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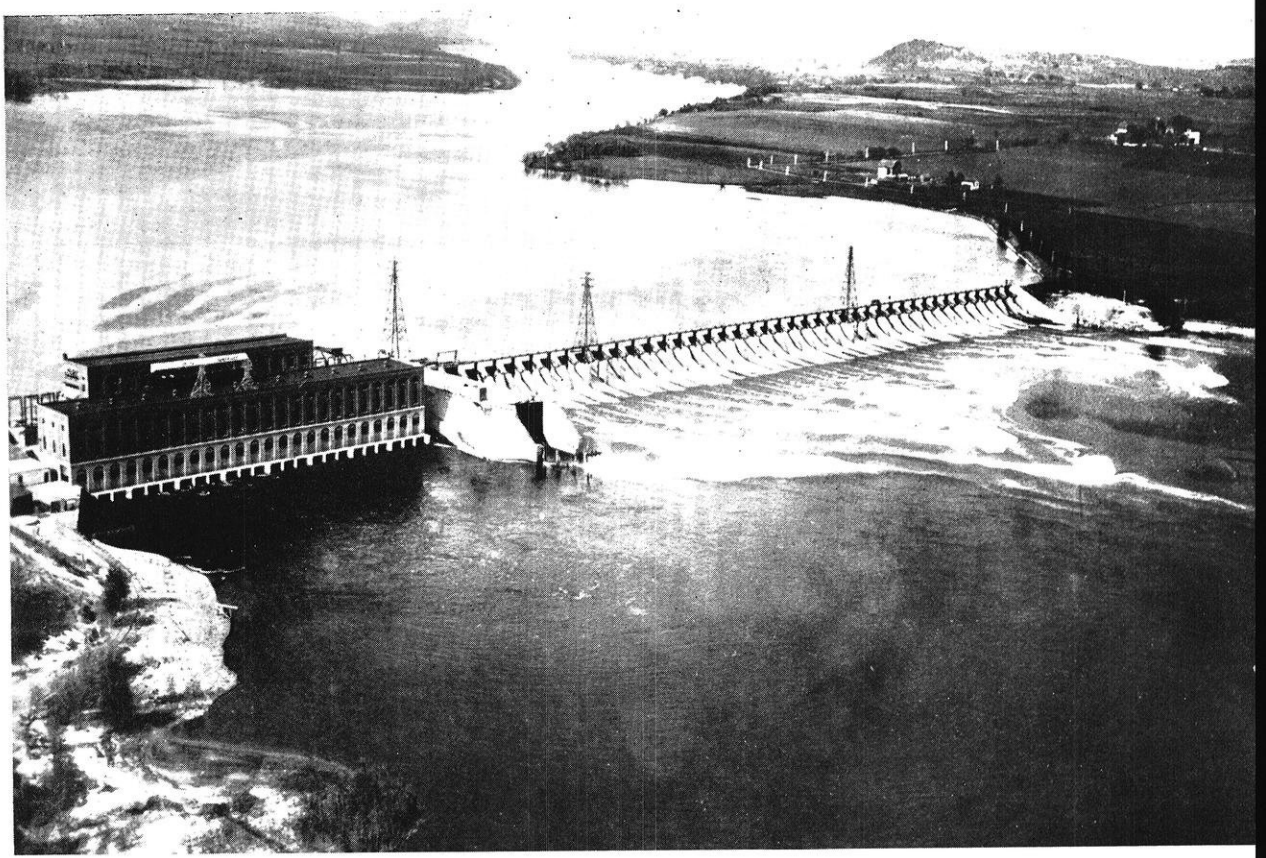
THE WISCONSIN ENGINEER



« MEMBER »
E. C. M. A.

NOVEMBER
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The WISCONSIN ENGINEER

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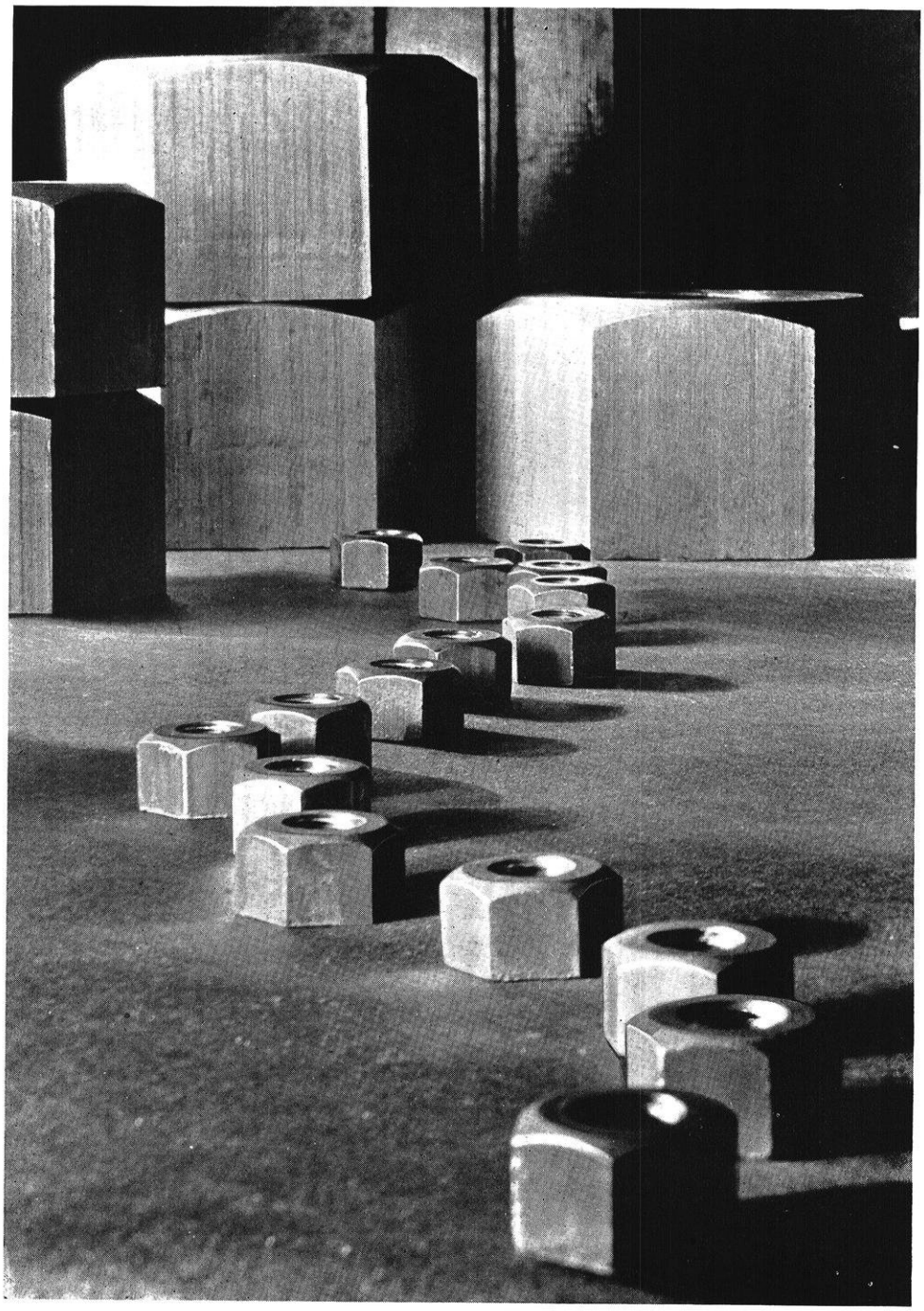


—*Courtesy "Metal Progress."*

SHADOWS IN THE SHOP

The WISCONSIN ENGINEER

VOLUME 38, NO. 2 NOVEMBER, 1933

The Red River Bridge

By C. W. P. WALTER, e'34

UPON glancing into the materials testing laboratory in the Engineering Building during the early part of this semester many students have seen what appears to be a single cable suspension bridge. The peculiar hardware laden contrivance is a half-model of the Red River

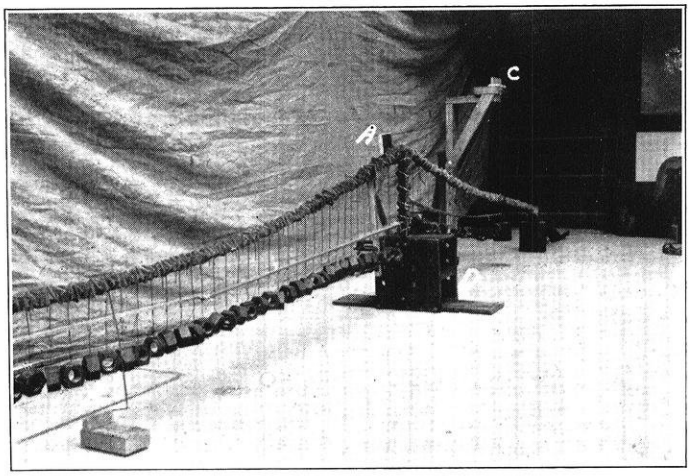


FIG. 1.—*Scale model of the Red River Bridge showing the method of loading the cable and towers.*

Bridge which carried light highway traffic between Clarksville, Texas, and Idabel, Oklahoma. In the early part of this year movement of the Red River as a result of flood waters washed away one of the intermediate piers supporting the end spans, and caused the cable to drop and be subjected to impact loading. It was contended by the company owning the bridge that the cable was overstressed and injured to such an extent that it would be necessary for the insurance company to replace the cable as well as the pier. A committee, consisting of Dean Turneaure, University of Wisconsin, Hardy Cross, University of Illinois, A. B. Hammond, President of the A. S. C. E., and Robinson and Steinman, Consulting Engineers, New York, was appointed to investigate the questions involved. While the investigation proceeded the Red River continued to scour away the foundation of the existing piers, ultimately causing the bridge to collapse completely.

