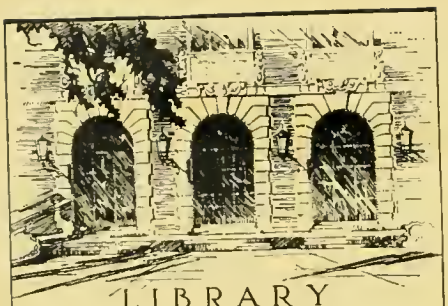
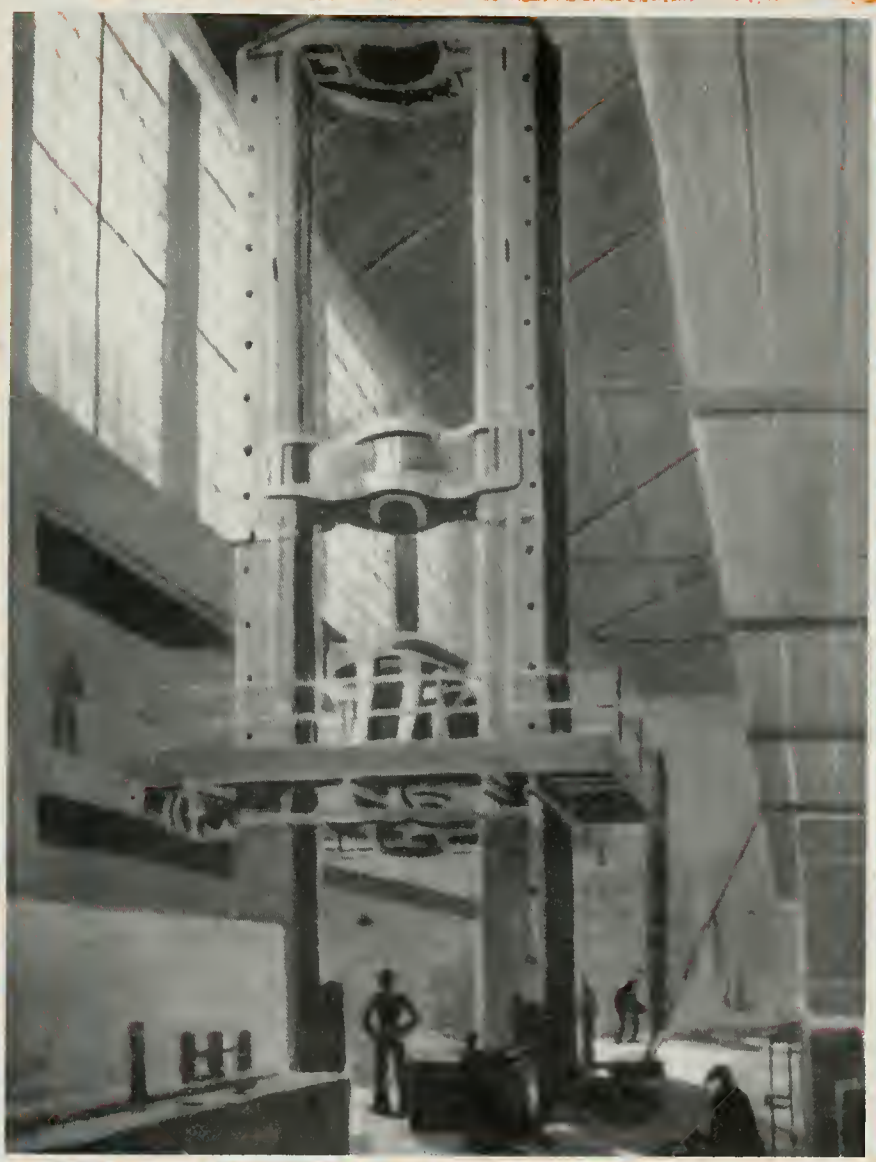


Illinois

TECHNOGRAPH

established 1885



SUE

20¢

a Defenses

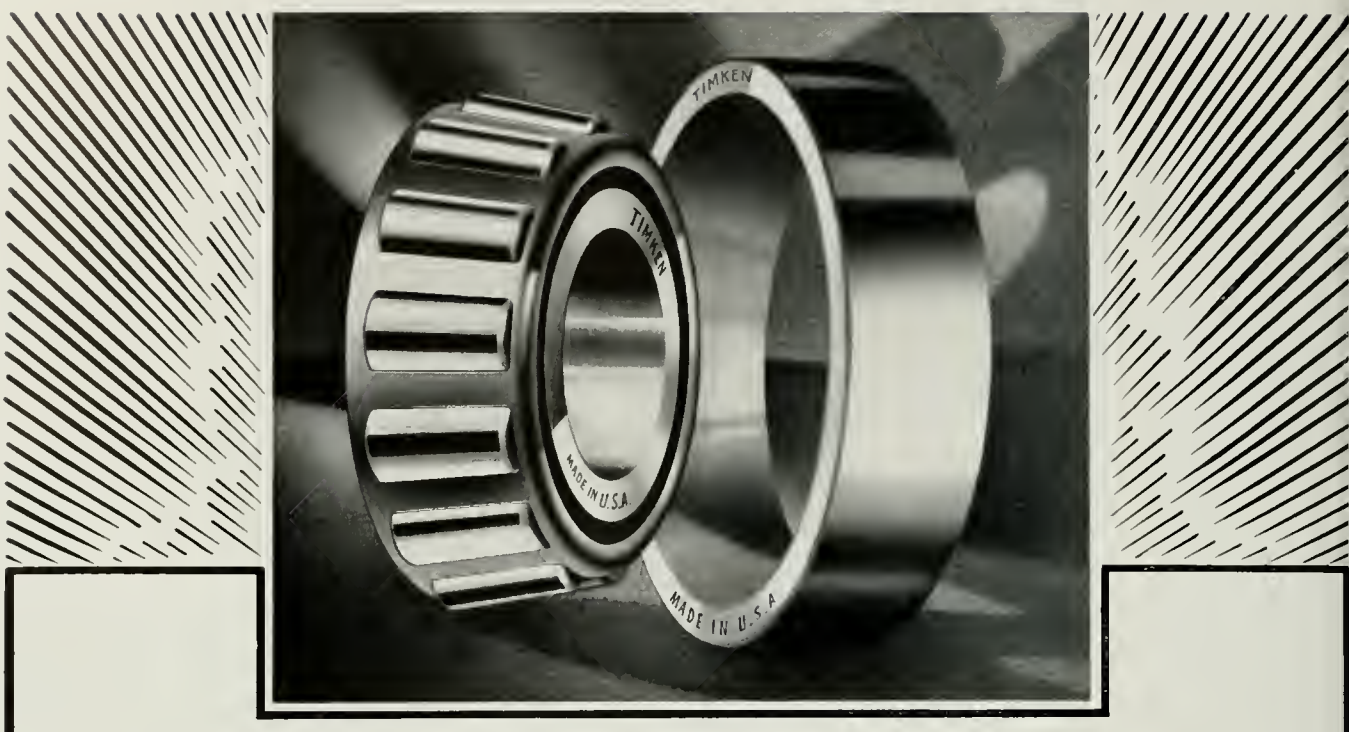
Huntington

in News

aming

BER, 1940

member E. C. M. A.



TIMKEN Tapered Roller Bearings

Industry's Preference for Every Purpose

Industry's bearing problems constantly are increasing in number and importance due to the rapid developments and improvements in machinery of all kinds.

Speeds are going higher and higher. Operating loads—both radial and thrust—are becoming heavier and heavier. Working clearances of moving parts are getting closer and closer.

So in order to meet all modern requirements an anti-friction bearing must be able to do a lot more than eliminate friction. It must also be able to carry any load or combination of loads that are imposed on it—radial, thrust or both together—and at the same time hold shafts, gears and other vital moving parts in correct and constant alignment.

TIMKEN Tapered Roller Bearings have been doing all of these things—and doing them effectively—for more than 41 years. Today they are used in automobiles, motor trucks, trailers, streamlined trains and locomotives, steel rolling mills, precision machine tools—in fact wherever smoothness, accuracy and stamina must be assured.

TIMKEN Bearings are made by one of the world's outstanding engineering-manufacturing institutions . . . a large and financially strong organization with complete research, production and testing facilities, including the world's largest electric furnace steel capacity.

TIMKEN
TAPERED ROLLER BEARINGS

THE TIMKEN ROLLER BEARING COMPANY, CANTON, OHIO

November, 1940

THE TECHNOGRAPH

This Issue . . .

Of course you'll notice that civil engineering is the theme of this issue. Professor Doland's observations on the defenses of the Panama Canal are set forth by interviewer Ed Foerster; Professor Huntington, Head of the Civil Engineering Department, discusses the civil employment situation; and three student civils are given the once-over by our "Names in the News" reporter.

By the way, we weren't fooling when we said staff members are welcome. There's still plenty of work and responsibility for freshmen, sophomores, juniors, and seniors. Writers especially will be welcomed with open arms, and promotion will be rapid for those who produce results.

Watch for the Christmas issue and get the low-down on the cavortings of seniors during the recent inspection trips; be assured of complete coverage by eye-witnesses.

MEMBERS OF ENGINEERING COLLEGE MAGAZINES ASSOCIATED

Arkansas Engineer, Colorado Engineer, Cornell Engineer, Illinois Technograph, Iowa Engineer, Iowa Transit, Kansas State Engineer, Marquette Engineer, Michigan Technic, Minnesota Techno-Log, Nebraska Blue Print, North Dakota State Engineer, Ohio State Engineer, Oregon State Technical Record, Pennsylvania Triangle, Purdue Engineer, New York University Quadrangle, Rose Technic, Tech Engineering News, Villanova Engineer, Washington State Engineer, Wayne Engineer, Wisconsin Engineer.

Published Eight Times Yearly by the Students of the College of Engineering, University of Illinois

Published eight times during the year (October, November, December, January, February, March, April, and May) by The Illini Publishing Company. Entered as second class matter, October 30, 1921, at the post office of Urbana, Illinois. Office 213 Engineering Hall, Urbana, Illinois. Subscriptions, $1.00 per year. Single copy 20 cents.

DEFENSE *of* "THE BIG DITCH"

Ed Foerster *interviews*
James J. Doland,
Professor of Civil Engineering

Prof. James J. Doland

Left:
Ships Passing on Gatun Lake, Canal Zone

Canal Cuts Courtesy The Military Engineer

J. J. Doland, Professor of Civil Engineering, during sabbatical leave toured 37 states and several foreign countries. Included in his itinerary was the Panama Canal Zone, where Professor Doland made an extensive survey. Of particular interest in these times are his notes on the canal defenses.

In peacetime the canal is of extreme commercial importance in interocean shipping. There were nearly 6,000 transits through the canal in 1939. This comprised a net tonnage of 27,170,000 tons. Leaders in the use of the canal are the United States, Great Britain, Norway and Japan. A measure of the convenience of the canal can be made from the distance saved by intercoastal vessels. The trip between San Francisco and New York is nearly 8,000 miles shorter via the canal than around the Horn, a saving of about three-fifths. The toll paid by a large ship may amount to as much as $4,000. Previous to the present war the canal was almost a self-supporting enterprise, which is surprising considering its economic and defensive value.

In addition to its commercial importance, it is a major defense unit. It has made possible the maintenance of a one-ocean navy. Should hostile forces render the canal useless, transfer of forces from ocean to ocean would be impeded, and our coasts would be isolated from each other except by land.

Despite its importance, the canal is a very vulnerable link in our defenses. The lack of any extensive defense preparations had accentuated the condition. Foreign powers recognize these facts, and there are said to be more spies per square mile in the canal zone than in any other place in the world.

The canal is vulnerable because it is a lock canal. The operations of the locks may be stopped in two ways: by destruction of the necessary water reserves, or by direct damage inflicted upon the locks. The water reserves for canal operation are obtained from the watersheds of Miraflores Lake and Gatun Lake. Gatun Lake, 85 feet above sea level, has an area of 1320 square miles. Its usable storage above the lowest feasible operating level is about 22 billion cubic feet; the average flow from it is 5,622 cubic feet per second. Madden Lake is an additional reservoir connected to Gatun Lake. Formed by Madden Dam on the upper Chagres River, it is 250 feet above Gatun Lake and has a maximum available storage of about 27 billion cubic feet. Lockages and power consumed 30 per cent of the yield of these watersheds in 1939. The reserves afford 43 major lockages per day. By proper conservation measures such as cross fillings and follow-up lockages this capacity may be increased to 59 per day.

