay products. This "pH control" greatly improves the workability and other qualities of the clay being used. Sodium carbonate is used as the reagent because it is cheap and effective.

In 1938, after eight years of experimentation, the first commercial test run was made at the Brisch Brick Company plant at Stickney, Illinois. This plant produces 300,000 bricks per eight-hour day. The test was planned so as not to interrupt this production. The reagent feeder was set to deliver the required amount of sodium carbonate and 100,000 bricks were made without interruption of operations. The results of this test were as expected. The plasticity of the clay was increased and the rate of extrusion of the clay column from the brick machine was increased about five per cent. As the brick came from the belt the handlers could notice the difference in it because there was less breakage of the edges in their hands. Since the clay column was now more dense and compact, a slightly higher temperature was required in the drier to dry the brick in the same amount of time. The brick thus treated passed through the drier without cracking and were considerably stronger than the untreated brick. This greater strength is very important since mechanical loaders are used to set the brick into kilns.

Treated brick fired in the same manner as untreated brick have superior color qualities. The treated brick have a better body structure, thus reducing breakage in the kiln. The savings in breakage will nearly pay for the cost of the reagent. The treated brick also have a much lower moisture absorption, which prevents crumbling of the brick.

Prof. G. J. Barker of the mining and metallurgy department, research ceramist, and Prof. Emil Truog of the soils department, soils expert, have developed the process through their work under the auspices of the Wisconsin Alumni Research Foundation. The Foundation is a non-profit organization, with the primary purpose of promoting scientific investigation at the University. Financial support is provided so that inventions of the staff may be developed and patented and offered for public and commercial uses. Revenue comes from the sale of licenses and patents which the Foundation holds. The famous Steenbock Irradiation Process is controlled by the Foundation under this system. The Barker-Truog Process has now been patented and through an agreement the Foundation is allowing the Solvay Sales Corporation to market the process. This company is a commercial chemical manufacturing company and is in a position to give technical assistance in the demonstration of the process to interested companies.

The adjustment of the pH between narrow limits is usually made at the time of pugging. To accomplish this, soda ash is added to the clay before pugging. In the case of naturally acid clays the optimum pH values or points of adjustment fall within the narrow pH range of 6.0 to 8.5. With naturally basic clays, the optimum points of adjustment fall within the pH range of 7.3 to 10.5. Brick manufactured with clay treated so as to fall in these respective pH ranges have practically no laminations, are more dense, have improved color, and have greater transverse and compressive strength.



Model extrusion machine used in the experiment.

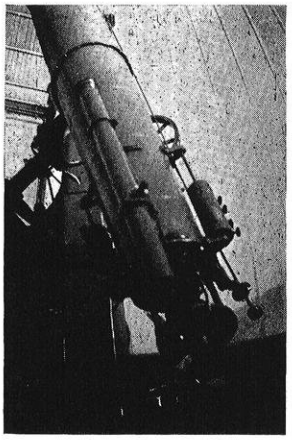
The optimum pH to which a clay should be adjusted by the addition of sodium carbonate may be determined as follows:

A series of twenty-gram clay samples contained in beakers is prepared. To each of these is added fifty cubic centimeters of distilled water, containing varying amounts of sodium carbonate. These amounts vary from 0.1 to 1.0 per cent of the weight of the dry clay. These mixtures are allowed to stand for about 10 minutes, with occasional stirring during this time. Then the pH of the clay suspen-

(continued on page 15)

Exposed! The Facts About Observatory Hill!

A Sixty-Year-Old Observatory Keeps Up-To-Date



by A. E. Whitford
Assistant Professor of Astrophysics

THE WASHBURN Observatory bears the name of the man who provided the funds to erect and equip it. That man was C. C. Washburn, governor of Wisconsin from 1872 to 1874, and a prominent figure in lumbering and flour-milling enterprises of that period. In 1877 he announced his intention to give the money to building an observatory which should have a telescope "equal or superior to that of Harvard University, Cambridge." Mr. Washburn personally selected the site, and construction was begun the following year. The telescope was ordered from the firm of Alvan Clark and Sons in Massachusetts, famed makers of the great telescopes of that day. A few years later they made what is still the largest existing refractor for the Yerkes Observatory, Williams Bay, Wisconsin.

The promise of a telescope 15½ inches in diameter, which was then considered a large one, was sufficient to lure the eminent Prof. James C. Watson from the University of Michigan in the face of higher salary offers. Watson arrived in 1879 and superintended the completion of the observatory and the installation of the equipment. At his own expense he began the construction of a solar observatory. The small stone building down the south slope from the present observatory was a part of it. A heliostat was to be located at the top of the slope and a tile drain pipe, parallel to the earth's axis, was buried in the hillside to carry the light to the instruments below. Unfortunately, Professor Watson died in the fall of 1880 at the age of 42, after he had been here only a little over a year. The observatory was not yet sufficiently completed to be put into regular use. F. D. Winkley, the builder of the orrery for demonstrating planetary motion now displayed in the lobby of the Mechanical Engineering building, was associated with the observatory in its very early days.

The directors who have succeeded Watson have been E. S. Holden, 1881-1887; G. C. Comstock, 1887-1922; and Joel Stebbins, 1922 to the present. In addition to Dr. Stebbins, the present staff consists of the following: C. M. Huffer and A. E. Whitford, assistant professors; S. H. Kalmbach, research assistant; Miss Ione Kulis, secretary.

It was the intention of the founder that the observatory "shall not be merely an ornamental appendage to instruction, but shall be vigorously used in the general interests of science." Accordingly, the observatory plunged directly into astronomical research. In fact, some of the first scientific research on the campus of the University of Wisconsin was that of the observatory. The results won immediate recognition in the astronomical world.