Determination of the probable tension to which the cable was subjected as a result of the accident involved a number of interesting problems. By making certain assumptions, this tension could be calculated, but because of the complexity of the problem, it was considered desirable to check the calculated value by tests on a scale model of the bridge. Such a model was constructed to have the same effective modulus of elasticity in tension as the bridge cable, and a flexibility comparable to that of the actual cable. For convenience, a scale of 1:50 was selected thus making all unit weights and linear dimensions 1/50 of those in the bridge. Concentrated loads, however, were reduced $(1/50)^2$, since such loads are related to areas. Unit stresses in the model cable were the same as in the actual cable, but the total tension, like concentrated loading, was reduced by a factor of $(1/50)^2$. The deflections produced in the minature cable were 1/50 of those occurring in the bridge. Although the actual cable consisted of 1200 wires having a net area of 20.64 sq. in., and a weight of 70.17 lbs. per linear bridge foot, the model cable was constructed of the smallest steel wire available, necessitating only 93 parallel wires. The condition of comparable flexibility between the model cable and the actual cable was therefore satisfied. Thus made, the cable had a net area of .00842 sq. in., and a distributed weight of .0286 lbs.,

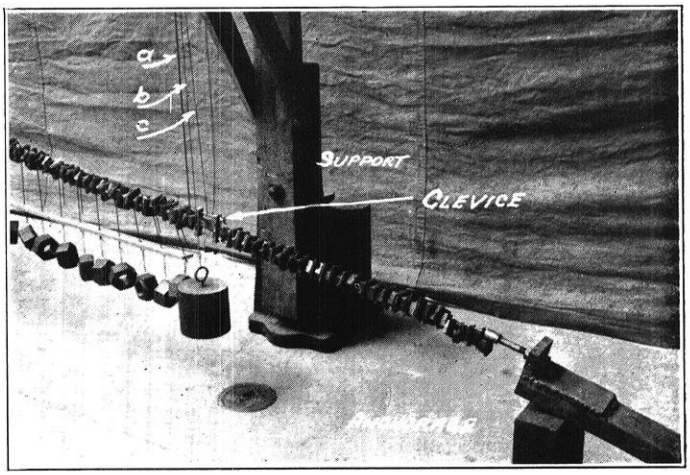


FIG. 2.—*Portion of the model cable in the vicinity of the intermediate pier showing the clevice and the supporting wires.*

per linear foot. The discrepancy in weight of the cable was made up by uniformly distributing 5/8 in. nuts along the cable (see Figs. 1 and 2). This distribution also served to reproduce in the model the inertia effect of the mass of the bridge cable. It was important that this effect be reproduced as accurately as possible because the period of vibration and the deflection of a cable are influenced not only by its mass but by its mass distribution. The ratio of the dynamic stress to the static stress in the model cable had to be the same as in the actual bridge; therefore, to approximate this condition, one-pound nuts were hung by light wires uniformly spaced along the cable (Fig. 1). The distribution of this load also served to approximate the condition of the floor load. One-pound nuts were fastened to the towers for the purpose of securing the same inertia effect under dynamic loading. The measured period of vibration of the model was found to check closely with the theoretical determination.

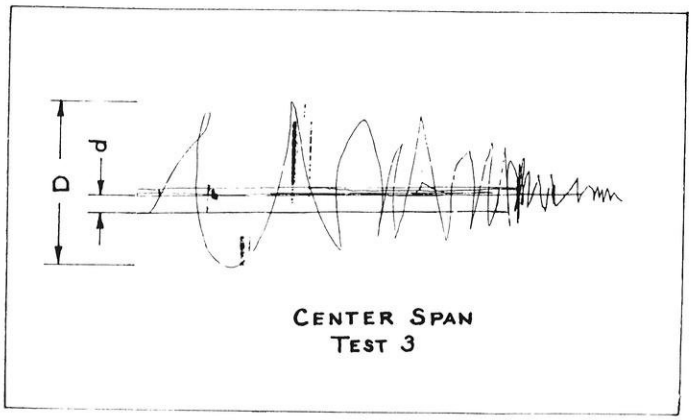


FIG. 3.—*Photograph of the tracing showing the vibration and displacement of the center span at point B, Fig. 1, caused by the loss of the intermediate pier support.*

Before testing the model span it was necessary to determine the point of maximum tension when the span was subject to impact loading. This was accomplished by hanging a uniformly weighted wire between the anchorage and the tower, and applying an impact load at the place corresponding to the position of the intermediate pier. At this position, the span was held at the correct sag by a vertical cord, and a weight sufficient to break the wire was attached loosely to the span so that it was not supported by the cable, but instead by another vertical cord. The two vertical cords were cut simultaneously, thus dropping the weight and the span. In effect, this approximated the condition of a sudden washing away of the pier, the most serious condition that could have existed. It was found after several attempts, that the wire consistently ruptured at the point of application of the load. At this point in the model cable a clevice, provided with a pin that could be replaced if sheared, was inserted. In determining the tension produced in the span under impact loading, the weight was held in place by wire b, (Fig. 2), the span supported at the proper sag by wire c, and a pin of known shearing strength inserted in the clevice. If after wires b and c were cut simultaneously the pin was not sheared, another pin having a slightly smaller shearing strength, was inserted in the clevice and the trial repeated. This procedure was followed until the pin was sheared. The conclusion then drawn was that the tension produced in the span was greater than that required to shear the last pin, but less than that required to shear the previous pin. The pins were made so that the shearing strength could be controlled within close limits, thus making it possible to determine the shearing force quite accurately.

Since it was desired to investigate the magnitude of vibration of the model, provisions were made to obtain tracings of the vibration at the center of the span B, (Fig. 1), at the tower A, and at the intermediate pier. Accordingly, rigid wires were attached to the span at these places, the free ends resting on smoked glass plates. When the bridge was sent into vibration, the plates were moved manually in a direction perpendicular to the motion of the tracing point, which caused a wavy line to be traced on the smoked glass. A reduced photograph of the tracing obtained at the center of the span B, (Fig. 1), is shown in (Fig. 3). The maximum vibration D, caused by the sudden loss of the support of the intermediate pier, is 1.13 inches. This corresponds to 4.708 feet in the actual bridge. From this tracing may also be found the position that the main span finally assumed. This is indicated by the displacement (d) in (Fig. 3) and corresponds to an upward displacement of .112 inches in the model or 5.6 inches in the Red River Bridge.

Due to the fact that the ensuing litigation between the bridge owners and the insurance company is not as yet under way, the publication of the results of the test will be deferred to a future issue of the *Wisconsin Engineer.*

WORLD'S FAIR TO REOPEN IN 1934

The Century of Progress exposition at Chicago will be held over until next year, according to an announcement made recently. The exposition needs approximately one million dollars to put the buildings in shape to weather the winter, and no trouble was anticipated in raising this amount from Chicago business men.

The suspension system of the sky-ride is not of any standard form, although it embraces many of the usual features of suspension systems, according to Professor Kinne of the Structures Department. A ride to the top of the observation towers after dark is well worth the money because of the magnificent view obtained. The elevator machinery at the top is open to inspection.

SCIENCE

There is no measure for the quantity of electrical science we have learned. Call it a lot. It is still only a rapidly changing speck of an infinite surface. We are still discussing the practicability of calling light a quantum and electrons particles or waves. (It would be an enormous handicap if we couldn't make use of new things until we agreed on their proper names.) James put it well: "Our science is a drop, our ignorance a sea."

—*Dr. W. R. Whitney.*

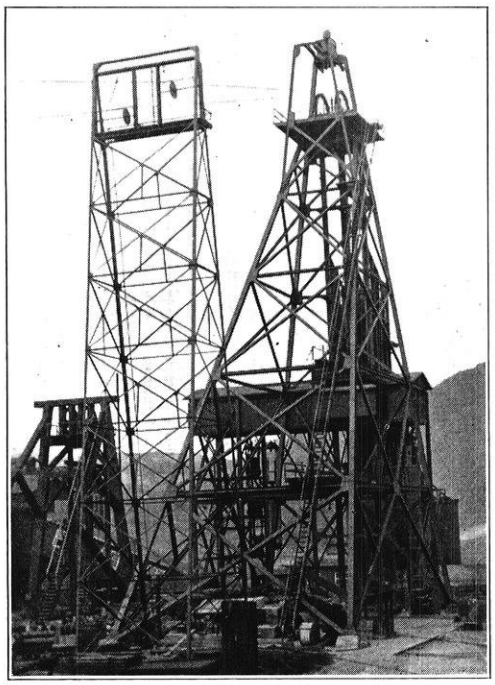
DOWN - -

EDITOR'S NOTE
The author of this article was a student at the Montana School of Mines for three years. He is now majoring in geology with the intention of eventually obtaining a degree in mining engineering.