The successful bombing of the upper gates of Gatun or the Pedro Miguel locks would lower the level of Gatun Lake 25 feet. The onrush of water would cause considerable damage to the structures and canal below. It would also lower the depth of water in Gaillard Cut sufficiently to prevent the passage of large ships. Destruction of Madden Dam would release the enormous reserve of Madden Lake into Gatun Lake from a height of 250 feet. At Gatun and Madden dams are hydroelectric plants, which furnish most of the power for canal operations and domestic use. The Madden plant has an installed capacity of 20,000 kva and the Gatun plant 14,000 kva. These plants are supplemented by the Miraflores diesel-electric plant. Damage to these plants would seriously cripple canal operations.

Bombing of the very exposed control towers of the locks could inflict serious direct damage to the locks. Sinking of a ship in the lock approaches, lock chambers, or in Gaillard Cut could cause suspension of operations.

Extensive defense measures are now being actively undertaken. They consist of two distinct precautions:

Airplane Carrier "Saratoga" in Gaillard Cut

(1) Prevention of the approach of hostile forces; and (2) Constructions to repair damages quickly or to make them ineffective. The hills along the canal route bustle with anti-aircraft batteries to ward off enemy bombers. At Rio Haiti the War Department is constructing a large air field from which planes can intercept within a few minutes hostile planes or ships 30 or 40 miles from the Pacific entrance. Coastal defense guns are stationed on a base at the entrance to the channel, which with the help of air forces from Rio Haiti, completely cover the only route of approach to the canal. In addition, bases are being established on outlying islands in both the Pacific and Carribean. Cruiser and submarine bases are located on both sides at Balboa and Cristobal. Significant also are the new bases acquired from Britain in the Eastern Carribean.

To reduce the damage of bombing the Gatun Locks, emergency gates have been constructed which lie floating above the locks and can be swung into position between the lock walls. Plans are under way to construct an auxiliary spillway in the event of a bombing of the Gatun Spillway. New channels and locks are being constructed at considerable distances from the present ones on both the Pacific and Atlantic sides. They will provide auxiliary facilities should the present locks be damaged.

Devices have been provided to inspect the bottoms of entering ships for mines designed to sink the ship in the canal. Should a ship be sunk, lock bottoms are being reconstructed to facilitate the removal of the hulls. Duplicate underground control mechanisms are being built, and will replace the existing control towers if they should be bombed.

The prevention of the approach of hostile forces is the best defense, however, despite the most elaborate preparations for correcting damage to the canal.

Tacoma Bridge Collapses

The third longest suspension span in the world fell into Puget Sound Thursday, November 7. The center span of the Tacoma Narrows bridge began swaying and buckling in a 35 mile per hour wind and fell when the vertical suspension cables failed over a portion of the span.

Various theories have been advanced for the failure, but none are conclusive until a complete investigation has been made. Professor F. B. Farquharson of the University of Washington was present at the time of failure, taking motion pictures of the rippling motion the 2,800 foot span underwent in high winds. The pictures should be very valuable in determining the cause of the failure and of this characteristic motion of suspension spans in a wind. Flat girders had been substituted for the open truss construction originally planned, which would have offered less wind resistance. Harmonic motion caused by the wind might also have been the cause of the failure.

Exceeded in length of span only by the George Washington Memorial bridge and the Golden Gate bridge, the Tacoma Narrows was the newest structure of its kind and was opened for service in July at a cost of $6,400,000. Immediate replacement will be begun. Research is now active at the University of Washington on a $14,500 model in order to eliminate the flaws from a new bridge.

When the 1900 car chugged down the road, without top, without headlights, without windshield or fenders or bumpers, it cost the driver 30 cents per mile to own and operate. Today the average is down to less than three cents.

—*Automobile Facts*

BRIDGES, 1940 STYLE

By Elwyn H. King,
Senior in Civil Engineering

Economics, one of the chief factors in engineering, caused one of the world's largest bridges to be built. Completed in July, 1940, the pontoon bridge across Lake Washington at Seattle, Washington, cost but one-fifth as much as would an equivalent bridge on piers. The floating structure is 6,500 feet long, with two 500-foot approaches. A clear waterway of 200 feet is provided by means of a movable pontoon span for large ships, as well as a 200-foot opening with 30-foot vertical clearance in each approach for smaller ones.

Although the pontoon bridge is one of the oldest types, it is rarely used for permanent structures. However, the depth to suitable foundation material in Lake Washington, in several places over 400 feet, raised the cost of a bridge on piers to five times that of a pontoon bridge, which would be just as safe. A study of wind, current, water level, ice, temperature, and lake bottom revealed that conditions were suitable for a permanent pontoon crossing. Wind velocities less than sixty miles per hour were found to result in negligible movement of the bridge, and who would want to travel in a wind with greater velocity than sixty miles per hour? The level of the lake varies no more than three feet during the year.

The pontoons are cellular, flat-bottomed boats, 59 feet wide and from 117 to 378 feet long, made of reinforced concrete, sides and bottom eight inches thick, and cell walls about fourteen feet apart. The lake water contains no chemicals that can act on the concrete. The pontoons were poured in graving docks on the shore of Puget Sound. From there they were floated to and through the Federal Government locks, which keep the tide from affecting the level of Lake Washington. From these locks the pontoons were floated to their proper position in the lake.

After being correctly placed, the pontoons were anchored by means of three-inch cables to one of three types of anchors. One type weighs 65 tons in air and is made of concrete. It was sunk into the clay of the lake bottom by means of high-pressure jets, until its top was well below the surface of the lake bottom. The second type, designed as a friction anchor, is a concrete box weighing 75 tons when submerged. It is used in water of a greater depth than 80 feet, at points where the bottom is too hard for jetting. When the box was in position on the bottom, it was filled with sand and gravel, after which 800 cubic yards of quarry rock were placed in front of it for better anchorage. The third type of anchor is used in water less than eighty feet deep, where the bottom is also too hard for jetting. It consists of two 24x14-inch solid steel piles in tandem driven into the bottom by underwater hammers.

The bridge has four sections of pontoons rigidly attached to each other. The first section is 930 feet long and is provided with bilge pumps to pump water ballast in or out of the shore end to take care of the three-foot seasonal rise and fall of the lake level. It is connected by a vertical hinge to the second section, which is 4,510 feet long. The third section consists of the movable pontoon, which is connected to the second section by trunnions and which, when closed, is connected to the fourth section by locks. The fourth section is 930 feet long and is also fitted with bilge pumps. The movable span, which overlaps the supporting section by about 170 feet, is retractable, sliding into an opening in the adjacent pontoon as does a sliding bolt on a door. Electric power opens or closes the channel in 1½ minutes.

An uncommon feat of civil engineering occurred recently when the flooding of the Chickamaugua Reservoir necessitated either rebuilding or reconditioning the Wolftever Creek highway bridge, a seven-span, reinforced-concrete girder structure. A study of various methods by T.V.A. engineers revealed that it would be more economical to raise the level of the bridge than to demolish it and build a new structure. Since the creation of the reservoir increased the importance of the highway, it was considered expedient also to widen the bridge. The revamping, it was decided, would consist of raising the floor level fourteen feet and widening the roadway four feet, making it twenty-four feet wide.

The conventional widening methods of removing one or both curbs and railings were found to be too expensive. Accordingly, each of the seven slabs was split down the center and raised by means of hydraulic jacks. After the halves had been raised to the proper elevation, each was placed on rollers resting on the new pier caps, added on to the old piers. The slabs were then moved laterally by a track jack placed between the halves. Then each slab was again raised, the rollers removed, and the slabs lowered to rest on the new caps, or on steel rollers where expansion joints were used. This method of widening had never been used before.

In keeping with T-Beam sections, the new slab was supported on steel I-beams encased in concrete, the finished appearance being that of T-beams throughout the cross-section. The slabs were cut by drilling holes six inches apart and breaking out the intervening concrete. A four-inch fillet on the new beams covered all of the spalled areas along the bottom of the slab.

Since the existing structure would be completely submerged at high water level, no attempt was made to match the appearance of the new parts of the bridge with the old, all surfaces and lines being kept severely plain. The new strip of roadway was soon discolored by traffic. Little evidence can now be seen of these alterations to the bridge.

Prof. W. C. Huntington

After Graduation What?

By W. C. Huntington,
Professor of Civil Engineering

The annual canvass of civil engineering graduates for 1940 which was completed last May included the graduates from the classes of 1923 to 1939. It was concluded before the defense program was inaugurated and therefore represents a reasonably normal situation.

One often hears statements that there is a dearth of employment for college graduates in general, that this is especially true of engineering graduates and that civil engineering graduates are particularly unfortunate. This article is concerned with this question but deals only with civil engineering graduates of the University of Illinois. The situation is probably about the same with engineering graduates in other fields. The annual canvasses of civil engineering graduates have never indicated that civil engineering graduates have great difficulty in securing positions. Even during the depression the situation was surprisingly good. The 1940 canvass, which covered 965 graduates, showed that 99.2 per cent were employed. Some unemployment is to be expected even in the best times due to men shifting from job to job.

Another common impression is that engineering graduates do not remain in engineering. The 1940 canvass showed that 93.1 per cent of the civil engineering graduates in the classes included were in engineering work. The remaining 6.9 per cent included one or more lawyers, bankers, preachers, insurance men, bond salesmen, airplane pilots, purchasing agents, public school teachers and men in other fields, and the small group of unemployed, but there was no tendency to group in any field. This situation does not support the opinion often expressed that our engineering curricula should devote more attention to the training of men to better fill positions in non-engineering work.

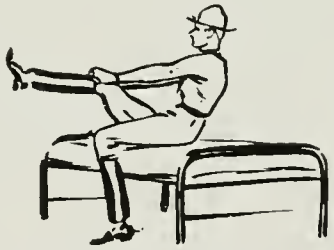
The tendency in civil engineering has been toward an increasingly greater proportion of civil engineering graduates to be employed in public work. This is to be expected but the field for private employment, for those who prefer such positions, is still large. Of the total group included in this canvas, 48.4 per cent were in private employment and 50.8 per cent were employed by public agencies, the remaining 0.8 per cent being unemployed at the time of the canvass. These percentages include those in non-engineering as well as those in engineering work.

Those who were in private employment were largely with industrial concerns with some employed by the railroads and consulting engineers. The 49.4 per cent employed by public engineering agencies were divided as follows:

Federal Government	23.1 per cent
State Governments	17.5 per cent
County Governments	2.3 per cent
City Governments	6.5 per cent
Total	49.4 per cent

Shortly after the canvass was completed, the 1940 class graduated. These men were all located soon after graduation.

With the beginning of the school year in September, the effect of the defense program was soon in evidence. All graduates were found to be employed and



Graduates for Defense?

frequent requests are being received for civil engineering graduates. A real scarcity of civil engineers exists at the time this article is written early in October. This is an unnatural situation from which no conclusion can be drawn concerning civil engineering opportunities in normal times. However, the annual canvasses during past years have shown that the normal employment situation concerning the civil engineering graduates of the University of Illinois is extremely favorable.

The Civil Engineering Department is very active in placing students as they graduate, in keeping them after graduation, and in helping them to improve their positions even though they are already employed.

Don Koehler

Ed Du Bois

NAMES IN THE NEWS . . .

By Richard Landon

Bright-eyed, dark-haired Don Koehler is a University town boy. He is slight of build and of medium height, good-natured and easy to talk with. His personality radiates good fellowship.

Don is writing a thesis this year dealing with the impact of structural steel after it has been overloaded. Doing this takes up a large share of his time, but somehow he finds time enough to act as president of the Illinois Society of General Engineers. He is a member of Tau Beta Pi and Pi Nu Epsilon, mathematics honorary.

Although studies keep him busy, Don's dates and work at the Wesley Foundation provide him relaxation. He declares that town girls are spoiled, and do not attract him as much as they otherwise might.