In the days when the Washburn Observatory began its work, the human eye had a very large part in astronomical observations. Accordingly, a great deal of time was spent in surveying zones of the sky to discover previously unknown nebulae and double stars. Observations of the relative separation and angle of double stars were carried on, and the meridian circle was used to record accurately the altitudes and the times of transit of stars as they crossed the meridian. These observations were all of a very high quality and have been used in subsequent years by astronomers all over the world in computing the orbits of double stars and in studying the motions of all the stars relative to each other. S. W. Burnham's name is associated with a long series of double star observations, while that of A. S. Flint is associated with meridian circle work. The observatory also took part in the work of determining the distance of stars by parallax observations. At one time over half of the known distances to stars had been determined at the Washburn Observatory.

As astronomy developed, the human eye was relegated to a much less important place and photography became the principal means of recording observations. Larger and larger telescopes were built and most of these were reflecting telescopes. Furthermore, the emphasis shifted away from the accurate measurement of the **position** of stars to the **analysis of the radiation** of the stars as a means of determining their physical properties. Because the telescope of the Washburn Observatory was a visual refractor with chromatic aberration corrected only for those colors for which the eye is most sensitive, it was not well-adapted to photography, and its limited light-gathering power was a handicap in comparison with larger instruments elsewhere. The result was that the Washburn Observatory found it-

self with a telescope which, while of excellent quality, was of rather restricted usefulness. Nevertheless, the observatory has been able to maintain its respected place in American astronomy because it has pioneered in developing a new field of work. That field is photoelectric photometry. Because no sharp image of the star must be formed on the photoelectric cell as compared with the photographic plate. the chromatic aberrations of the telescope are not serious. This work began here with the coming of Dr. Stebbins as director in 1922. He had previously carried on similar work at the University of Illinois. In the years since, the Washburn Observatory has assumed a recognized place of leadership in this type of work, and the apparatus used here has been copied elsewhere.

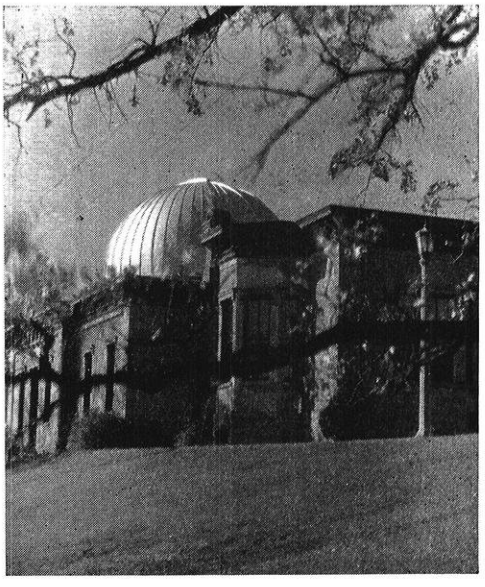
Two main types of work have been carried out with the photoelectric cell. The first of these is the accurate measurement of the brightness of the stars. The class of stars to which most attention has been devoted has been eclipsing binaries. Accurate records of the variation of light during the periodic eclipses permitted the calculation of the linear diameters of stars for the first time. The photoelectric cell is able to give a record considerably more accurate than that obtained by any other method. The second field of work involves the determination of the color of stars by measurement of relative brightness through two colored glass filters. This has proved to be a rapid and accurate method. The principal application has been the study of the reddening of distant stars by interstellar dust. The study has helped to prove the existence of a large amount of material in the universe which is not in the stars but is now known to have a total mass fully as great as that of the stars themselves.

The quantity of light received from a star with a telescope is at best far smaller than that available in the normal applications of the photoelectric cell. The successful use of the photoelectric cell therefore demands careful attention to technique. It is in the first place desirable to have a cell which will give as large a current as possible from a given quantity of light; and second, it is necessary to have a very sensitive method of measuring the extremely small electric currents encountered.

From the beginning of this work the Observatory has carried on continual experimentation looking toward improvement in both of these respects. A small machine shop and an electrical laboratory are maintained for this work. The currents, which range from 10^{-12} amperes down to less than 10^{-15} amperes, are now measured by a vacuum tube amplifier instead of the electrometer previously used. Under the best observing conditions the errors of observations are not very much greater than that set by the graininess of the electricity itself, i.e., there are unavoidable fluctuations caused by the fact that an electric current is not a steady stream but an irregularly spaced procession of discrete electrons. Therefore, not very much more improvement can be expected from experiments on the current-measuring device.

In regard to the photoelectric cells, very little improvement has been made in the last fifteen years. During this time almost all of the technical and industrial application of the photoelectric cell has taken place, but here the need has been for a cell which will give a high response to incandescent tungsten lamps which are rich in red and infrared light, but poor in blue light. The caesium-oxide cell meets this need admirably, and it has found some use in astronomy in spite of certain inconvenient features. But the mainstay in astronomy has been the potassium hydride cell, which has scarcely changed at all since the first one was made by Elster and Geitel in 1888. It is especially sensitive to blue light, in which the stars are rich because they are so hot. Another great advantage is the extremely low dark current. Recently with the advent of the fluorescent light sources and high-pressure mercury arcs which are very rich in blue light, as are the stars, industrial research laboratories have begun to be interested in blue sensitive photoelectric cells.

The exterior appearance of the observatory has changed very little in the sixty years since it began its work. Inside, there have been a few changes. The meridian circle telescope, located in the room at the west end of the building, has been removed and the space converted into a classroom. The telescope tube and objective lens are just as they were when received from Alvan Clark and Sons. A new polar axis, driving clock, and mounting for the telescope were installed in 1933. These were made locally, the machine work being done in the Engineering Shops by O. E. Romare and M. G. Kidder. And, of course, there have been many changes in the attachments to the eye end of the telescope.



The history of the observatory is perhaps a demonstration of the fact that the largest and finest equipment is not always an essential for first-rate scientific work; the resourcefulness and ingenuity of the men doing the work is fully as important. In this respect the Washburn Observatory has been fortunate from its earliest days.