By J. F. HAVARD, min'35

DAY-SHIFT time at the Mountain Con. . . .

Awaiting the call for our working level, we stand at the shaft collar with several hundred Butte miners. Above us the lattice-steel headframe looms gaunt and black against the grey winter sky, dwarfing the shivering men who are grouped beneath it. Gleaming cables whirl to and from the hoisting-engine drums, speed over pulleys on the idler towers, bend around spinning sheaves and race vertically in the shaft. Cages whip up from underground and dangle before the platform, then, loaded with men, sink deep into the earth. Far to the east and west of us, from the Black Rock to the Orphan Girl, other "A"-shaped headframes bristle above the mist that still drapes Anaconda hill.



The Towering Headframe.

"Thirty-four!" bellows the station tender.

We pull our frost-nipped hands from the pockets of our frayed jackets, pick up our lunch buckets and lamps, jerk our hats lower over our eyes and step across the sheets to the lower deck of the cage which hangs, slightly swaying in its guides, before us. The deck shakes as we crowd into it. The station-tender counts nine of us in, forces the gates shut, throws the safety bar and pulls once on the signal cord. We slip down one deck height. Nine more rubber-booted miners shuffle in above us, scraping a shower of snow and icy mud down on our heads through the grilled floor.

"Damn you, you sheepher-r-r-rders — clean yor feet!" growls one of our fellow passengers, from County Cork.

"Pull in your ears, Harp!" shouts a jolly "Counsin Jack" above us, as we are further deluged with slush.

Twice more our decks drop. The men shiver and curse and laugh — and yell to be lowered away from the icicle-hung collar.

We hear the station-tender jerking the signal rope, this time two long series of taps. We can visualize the engineer, up in the hoist house, as he responds to the blinking light and ringing bell, releases one lever, engages another and, while the huge electric hoist unwinds with increasing speed, watches the hand of the indicator dial as it leaves zero and swings slowly through the scale.

Daylight glides away from us and — we drop. No other word describes it. The cage falls from beneath us, the floor leaves our feet and our hearts seem literally in our mouths. After a moment of acute nausea, our feet press once more on the floor and we find ourselves descending at terrific speed through the darkness.

At regular intervals we flash into pools of light that illumine the miners' faces, show up a timber or two and then, in a fraction of a second, leave us more blinded than before. These are the stations at hundred-foot intervals. Looking through the floor, we see an endless series of such stations — yellow squares rising up to meet and pass us.

The miners do not talk much — a muttered word now and then, a smothered laugh. The rumble of the cage against its guides, the rush of air, the smell of wet timber, the increasing warmth — all these are part of the unique sensation of descending a high-speed mine shaft. We dangle, thirty-six human beings, on a single thread of steel. Two wooden guides keep us from smashing against the timbers. Our speed is somewhere around a thousand feet a minute — we don't know. We rely on that man in the hoist house, that rigorously trained, dead-sober, vigilant engineer. We rely on him more than we do on speed governors, automatic braking devices, safety catches and all the ingenious tricks of the mining engineers. But perhaps we trust mostly to luck.

Suddenly, just after falling past another square of light, we slacken speed and soon slip by a brilliantly illuminated, arch-timbered underground station. We can almost feel the engineer pull his brake lever tight. "That's Tim O'Connor on the engine, and a damn' good man he be," whispers the Irishman. We stop, rise, sink, rise, sink on the elasticity of three-quarters of a mile of wire rope.

Before the cage has ceased bouncing, we hear the safety bar crash up and the men step off the top deck. One after another the decks are spotted at the station floor. A sign hangs before us: "3400 Station."

Eight hours later we will be stamping on the turnsheets again, awaiting our turn to go up.

A Report on the Turkish Land Code

By Demetrius Bassiliades, e'grad.

THE work compiled herewith is a translation from the Ottoman Land Code written in the old Turkish script. This code was used during the rule of the Sultans and although no new code has yet been published by the present regime there have been a number of modifications in the old one.

Turkey is fast adopting European methods, has already done away with the old Ottoman Civil Code and adopted the Swiss Code, and the writer believes that a new code is now pending in view of the fact that there are a good many difficulties arising from the present one, due especially to the separation between church and state and the consequent ownership of church property by the government.

The material used herein has been selected from an abundance of irrelevant material, such as laws dealing with inheritance, taxes, etc. Because of the form in which the laws were stated, no attempt can be made, in translating them, to give an orderly and unified presentation. They appear, therefore, as translated from the Turkish script.

Mr. Bassiliades came to the university as an advanced student from his home in Turkey and since graduation has been engaged in research work in the hydraulics and electrical engineering departments.—Editor.

Types of Property

Real property is held in one of the following four ways: *mulk, emirye, vakuf,* or *khaliye.*

1. *Mulk* is the absolute property of the owner, such as land, buildings, etc., and can be disposed of by him as he wills, without any restrictions.

2. *Emiriye* is practically public domain. The state may grant land of this category to private persons upon payment of the land tax. It cannot be mortgaged but can be given as security for a debt. *Emiriye* is not transmissible by will but may be transferred by donation; however, it returns to the original owner in the event that he outlives the beneficiary. Should the holder of *emiriye* plant trees or vines, or erect buildings upon it with the consent of the state, they are considered as *mulk* with certain restrictions as to transfer dues.

3. *Vakuf* is "all property dedicated to God, of which the revenue is consecrated to his poor," or "property of which taxes and rents is attributed to a work of charity and of public interest." When once property has been registered as *vakuf* it can never be withdrawn. The *vakufs* are administered by a special ministerial department who are theoretically the owners of the property.

4. *Khaliye* consists of uncultivated lands, such as mountains, stony ground, etc., which are useless without clearance, to which no possession is claimed, "and which are at such a distance from the reared dwellings that no human voice can be made to reach them." Anyone can obtain gratuitious permit to clear and cultivate such lands; the laws governing ordinary agricultural lands then apply to them. The permit is withdrawn if the clearance is not effected within three years.

Division of Land

The country is divided into *vilayets* or provinces, *kazas* or counties, *mohiyes* or districts, which contain smaller units of government in the *Kasabas* (towns) and villages.

No attempt is made toward an arbitrary standard subdivision of land into townships, sections, etc., as the case is in the United States. Land in title deeds is described according to its boundaries, cultural and geographical, and as most property is enclosed in permanent walls instead of fences, the walls themselves serve as boundaries and landmarks for descriptive purposes.

Only in special cases does the government require that special cornerstones be used to delimit the boundaries of land.

Land Disputes, Property Trespass, Adverse Possession, etc.

All disputes concerning land ownership are settled by a special property commission, and if no appeal is made to the civil court within three months the commission's decision is final.

The civil court has the right to pass upon decisions handed down by the special commission, upon appeal by either party concerned. There is no appeal from decision made by the civil court.

If any building is started upon land which is not the property of the builder, the owner of the land may not resort to violence but must apply to the circuit court for justice. The court then appoints a commission of two or three men to investigate the matter and the expense of this investigation is borne by the party who applied to the court or by the government. The decision of the committee or the circuit court is enforced by the police.

In cases where crops are planted on land not owned by the planter, the owner of the land may not destroy the crops but must wait until after they are harvested and sue the planter for damages.

(Continued on page 30)

« CAMPUS ORGANIZATIONS »

ETA KAPPA NU

The active chapter of Eta Kappa Nu, honorary electrical engineering fraternity, will be host to alumni from Madison and Milwaukee at a noon luncheon Saturday, November 18, just preceding the Wisconsin-Ohio football game.

The date for initiation of new members has tentatively been set for the first Wednesday in December.

The officers of the chapter are:

President ---------- Melvin W. Stehr
Vice-President ---------- Robert I. Howes
Recording Secretary ---------- Shirley A. Heider
Corresponding Secretary ---------- John H. Hinman
Treasurer ---------- Alvin O. Lund
Corr. Bridge Editor ---------- August O. Bartel

POLYGON

Polygon, the society whose function it is to sponsor all-engineering activities and to bring about a closer tie between the students in the various engineering courses, has made a tentative outline of this year's activities. There is to be a smoker on November 21st and a dance on December 1st.

The smoker will be held in the Memorial Union, and will be free to all engineering students, and faculty. A good entertainment is promised and refreshments will be served. The dance will be informal, and will be held in the Mechanical Engineering Building.

A smoker and a dance are being planned for next semester also; the smoker to be on March 7th and the dance on April 27th. Plans are being discussed for a St. Patrick's Day Parade.

We hope that all the engineers will turn out to these functions and make each one a success.

A. S. M. E.

At the last meeting of the society, Marshall W. Hanks of the Hankscraft Company of Madison, gave an informal talk and demonstration on "The Evolution of an Invention." The invention which is now being manufactured by the Hankscraft Company is an egg cooker working on the principle of the liquid conductor heater and though the principle might seem to be one of relative insignificance the talk and slide illustrations by Mr. Hanks of the scientific solutions of his problems made the invention attain a singular significance to those who heard him.