Photography is Don's main hobby. In the winter he makes his own personal Christmas cards, and in the summer his camera accompanies him everywhere, second in importance to nothing save his trousers.

Ed Du Bois, who can't give a home address because he "just lives all over," possesses an impressive list of activities. Along with being the Student Colonel, he is a member of Scabbard and Blade, Pershing Rifles, the Coast Artillery Club, and Ma-Wan-Da. Oh yes, he's an engineer too, and a member of Tau Beta Pi.

Ed's a medium-sized *boy* with light brown hair, glasses, and a bashful, liquid voice. He doesn't like to talk about himself, but when he does, you'll find quite a story behind him.

His hobby is traveling. He thinks everyone of college age should spend a year or so traveling about the country. Ed says the best way to travel is by thumb, and this way he has been through most of the States. He's visited even the Hula girls in Honolulu, but found it difficult hitch-hiking the Pacific.

Now young Mr. Du Bois thinks the engineers get around as much as any other students. Of course the girls are limited, but if you look hard you can usually find some. He thinks the engineers ought to show off to the rest of the University by going after this engineers' dance in a big way.

Ed's grade-point average is 4.6, yet he says he gets the urge after a few months to give up his books and wander about the country. Studying used to keep him up late at night, but now things have changed so that he manages eight hours of sleep, which amazes him no end.

Tom Huber Morry Hochberg

Another engineer much interested in military work, Morry Hochberg, is a Cadet Second Lieutenant and a member of TNT, military honorary. Morry enjoys dates, likes to meet people. He's a scholar too—president of Chi Epsilon and member of Phi Eta Sigma. He says though that books never keep him up later than eleven o'clock—sleep is too valuable.

Morry feels that engineers aren't taking their place in the college limelight as they should. His ambition is to raise such rivalry between the engineers that their desires will increase until, as a group, they can regain their lost place.

(This year's football captain, basketball captain, Student Colonel, and president of the Senior class are engineers—Ed.)

Morry feels that it was a sad thing when the engineers let go of St. Pat's Ball. An engineers' dance, he feels, is just the place for engineers to show off, to show the rest of the University that it really means something to be an engineer.

After meeting Ceramist Tom Huber, seeing his warm smile, and talking with him, it's easy to see why he was elected president of the junior class in '39. He's a born politician, and a sincere one. Tom isn't the kind to stop with just one activity though. He's a member of the executive council of the Men's League, holds a Second Lieutenant's commission in the R.O.T.C., and is a member of Pershing Rifles. Nevertheless, his first love is politics. Tom has few dates, says "Engineers ought to get out a little more." Study is the only unenjoyable activity he has found. Like all senior engineers, he thinks the engineering school ought to be able to put over a very successful engineering dance.

Close-cropped black hair, glasses, and the olive drab of an army uniform confront you first in meeting Bill Bills. Next you see that he is short, but appears to know how to give orders when necessary.

Bill came from Streator, Illinois, and has spent all of his college life here at the University. He has participated in a great many extra-curricular activities, yet is quite unassuming. He says merely that he is connected with the A. S. C. E. He holds the presidency.

Although Bill is all engineer, and a very good one, one of his prime

Bill Bills Joe Smith

interests is the University R. O. T. C., in which he is a Second Lieutenant. He is a member of Phalanx, Treasurer of Tau Nu Tau, and before his studies began to limit his time away from his desk, he was a member of Pershing Rifles.

Bill has an infectious laugh that makes you want to laugh right along with him. He likes to twist things when he talks, and putting one foot on his chair, seems to make the words come out better.

Pretty girls fascinate Bill. He thinks that dates are a fine thing if only he could find time for them. He thinks engineers ought to get out and mix with people more. "An engineers' dance," says Bill, "is just the thing to put the engineers out in the running socially with the rest of the University." (See Oct. issue, p-8—Ed.)

Lanky, short-haired Joe Smith gives us a circular sort of smile and modestly admits he was rather surprised that he was elected to the presidency of the senior class after changing parties the night before the caucus. He says the engineers were the ones that elected him.

Joe came from Auburn, Illinois, and since his invasion of the campus, he hasn't missed much that the school has to offer in the way of activities. He is a member of Blue Pencil, Skull and Crescent, Tau Nu Tau, Keramos, and Scabbard and Blade.

Joe is a sports addict too. He was the junior manager of the basketball team.

Joe claims there's no point in staying up till all hours of the night studying. He thinks campus engineers ought to try to lead more natural lives—they ought to try to get around more. To stimulate the social advances of the engineer, Joe is going to exercise his influence as a member of the Student Affairs Committee of the Student Senate to make something of the engineers' dance this year.

Quizzed regarding his likes and dislikes, he replied, "Girls and Physics." At present Joe claims that he can't decide upon his post-graduate career, but it's either a Master's Degree, the Army, or work in a glass factory.

Are Proctors Necessary North of Green?

PETER KURLAK: No. The more opportunities a student has to be honest, the more honest he tends to become. If a procotorless system is established, it should be started in the professional colleges, especially in the junior and senior classes. After a few years I think such a system would show definite results in the improved characters of students.

W. NUMRICH: I wouldn't say that proctors are altogether unnecessary, but I do think that if proctors were abolished in the junior and senior classes, cribbing would diminish.

R. L. MILLER: Yes. If no proctors were present, especially during finals, the student would forget that he is really hurting himself in the long run and would crib for a grade.

A. R. KNIGHT, *Prof. of E. E.*: I don't think proctors bear much influence on the tendency of students to crib. I find very little of it, but I do think that proctorless exams would help greatly to develop a student's character for his future profession.

WILLIAM BUSSE: No. If we had no proctors, we would have no cribbing, because cribbing would be too obvious.

G. L. CLACK: Yes. Of course some cheat with proctors, but without them there would be more cheating, and the grading basis would be more unfair.

ED DU BOIS: Proctors do very little in the prevention of cribbing. I think that if there were no proctors, cribbing would decrease and eventually disappear.

MARK KNIGHT: No. If there were no proctors, there would be very little cribbing, because students would be "on their own." On the other hand, with a proctor, a student considers cribbing o.k. if he can get by with it.

E. SEAGRAST: Yes Proctors protect students in the long run and help to maintain the high standards of the University.

RALPH KUEHN: I don't think so. At least not for juniors and seniors. By the time students are juniors, most of those who would cheat have already flunked out.

M. M. ABRAMS: No. I don't think those students who prepare their assignments would cheat in a proctorless exam.

O. L. JOHNSON: Yes. If proctors were not present, there would be too great a temptation to crib. We're all human.

W. WOLF: No. Proctors don't stop cribbing. We would still have cribbing, however, even if we had no proctors.

W. W. WITORT: No. Engineers are honorable men.

J. M. ZEMAN: Yes. Students would be free to crib if there were no proctors. Only a small percentage would cheat, however.

R. TIDEMAN: I think not. Would you cheat if you weren't watched? No one considers proctors necessary for himself—only for the other fellow.

H. BUTCHER: No. If we had no proctors, cribbing would decrease and disappear.

Just Daydreaming . . .

Daydreaming may be defined as a state of reverie in which a person imagines that he is in an entirely different atmosphere from that which surrounds him. When a person imagines himself in the position of another, usually greater men, he is daydreaming.

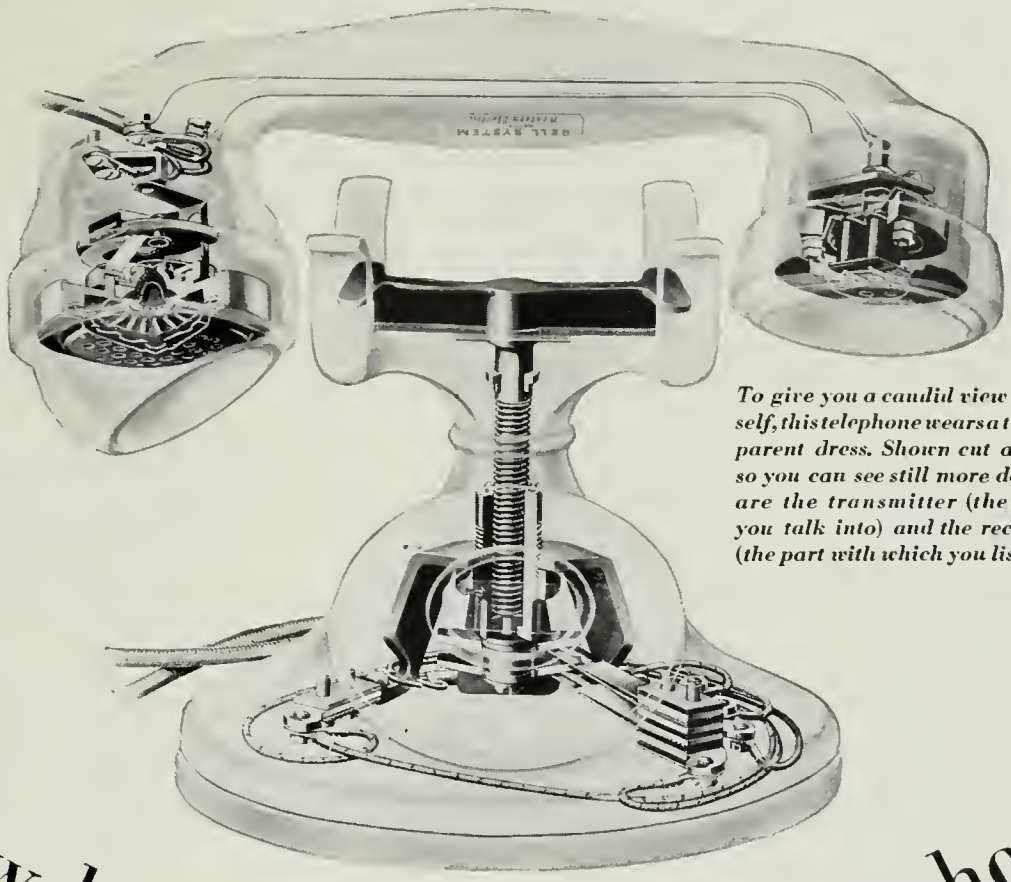
Many people scoff at the idea that daydreaming may be harmful. Let us examine some forms of daydreaming and see just how helpful or harmful they may be.

Consider a young high school boy who enjoys watching the football players practice. He may enjoy imagining himself as the hero of the team, scoring the winning touchdowns, and being cheered wildly as he is carried on the players' shoulders after the game. He is indulging in a dangerous form of daydreaming. He is saving his skin from bruises and he is free from the hard work outs, but he injures himself by getting complete satisfaction in merely imagining himself in the position he desires. This young man may have the talent or ability to succeed in some endeavor, but since he becomes satisfied by merely imagining himself as the person he should like to be, he does not take the trouble to carry out his ideas and work up to that position.

In the theatre we find a good example of daydreaming. When the hero or heroine is in great danger, we grasp our seats and lean forward; perspiration forms on our brows if the scene is convincing enough. We are elated and give a sigh of relief when the climax is over and the hero is safe. A person who frequents the theatre may be exposing himself to danger. His emotions are played with and he may become accustomed to getting complete satisfaction in his theatre daydreams. When the movies become a means of emotional gratification the danger line has been reached. Unless they stir us into action and make us think in terms of accomplishment we injure ourselves by attending them. Sometimes a person becomes such a habitual daydreamer that he cannot discern where his material thoughts start, and when he begins to talk of himself as Napoleon or some idol of his thoughts, he is sent to an insane asylum. Probably just as serious is the habitual daydreamer whose every desire can be fulfilled merely by exercising his imagination. He has no ambition to succeed in the material world since he can imagine himself as any of a number of successful men and be completely satisfied.

On the other hand, daydreams can be very useful. Nearly all the great accomplishments are materialized daydreams. Many an invention had its origin as a daydream in the inventor's mind. However, the inventor's daydreams are not mere gratifications in fantasy of some desire. His daydreams serve a definite purpose: they help him to direct his plans toward a certain goal, and serve as an inspiration, telling him what may happen when he carries out his useful ideas. The engineer builds a bridge from a daydream. His imaginative ideas are brought forth. He is not satisfied in just dreaming about huge structures; he is satisfied when his daydream has materialized into steel and concrete.