Perhaps in the future the observatory will have to be moved several miles out of Madison for better observation conditions. New buildings mushrooming up on the campus and smoke from the heating station and the Milwaukee Road may prompt a change of location, but with the head start Washburn Observatory has in photoelectric measurements, the future holds no apparent threat to its place of leadership in its field.

ENGINEERING SCHOOLS IN EUROPE

by George Beck, e'41

IT HAPPENS fairly often that some of my fellow students here at the University of Wisconsin ask me about my university experience in Europe, and the result of such a question is usually that I take out the yearbook of my former school in Vienna and look through it again. Whether I wish it or not, it stirs up stories and memories which are now three or four years old. Unwillingly, I also attempt to draw comparisons between an American and a European university, which are as different as night and day. I think it is a good experience to have been able to attend both kinds. Both have their advantages and both their disadvantages. Thinking that some of you might be interested in how a European university is run I am glad to have the opportunity to give you here a short sketch of university life in Vienna—at least as it was until three years ago.

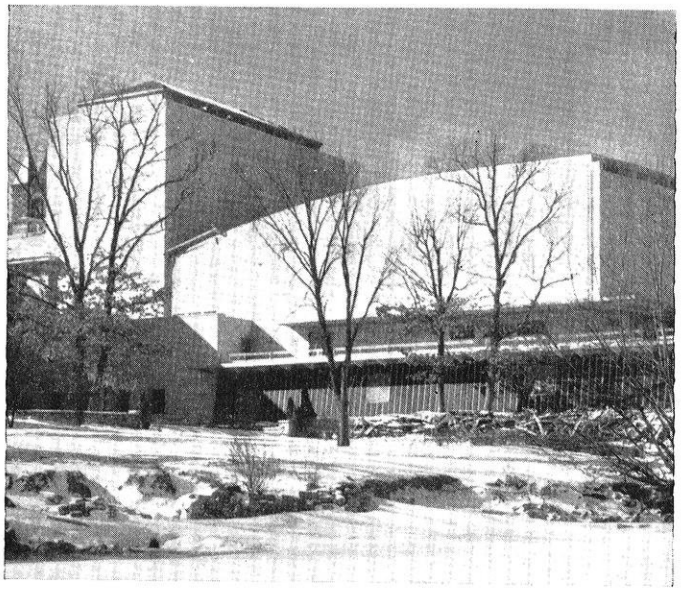
When I speak of "university-life," I frankly mis-speak, because there doesn't exist anything like "university life," as we know it here, in Vienna. Austria was a very small country, with about 6,500,000 people, and the population of Vienna alone was nearly two million. Consequently about 90 to 95 per cent of the students attending the university were Viennese and they lived at home with their parents. Thus the contact with fellow students, such as occurs on any American campus, was almost entirely lacking. It was the usual thing for one to stick with his friends from high school.

Another reason for this lack of student life was the decentralization of the schools of higher learning. When I speak of "university" with reference to myself, I mean the Institute of Technology of Vienna — the "Technische Hochschule." In all of the central European countries, however, the name "university" is used only for a small group of the different fields it is possible to study at an American university, these fields being theology, medicine, law, and philosophy (four of the five "classical" branches of knowledge). All other schools were separated from the real University and had entirely separate governing bodies and administrations. Also the fees differed greatly among the separate schools. Thus we had separate schools of agriculture, music, commerce, fine arts, engineering, and so on. While I don't know the exact figures for the other schools, I know that the University itself had about 10,000 students in Vienna, and the Institute of Technology about 2,000. All of the schools were owned and directed by the state.

In Europe the high school education, which covers eight years (grade school is four years), is so extensive that after one enters one of the schools of higher learning, he doesn't do anything but work in his chosen field. That means, for instance, that a student at the Institute of Technology is not required to take any general subjects, such as languages, philosophy, arts, history, and so on. He works only in his immediate field. But, nevertheless, don't think that such a student will be fairly narrow-minded when he graduates from the Institute. He has already got his general education in high school where he had to take two languages (one for seven and one for five years), natural sciences like geology, botany, zoology, and mineralology for six years, geography and history for eight years, and so on. Besides these subjects we also had several of the more technical subjects to study in high school. For instance, every high school boy, whether he intends to study engineering or not, must know how to differentiate and integrate simple expressions if he wants to pass the requirements in mathematics, which everyone has to take for eight years.

So it may be seen that the background, when one enters the schools for higher education is a pretty thorough one. One disadvantage is that you have to choose immediately the subjects you want to study when you enter these schools and it is very hard to change your course without losing practically all your credits.

In general the study is for eight semesters; however, some of the courses, namely the electrical and mechanical engineering courses, require attendance for nine semesters. After one has finished one of these courses he gets the title "Engineer with Diploma," something which is about equal to a master's degree in engineering. A title of Bachelor of Science in Engineering does not exist. Study can then eventually be continued until one gets a degree of Doctor of Engineering. This study is similar to corresponding study in America.



"University life, as we know it here, does not exist in Vienna . . . "

• George Beck came to America from Austria in December, 1938, and to the University of Wisconsin six weeks later. With only slight previous knowledge of English, he has done rather well here, this article being a good example. Incidentally, he wrote it while the rest of the Electricals were on their Senior Trip, because, although George has his first citizenship papers, he is still classed as an alien, and was not permitted to go along. Scholastically, George has done all right, too—having r e c e n t l y been elected to Eta Kappa Nu, honorary electrical engineering fraternity. He is an expert skier and is prominent in the University Hoofers, where he puts his skiing experience in the Austrian Alps to good use and gives instruction in skiing—sometimes to the pretty girls—but you'll have to ask George about that.

The curriculum in each of the departments is laid out in such a way that in the first two years, mainly theory is presented without much laboratory work, while during the rest of the study period, mainly practical experience is obtained and each one can choose more or less his own field of interest, in a manner similar to our system of free electives.

Now I come to a point which readers of this article should find unusual in the light of procedure here—and that is that there doesn't exist anything like quizzes or mid-semester exams. There is only a final exam and this can be taken any time after the end of the lecture series in the specific course. If one flunks such an exam, there is a possibility of taking it over again three months after the flunk. Many departments, however, don't keep this rule and it is often possible to take the exam over again after a period of a week or two.