Officers elected for the current year include Joe Ermenc, President; Laurence Allen, Vice-President; Lu Verne Lausche, Secretary; Robert Stoessel, Treasurer; and Royal Thern, Polygon representative.

PI TAU SIGMA

Below is a list of officers of Pi Tau Sigma, the honorary mechanical engineering fraternity:

President ---------- H. Leroy Mohn
Vice-President ---------- Joseph J. Ermenc
Recording Secretary ---- Robert M. Rood
Corresponding Sec'y -- Luverne F. Lausche
Treasurer ---------- Robert F. Stoessel

TAU BETA PI

The forming of three new chapters was approved at the national convention of Tau Beta Pi, held this fall in Chicago, October 12 to 14. This brings the total number of chapters to sixty-five. The new chapters are to be installed at the University of Utah, the University of Delaware, and the Virginia Polytechnis Institute.

Officers of the chapter at Wisconsin are as follows:

President ---------- John E. Brennan
Vice-President ---------- Melvin W. Stehr
Recording Secretary ------ Robert L. Engelhardt
Corresponding Secretary ------- H. Leroy Mohn
Cattalouger ---------- George M. Hausler

CHI EPSILON

On the 28th of November exactly a century will have elapsed since the driving of the government survey stake now hanging on the wall just outside the office of Prof. Ray S. Owen.

In commoration of this centennial, Chi Epsilon will hold its fall initiation on that date.

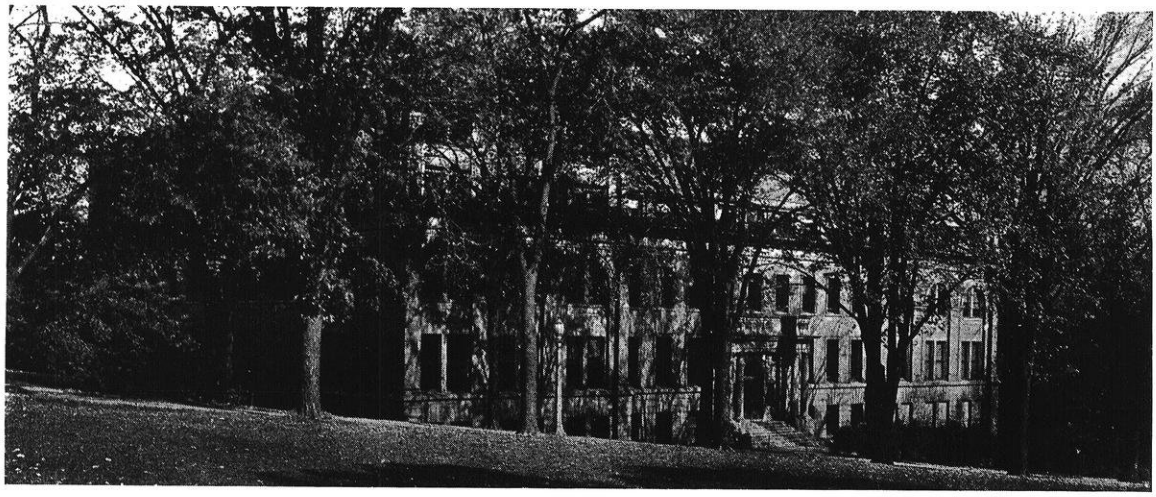
The following are the chapter officers for the current semester:

President ---------- Harold Trester
Vice-President ---------- Richard Dittman
Secretary ---------- Joseph Zack
Treasurer ---------- Robert Schiller
Assoc. Ed. of Transit ----- Robert L. Engelhardt

A. I. E. E.

At the first meeting of the year held on Wednesday, November 15, at the Memorial Union, members of the student branch were entertained by moving pictures showing the use of high explosives in engineering practice. Following the pictures Professor C. M. Jansky explained the purpose of the organization for the benefit of prospective new members. An adequate lunch of cake and coffee was served following the meeting.

Officers of the organization are Wallace Gates, President; Shirley Heider, Vice-President; Walter Fritz, Secretary and Treasurer.



« CAMPUS NOTES »

REFRIGERATION TEST HOLDS SWAY

A group of engineers, with civils predominating, started the biennial test of the refrigeration machine in the Steam and Gas Laboratory on Monday, November 7. The test continued throughout the week, with the boys putting in four hour shifts. It is planned to install refreshments as soon as the test is well under way.

Mr. E. T. Hansen, Instructor in Steam and Gas, was given a vote of thanks and will probably get some of the refreshments before the week is over, because he donated the use of his radio for the week. Possibilities of holding a dance during the evening shifts were discussed, but the mechanicals were too upset by the idea to permit it to go through, so — no girls in their kennel.

The international students attending the University were recently entertained by a group of Madisonians. It was intended that each guest at the party have a host whose nationality was the same as that of the guest. Richard Huzarski, c'34, was entertained by Dean Scott Goodnight, and Dick reports that although the basic idea was not fulfilled, the Dean was a most charming and entertaining host.

1933's ATHLETIC ENGINEERS

The following is a list of men certified by the Office of the Registrar as eligible for football and cross-country:

Football

John S. Bender, c'
James Bingham, m'
James Donaldson, c'
Gerry Halverson, c'
Richard Haworth, e'
Milton Kummer, c'34
Ronald Ostrander, ch'
Bob Schiller, c'34

Cross Country

Winston Bone, ch'
Louis Dequine, ch'
Earl Durkee, c'
Joel C. Hougen, ch'
Evan W. James, e'
Ralph Ley, m'
Robert Mercer, m'
A. C. Plautz, e'
Otto Wustrack, ch'

SENIOR CIVILS VISIT MILWAUKEE

The Senior Civil Engineers spent Monday, October 16, in Milwaukee inspecting the town. They met at the State Street bridge early in the morning, and the bridge tenders courteously opened the bridge and made the tax paying citizenry wait while the seniors found out how the bridge opened.

The group then visited the Worden-Allen Bridge Plant. Of special interest was a bulletiin board upon which were posted notices and placards that were printed during the World War.

The spotless Riverside Pumping Station presented a sharp contrast to the smoke and dirt of the bridge plant.

—o—

Ed. Niederer nearly inspected the Safety Building when he went past a traffic cop, but got off with the plea that he "came from Madison."

TOCK, ch'35, ELECTED HEAD OF A. I. Ch. E.

Wilfred Tock, ch'35, was elected president of the student branch of the American Institute of Chemical Engineers for the coming semester. Other officers elected are: Emil Olbrich, ch'34, vice-president; Grafton Berry, ch'34, secretary and treasurer. John Smithwick, ch'34, was elected as the organization's representative to Polygon.

Tentative plans for programs during the semester were discussed, and the meeting closed with refreshments. No information was given out as to possible plans of the chemical engineers concerning the lawyers. We hope that they will be ready at all times to lend an air of distinction to the law building in case of necessity.

E. C. M. A. CONVENTION HELD IN MILWAUKEE

The annual convention of Engineering College Magazines Associated was held in Milwauke on October 16 and 17, at the Marquette University. The convention was held in the Auditorium of the Medical School, with group luncheons on Monday and Tuesday in the La Salle Hotel.

The convention banquet was held in the Republican Hotel on Monday evening. Professor L. F. Van Hagan was the able toastmaster of the occasion. The leading address was delivered by Editor Innes of the *Electrical World*. His topic was the apparent waste of government funds used in certain hydro-electric installations throughout the nation. Other speakers of the evening were the stately George Bruce of Milwaukee, publisher of many years experience, and Dean Kartak of the Marquette Engineering College who is a graduate of the civil engineering department of the University of Wisconsin. The banquet was followed by an entertainment smoker, which in turn culminated in quite a social evening for some of the boys.

Aside from the banquet and smoker, the convention was extremely well managed and extraordinarily business-like for an affair of that nature. Matters to be placed before the general assemblage were listed ahead of time and presented according to schedule.

Engineering College Magazines Associated is an Association formed primarily for the purpose of securing National advertising by giving the advertiser a wider scope than he could reach in any one college. The Association in turn impartially judges and criticizes the publications of its members in an endeavor to improve the quality of the publications. The *Wisconsin Engineer* in the past has won many awards as well as brickbats and occupies a prominent position in the organization.

Professor Van Hagan, F. T. Matthias, L. G. Janett, W. K. Neill, and R. L. Engelhardt represented the *Wisconsin Engineer* at the sessions.

ENGINEER DIGS FOR GOLD

William H. Horton, '34, did not return to school this fall because he is employed on a gold dredge at Breckenridge, Colorado. He will return next semester to complete his course.

SIDELIGHTS

R. F. Stoessel, m'34, and man about town, rates a rubber doughnut for the prize boner of the month. R. F. had a class scheduled in the M. E. building one morning, and upon arriving late he peeked through the keyhole and saw no one. Neither "M" Nielson nor the Dean's office could help him, because they didn't know where the class was, inasmuch as he knew it wasn't where it was supposed to be. That night R. F. called up his pal Sal Mollica, m'34, who in turn politely informed R. F. that either R. F. needed glasses or else was out of keyhole practice, inasmuch as the class was in the room at the time.