—W.W.W.



To give you a candid view of itself, this telephone wears a transparent dress. Shown cut away, so you can see still more detail, are the transmitter (the part you talk into) and the receiver (the part with which you listen).

Now look INSIDE your telephone

"You'd never guess this one. It says our telephone has 248 parts."

"And think how seldom it gets out of order!"

To Americans, telephoning is second nature. They do it 94,000,000 times a day. To them, who thus conquer space and time, telephones are a commonplace — these familiar instruments, gateways to 21,000,000 others in the homes and offices of this land.

Making Bell telephones so well that you take them for granted, is the achievement of Western Electric craftsmen. It's what they have learned in doing that job for 58 years. It's the way they make cable, switchboards, vacuum tubes, all the 43,000 designs of apparatus for the Bell System. The excellence of their workmanship thus plays a part in your daily life.

Western Electric *. . . is back of your Bell Telephone service*

Freshman-Faculty Banquet

Freshmen who attended the annual College of Engineering Freshman-Faculty Dinner at the Y.M.C.A., Thursday, Oct. 24, are now able to give a concise definition of an engineer. Dean Enger offered the following definition to avert the sad condition of an engineering student unable to define his chosen vocation. "An engineer," said Dean Enger, "is a person who uses the forces and materials of nature for the benefit and use of mankind."

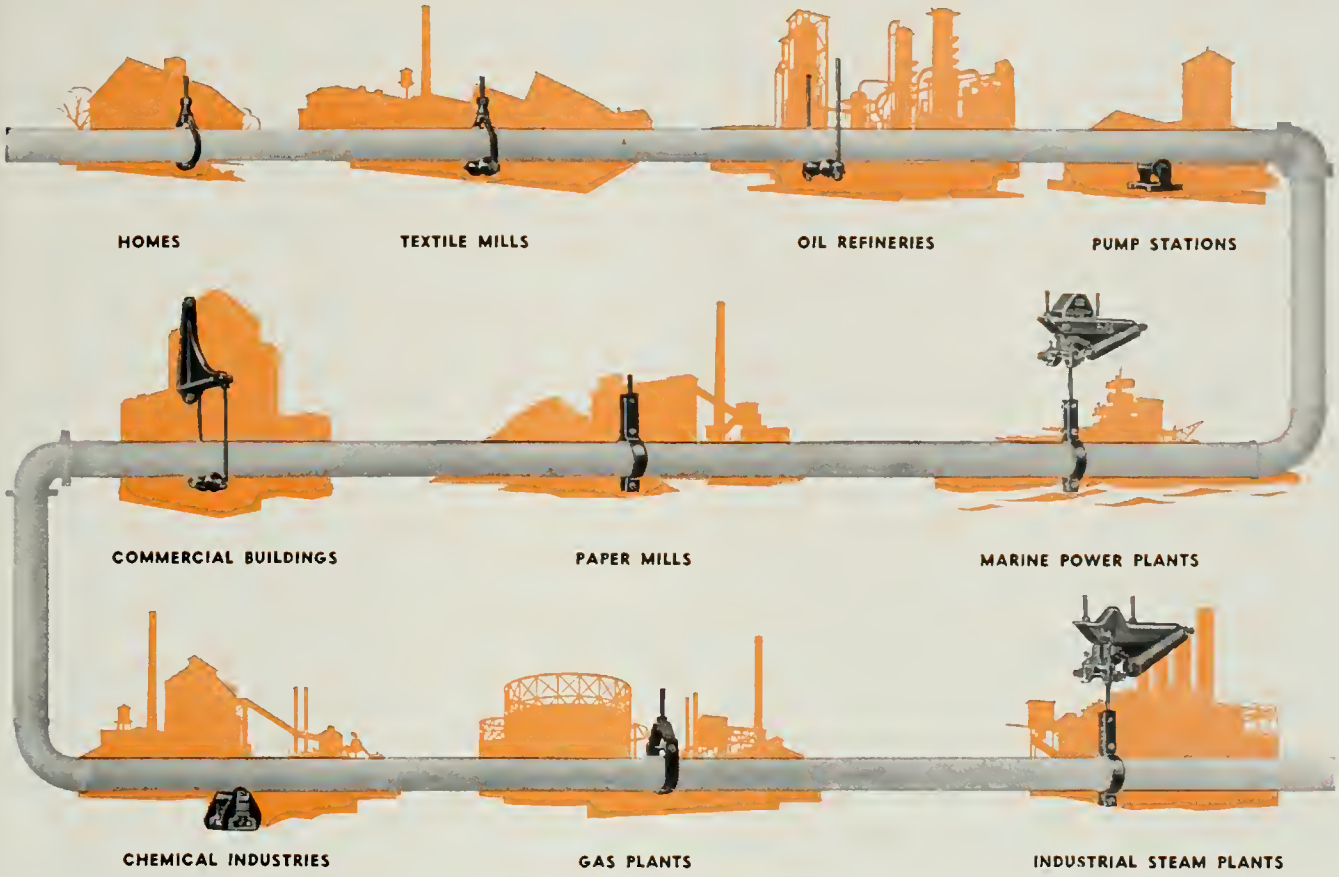
The dinner was preceded by a faculty-student mixer in which freshmen made informal personal contacts with such faculty notables as Deans Enger and Jordan, and Professors Knight, Richards, Pickels, Hoelscher, and others.

Professor Knight of the electrical engineering department suggested means by which students can make use of the experience of the faculty. "Feel free to consult with your instructors any time you are in need of advice. Certain individuals might accuse you of tubing, but your instructor and the intelligent student body harbor no such thoughts." These and other remarks from the generous faculty group helped to put the '44 engineer "in the know" in their Latzer Hall gathering.

Correct Your Officer Index

The unexpected return of Robert Owen has made incorrect the list of S.G.E. officers published in the October *Technograph*. Bob is the secretary; Tom Posey is the corresponding secretary.

SCIENCE IN AN UNEXPECTED ROLE...



Pipe Hangers are now *Engineered* for each specific service

NO longer is pipe hanging a haphazard matter of fastening pipes "somewhere, out of the road." Every industry has individual requirements . . . every type of system its vagaries At one extreme is the domestic water system involving chiefly dead weight. At the other, pulsing steam power lines where thermal-movement and vibration demand scientific control.

Until Grinnell engineers attacked these problems, pipe hanging was given little attention. Today, Grinnell produces adjustable hangers in thousands of combinations to hang *any* piping *anywhere.*

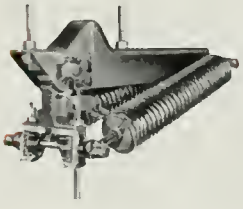
This is merely one example of improved services developed by Grinnell. Others include prefabricated piping, automatic sprinkler fire protection, Thermolier unit heaters, Amco industrial humidifiers, extra-quality pipe fittings. Write for reference folder on Adjustable Hangers or other Grinnell products. Grinnell Co., Inc., Executive Offices, Providence, R. I. Branch offices in principal cities of U. S. and Canada.

Grinnell Company, Inc. . . . Grinnell Company of the Pacific . . Grinnell Company of Canada, Ltd. . . General Fire Extinguisher Company . . . American Moistening Company . . . Columbia Malleable Castings Corporation . . . The Ontario Malleable Iron Company, Ltd.

GRINNELL

WHENEVER **PIPING** IS INVOLVED

Adjustable Hangers for all low-pressure piping.



Genspring Constant-Support Hangers for power piping.

Pipe Fittings | Automatic Sprinklers | Thermolier Unit Heaters | Prefabricated Piping | Amco Industrial Humidifiers

Chemists Hear H. F. Willkie

H. F. Willkie, brother of the Republican Presidential candidate, gave a non-political talk on October 24 to the Student Branch of the American Institute of Chemical Engineers.

Mr. Willkie advised students not to specialize but to learn fundamentals and how to think. According to Mr. Willkie, too many students go to college only for knowledge which could be obtained later by specialization in industry. He placed special emphasis on the use of proper English, for engineers as well as others. "If you intend to go into graduate work, don't get a doctor's degree," was his advice, "get two master's instead." In closing he said, "The only way to succeed is to get things done. An excuse has no economic value."

Mr. Willkie was obtained as a speaker by Prof. D. B. Keyes of the chemical engineering department, who with Professor Rodebush worked with the speaker 22 years ago at the Industrial Alcohol Company. Mr. Willkie is now the vice president of Seagram's Distilleries, Inc. He built the world's largest distillery for Hiram Walker in Peoria.

Doland Speaks

Professor Doland spoke at the A.S.C.E. meeting October 22 about his recent 140-day trip through the eastern part of the U. S., Haiti, Panama, and the West. Said the Professor, "Engineering has not degenerated to 'cut and try' methods. A graduate with an original mind has as much to create as did Thomas Edison. An engineer needs to direct his attention to nature, to people and their habits and living conditions."

STATEMENT OF THE OWNERSHIP, MANAGEMENT, CIRCULATION, ETC., REQUIRED BY THE ACTS OF CONGRESS OF AUGUST 24, 1912, AND MARCH 3, 1933.

Of The Illinois Technograph published eight times a year (Oct., Nov., Dec., Jan., Feb., Mar., Apr., and May) at Urbana, Illinois for October, 1940.

State of Illinois }
County of Champaign } ss.

Before me, a notary public in and for the State and County aforesaid, personally appeared William Walter Witort, who, having been duly sworn according to law, deposes and says that he is the business manager of The Illinois Technograph and that the following is, to the best of his knowledge and belief, a true statement of the ownership, management and the circulation, etc., of the aforesaid publication, for the date shown in the above caption, required by the Act of August 24, 1912, as amended by the Act of March 3, 1933, embodied in section 537, Postal Laws and Regulations.

That the names and addresses of the publisher, editor, and business manager are: Publisher, Illini Publishing Company, University Station, Urbana, Illinois:

Editor, Robert Tideman, Urbana, Illinois.
Business Manager, William Walter Witort, Urbana, Illinois.

That the owner is the Illini Publishing Company, a non-commercial organization, whose directors are W. E. Britton, F. H. Turner, Cecil A. Moyer, A. R. Knight, Harold G. Nelson, Loren B. Felt, James Felt, and Dean Wessel.

WILLIAM WALTER WITORT, Business Manager.

Sworn to and subscribed before me this 1st day of October, 1940. (SEAL)

ALICE SMITH, Notary Public.