To some of you this method might seem to be pretty good, but unfortunately we know only too well that without some compulsion we don't do our work on time. And that is exactly the thing which happens to the majority of students in Vienna. They take it easy, have fun, and don't take any exams, and consequently they fall behind in their work. So it often happens that a student goes to the university for eight years before he graduates—not because he flunks so many exams, but because he takes it too easy and doesn't get enough work accomplished.

The exams are usually very hard. They consist of a written exam and an oral exam. If one doesn't pass the written exam, he cannot take the oral. On the other hand, no great importance is put on the written exam, and usually the oral decides the grade. In most of the courses, one has to know, besides how to work problems, the most complicated derivations, and in the oral exams usually nothing but theory is asked. To study for such an exam takes from about three weeks to two months, depending on the exam. The reason for this is that, although the credits for each course are about the same as here in America, there is much more material taken up in each lecture and the instruction proceeds very fast.

Another "wonderful" feature which results in falling behind in the work, is that no home work is given. On the contrary, it is very seldom possible to find any problems in the line of the things taught in the course, since there are no text books. In the few "comp" sections existing, the instructor usually works problems on the board, without giving his students any opportunity to ask questions, and the students just copy the problems—and often don't understand them.

Contact with the faculty hardly exists at all, which is, I would say, very undemocratic. It is hard to talk to the professor himself, usually only the assistant being available for questions—and only too often he can't answer them. The professor naturally never knows any student by name, because he just lectures in front of the class without calling roll or asking any questions, so that it would be impossible for him to get acquainted with the names of his students. Usually the audience in such a class is from 150 to 200. The comp sections have the same size and are generally, as mentioned before, carried through just like any lecture.

There is no attendance requirement for the lectures and only too many students take advantage of that—instead of going into class, they just have fun some place else (a condition which, I understand, is not entirely non-existent here). The result is easy to imagine. However, for this kind of student there exists another school—a private, tutoring school where students are continuously prepared for their exams without actually understanding what they are doing—they just memorize or "cram." Often the rumor went around that some of the classes of that school were better attended than the actual lectures. Anyway, Mr. Vogel, the director of this tutoring school, had more fame than some of the professors—at least among the students.

For many of the students the university time is vacation time. For in addition to not attending lectures and not taking exams, there are plenty of official vacations—three weeks Christmas vacation, three weeks Easter vacation, and a week vacation between semesters, besides summer vacation from July 1 to October 15, not including holidays. And if this doesn't sound like enough, here is the vacation schedule of the University itself (not the Institute of Technology): three weeks at Christmas, two weeks between semesters, six weeks at Easter, and summer vacation from June 15 to October 15 . . . Who wouldn't like to go to a University like that?

Perhaps you wonder about the results of such a system of handling school. There are actually only few who ever graduate, because the courses are hard and the compulsion lenient. The result is that one must have a great deal of self-control to devote himself to school work to the extent which is actually necessary. On the other hand, for those who finally finish their university study the competition is less, so it is a question of whether this method of selection, which at first seems to be pretty bad, isn't a better training for future life than if the professor always stands at your back and urges you to hand in the report on time or do the assigned homework. Concerning myself, I always need something to keep me down to work and to keep fun in its proper proportion. Knowing both schools, the one in Vienna and the one in Madison—if I am asked to choose—I choose Madison.

Miller

Choren

Fluck

Werren

Presenting the

Honorary Fraternity Presidents

PI TAU SIGMA

President of Pi Tau Sigma, the honorary mechanical engineering fraternity, is affable "Tony" Choren. The amount of drive and push that he possesses is evidenced by the fact that he is rushing through the stiff Mechanical Engineering course in three and one half years. Tony finds that earning 50 per cent of his school expenses is no hindrance to scholastic work.

Before coming to school, he took a drafting apprenticeship at the Allis-Chalmers Corp., but he was able to foresee the importance of technical training and came to the University of Wisconsin. During the summers, Anthony has worked as a filling station attendant, as stockroom manager of a dime store, and as a painter. Machine shop and thermodynamics are his favorite subjects; tinkering around machinery and reading are his favorite pastimes. The A. B. Dick Company of Chicago recognized a good find, and Anthony has reciprocated by accepting this firm's attractive offer, starting work after graduation this February. In his leisure, Tony patronizes a certain dark eyed Irish lassie who is reputed to be a "very luscious lovely."

CHI EPSILON

Fred Werren, from Blue Mounds (one of the high points of the state), known as "Fritz," is president of the Wisconsin chapter of Chi Epsilon, national honorary civil engineering fraternity. His record is one to be envied, for, in addition to his Chi Ep office, he is a member of Pi Mu Epsilon, math society, the American Society of Civil Engineers, and the House Presidents' Council. While participating in these activities, Fred has earned more than three-quarters of his college expenses.

Before coming to Madison, he was employed by the home office of the Metropolitan Life Insurance Company, remaining, for the most part, in the realm of secretarial work. He has no particular hobby, other than dancing, but is very much interested in entering the field of personnel management after graduation—provided the Army does not get him first, for his draft number is rather low. But we wish him luck in whatever he does.

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TAU BETA PI

Paul Fluck, president of Tau Beta Pi, honorary engineering fraternity, is one of those few students who can be a B.M.O.C. and still maintain a 2.9 grade point average.

Paul is the son of the pharmacist at Algoma, Wis., where he graduated from high school. His choice of civil engineering was made because of its wide general scope and now Paul finds that mechanics and structures are the most interesting subjects for him. Because of his native ability, training, and fine personal qualities, Paul at present has the distinction of being the holder of a year's scholarship from the Wisconsin Alumni Research Foundation. Earning about one half of his expenses while attending school and the remainder by doing summer work, he is practically self-sufficient. In addition to this work, he is also a member of Chi Epsilon, A.S.C.E., and the Polygon Board. His leisure is spent with the girl friend. He was promotion chairman of the recent successful Polygon dance.