Moral: Wine, women, and keyholes don't mix.

Mr. and Mrs. Frank T. Matthias chaperoned the Gregory House party held in the Old Madison Room at the Union on Friday, November 4. Frank is well known to the civils as Assistant Professor of Topographical Engineering. We wish to record here, that his charming wife is an excellent dancer.

Dean Tureaure, speaking of concrete columns, "Putting in hoops makes them tougher."

Burr Randolph, c'34, waking up, "They say that women's styles are tending toward hoops.

Professor Ray Owen of the topographical engineering department recently received a pamphlet from a Chemical Research Laboratory in Chicago. It offered as a special inducement the fact that "for the convenience of tired chemist visitors to the American Chemistry Society and American Petroleum Institute meetings at Chicago this fall we have located our Chicago laboratories just across the street from the famous '225' club, which is one of the best known and most frolicsome clubs in Chicago."

BABES IN CHICAGO

Four E. E.'s and four M. E.'s, names upon request, went to the Aragon Ballroom on the second night of the trip. They were all disappointed for Tuesday night is instruction night at the Aragon, and you can well imagine the consternation and indignation that was aroused in some of the Engineering College's foremost dance floor "barrelers" on being corrected.

—o—

The Hotel La Salle is missing quite a quantity of towels and stationary.

—o—

Another thing that would have been appreciated in Chicago was a conductor on the elevated line with a voice one could understand, so that those not well acquainted with the city would have an even chance of getting off at the right corner.

—o—

Of course, the patronage of Chicago's burlesque shows was increased the week of the trip.

One of the interesting exhibits at the Lighting Institute was a mercury-vapor, nickel-cobalt light. Under this light, blue skirts looked red, false teeth shown pink, finger nails looked as though they had been dipped in flour, and radium dials on wrist watches glared. A piece of crystalline chomium filched from the Illinois Steel Co. (no gold lying around loose) glowed a beautiful purple under the light.

—o—

A bus-load of assorted M. E.'s and E. E.'s had an enjoyable time on the way back from State Line Generating Station. On discovering a pleasant looking young miss in a passing bus, they al yelled, "Hi, Babe!" much to the "Babe's" embarrassment.

—o—

Acording to most of the "trippers," Fred Waring's apparance at the Chicago Theatre was one of the worth while events of the trip.

—o—

Several of the E. E.'s, fagged out by the hiking, make a bee-line for any chairs at the Bell Telephone Exchange whenever and wherever they saw them. They were very well pleased by the easy chairs they found later in the afternoon at the Lighting Institute.

—o—

Several of the fellows staying at the Hotel La Salle went searching for ice water because they did not feel like tipping the bell boy for bringing it up.

« ALUMNI NOTES »

HAHN, EMILY, min'26, wanted first to study medicine but had to go through two years of L and S . . . studied geology for her science credits and drifted into engineering . . . after commencement she was a courier out west, guiding dude easteners . . . went off to Europe twice as research assistant to a man writing books . . . began writing herself . . . planned to go to Africa because Lake Kidu looked like a good place for a mining engineer . . . the writing of the "Seductio ad Absurdum" yielded royalties for the African trip . . . the African trip yielded "Congo Solo" praised by critics for the sympathy and depth of insight into the ways of the natives . . . wants to go back to Africa but hasn't the where-with-all . . . is now secretary to J. P. McEvoy . . . single . . . 28.

—Courtesy Milwaukee Journal.
EMILY HAHN

CHEMICALS

BLISS, WILLIAM D., '13, was elected president of the Engineers' Society of Milwaukee at its annual meeting held October 18. Professor Bliss holds engineering degrees from Wisconsin as well as Marquette University, and heads the departments of industrial relations and chemical engineering at Marquette.

—Courtesy Mil. Sentinel
W. D. BLISS

COLBURN, ALLAN P., '26, is the father of a daughter, Judith Evelyn, born on April 17.

FULKERSON, PERRY, '24, is the father of a son, Perry John, born on April 16.

HEAD GUERDON H., '21, M. S.'22, is the industrial engineer for the Gas & Electrical Company at Racine, Wisconsin.

HIRTH, CARL W., '24, is with the Wisconsin Telephone Company in Milwaukee, Wisconsin.

HOFFMANN, ARTHUR W., '08, is superintendent of the pulp mill of the Kimberly-Clark Corporation at Kimberly, Wisconsin.

WATSON, JAMES E., '32, is engaged to Miss Mamie Lutzen. James is employed by the Wisconsin Wire Works of Appleton, Wisconsin.

MECHANICALS

BENTSON, HAROLD, '24, is employed by the Bogalusa Paper Company, Bogalusa, La.

GIBSON, G. W., '31, is working in the development department of the Kimberly-Clark Company at Neenah, Wis.

HANSEN, ELLIS P., '33, has been transferred to the research department of the A. O. Smith Corporation in Milwaukee.

HILDRETH, LANE W., '24, is manager of the New York District Anthracite Institute with offices at 19 Rector St., New York City.

JENS, ROLAND, '16, is superintendent of the Minneapolis Moline Power Implement Company at Hopkins, Minnesota.

KEHL, RALPH H., '31, is foreman of the kimflex department of the Kimberly-Clark Company at Neenah.

KING, K. J., '24, is connected with Commercial Solvents at Terre Haute, Indiana.

MATTISON, R. J., '33, is with the Crowe Name Plate Company in Chicago, Illinois.

MORTENSON, MARTIN, '31, is foreman in the crepe wadding converting department of the Kimberly-Clark Corporation at Neenah.

NIEDERMAN, PHILIP H., '25, c'26, was married to Mary E. Wade, of Oak Park, Illinois, on May 20. Their home is at 431 E. Spruce Street, Sault Ste. Marie, Michigan.

RICE, E. R., '32, works in the production department of the Wilson-Bennett Mfg. Company in Chicago.

SARGIS, SAMSON G., '25, is **geophysical engineer** for the Columbia Steel Company in Provo, Utah.

STECKLER, NORBERT, '31, has returned to this country after a year of graduate study in Germany and is now an instructor in mechanical engineering at Yale.

Upon graduation from Wisconsin Mr. Steckler was awarded a graduate Fellowship at Yale and upon completion of a year's work at Yale was awarded a fellowship for a year's study at the Polytechnic School at Hanover, Germany.

VON KAAS, HERMAN K., '24, is an engineer at the Chain Belt Company at Milwaukee, Wis.

WEIDEMAN BERNARD A., '25, is mechanical engineer for the Globe Union Mfg. Company at Milwaukee.

MINERS

CAMERON, GEORGE H., '28, is a special agent for the Northwestern Life Insurance Company at Neenah, Wis.

LEVERING, LEE F., '27, died at Dallas, Texas, recently of pnuemonia.

MANN, L. R., '21, M. S.'22, who visited Madison in August, reports increased activity in Montana mines. His home is in Butte.

SILVER, C. E., '23, M. S.'24, formerly plant engineer with the Sivyer Steel Casting Company, is now metallurgist for the Milwaukee Steel Foundry Company, Milwaukee.

SIRELSCHIKOV, I. A., M. S.'32, is in the metallurgical department of the Illinois Steel Company, South Chicago.

R. S. BEMIS, '29, M. S.'33, **ARTHUR HIGGINS,** '29, M. S.'32, and **EDWARD KNECHTGE,** '32, M. S.'33, spent the past summer in a placer mine in Aspen, Colorado. Large shipments of American gold produced there during the summer are reported in the press.

CIVILS

BLANCHAR, JOHN, '29, who is associated with the U. S. engineering department at Alexandria, was married to Ruth Simonson, Milwaukee, on May 6 at Alexandria, La., where they are making their home.

BUEHLER, ROBERT H., '32, M. S.'33, was an instructor at the U. W. summer surveying camp at Devil's Lake. After camp he worked on a sewage disposal construction job with Prof. Kessler of the sanitary engineering department. He is now working on the soil erosion project at West Bend, Wisconsin.

BURMEISTER, WALTER L., '32, resigned his position as teacher of manual training in a Milwaukee high school to accept a position with the Red Star Yeast Company in the same city.

CAHILL, RALPH R., '13, C. E.'26, was recently elected to the board of directors of the Engineers' Society of Milwaukee.

DEVER, HARRY C., ex'32, labors in Nebraska on various construction jobs. He can be reached in care of Miss Barbara Thorpe, McCool Junction, Nebraska.

DRUML, FRANK U., '30, is with the Kansas City District of the same department; he is at present inspecting the construction of dikes now built along the Missouri River near Council Bluffs, Iowa.

A. D. Freas

FREAS, ALAN D., '33, was engaged to Miss Ruth Biesen of Milwaukee, October 29, according to a recent announcement in the Milwaukee Journal.

HAGESTAD, HERMAN T., '32, is in private practice as a member of the Starbuck Engineering Co. at Starbuck, Minn. He state he has been busy since leaving school. He designed and built sewage disposal plants at Wadena and Glenwood and a storage reservoir and pump house at Starbuck. He has completed a valuation survey of an electric utility at Glenwood and has made surveys and maps of the water works at Monticello and Wadena. In addition, other jobs are under construction, ready for bids, or in the process of planning. Hagestad has secured registration as a professional engineer in Minnesota.