Illinois

TECHNOGRAPH

established 1885

CHANICAL ISSUE

20¢

Beta Pi Essay

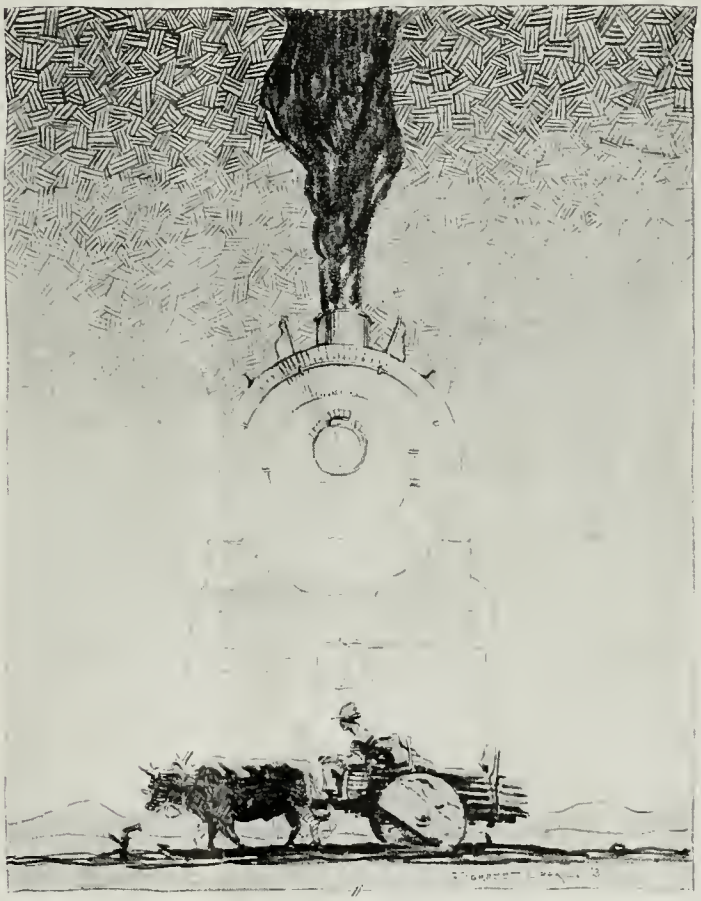
ni" Rail Car

E. Progress

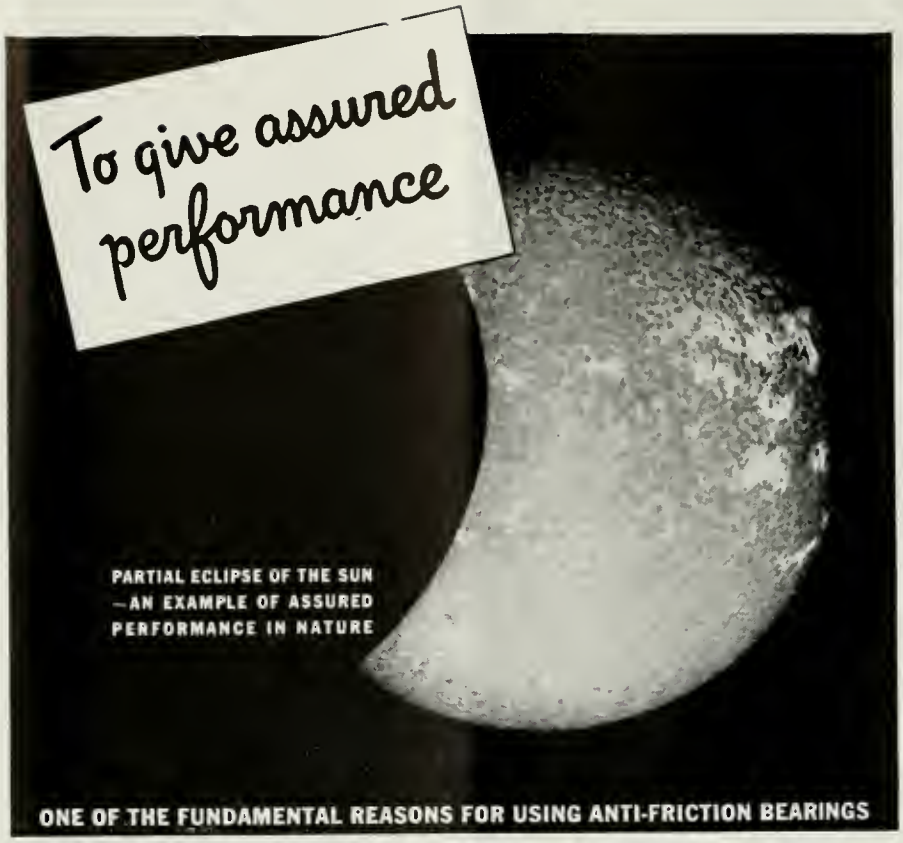
ot Lab

nocracked

RUARY, 1941



member E. C. M. A.



BECAUSE of the dependence placed upon them in the production line, machines of modern design can afford to employ only those parts whose reliability and service life can be accurately determined *before* they are used. That is why more and more machine builders are standardizing on ball bearings, the fundamental bearing type which gives assured performance.

The ball bearing has a thoroughly sound background of scientific principle governing its design, and the life and capacity of ball bearings—New Departure *ball* bearings—are subject to as accurate mathematical determination as is the strength of a steel bridge. New Departure ball bearings are the last word in anti-friction bearings.

Field Performance
as Determined in Advance
by Bearing Engineers

Millions and millions of New Departures of all types and sizes must be right, when uniformly they demonstrate the same result — that their performance in the field is precisely as determined by the bearing engineers, before they made even one revolution in a wheel or on a shaft.

ENGINEERING STUDENTS: For free brochure, "Bearings—the Life of the Machine," write New Departure, Division of General Motors, Bristol, Connecticut.

NEW DEPARTURE

BALL BEARINGS

Nothing Rolls Like a Ball

FEBRUARY, 1941

Staff . . .

Robert Tideman.....*Editor*

Donald K. Stevens.....Managing Editor
Edward L. Foerster.....Assistant Editor
Richard W. Landon.....Names in the News Editor
Joseph E. Foster.....College Research Editor
Sheldon J. Leavitt.....Art Editor
William N. Cramer.....Photographer
Charles P. Stearns.....Assistant

William W. Witort.....*Business Manager*

Victor McMahill.....Advertising Manager

James Francis, Richard W. Landon,
Robert Lankston, Joseph Miller,
James Freek.....Advertising Assistants

Donald L. Renick.....Circulation Manager

Henry P. Evans.....*Faculty Adviser*

THE TECHNOGRAPH

This Issue . . .

MEMBERS OF ENGINEERING COLLEGE MAGAZINES ASSOCIATED

Arkansas Engineer, Colorado Engineer, Cornell Engineer, Illinois Technograph, Iowa Engineer, Iowa Transit, Kansas State Engineer, Marquette Engineer, Michigan Technic, Minnesota Techno-Log, Nebraska Blue Print, North Dakota State Engineer, Ohio State Engineer, Oregon State Technical Record, Pennsylvania Triangle, Purdue Engineer, New York University Quadrangle, Rose Technic, Tech Engineering News, Villanova Engineer, Washington State Engineer, Wayne Engineer, Wisconsin Engineer, Kansas Engineer.

Published Eight Times Yearly by the Students of the College of Engineering, University of Illinois

Published eight times during the year (October, November, December, January, February, March, April, and May) by The Illini Publishing Company. Entered as second class matter, October 30, 1921, at the post office of Urbana, Illinois. Office 213 Engineering Hall, Urbana, Illinois. Subscriptions, $1.00 per year. Single copy 20 cents.

Notes on the Author

Working as waiter and janitor has helped give Chicagoan Gilbert Gavlin four years at the University. He has slighted his studies and work long enough now and then to join Phi Eta Sigma, Tau Beta Pi, Phi Lambda Upsilon, and Omega Chi Epsilon, of which he was vice president.

Gilbert is fond of sport, especially swimming and track. On the less active side, he likes music, hot or sweet, light or heavy. His favorite orchestra leaders, other than concert conductors, are Benny Goodman, Richard Himber, Raymond Scott, and Tommy Dorsey. Even though it detracts from chemical equations, he's a constant listener to the ten-p.m. concert hour. Gilbert says he goes to bed early on school nights—midnight. He dates a little with campus girls, but has his best times in the Windy City with a lot of very good friends. He names as good movies "Pygmalion" and the new Marx Brothers' picture, enjoys reading current best sellers.

Gilbert has traveled in Colorado, and last summer, in the 33rd Division of the National Guard, saw a great deal of Wisconsin. He's a great exponent of thumb travel, often thumbs home and meets "interesting people."

Gilbert likes his pipe

Prize-Winning Tau Beta Pi Essay

My Future in Engineering

By Gilbert Gavlin
Senior in Chemical Engineering

APOLOGY

A few of the sentences in the essay enclosed are virtual quotations from papers read in the past few years. The sources have long since been forgotten and are therefore recognized only with an asterisk.

The individual in modern society finds himself in a unique position. He is literally going in all directions at the same time. Myriads of forces are constantly playing upon and battering at his resistance. Seldom at the end of a day can he pause to ask: "What is the meaning of it all?" Soon, however, he must seek an answer, for the spirit cannot live on bread or wealth alone and if not nourished by things of the spirit it may crack.* It is not at all uncommon to find people whose worlds have crumbled all about them merely because they are spent, merely because they can no longer find the energy to fight against a vicious, unsound world. I, for one, feel that I must have an answer; I must have some conception of the ultimate meaning of life before I can continue with any measure of contentment. Am I blindly going to meet the same fate that so many all around me have surrendered to? Shall my studies in engineering fashion for me the generous philosophy of life that I have in mind?

Of one thing I am sure. Life is not merely a getting and a having, but a growing and becoming. Such a philosophy attempts, with Mathew Arnold, to see life in the raw, and yet it fully agrees with George Sand that "the ideal life is the normal life as we may one day all see it," the life that is vaguely referred to as one of culture.

Such a culture does not mean a Hahvahd accent or speaking of the plastic qualities of a painting of a conglomeration of conic sections labelled "Surrealistic Art." It surely does not refer to formality or to Bob Crosby's rug cutters.

What then does it mean? Mathew Arnold, in his early essay on "Culture and Anarchy" has confined his idea of culture to the learning of the thoughts and words of the writers of the classics, such as Sophocles, Shakespeare, and Plato. Undoubtedly he is right. In the study of the classics the opportunity to observe the different meanings conveyed by the play on words offers much training in the way of observation and interpretation, thought processes that we know develop the mind and add to the refinements of manner and taste.* We of the modern western world, in our ideal of the perfect life, may include open-mindedness, sincerity, cultivation of the moral nature, and an active interest in social betterment. On the whole, however, I would say that we too, intensely practical though we are, actually agree with Arnold.

What are we to do? What am I to do? Shall I feel an enduring sense of shame because my sincere hope is to be, for the rest of my life, an engineer of unquestioned ability. No, I am firmly entrenched in the idea that engineering lends itself splendidly to a cultural education. Certainly here is a subject that meets the most exacting of our educational requirements, a subject that demands of its students a carefully trained mind, a mind that interprets phenomena and applies knowledge to useful ends.

A mere glance in any direction will find enough evidence to illustrate any of my statements. Yes, in engineering as in art and literature the imagination plays the predominant role. The masterpieces of art and literature are the products of creative intellects. Engineering, too, has its masterpieces.

Again and again, for the sake of argument I suppose that my line of reasoning is all wrong and I repeat to myself the same question: "Shall my life in engineering fashion for me the generous philosophy of life that I have in mind?" My answer invariably finds its justification in faith that a subject so rich with the noblest resources of human fancy and so devoted to the noblest causes of our common destiny* must, in some way, be related to the capacities we have vaguely termed "culture."

My answer is invariable: "Yes, I think it shall!"

By Joseph E. Foster
Senior in Metallurgical Engineering

Looking Toward Rear in Coach

New Streamlined Car on

With the advent of Diesel-powered, gracefully streamlined, gay-colored trains, the "unsightly" steam- and smoke-belching "iron horse" is slowly but surely being put out of the picture. Anyone who has traveled on a streamliner can testify to their supremacy in riding comfort and convenience.

Such a streamliner is the new "Illini," a single-car unit operated between Champaign and Chicago by the Illinois Central Railroad. Although at present the "Illini" is just a single-car unit, another car will be added in the near future. Orange and blue, University colors, predominate over the interior and exterior of the car.

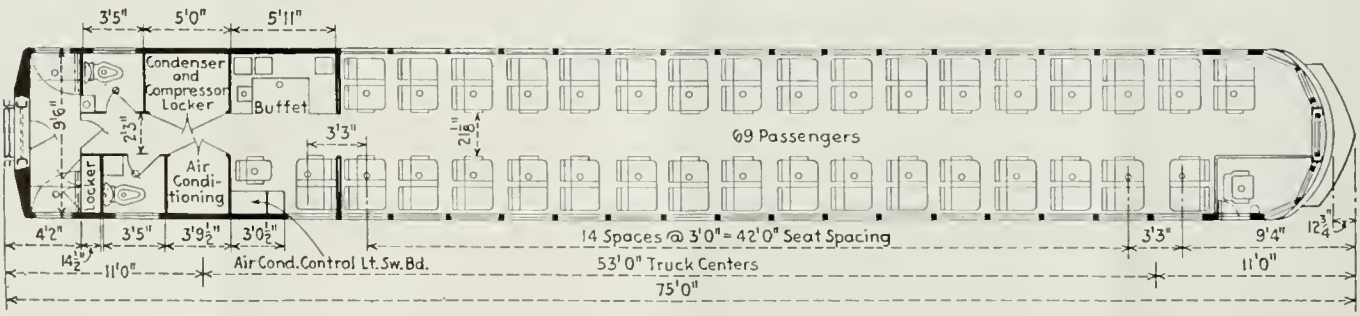
The "Illini" was built by the American Car and Foundry Company at Berwick, Pennsylvania, for the Illinois Central and accommodates 69 passengers. Over each seat is a ceiling light fixture, the lens of which is made so that there is adequate light at the reading plane. The effects of the finish and illumination are very restful.