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ETA KAPPA NU

Eta Kappa Nu, honorary electrical engineering fraternity, claims as its president a man of wide industrial experience. Dan Miller, after graduation from Washington High School in Milwaukee, worked two years for the Milwaukee Electric Railway and Light Company and for five years at the Milwaukee bulk plant of the Cities Service Oil Company. While working he saw the importance of a technical education and took a five year evening course at the Milwaukee Vocational School.

At school Dan is a "regular guy" and is well liked by all who know him. He earns 100 per cent of his expenses by working in the Electrical Standards Lab and by teaching in the Dynamo Lab. During the summer, he worked at the Barber-Colman Company at Rockford, Ill., doing electrical research work. Dan is interested either in teaching or becoming associated with a large company where he can take a student test course. His chief dislike about the College of Engineering is that the regular courses take so much time that it is impossible for a student to pursue his own special interests.

Some 21,500 cars and trucks are in regular day to day service with the Bell System. The great majority have bodies specially developed by telephone engineers. Many are equipped with power winches, air compressors and pole derricks. Each of the many types is designed to handle particular functions in the construction and maintenance of telephone plant.

Planning, purchasing and operating the world's largest fleet of commercial motor vehicles is a big job in itself.

Yet it is but part of the far bigger job: providing the finest, fastest, friendliest service to the millions who daily use the telephone.

ALUMNI NOTES

by Joe Keating, min '41

NATIONAL METAL CONGRESS AND EXPOSITION

Wisconsin engineering graduates and faculty played a responsible role in the twenty-second annual meeting of the National Metal Congress and Exposition held under the auspices of the American Society for Metals.

Professor Oesterle, chairman of the department of mining and metallurgical engineering, who was elected chairman of the Milwaukee chapter A.S.M. last spring, jointly supervised a symposium on Surface Treatment of Metals.

Donald B. Oakley, a graduate in mining and metallurgical engineering, who has been engaged in metallurgical research under Professor Oesterle, presented in conjunction with the latter, a paper entitled "Dilatometric Studies in the Transformation of Austenite in a Molybdenum Cast Iron."

Prof. R. A. Ragatz of the department of chemical engineering presented a paper in conjunction with M. Sutton of the Standard Oil Co. of Indiana entitled "Factors Affecting the Activity of Carburizing Compounds."

It has been the custom in the past for many universities to hold meetings of their alumni during one day of this week. The University of Wisconsin's group got together for the first time this year on the invitation of Professor Oesterle. Those present were: David Zuege, 1920, technical director, Sivyer Steel Casting Co., Milwaukee; Thomas G. Harvey, M.S., 1940; M. A. Schil, 1927, research metallurgist, A. O. Smith Corp.; Dr. L. W. Eastwood, 1929, research metallurgist, Aluminum Co., Cleveland; R. A. Grange, 1935, research metallurgist, U. S. Steel Corp., Kearney, N. J.; Waldemar Naujoks, 1926, chief engineer, Steel Improvement and Forge Co., Cleveland; D. E. Krause, and wife, 1929, research metallurgist, Batelle Memorial Institute; Dr. P. T. Stroup, 1929, Aluminum Co. Research Lab., New Kensington, Pa.; Hugo Hiemke, 1926, welding engineer, Navy Department, Washington; J. Fletcher Harper, director of engineering, Globe Union, Inc., Milwaukee; Dr. M. D. Harbrough, vice-president, Lake Superior Iron Ore Association, Cleveland; Dr. C. H. Lorig, supervising metallurgist, Battelle Memorial Institute; Fred Webbere, senior, Department of Mining and Metallurgical Engineering; R. S. McCaffery, Madison; and Julian Conover, American Mining Congress, Washington.

There was unanimous accord for this meeting which brought together both old and new alumni, and strong sentiment was expressed for future meetings.

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Chemicals

LARSEN, B. M., '21, is with the research laboratory of the U. S. Steel Corporation, Kearny, New Jersey. He was author of an article "Temperature Measurement With Blocking Layer Photo-Cells" in Journal of Applied Physics, August, 1940.

WILLE, CLARENCE, '22, is superintendent of drying with Benson Knitting Company, Rockford, Illinois. He presented a paper with Archie Alexander of the Phoenix Knitting Company at the New York American Association of Textile Colonists and Chemists entitled "The Split Bath in Silk Hosiery Drying."

HANSON, MERRILL, '23, is in charge of production concerning the deposition of rubber from latex with American Anode, Inc., at Akron, Ohio, a subsidiary of the Goodrich Rubber Company.

HOFFMAN, R. E., '38, who was previously with the South Carolina plant of Southern Kraft is now employed in the research laboratory of American Steel Foundries, East Chicago, Indiana.

Civils

The Wisconsin section of the American Water Works Association, at its meeting in October, elected **JEROME C. ZUFELT,** '26, vice chairman, **OSWALD J. MUEGGE,** '23, director, and **LEON A. SMITH,** '12, secretary-treasurer. **LOUIS R. HOWSON,** '08, was the principal speaker at the meeting.

MENDELSOHN, ISADOR W., '17, is in the Q.M.C. of the War Department at Washington, D. C., in charge of the subsection on the design of sewage treatment plants.

BENNETT, PROF. J. GARDNER, '18, accepted a teaching position with the Robert College at Istanbul, Turkey.

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Electricals

BARTEL, AUGUST O., '34, has a position with the Automatic Products Company in Milwaukee. He is engaged in development work in the engineering department.

SOULE, JOHN W., '35, is with the Wisconsin Public Service Corporation in Green Bay, Wisconsin. His work is engineering calculations and drafting.

WELKER, OSCAR L., '36, is getting married in January, 1941. He is working in all departments of the Connecticut Coke Company in New Haven, Connecticut as a cadet engineer.