HARZA, LEROY F., '06, is one of the Wisconsin engineers whose work is featured at the Century of Progress. The Electrical Building contains a diorama illustrating the production of electric power. It contains three generating plants tied into a network of transmission lines. Two of the generating plants, a high-head and a low-head water-power development, are models of plants designed by Harza and are so credited.

PERRY, THEODORE H., '31, works for the Kimberly-Clark Company at Niagara Falls.

THRAPP, HARRISON F., '32, is at Durand, Wisconsin, working on the federal soil erosion project. He reports that the work is interesting and that nothing succeeds in getting the men to work like a keg of beer.

WHEELER, EARL W., '32, was married to Miss Esther Litney of Beloit on September 30. Earl has been engaged on the soil erosion work in Buffalo County during the past summer but expects to be working in the Tennessee Valley this winter.

TITUS, WILLIAM J., '13, former engineer of the Indiana state highway department, has been named senior highway design engineer for the federat bureau of roads. He begins work at once under J. T. Voshell, Chicago, district engineer, and has been placed in charge of all bridge and railroad grade separation construction for Indiana, Illinois, Michigan, and Kentucky. In addition he will be in charge of all municipal projects undertaken by the Indiana state highway commission with money alloted to Indiana under the federal public works act.

* * * * *

From the following list of civils it would seem that the U. S. Engineer Office in Milwaukee is being run by Wisconsin men:

VAN AKKEREN, IVAR, '29 ---------junior engineer.
FISCHER, FRANK A., '29 ----------junior engineer.
HENKEL, ROBERT H., '29 ----------junior engineer.
HUNDER, MARCUS B., '30 ----------junior engineer.
JENTZ, GILBERT L., '30 ----------junior engineer.
POSS, ROBERT J., '30 ----------junior engineer.
SCHLONDROP, EDWIN E., '29 ------junior engineer.
STEPHENS, CLYDE K., '28 ----------junior engineer.
STRIEGEL, A. R., '21 ----------civil engineer.
WIGHTMAN, NELSON W., '27 ----assistant engineer.

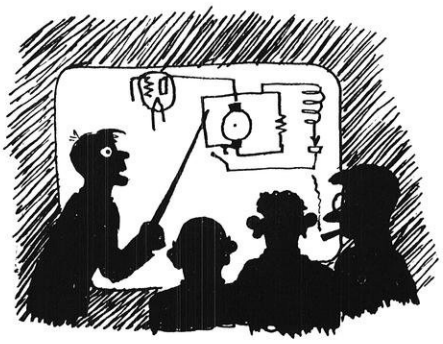
ELECTRICALS

CONOVER, JULIAN D., '24, is the father of a son, Frederic King II, born on June 4 at Scarsdale, N. Y. Mrs. Conover was Josephine Taylor of Washington.

KLEIN, JEROME N., '33, former alumni editor of the "Wisconsin Engineer," is in charge of the freight loading office of the Wisconsin Freight Loading Company in Milwaukee.

KOHN, ALVIN J., '10, is president of the Schauer Machine Company at Cincinnati.

KWASIGROCH, PAUL J., '25, is supervisor of the electrical courses in the instruction division of the T. M. E. R. & L. Co. at Milwaukee.



MAGANN, J. WIBUR, '22, is a rate engineer for the Oklahoma Gas and Electric Company in Oklahoma City.

NOLTE, FREDERICK W., '23, is division manager for the Wisconsin Public Service Corporation, 712 — 5th Avenue, Antigo, Wisconsin.

O'CONNOR, ARTHUR J., '14, is an electrical engineer in the illumination engineering division of the T. M. E. R. & L. Company in Milwaukee.

PARKS, ROLAND R., '12, M. S.'27, is in the Department of Mining of the Michigan College of Mines and Technology at Houghton. He has recently patented some devices for the support of underground workings.

UEKER, ALFRED B., '33, is a night watchman at the Briggs-Stratton Company in Milwaukee. During the day he is taking a few courses in law at Marquette University.

WISE, JOHN E., '16, electrical engineer for the Wisconsin Industrial Commission was recently elected first vice-president of the western section of the International Association of Electrical Inspectors.

WULFING, H. E., '05, has been promoted to system development engineer of the Commonwealth Edison Company of Chicago, Illinois.

« « EDITORIALS » »

THE ENGINEER SHOULD KNOW HOW TO ARGUE

Little debating is done in the various student engineering societies because of a wide-spread idea that there can be only one correct solution to any problem and that the engineers will always be unanimously on the right side. A recent test of this idea in a class of seniors rather upset this traditional belief. Without previous discussion, the members of the class were asked to prepare an argument upon the question: "Resolved that the federal government should own, produce, and distribute the waterpower of the country." The papers submitted showed that the members of the class were equally divided in their opinions. One-half of the class argued for the resolution and one-half argued against it.

The practicing engineer frequently faces the task of supporting his ideas by argument. Some engineers become skillful in debate through natural ability, but, in many cases, the engineer, although in the right, is out-argued by someone who is more glib.

Some philosopher has said: "What is the use of having high ideals if one has not the strength and courage to make them effective?" His statement might be paraphrased: "What is the use of being right if one lacks the ability to convince others that he is right?"

The student societies might well consider adding an occasional debate to their programs.

PERSEVERANCE PRECISION PATIENCE

What are the prerequisites of a successful research engineer? The inclination is to say that these qualities depend upon the individual and the type of research work. This may be true to a certain extent but there are quite a few qualities that successful research men have in common.

Never has there been an ardent research worker who has not perseverance, precision, and patience. Never has he been lacking in persistence, ambition, and the intense desire to delve deeper into the things that he does not understand. Attention to apparently minor details, observed only by the careful and precise, has often led to unanticipated discoveries. In an attempt to produce synthetic diamonds, Acheson discovered in the results of his research that he had produced a mass of blue crystals. Most of us would have discarded them since they were not the result being sought. Acheson was a bit more curious and investigated the physical properties of these crystals. As a result of his curiosity and broad mindedness, the abrasive industry was revolutionized. Karl Jansky recently discovered a peculiar electromagnetic disturbance apparently originating at a point infinitely remote in interstellar space. Were it not for his curiosity and persistence, this disturbance which was heard in his radio receiver would have passed by unnoticed, for his interests at that time were devoted to the investigation of static conditions in short-wave transmission.

If men were easily satisfied, this world would have never reached its present state of progress. Curiosity, stimulated by a broad open mind, is essential in research, and when reinforced by ambition, precision, and unending patience, the most minor things of presumably little import loom up before inquisitive eyes as a clue to a new line of development.

THE DECEMBER ISSUE

The coming issue of the *Wisconsin Engineer* will feature an article on engineering construction work being done by the Civilian Conservation Corps throughout Wisconsin under the N. R. A. The author is L. H. Kessler, Assistant Professor of Hydraulic Engineering. The article will treat the subject of the use of dams for erosion control. "A Tenative Revision of the Engineering Curriculum" will be the title of another article by Robert E. Moe, e'33. This article will be of vital interest to all engineers who feel that the present engineering curriculum could stand a revision. C. W. P. Walter, e'34, who has written many other articles for the *Wisconsin Engineer* is the author of "The Development of the Microphone," which will be published in the December issue.

VALUES OF TECHNICAL SOCIETIES

At the first meeting of the A. I. E. E., student branch, Prof. Jansky spoke on the value of membership in technical societies. The majority of his speech was taken from an article by Dr. J. B. Whitehead in the last issue of "Electrical Engineering." The message of Dr. Whitehead and the comments of Prof. Jansky are indeed worth while and should be of vital interest to all engineering students.

—EDITOR'S NOTE.

In our journey through life we learn many things from books, journals, and from the spoken words of our teachers, associates, and other sojourners. All of these things that we thus acquire is mere information until it is vitalized by experience when it is either discarded or becomes knowledge, and knowledge which has been tested and tried under both favorable and unfavorable conditions, and which has withstood the ordeal becomes wisdom. That is why the opinions of the inexperienced, though valid, under the assumed conditions, always lack the power to secure conviction, while those of the experienced are listened to with respect, or at least should be.

Thus understanding is more the product of experience than of information, and that brings me to the subject of the evening, namely, the function and value of technical societies, such as the A. I. E. E., A. S. M. E., A. S. C. E., I. R. E., etc. Experience of men has shown them that organization is essential to the success of any movement or enterprise. An association of like minded individuals can and often make their will effective, whereas individually they would be impotent. When I agreed to make a few comments at this meeting I did not know that the President of the Institute was going to write my speech, but this he has done so well that I shall take the liberty of reading extracts of my speech which he so kindly had printed in the last issue of *Electrical Engineering*.

"In a profession particularly, without organization there is no cohesion, no opportunity for mutual consideration and discussion and subsequent combined action in matters affecting the profession as a whole, no machinery for promoting technical development and disseminating its results, and in fact, complete absence of all combined action looking ultimately to the elevation of the profession and the welfare of the individual engineer.