High-tensile, low-alloy steels were used in the car shell, resulting in a substantial saving in dead weight. The car is effectively insulated against sound and temperature changes and is thoroughly air-conditioned. The air-conditioning system cools the car in summer, heats it in winter, and shuts out noise and dust. The air is continually purified.

The "Illini" is powered by two six-cylinder Waukesha-Hesselman 225-h.p. engines burning Diesel oil. However, they are not Diesel engines. They are solid-injection, low-pressure, electric-ignition oil engines built for the American Car and Foundry by the Waukesha Motor Company of Waukesha, Wisconsin, under license of the Hesselman Motor Company of Stockholm, Sweden. The crankcase and cylinder block frame are installed in a horizontal position under the floor. The engine has removable heat-resistant, alloy-iron cylinder liners pressed into the case. The pistons are cast from an aluminum alloy. The piston rings are the non-sticking, wedge-type. The head of the piston is cupped to form the combustion chamber, which is fully machined and designed to create and sustain the controlled turbulence necessary for complete combustion.

The Waukesha-Hesselman engine, like the Diesel engine in operation, draws a charge of air alone, which is compressed to a pressure of 135 or 140 lb. per sq. in. As the piston approaches the top of the compression stroke, the fuel pump injects a pre-determined charge of fuel oil into the turbulent air stream, where it is thoroughly mixed and is swept around the combustion

Floor plan of seventy-five-foot "Illini" indicates comfortable seats for sixty-nine passengers



Orange and blue streamliner stops at six local points, makes 135-mile run in two hours and thirty-five minutes

Chicago-Champaign Line

chamber past the electrodes of the spark plug, which is on the opposite side. The spark plug ignites the charge, and the piston moves forward on the power stroke. At the end of the power stroke the exhaust valve opens, releasing the burned gas. The cycle is then repeated.

Each of the two engines develops 225 h. p. at 1800 r. p. m. They will operate either independently or together from one control station. This permits flexibility in car performance as well as in the selection of the actual power applied. The piston bore is 6¼ inches, and the stroke is 6½ inches.

Safety devices protect the engines against over-heating, loss of lubricant, low oil pressure, and low cooling water supply. Conventional starters are made possible by the low compression pressure of the engines. An unusual engineering feature of the "Illini" is the hydraulic transmission of power to the wheels. However, direct drive can be used. There is a duplex clutch in the torque converter for the engagement of either the hydraulic or direct-drive element. This duplex clutch is another engineering design feature incorporated in the "Illini." It permits the operation of either engine if the other becomes inoperative.

The car is equipped with a dual-voltage system, i.e., 12 volts and 125 volts. The 12-volt system is used for the starter, headlight, defroster, and other small accessories. Each headlight is equipped with a 12-volt, 30-ampere lamp, which throws a more penetrating beam than a conventional locomotive headlight. The 125-volt system supplies power for air-conditioning, electric heat, electric range in the buffet, hot water, light, and other electrical accessories, and at the same time charges a 56-cell battery.

The car is equipped with air brakes which have a braking rate of 2.5 m. p. h. per sec. at 75 pounds pressure. The trucks of the car are the four-wheel type with cast steel frames and bolsters.

The "Illini" recently completed a test run at 65 m. p. h. over a 100-mile course.

Alumnus Morrison in Charge of "Illini"

Francis L. Morrison '36, electrical engineer, has charge of the "Illini." Morrison, originally from Manville, instructs the engineers and has general charge of the operation of the new train. On the test run, with University officials as guests, he was at the controls.

Morrison went to Paducah, Kentucky, after graduation. He helped design the "Green-Diamond," streamliner on the Chicago-St. Louis division of the I. C. He has been working at the American Car and Foundry Company's shops designing certain novel features for the "Illini."

•

Looking Forward in Coach

NAMES

. . . *in the news*

By Richard W. Landon
Junior in Electrical Engineering

•

Dean Raymond

Most engineers claim they have to work so hard that they can't participate in outside activities, but not S. A. E. president Dean Raymond. Dean started as a freshman member of the Illinois Union board and became a member of Skull and Crescent. From there he went on to Sachem, Blue Pencil (he's director of finance), and the chairmanship of the 1940 Junior prom. He also mentioned ecstatically that he was the chairman of the floor committee of the last summer prom.

After explaining that the towel spread over his desk was to hide that it hadn't been cleaned up, Dean told us that while Roscoe Ates might be his movie hero, he thought Hedy Lamarr and the new Joan Bennett would do all right on the feminine side. He goes for women in a big way (ask him his specifications), but he dislikes newspaper men strongly.

Dean will miss graduating as a chem engineer this year by about two hours, but he heard that patent attorneys can make a lot of money, so he is going to enter the Illinois Law School next fall. He says there are a lot of things he likes—including the Varga girl on the wall—but they all take second place to money—the stuff that keeps yachts in the back yards and Lincolns in the driveway.

He doesn't want to make less than $50,000 a year, but says that if anyone wants him badly enough, he will work for them next fall for $175 a month. He thinks that's high enough to assure not getting a job. Then he can come back to school.

"In order to save time," Dean reads picture magazines instead of the ones where they make you work to find out what is in the news. While he says that he finds himself dressed but unsinging at Sachem sings, he has a voice that ought to help in any court.

JOE DEAN

Joe Lange

Joe Lange, president of the M.I.S., came to Illinois from Lewis Institute. He is president and secretary of the Mineral Industries Society and a member of the Engineering Council as well as the American Society of Metals.

ROGER BOB

Built like a power house, he is well dressed and thinks that even though engineers don't have razor-sharpe creases in their trousers, they can keep shaven and in clean clothes. "We don't have to meet many women, but that's no excuse for being sloppy," says Joe.

Joe thinks speech and business letter writing ought to be required for engineers. They would be great helps in future relations with both subordinates and superiors.

He doesn't like the idea of a five-year engineering course. As a matter of fact, he believes there are courses in the present curriculum that could easily be dropped. He gives the cry for courses to be specific and to apply to the prime interest. "Abolish courses that are not absolutely necessary," he says. Again he stresses the need for much speech and rhetoric.

His principal interest here on the campus is the societies in which he holds membership. He is having quite a time trying to get speakers now that the national defense program is under way, but he bas managed to get a few that he thinks will be very interesting.

Joe goes for weird scientific movies. "Of course they're a lot of bunk, but they are relaxing." Aside from movies, he finds most of his mental relaxation in reading the publications of the various engineering societies. He would like to read some of the best sellers, but *tempis fugit*.

Finding that a short review of the day's work early in the morning is very helpful, Joe gets up about 6 a. m. and tries to get to bed by midnight if possible. He likes sleep, but studies come first.

He has worked in both the factory office and the shop. He plans to go into production and factory management. He hopes to work with some foundry where he can make use of his metallurgy and at the same time have some part in the management.

Bob McCreary

Bob McCreary is a most modest fellow, but he needn't be. As a freshman wrestler; president of Alpha Phi Omega; member of Pershing Rifles, Scabbard and Blade, and Tau Nu Tau; Cadet Major; and Adjutant of the Brigade, he has most convincingly demonstrated his tact and energy. Bob is very active in the Y.M.C.A.; he is in charge of the fraternity fireside forums. He has a large part in seeing that these forums run smoothly and that they give a full measure of benefit.

He is about the average height, has soft, black, straight hair, and looks as though he could take care

of himself in any occasion. He dismisses his dislikes about school—they're too many to discuss—but he names Professors Knight, Babbitt, and Ryan among the most outstanding personalities he has ever known.

Bob is another engineer who prefers the clothes of Petty to the "lack" of Varga. He likes movies that are very light or verry, verry deep. He names Charles Boyer, Charles Laughton, and Myrna Loy as his favorite movie stars. "Grable's nice to look at, but . . ."

Bob's ambition is a very worthy one. He wants to be of service to people, not necessarily in social service work, but perhaps in the line of personnel work. For a long time he has enjoyed serving, first in the scouts, where he was an Eagle, then here at school in the scout fraternity Alpha Phi Omega and in the "Y." He expects tremendous changes after this war and it is then that he hopes to render real service to people by helping them to start new lives.

Bob's girl, an Illinae, lives in New Jersey, "a bit far for her to go home," so she comes to his home in Danville for vacations. Bob informs us that his matrimonial ambitions are entirely in hand.

Roger Smith

Blond, good-looking Roger Smith parked his bicycle out by the tree and came in to tell us all about himself. From the moment we met him, we knew he was an effervescent personality. Roger is president of the student branch of the American Society of Agricultural Engineers, a member of Phi Eta Sigma, Sigma Tau, and Tau Beta Pi. He is also on the engineering and agricultural councils. All through his schooling, he has worked at the "Y" and as a research assistant in agriculture.

Roger reads the poets, especially Tennyson, Wordsworth, and Browning. He enjoys music, goes for musical shows over comedy and heavy drama, especially likes Alice Faye and Henry Fonda. For magazine reading he keeps up with the Saturday Evening Post and Reader's Digest, looks only at the pictures in Esquire.

Rog says he gets along fine with girls—doesn't have anything to do with them. His time is too valuable to waste with mere women—except to dance once in a while. He expects the engineers to put on a swell dance this spring, hopes it will be semi-formal. "Other colleges put on good dances; we ought to get a name band and really bring in the crowd," says Roger.

His preference is toward mechanical engineering, and he wants to work with a company manufacturing farm machinery. He doesn't care to set the world on fire, wants only to have a job where he can enjoy the work and have enough money to live the life he likes.

Don Gerberich

When Don Gerberich got out of high school, he went to work. After working for three years, he decided to enter engineering physics here at the University. Since coming to the school, he has twice been on the Electrical Show. He was president of Sigma Tau, a member of Pi Mu Epsilon, math honorary, a member of Tau Beta Pi, as well as a member of the Riding Club. Last year he was secretary of the Physics Club; this year he is president.

Don didn't like to pay anybody else to have the fun of developing his pictures, so he partly bought and mostly built himself a darkroom at home. He says that he liked enlarging pictures better than any other part of the work.

Don likes sports. He plays with his house group in a good many of the intramural sports. Back home, he won an industrial tournament playing ping pong with the team where he worked. He says he gets more exercise than the average person when he plays golf.

Like so many others, he isn't crazy about spending a year in the army. He is hoping he can get a job with some unit that is indispensable to national defense. He expresses no dislikes about the school, but thinks that the Electrical Show is something the school ought to keep building up until its fame spreads far and wide.

Don wouldn't commit himself on the subject of girls. He says he likes both independents and Greeks and differs with the majority when he says the Illinois girls are just as good as any others. He likes light picture shows and informal dances. If it weren't for expense, however, he thinks that formal dances are the nicest.

Don doesn't know exactly what he wants to do when he gets out of school. He does like research and hopes to work with some company maintaining their own laboratories.

Dick Reising

Well dressed Dick Reising invaded Illinois from Aurora about four years ago and since that time has engaged in an impressive number of activities.

Last year he placed second in Big Ten track, his specialty being high and low hurdles. He missed first by bad luck, hitting one of the hurdles and being beaten by inches. Dick was president of Skull and Crescent, treasurer of Ma-Wan-Da, a member of Sachem, president of the Tribe of Illini, as well as a member of the athletic council. He is president of his social fraternity, Phi Kappa Sigma.