BERG, ROBERT H., '38, is with Scientific Lighting, Inc. as a sales engineer. He spent two years with General Electric, and was assistant manager of the G.E. exhibit at the San Francisco Fair.

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Mechanicals

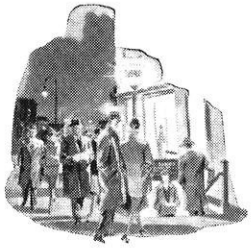
Employed as field engineers with the Shell Oil Co. are **R. M. LEY,** '34, in Detroit; **L. S. NIKORA,** '36, and **J. P. THOMAS,** '36, in Chicago; and **J. M. VAN VLEET,** '36, in Milwaukee.

SLEZAK, JOHN, '23, was recently elected president of the Turner Brass Works in Sycamore, Ill. He has been vice president and general manager of the concern since 1931.

BENFER, MAURICE, '27, visited the campus in October on his way to Burbank, Calif., to take a position in the industrial engineering department of the Lockheed Co.

JORGENSON, GERALD A., '31, is assistant chief engineer for the Schulz Baking Co., Chicago. He was formerly with the Phoenix Hosiery Co., Milwaukee.

The Finest Seats – 5 CENTS!



RECENTLY subway riders in New York were introduced to the latest development in car seat covering materials—woven plastic. This new material results in seats that are the last word in comfort, cleanliness, and durability.

A special type plastic, produced by Dow and marketed under the trade name *Saran*, is extruded in rattan-like strips and then woven. The advantages of this seat covering material are numerous.

It is tough and long wearing—cleans readily and thoroughly—will not crack or splinter—possesses the attractive, gleaming characteristic that makes plastic materials so popular.

Only those confronted with the constant problems of public transportation maintenance can fully appreciate the decisive value of such a development. Car cleanliness is a major objective. Former types of seat coverings, only partially resistant to absorption, soon became objectionably soiled and were beyond cleaning.

Saran, possessing all the non-absorptive characteristics of plastics, suffers only surface soiling and is readily cleaned.

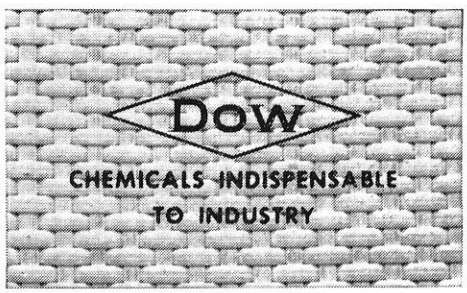
Wearing quality and resistance to breakage are other important factors in public transportation seating. Here, also, *Saran* is definitely superior to previous materials, giving not only long, economical service but avoiding such difficulties as damage to passengers' apparel, particularly hose.

Undoubtedly, this new advance in seating will be eagerly employed in all types of public transportation—also in theatres and restaurants.

Dow, through its research and development work, is happy to be identified with this new application of plastics in the betterment of public service.

THE DOW CHEMICAL COMPANY, MIDLAND, MICHIGAN

Branch Sales Offices:
New York City—St. Louis—Chicago—San Francisco—Los Angele.—Seattle



ON THE CAMPUS

with Bob Diehl, e'43

ENGINEERS SWING OUT

Just to prove that engineers aren't a bunch of slip-stick slaves all of the time, the boys got together Saturday night, November 30, and held quite a dance. Gliding e v e r so lightly across the floor of Great Hall, to the delightful strains of Dick Harris' orchestra, the Electricals, the Mechanicals, t h e Chemicals, the M&ME's, yea, and even some lowly Civils had the time of their social life. Spirits ran high both in Great Hall and in the Rathskeller, between dances. In fact, during one intermission, a few Triangle troubadours and dates tried hard to tell the rest of the dancers just what type of engineers they were — Georgia Tech style.

King Ray Erickson and Ruth Vinger

Even the band entered into the spirit of the affair, being dressed in the fashionable engineering tuxedo —patchy p a n t s, no ties, and old shirts. But a real range of clothes was observed on the dance floor, going from sweater without tie, to tux with tie. The decorations were impartial, with each school having a display. Best one was that of the Civils', depicting some transit tinkerer surveying various curves and profiles.

But the real hit of the ball was that little lady from way down Argentine way — Maria Louisa Huertado Delgado. Maria Louisa danced the Argentine tangos in her own inimitable style, and captured many yound lads' hearts with her sirenish swirls. Sidelight attraction was "Professor" William Erin lecturing on the culture and geography of Argentina; and of his search to find his friend Franz Heifel.

A swell dance, fellows, and let's have more of them. We'll show the University we can cut a mean rug, same as the Loaf and Smoke college.

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CHI EPSILON HOLDS ITS INITIATION BANQUET

Chi Epsilon, national honorary civil engineering fraternity, held its semi-annual initiation banquet in the Beefeaters room of the Memorial Union on Wednesday evening, November 27. Newly initiated members are Harry Clarke, ce4, of Wauwatosa; G e r a l d Fintak, ce4, of Oshkosh; Robert Hogensen, ce4, of Watertown; Fred Bertle, ce3, of Milwaukee; and M e l v i n Ree, ce3, of South Milwaukee.

On the program were L. K. Astell, of the State Highway commission, who was toastmaster; Fred Werren, president of Chi Epsilon, who gave the President's Welcome; H a r r y Clarke, who gave the Response for Initiates; and Prof. Glenn T. Trewartha, professor of geography, who talked on "The Far East, Its Resources and Problems."

The local chapter was represented at the bi-annual conclave held at the University of Iowa, Iowa City, on December 13 and 14 by Fred Werren, Don Curry, Melvin Ree, Glen Finner, and Instructor Ray Voelker.

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KAPPA ETA KAPPA

Friday the 13th seemed to mean nothing to the Electricals of Kappa Eta Kappa, for on that night a very enthusiastic group of actives ushered ten new men into the fraternity. This informal initiation at the chapter house included the following Electricals:

Bernhard Hanson, Garth Heisig, Joe Kelar, Hugo Logemann, Leonard Hesse, Edward Lundberg, Donald Reek, William Schink, and Leon Smith.