"The American Institute of Electrical Engineers is an organization through which electrical engineers are united for conserving and expanding the opportunities open in the profession, for the elevation of its standards, and for the stimulation and improvements of the professional equipment of the individual member. Thus the Institute concerns itself with the economic status of the engineer, questions of Institute public policy are constantly considered by a committee of experienced leaders; a continuous scrutiny of legislation affecting the engineering profession is the duty of another group, among many other matters receiving constant consideration are a code of principles of professional conduct, safety codes, the fixing of standards, and the award of prizes and medals for conspicuous achievement. The direct results of these activities are not commonly obvious, and in few cases is it possible to point out striking instances in which the welfare of the profession and its members have been protected or enhanced. Nevertheless, these general activities, representing as they do the principles, codes, and standards of the profession, constitute perhaps the most valuable functions of the Institute to the profession as a whole and so to the individual member.

"What then of the prospective new member? Is it possible for any young man contemplating the electrical profession to picture to himself a successful progress or career without identification with the American Institute of Electrical Engineers, representing as it does the combined counsels of its best leaders in the interests of the profession generally, and setting forth as it does for direct service to its members, the contemporary state of the art in all its branches, in a continuous record of progress and development?

"And what should be the attitude of an Institute member to the Institute itself? Should not his foremost question be, 'what can I do to aid the work of the Institute, what can I contribute to the high standards it sets of professional conduct, attainment, and progressive development?' Should not his question be always, 'what can I do for the Institute?' rather than, 'what does the Institute do for me?' For every member must realize that ultimately his own professional and material welfare is ultimately bound up with that of the Institute. The work of the Institute cannot be curtailed, its resources cannot be impaired, without ultimate detriment to the professional and material well-being of each of its members.

"If a man deserves to have the advantage of living in an organized community, he has to consult not only his own fortune, but also that of the society, . . . He must realize that its property is his own prosperity, and that it cannot suffer wihout his own injury."

All of which is true, but it lacks the power of conviction to the younger men who have no background of experience against which to project Dr. J. B. Whitehead's exposition. This conviction can come only through experience, and, hence, the statement that membership in the Institute is worth while must be taken on faith. There is a certain sense of satisfaction that comes from just belonging. An orphan reared in an institution can never have the same realization of the benefits of a home as one who has been reared in one. Likewise, the worth of a technical society can be realized only by those who participate in it. The strivings, the achievements of other engineers or men called engineers, become personal when their authors are our associates. These are intangible benefits which no one can measure, they must be taken on faith, but faith without works is of little avail, whereas faith with works moves mountains.

Perfection is the noblest, austerest, and most stringently moral thing in the world.

TURKISH LAND CODE

(Continued from page 22)

Land which has been stolen and cultivated unlawfully or by force, and on which the taxes have been paid every year, is seized and returned to the rightful owner by an official court. The person taking back his land shall not have the right to claim an indemnity for the deterioration of the land.

An island which forms in a public river becomes the property of the bordering proprietor; a line drawn in the middle of the river forms the limit of their domination.

Springs which show themselves at the surface of the ground without man's aid and which form the rivers and streams cannot be the property of individuals. In general running waters are considered as *res communes omnibus,* and consequently the state could only regulate the use of public streams.

If the owner of any arable land does not cultivate it during a period of three years the land becomes automatically the property of the government.

If the distinguishing and fixed ancient boundaries of a town or village have been erased or are not recognizable, they shall be reestablished by persons aged and trustworthy from among the inhabitants of the neighboring towns and villages and the ancient boundaries shall be defined through the *Sheri* (an official map) and the necessary marks renewed.

In order to prove title to land a person must cultivate it for a period of ten years successively. Care must be taken to inquire into the fulfillment of this provision, otherwise the prescriptive right will not be acquired by a person who has not cultivated the land.

If someone uses public property next to his own for a period of ten years, twenty per cent of it can be permanently given to him by the government.

If someone uses property that he does not own for a period of twenty years and no objection is filed during that time he can officially claim it. Exceptions to the rule can be made if the property claim interferes with the public such as in the case of streets, rivers, etc.

The whole of the lands of a town or village can not be granted *en bloc* to the whole of the inhabitants nor by choice, to one, two, or three of them. Different pieces of land are given to each inhabitant and title deeds showing their possession are delivered to them.

Without permission from the government a person may not use the earth of the land which he possesses to make things such as bricks, tiles, etc. If he has made them, the local value of such earth shall be taken from such person for the treasury.

Land cannot be divided without obtaining the permission and assistance of a special committee, and without the owners or the legal agents being present.

Neither the owner nor another may bury a corpse on land held by the government. In case anyone has done so, if the buried corpse has not been reduced to dust, officials shall have it removed to another place. If the corpse has been reduced to dust the surface shall be levelled.

ELECTRIC MANIFESTATION OF MUSCULAR CONTRACTION

Contraction of the heart muscles is accompanied or preceded by an electric manifestation. When a muscle contracts, its electric potential differs from that of a muscle at rest. If two points of the body of a patient are connected through a sensitive measuring device, such as a galvanometer, the instrument indicates an electric tension which varies with the pulsations of the heart. The cardiograph indicates or records these voltage variations, of the order of a millivolt, so an analysis of heart action can be obtained.

When string galvanometers were used with the cardiographs the apparatus was bulky and required rigid support; it was generally necessary to take the patient to the instrument unless other provisions had been made in the installation of the apparatus. A few years ago an entirely new type of portable electrocardiograph employing vacuum-tube circuits, was developed.

This device now employs vacuum tubes which are a thousand times more sensitive than earlier tubes of this general type. The "low noise" tube is exhausted to a billionth of atmospheric pressure; the gas pressure within the usual tube is of the order of a millionth of an atmosphere. Reducing random disturbances and ground noise between 100- and 1000-fold, the tube makes it possible to measure accurately voltages as small as one millionth of a volt, and to detect voltages ten times smaller, at any frequency from zero (direct current) to a million or more cycles per second.

HIGH CURRENT CONDUCTOR

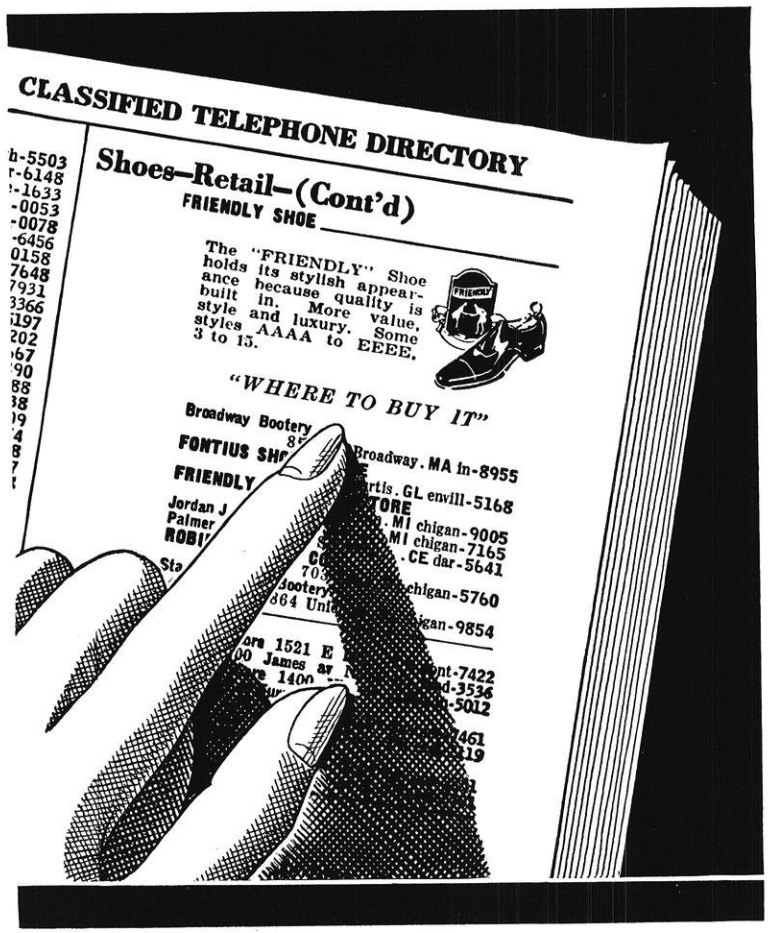
It has recently been found that an iron pipe filled with metallic sodium serves more economically as a conductor of high currents than a copper conductor. The weight per unit conductivity of sodium is decidedly less than that of copper and the cost per running foot is approximately the same. The cost of insulators and supports in an 850 foot sodium pipe conductor carrying a 4000 amperes will be less than required for a similar length of a copper conductor.

While chemists have known sodium to have a high electrical conductivity, it has not previously been thought of as a practical conductor.

IRONALYSIS

It's not a difficult job to determine the amount of magnetic iron in a sample of asbestos, unless you try to do it chemically. Then the difficulty arises — FeO and Fe_2O_3, both of which are nonconducting and nonmagnetic and therefore not detrimental in electrical applications of the mineral wool, are included in the iron content revealed chemically.