Dick is a General Engineer. He says he has no kicks about school with the exception of E. E. courses. "They're awful." His main trouble is a lack of time to study,

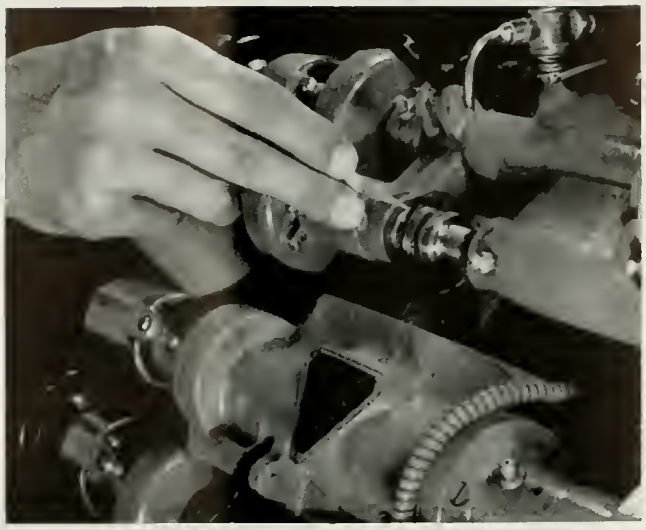
DICK

DON

though he maintains he likes to study and does so whenever he can. Horseback riding is his main hobby, and he rides considerably.

Among the movie stars he likes Betty Grable and throws in Spencer Tracy if you want somebody that can act; "but who wants that?" A connoisseur of figures, Dick prefers Petty to Varga.

We see that the Pi Phi's, as ever, are adept with their little golden arrows, for Dick left a ring over there last Christmas vacation.



—Courtesy Bausch and Lomb Optical Co.

(Above)—Hand guides "barium crown" lens over special edging stone. Barium glass was developed in America during World War, when German monopoly deprived American forces of necessary anastigmatic lenses. Before close of war, lens glass was perfected, produced in quantity.

(Right)—Loading cable into rail cars from special extension on mill roof. This cable, part of the world's longest and largest leadless submarine cable, is laid in San Francisco bay to carry power to the city. The 4.81-inch cables contain three conductors and three pairs of telephone wires. The one-mile sections, being too large to coil on ordinary reels, are here being coiled directly into water-filled gondola cars, where they will be given high-voltage tests, then shipped to the scene of operations to be spliced into eight-mile sections, each weighing more than 400 tons. The cable is armored with No. 3 round steel wire. Copper area varies between 500,000 and 750,000 circular mils from deep sections to shore ends.

—Courtesy U. S. Steel

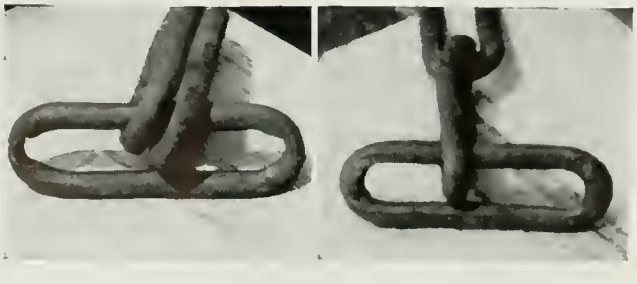
by

Robert Tideman
Donald K. Stevens

MECHANICAL

(Above)—Rather than replace worn conveyor chains, a southern tannery uses this rack as a jig for refacing inner end surfaces of links with hard-facing material. Chains had been very badly worn from use; average increase in length: eight inches for each fifteen feet of chain (about twenty-four links). Refacing is easy and economical, already 609 five-inch links have been rebuilt. Experience indicates that chains hard-faced when new will last two to three times as long as unfaced ones.

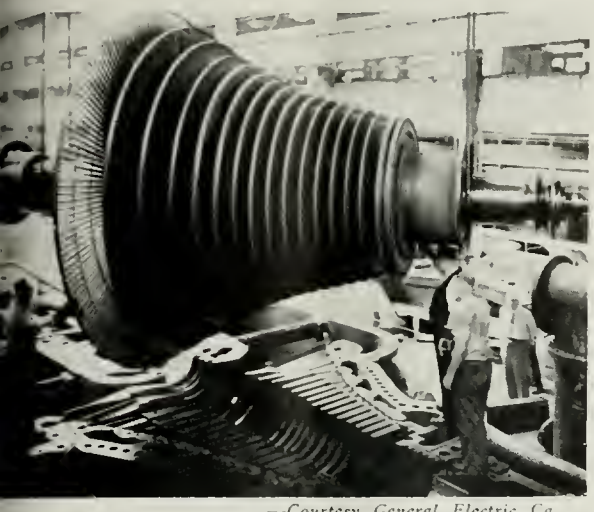
—Courtesy Linde Air Products Co.



(Below)—Gear has its "skin" hardened at 1700 deg F in carburizing furnace, is now very wear-resist

PRO

v)—No, not a chandelier! Rotor of steam turbine is sus-
d above bottom half of turbine frame after conclusion of
y tests. Note rotor's size compared with men guiding it
alignment with frame. Turbine rotor requires careful
ng when unprotected by its frame.

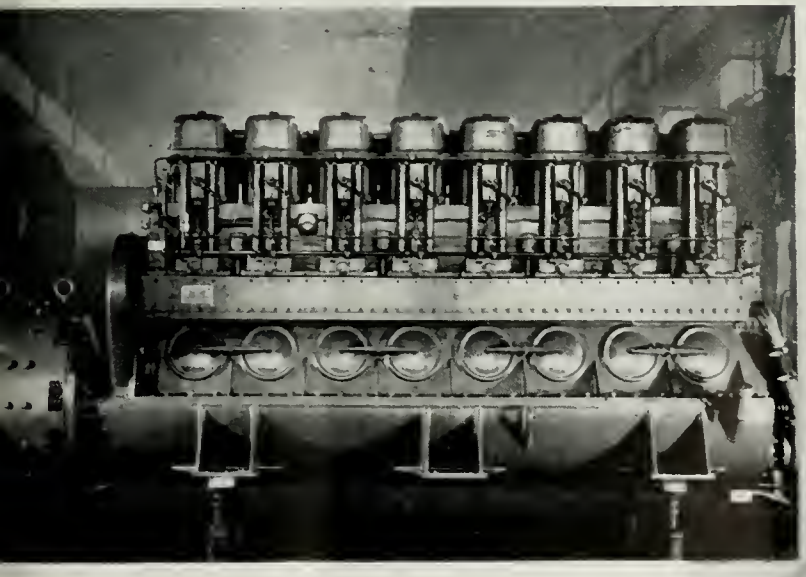


—Courtesy General Electric Co.

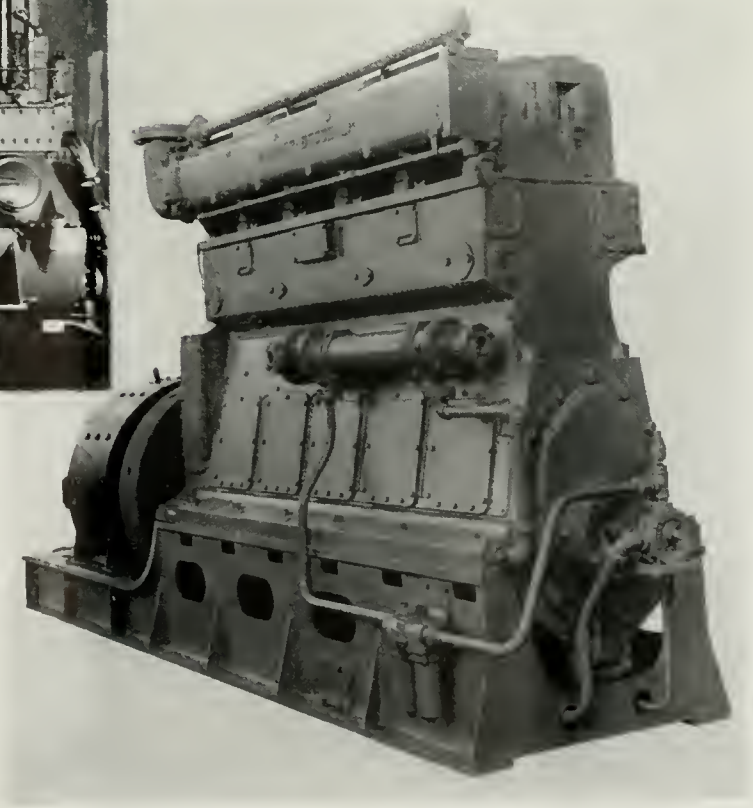
—Courtesy Westinghouse Electric and Manufacturing Co.

(Above)—Six giant hydro-generators at Boulder Dam, first links in Boulder electrical system. Note diminutive observer on stair over first generator.

NGINEERING



(Below and Left)—Comparison of this old power plant with new engine indicates how well engineers are learning to pack more power into less space.



RESS

In and Around Talbot Lab

By Richard W. Landon

Junior in Electrical Engineering

In the last issue we talked of two of the major research problems that are being carried on in Talbot Lab. Continuing our ramble about the building, we again enter the Fatigue of Metals Lab where Mr. J. O. Smith is guiding an investigation into the reaction of a high strength cast iron to various temperatures—from room temperature to 1200° F. The object of these experiments is to determine how the machine parts of pumps or other machines that run at high temperatures will react to the fluctuating loads placed upon them.

In order to carry out these tests, specimens are prepared according to exacting specifications of shape, size, and smoothness. Some of the specimens are highly polished and are properly curved so that no obstruction will be in the path of the stresses which, it seems, "flow" through a piece of metal much as water flows through a pipe. In other specimens, an artificial obstruction, in the form of a hole, is placed in the path of the stresses

Giant of Talbot Laboratory

in order to determine how it will affect the specimen's ability to withstand repeated loads.

The specimen is placed in a machine, which through the use of an eccentric, applies a constantly changing load. Temperatures around the piece are carefully maintained by an electric furnace with the proper controlling devices. The load and the number of times it is applied are carefully determined, and from this data the characteristics of the metal under these adverse conditions are computed.

It has been found that a piece of heat-treated steel with no obstructions in it can carry as much as 100% greater load than can one with an obstruction such as a notch or hole through its surface. A polished specimen of a heat-treated steel with no obstruction for the stress flow withstood a repeated stress of 89,000 lb. per sq. in., while a similar specimen with a notch cut in its periphery withstood a repeated stress of only 39,000 lb. per sq. in. On the other hand, under a static load the notched specimen withstood a stress of 250,000 lb. per sq. in., while the polished specimen withstood only 164,000 lb. per sq. in. Thus we see that a repeated load introduces entirely new conditions into the failure of metals.

What these men are doing here is trying to furnish facts that will enable industry to build machines to meet more exacting conditions—machines that are better, yet cheaper, because guesswork is eliminated in their construction.

The Hydraulics Lab has a lot of interesting equipment about the main floor, but it's down on the lower floor, around the water channels, that the real work is going on. The Hydraulics Lab furnishes a great deal of practical work for the University and commercial concerns. Here were calibarted the six Venturi meters being used in the new University power plant. These tubes range in size from 6 to 1¼ inches and are capable of handling up to 200,000 lb. per hour.

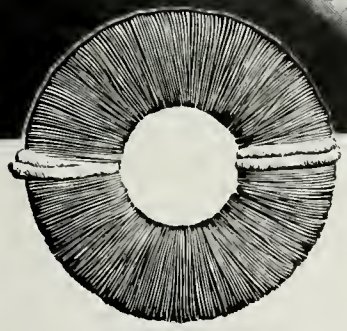
Under the direction of Professor Lansford, W. G. Dugan, M. E. '39, has just finished a bulletin on the hydraulic ram, a type of pump that obtains the energy it uses for pumping from the very water which it pumps. Dugan is now assisting Professor Lansford in making tests concerning discharge through manifold openings in pipes. This concerns the discharge of a liquid through small holes in the side of a pipe, such as might be found in commercial filters or in sprinkling devices.

Probably the most pretentious machine about Talbot Lab is the giant three-million-pound machine. It's the second largest machine of its type in the world. The University of California has the one that will apply four million pounds in compression, but only three in tension.

Lately, Professor Putnam has been testing joints in pipes used as casings for oil wells. There is a great pressure on oil well casings requiring the casing to have a large "pulling out" strength, especially when a well becomes very deep. These experiments are being carried on for a manufacturing company to discover what type of joint for the casing will yield the greatest efficiency or strength. Some of the pipes or casing take as much as two million pounds to pull them apart.

These are only a very few of the fields that are being investigated about the campus. All these experiments are primarily designed to aid industry in its production of quality merchandise to meet the everyday demands of a growing people.