On the following evening, Saturday, the 14th, the banquet and formal initiation were held at the Loraine Hotel. A representative group of alumni from Milwaukee, Madison, and the surrounding areas attended.

The national convention of Kappa Eta Kappa was held at Kansas University November 22 and 23, and was well attended by representatives from the various chapters. Our Delta chapter sent six active members, who were the guests of the Gamma chapter during the convention. LeRoy Day, Lester Elmergreen, Homer Schneider, Bob Miller, Bob Krohn, and John P. Eising made up the Wisconsin group that left on the 21st for Lawrence, Kans. The boys reported that, fraternally speaking, a profitable time was had by all. In fact, some of the fellows are already making plans for next year's convention, which is to be held here.

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TRIANGLE INITIATION

On November 17 the following men were initiated into the active chapter of the engineering social fraternity, Triangle: Edward Bosley, Harold Holler, Robert Wicen, and Douglas Bainbridge. Toastmaster W. S. Kinne conducted the initiation banquet and the address was given by Professor Shorey.

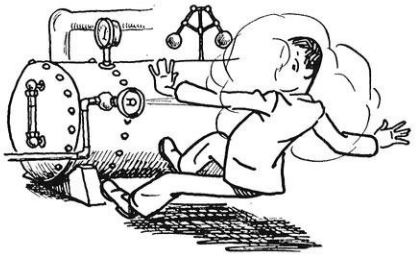
FOOTBALL

While Paskvan, Tennant, and Gage were the more glittering stars, the engineers of the team did their part in showing that Wisconsin spirit to football fans of this and other states.

The football engineers were Fred Ladewig, e'42, from Washington High in Milwaukee; Edward Halamka, e'43, from South Division of Milwaukee; Harry Harter, me'43, from Colby; and Pat Lyons, m&me '43, from Horicon. Since most of these are sophomores returning next year, it is evident that the plumbers will continue to make the Badgers go in 1941.

SLIGHT ACCIDENT

It occurred on Wednesday, December 4th. E. T. Hansen, steam and gas instructor, was testing a White and Middleton engine when the thing happened. The engine had slowed down for some reason, which turned out to be an accumulation of the unburned fuel gas in the cylinder. When Mr. Hansen peered into the engine and applied a spark again, the mixture exploded in his face. He was scorched and singed on the head, but fortunately escaped serious injury.



Devotion to duty brought Mr. Hansen back to his classes without hospitalization delay, but with a salved face and minus some essential hair.

A.S.C.E.

Nov. 22—A dancing party held in the Union.

Dec. 12—Regular program meeting in the Hydraulics lab.

A.I.E.E.

Dec. 12—Adoption of new constitution and by-laws, election of new chairman and vice-chairman, talk on the "Novachord" by Elmer Scheibe, and a General Electric movie.

A.I.Ch.E.

Dec. 11—DuPont movies were shown in the Play Circle of the Union and a new constitution for the organization was adopted.

A.I.M.E.

Nov. 28—Afternoon business meeting at which plans for the Christmas meeting were made and a discussion of the national student organization was held.

Dec. 11—Christmas Banquet.

S.A.E.

Dec. 2—Arthur Nutt, national president, spoke at two meetings in the Union Theater.

"STATIC"

with Nathan Itzkowitz, c'41

THE HEATING STATION . . .

experiment was carried out last week with its usual finesse and accuracy . . . as is usually the case, the civils carried the brunt of the work with the mechanicals and the electricals performing the more menial tasks . . . Leo Jeselson was a mighty disappointed lad . . . he had the "shoveling ashes" shift during a shovel-less period . . . Ed Ryan looked like a minstrel man . . . he was rubbing noses with a coal bunker all nite . . . Ryan had to go over to the B. T. to wash off . . . we tried to get Ed Kuenze to climb into one of the boilers, but after glancing at Ed's perifery and measuring the area of the door, the project was dropped as not being feasible . . . at the end of the test, Spencer Olson, Bob Hogenson, Maxie Pollack, and yours truly adjourned to the Campus to start our computations !!! rest our weary bones . . . and . . .

•

WE HEAR . . .

that Dave Miller still thinks that a salami is a person who tells fortunes and does tricks . . .

that Joe Keating is considering working in a spaghetti factory . . . well, that is one way to get all tangled up in your work . . .

that George Kuetemeyer is trying to work up an exchange agreement with the La Parissien Nights magazine . . . best of luck, George . . .

THE ELECTRICAL ENGINEERS' COED OF ETHICS . . .

when she is sulky and won't talk . . . they **exciter**
if she gets too excited . . . they **controller**
if she comes halfway . . . they **meter**
if she comes all the way . . . they **conductor**
if she wants candy . . . they **feeder**
if she gossips too much . . . they **regulator**
if she is all wrong . . . they **rectifier**
if she wants to be an angel . . . they **transformer**

•

A hug is energy gone to waist.

•

In Scotland, a dead-end street is one with a toll bridge at the end.

•

BEWARE . . .

of that collapsible chair in Room 323 . . . see Marv Weller or Jimmy Vollstedt for further details . . .

•

POME

There was a little dachshund once
So long he had no notion
How long it took to notify
His tail of his emotion.
And so it was that while his eyes
Were filled with woe and sadness,
His little tail kept wagging on
Because of previous gladness.

•

LUCKY INDEED . . .

are the gentlemen who have girl friends living in town . . . a confidential source informs us that when Melvin Ree's girl friend's father wants Mel to leave . . . he casually walks through the parlor with a box of breakfast food in his hand . . .

(continued on page 16)

"pH" Control in Clays---

(continued from page 3)

sion can be determined with the glass-electrode electrometer. The pH values are plotted on the vertical axis and the corresponding percentages of sodium carbonate added are plotted on the horizontal axis. A portion of the curve usually flattens out rapidly and becomes practically horizontal. The range of this portion of the curve is the optimum pH range.