In the General Electric Testing Laboratory at Schenectady the magnetic iron in asbestos textiles is easily determined. A 10 gram sample of the asbestos is placed in a tube container. The container is then slid in to the center of a magnetizing coil which is supplied by ordinary 110-volt 60-cycle current. Wires from the coil lead to an amplifying and recording device in which sufficient magnification is provided for the required sensitivity. A direct-reading meter shows the percentage of magnetic iron in the sample.



A strategic point *in the battle for sales*

Today's intense competition calls for new and more effective merchandising methods. Several plans pioneered by Bell System men are proving helpful.

For example: the "Where to Buy It" section of the telephone book. Here local dealers are listed beneath the trade marks of advertised products —such as Plymouth, Greyhound Lines, Exide, RCA Victor. This service helps manufacturers to reduce substitution, helps dealers to increase sales, helps *you* to locate the brand you want.

BELL SYSTEM

TAKE A TRIP HOME BY TELEPHONE
—TONIGHT AT HALF-PAST EIGHT!

« SCIENCE AND ENGINEERING »

Stainless-Steel Train Doubles Speed, Halves Expense

OPERATING at about twice the speed and half the cost of the steam train it replaces, a gas-electric, air-conditioned, two car train of stainless steel will soon take over a 500 mile daily run on the Texas-Pacific aRilway. Recent tests of this 480 H. P. Budd-Westinghouse train showed a top speed of more than 75 miles per hour and acceleration of approximately 2½ miles per hour per second, which is approaching to automobile performance. The loaded train is expected to maintain a schedule speed of about 50 miles per hour over the 250 mile round trip run between Ft. Worth and Texarkana, Texas. The leading motor car on two 4-wheeled steel tired power trucks, and its 16-wheeled pneumatic tired trailer seating 76 passengers, constitutes a train of great flexibility.

The forward car contains the two-240 H. P., 12 cylinder gasoline engines coupled to two-125 kw. generators, a 15 foot railway post-office and ample baggage space, and all of the air conditioning and refrigerating apparatus. This leaves the passenger trailer free of any moving mechanism and provides the utmost in easy riding and silent operation. Both cars are constructed entirely of stainless steel and make a striking appearance in their natural bright finish, which requires no painting and but little cleaning maintenance.

Each of the 12-cylinder American La France gasoline engines is direct connected to a main Westinghouse 500 volt generator and an auxiliary 50-volt generator. The main generators supply four 500 volt Westinghouse motors, which drive the axles on the power trucks through spiral bevel and spur gears. The auxiliary generators drive the air conditioning compressors, charge the battery and carry the auxiliary load including the lights. The main generators, using aluminum construction and self-ventilation weigh less than eight pounds per engine horsepower.

Power from the generators is transmitted to four Westinghouse high-speed motors, two mounted longitudinally on each truck driving one axle through special bevel gearing with 5.5 to 1 reduction, built by the Philadelphia Gear Company.

The 85 H. P. continuous rated, propulsion motors, like the generators, use aluminum where possible and utilize self ventilation to secure the exceptional light weight of less than eleven pounds per rated horsepower. The motors are designed for high armature speed, so essential for the 30-inch diameter car wheels. The armatures will safely stand a speed corresponding to coasting down grade above 80 miles per hour.

The Westinghouse torque control system provides maximum utilization of engine power, enables the auxiliary motors to operate at full speed whether the engines idle or run at full speed, and assures ample charge for the battery used for engine starting and car lighting.

Electro-pneumatic, remote type control, admirably suits this type of car and effectively utilizes space with minimum of weight. The control apparatus is enclosed in a cabinet located in the baggage room of the motor car.

A master controller, governs the direction and speed of the car. It is mounted on the inside of one of the large doors at the front end of the motor car, and swings out of the way when the door is opened — another unique utilization of space that also provides much convenience in removing a power plant from the car.

Air conditioning is provided on the passenger car of the train by a Sturtevant system using a Westinghouse 6-ton refrigerating unit. The refrigerating unit, mounted under the car, operates normally from the direct-current, low voltage auxiliary generators when the train is moving, but can be supplied by external, 220-volt, alternating-current power when the train is standing in the yard or terminal.

The air-conditioning apparatus in the forward car is of special light weight design of Westinghouse-Sturtevant manufacture. This is the first time that a complete system of air circulation with mechanical refrigeration has been installed on a light weight motorized train. Refrigerated air in summer or heated air in winter is conducted to the rear through flexible ducts, and by thermostatic control is kept at any desired temperature.

The same air ducts are used for conveying the heated air and refrigerated air. The overhead duct in the rear car which has openings for air conditioning also contains the lights which are of the indirect type having plenty of illumination with absence of glare.

Another improvement in rail car design is the entire forward end, which may be opened outward in door fashion to allow removal of both engines and power plants which are arranged to slide out on rails in case of repairs or replacements. This saves considerable time avoiding a special provision in the roof for removal.

Safety features of the train include a quick acting duplex braking system, complete automatic lighting and signal equipment, automatic power and electric shut-off and automatic engine stop in case of oil pressure failure.

Westinghouse air braking on the forward car is by clasp brakes on all eight wheels, operated from brake cylinders mounted on the truck frames. Braking on the rear car is of Bendix-Westinghouse automotive type, havings drums on all eight wheels, four of which are on each truck.

Significant Facts!

The Wisconsin Engineer

IMPLIES . .

. . . A magazine entering its **thirty-eighth** year of **Service** through **uninterrupted** publication with its staff grimly determining to safeguard that record at all costs.

. . . A periodical that all times attempts to place worthy achievements of faculty, alumni, and students before its readers.

. . . A conveyor of engineering alumni news to the far corners of the nation in order that **Wisconsin men** might become more closely united.

. . . A periodical that primarily devotes its editorial columns to the vital interests of the college of engineering as a distinct element and influence in the University of Wisconsin.

. . . One of the few publications on the campus which does not subsidize its staff members in any way.

The new low subscription rate of **One Dollar** per year has been our recent attempt to be of more service to our potential readers. . . .

May we in turn have YOUR CO-OPERATION?

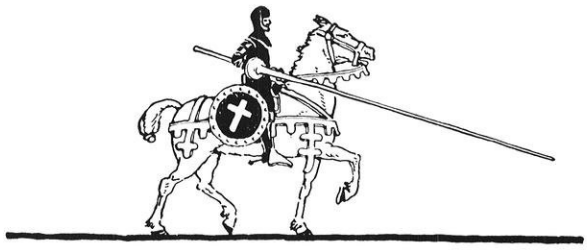
G-E *Campus News*

TALK FOR TRAINS

On a track near Schenectady, a few weeks ago, several visiting trade-journalists sat in a test car. From a loudspeaker in this car came a running stream of information. The voice was that of a G-E engineer in a "station" a half-mile down the track. Sample remarks:

"Believing that we could help railroads to speed the movement of freight trains, G.E. has now produced this device — a new system of communication. It's not radio, but, in principle, direct telephony. It's a distant cousin of the carrier-current communication that power companies use. They talk over the power lines; we use the rails, plus any wire line along the track. Now, the man in the caboose can talk with the man in the cab. It also works between trains up to 5 miles apart, and between trains and stations. Loudspeaker reception overcomes the train noises. Can you hear me all right?" They could.

Dr. Ernst Alexanderson, a G-E Consulting Engineer, is responsible for this development. He is a 1900 graduate of the Kungliga Tekniska Högskolan, Stockholm, Sweden. Incidentally, a partial indication of his versatility in engineering design will be found in the U.S. Patent Office, through which he has been granted more than 200 patents.



A RÖNTGEN WARRIOR

For the doctors who are waging continuous warfare against the dread, lurking specter of cancer, G-E research men believe they have provided another shining sword. Again they have produced the most powerful x-ray tube ever built—this time, for continuous operation in practical cancer therapy at the Mercy Hospital, Chicago. Dr. E. E. Charlton, Grinnell College, '13, is the man who directed the production of this tube.

The giant tube (brother under the glass to those in your radio) measures more than 14 feet in length, is rated 800,000 volts, will treat patients in a fraction of the time required by the last "most powerful" one, has x-ray radiation equivalent to $75,000,000 worth of radium (if there is that much!) and needs 20 gallons of Lake Michigan's coldest water every minute to keep cool.

It's a pleasure to make good motors and good lamps. It's a greater pleasure to help alleviate human ills—all in the line of duty! More tubes are on the way.

SMOKE IN THE EYE

An eye in the stack is worth two on the ground. So thought G-E engineers as they finished mulling over the smoke-nuisance problem of power and heating plants.

A light source and a photoelectric-relay unit were installed in stacks in Chicago and New Jersey. They are so arranged that when the stack is clear, light falls on the phototube; a meter or recording instrument registers zero smoke density. As the density increases, the phototube receives less light and indicates an increase in density. An adjustable electric contact is provided to operate an alarm. (A running record of the amount of smoke passed up the stack could be obtained by adding a recorder.) Thus, the "electric-eye," which is not affected by cinders and is never closed in sleep, has found another way to be of service.

Two G-E engineers, W. R. King and Pieter Juchter, developed this new smoke-density indicator. King is a '28 graduate of the U. of Kentucky, and Juchter a '24 graduate of the Eidgenössische Technische Hochschule, Zürich, Switzerland.