To compare the results of the treated and untreated clays, a small extrusion machine was built which would make small brick or tile specimens. With this machine it was possible to study the laminations in the brick, the power necessary to force the clay through the die, and the general workability of the clay. It was found early in the experiments that the addition of a small amount of sodium carbonate to the clay improved the workability of the clay and reduced the power used in extrusion, and produced a finer structure in the finished ware.

A large number of clays from all parts of the United States have been tested in the laboratory and all have responded satisfactorily to the treatment. Industry has been quick to realize the ability of the process to enable them to make a better product. Several additional commercial tests have been made with the desired results. The process will undoubtedly find widespread use now that it is on the market.

STATIC... CHRISTMAS GREETINGS . . .

to everybody and we hope Santa Claus brings everyone his most wanted gifts . . . and to the following . . .

about two days warm weather for those lads who are still running around outside with a level . . . you fellows ought to know that Prof. Owen is darned accurate in his weather predictions . . .

to Prof Kinne . . . a box of big black cigars

to the Hydraulics Lab . . . a new floor

to Mr. Cromer . . . a class of civils with more of an aptitude for S. & G.

to Prof Cottingham . . . a bowling average of more than 105.

to Mr Peters . . . a torch (singer) . . .

Wisconsin Engineer—an NYA girl to do the staff typing . . . yes, we said typing . . .

Bob Borkin . . . a girl friend.

anyhow a Merry Holiday to all our readers and a very happy (but not too hilarious) New Year!

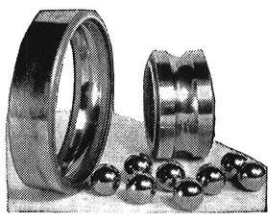
•

WORST PUN OF THE MONTH . . .

speaking of heating stations, I wonder if the steam said to the boiler as it flowed out . . . well, I'll B T'ing U . . .

EVERYONE knows this inevitable result of Wear due to friction. Yet . . . the sliding, scuffing contact of countless feet on granite is as nothing in wear potential compared to the contact of metal on metal—in modern machinery, under heavy loads, at high speeds.

During the useful life of an ever increasing number of modern machines, the bearings make millions or even billions of revolutions. And these machines stand up! For friction is practically eliminated in the ball bearing as perfected by New Departure, and Wear is less than in any other type of rolling bearing.

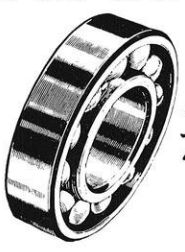


. . . and still going!

In this New Departure ball bearing, which had made 35,000,000 revolutions under load, the original finish was perfect and Wear for all practical purposes was not measurable. Think what that kind of "wear prevention" means in lower maintenance and longer machine life!

ENGINEERING STUDENTS: For interesting brochure, "How Wear Wore Itself Out," write to New Departure, Division General Motors Sales Corporation, Bristol, Conn.

NEW DEPARTURE



BALL BEARINGS

Nothing Rolls Like a Ball

G-E Campus News

MICROANALYSIS

IN ordinary chemical analysis, where material is plentiful, the work is done on a scale most suitable for obtaining the results sought. Samples are relatively abundant; they may be used prodigally.

Not always, however, is the material for test so plentiful. The General Electric Research Laboratory at Schenectady, N. Y., handles the exceptions with its facilities for "microchemistry," in which the amount of test material available controls both the scale of operations and the strategy of attack. Microanalyst Charles Van Brunt, Harvard, '92, of the laboratory staff is prepared to test material whose limit in smallness is set only by the refinements of manipulation attainable under the microscope with the aid of a "micromanipulator."

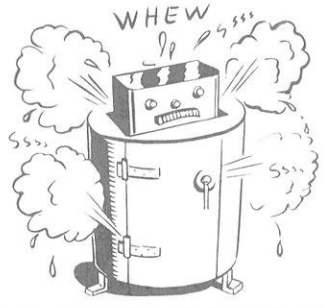
Seldom does Van Brunt attempt to identify or classify materials in solution volumes less than a cubic millimeter (about the size of a pinhead). But to analyze an ordinary drop, as delivered from a medicine dropper, is comparatively coarse work for him—near the upper limit of the true microchemical range.

FROZEN LIGHT

THE "late" Baron Munchausen was accredited (by himself) with incredible feats among which was freezing the ring of a bell. Recently, however, General Electric Research Laboratory scientists at Schenectady, N. Y., outdid the Baron by freezing light.

In producing this frozen light, G-E scientists submerged fluorescent plates in a large thermos bottle of liquid air with a temperature of 320 degrees below zero. The bottle and the plates were then bombarded by x-rays, exciting the atoms of fluorescent material on the plates literally freezing them stiff. When the plates were removed and allowed to warm up, they glowed with all the colors of the rainbow.

A "bottle" of frozen light was sent to East Orange, N. J., where it was unveiled in connection with the ceremonies marking the premiere of the motion picture, "Edison, The Man."



RADIO TURKISH BATH

RATS and moisture seem to be the two chief enemies of radio sets in the tropics. A letter from the Belgian Congo testifies to the rats; the evidence for the humidity is already ample. Except for recommending traps, there is little the General Electric Company can do about the rats, but the study of humidity is right up its alley since G-E engineers at Bridgeport, Conn., have built a humidity chamber capable of reproducing the weather conditions of the tropics.

Lamps under water tanks provide humidity by vaporization, and generate enough heat to maintain a temperature of about 100 F. Humidity and temperature are controlled by time clocks outside the sealed chamber, while uniform weather conditions are maintained within the chamber by circulating fans.

Radio receivers placed in this room are continuously subjected to conditions far more severe than those of the tropics until failures occur in the sets. In this way, young engineering college graduates enrolled in the G-E Test Course gather data which contribute to the improvement of radio, not only in the tropics, but everywhere that radios are used.

GENERAL ELECTRIC

953-9