Little things help to keep telephone rates low...



Developing better apparatus of many kinds at lower cost is a continuous process in the Bell System. It plays a major part in making your telephone service the finest and cheapest in the world. Here is one of many cases in point:

Above you see two telephone loading coils—one old, one new. Such coils are spaced at regular intervals along telephone circuits. They reduce electrical losses... help to bring your voice through clearly, strongly over long distances.

Through the years, engineers at Bell Telephone Laboratories have succeeded in making these coils smaller and smaller. In so doing, they have greatly reduced the cost per coil, which... multiplied by the millions in use in the Bell System's nation-wide network... has helped to keep the cost of out-of-town service low.

Why not telephone home at least once a week? Long Distance rates to most points are lowest any night after 7 P. M. and all day Sunday.

AMERICAN TELEPHONE & TELEGRAPH CO. BELL SYSTEM AND ASSOCIATED COMPANIES

TECHNOCRACKED

By Ed Tudor
Senior in Electrical Engineering

Well, to coin a phrase, "Here we are again—you lucky people."

The approach of true State University weather reminds us that alarm clocks soon will sound worse than ever.

After seeing some of our semester grades we are strongly inclined towards the idea that some peoples' idea of philanthrophy is giving away spray from a water fall.

Oh well, "Honesty is the best policy"—but it's a helluva handicap when you have to do business with crooks.

It's just like whistling while going by the graveyard at midnight. That's all right until something whistles back. That wouldn't be unusual for the Quadrangle—just another co-ed looking for a late date, or perhaps a chem engineer looking for company.

These engineers are ingenious fellows. We are reminded of one M. E. who always knows how fast he is going by virtue of a cuckoo clock arrangement. When the machine is running 12 miles an hour the cuckoo pops out and sings, "This is the Life."

The C. E.'s are the careful drivers. They don't believe in honking at pedestrians; prefering never to let their victim know what happened.

All of this talk of driving reminds us of the traffic cop we met during Christmas vacation. The cop asked, "How long have you been driving?" We told him, and, with a view to holding up our end of the conversation, we asked him how long he had been traffic copping. Ten dollars and costs.

The meanest man we ever knew was the guy who mixed axle grease with the mustard, so that when a man bit into a roll the frankfurter popped out the other end like a tracer bullet.

Fairy Tale

The co-ed refrained from smoking when she saw a "No Smoking" sign in the place.

Well, anyway, those who voted for the losing side experienced a pleasant surprise Monday morning, January 20, when the sun rose as usual and on schedule.

After hanging around the corridors of Engineering Hall we now think Roosevelt will be President of the United States for such a long period that even the Engineering Profs will eventually learn how to pronounce his name.

Under the secret service rules one who approaches the President must do so with empty hands. We would like to know, is it necessary that they be outstretched, palms up?

Letting off hot air around the various sororities must be like a racing driver letting out a little air from his tires. It helps you to hold the ground better on the curves.

He was found in the gutter, bruised, battered, and semi-conscious. "What happened?" demanded the police. Replied the victim, "I just gave a fellow every aid short of war."

The European war is really getting good now, which goes to show that the world would certainly miss Hitler. He's provided the guessing game of the ages.

One thing is certain, however, if Italy has a secret weapon it's certainly not skid chains.

On the other hand, maybe they just can't get the darn thing out of reverse.

Mussolini is reported to have paraphrased Caesar with, "Veni, Vidi, Gangway!"

Don't make any bets on Greece licking the Fascists, she'll have to catch them first. In view of the enviable (?) reputation held by Mussolini's soldiers of being the world's swiftest cross-country runners when headed to the rear, we wonder that the advancing Greeks continue frequently to encircle large bunches of them?

With so much R. A. F. bombing, it's strange that as yet they haven't hit even the outskirts of Goering.

Goering is the sort of guy you wouldn't trust in a quick-silver factory with mittens on.

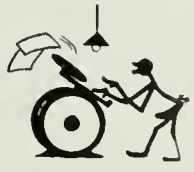
We wonder if the Chinese don't deserve some of their hard luck. After all, didn't they invent gunpowder, printing, and civilization?

We wonder if Ernest Hemingway had Major Bowes in mind when he wrote, "For Whom the Bells Toll"?

A speaker at the recent convention of the Western Section of the Association of Electrical Inspectors was explaining power factor. "It's like one of those big, 10-cent mugs of beer," he said, "it looks as though it were full, but only about 75 per cent will do you any good—the rest is foam."

We wonder if this might not be a satisfactory explanation for that group of E. E. seniors whose names graced an impromptu honor roll just after exams last semester?

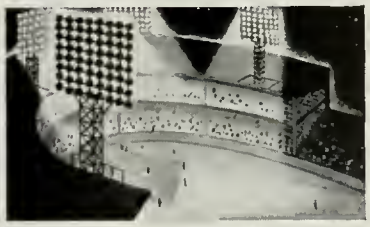
After attending the Registration dance we are convinced that the conga is a quarrel on the dance floor that started in the taxi.



With this parting shot we give up the issue to the printer firmly convinced that regardless of all controlling factors—"Youth will be served"—and carried out.

What do you know about Electricity?

No.1 of a Series of Modern Science Tests!



NIGHT BASEBALL

Six major league parks have been equipped by Westinghouse for night baseball. Each of these "8-tower" installations develops approximately the following amount of light:

1. 750,000 Candle power
2. 100,000,000 Candle power
3. 2,575,000 Candle power
4. 210,000,000 Candle power

LONGEST ELECTRIC STAIRWAY

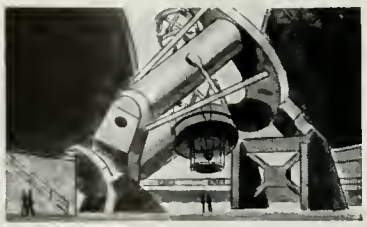
Two years ago Westinghouse engineered and built the longest electric stairway ever used in this country. It was designed to:

1. Save subway riders millions of steps.
2. Transport passengers to the top of the Empire State Building.
3. Carry shoppers from floor to floor in Macy's Department Store.
4. Transport World's Fair visitors to the inside of the Perisphere.

THE STERILAMP

Science has acclaimed the new Sterilamp developed by Westinghouse because:

1. It provides normal daylight for classrooms, offices and factories.
2. It facilitates medical diagnosis of difficult pathological conditions.
3. It kills micro-organisms with ultraviolet radiation.
4. It extends the range of airway beacons.



THE LARGEST TELESCOPE

The 200-inch telescope for which Westinghouse designed and built the mounting is now being erected:

1. On Mt. Palomar, California.
2. On Bear Mountain, New York.
3. On Sankaty Head, Nantucket.
4. On a mountain in Aberdeen-Hoquiam, Washington.

THE ATOM SMASHER

The giant 90-ton atom smasher in the Westinghouse Research Laboratories is used principally for:

1. Testing the tensile strength of metal.
2. Measuring the impact of projectiles.
3. Conducting theoretical research in nuclear physics.
4. Providing high-voltage beam for deep X-raying.

THE TIME CAPSULE

The Westinghouse Time Capsule buried on the site of the New York World's Fair contains:

1. Various plans for universal peace.
2. A record of contemporary civilization.
3. Autographs of celebrities who visited the N. Y. World's Fair.
4. A list of the most important electrical inventions of the twentieth century.

Just a Word Before You Begin

Here's an opportunity to test your knowledge of electricity and measure your familiarity with important developments in the field of science.

Optional answers are provided for each of the six situations illustrated at the left. Your task is to select the one that's correct. So that there'll be no temptation to peek, the answers are printed below, upside down.

If you get four out of six correct your knowledge of electricity is average. Five out of six is good. If you chalk up a perfect score the class ought to vote you "most likely to succeed."

★ ANSWERS ★

1. Largest Telescope ..... Ans. 1.
2. The Time Capsule ..... Ans. 2.
3. The Atom Smasher ..... Ans. 3.
4. The Sterilamp ..... Ans. 3.
5. Longest Electric Stairway ..... Ans. 4.
6. Night Baseball ..... Ans. 4.

Westinghouse "The name that means everything in electricity"

WHEN *an* IRRESISTIBLE FORCE . . .

What would happen if an irresistible force hit an immovable object? Would the force have no effect or would the object move? One man has suggested that the answer to what would happen is "Pow!" But we all know that even if an irresistible force were a physical possibility, there could be no immovable object, because the irresistible force would move it. By *definition*, the two terms are mutually exclusive. Obviously, definitions are important, not only to find, but to remember. "Definitions," said Aristotle, "are the basis of systematic reasoning."

Let's review the process of definition. We all know that a word has two parts, a meaning, and a sound or spelling. When we define a word, like "horse" for instance, we act upon the meaning part, setting boundaries which exclude the meanings of the words "mule" and "donkey" but include what usually pulls a milk wagon. And so, by means of other words, pictures, or illustrative examples, we arrive at an understanding of the thing in mind, and we agree to use the letters h-o-r-s-e for this thing. That is the logical order to which engineers are accustomed, first delimit the thing or the conception in mind, then assign to it a symbol.

This process can be entirely arbitrary. If some eccentric chooses to assign the symbol h-o-r-s-e to what the rest of us ordinarily call a milkman, we need have no argument with him. When he uses the symbol, his milkman need only recall the definition in order not to be offended. However, for the convenience of our memories, we find it best to accept standard symbols and standard definitions, at least wherever they are reasonably clear and useful. If some one usurps the standard symbol and applies it to his own private concept, we need only to remember to recall his definition before we applaud.

A definition is nothing to argue about; it is something to agree upon. Yet we must be wary. A clever speaker may carry half his argument by clothing his assumptions as definitions. For example, an illogical Communist might define the class struggle as the battle being fought between labor and capital.

As an example of the illogical muddle into which a thinker, unsettled in the philosophy of definitions, may fall, consider an editorial which appeared some while ago in our campus newspaper, lauding the "Council for Democracy," a self-appointed committee having as one of its objects, according to our editorialist, to " 'define the concept of democracy.' " He wrote:

> Here is "an undertaking that should have been started a great while ago . . . this column fervently hopes that out of the labors . . . may come a definition of a dynamic democracy, a democracy looking to the future, turning its back on the rotten[1] laissez faire of nineteenth century liberalism, going forward to achieve for its people security and the ability, as well as the right,[2] to manage common affairs for the common good."

Apparently our columnist was momentarily captured in zeal and forgot that definitions are arbitrary, even those of nationally publicized committees. Or did he really expect to read the Council's definition of "democracy" and say, "Now I know!"?—R. T.

[1]Begging a pretty question.

[2]Can "a right" as distinguished by our columnist from an ability, be achieved, or is it inherent in man?

THE ZEST OF WINTER BRINGS *the Glow of Health!*

Winter brings both the enjoyment of sports with skates and skis and the healthful stimulation of a zestful season. Young and old find the countryside inviting—the fields blanketed with snow, trees sparkling with crystals.

No longer is the season regarded as too formidable for outdoor recreation. The advances of medical science and chemistry have minimized the former hazards of winter cold.

We can enjoy winter with confidence today largely because of chemistry's contribution to the preservation of good health. For the chemist is behind both doctor and pharmacist who prescribe and dispense the drugs that safeguard us.

In this field Dow has long been active producing such products as:

Acetyl Salicylic Acid and Acetphenetidin, both widely used by the medical profession to combat common colds, influenza and muscular distress—Chloroform, a common sedative agent in cough remedies—Epsom Salts that recreate the therapeutic values of England's Epsom waters—Glycine, Iodine, Carbolic Acid. These and more than thirty other pharmaceutical chemicals form a major division of Dow's widespread activity.

Here is a field in which Dow is recognized as an outstanding leader—a field of chemistry which has an exceedingly important bearing on the maintenance of America's good health.

DOW

CHEMICALS INDISPENSABLE TO INDUSTRY

THE DOW CHEMICAL COMPANY, MIDLAND, MICHIGAN

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

CREAM PUFF ENGINEERS

When an engineer earns prominence in University athletics, he does not, as a prominent man, represent the engineering student body. Instead, he is quite an individualist, an exception to the accepted group of slip-stick slaves north of Green Street. Engineers *are* career men. We do have tough academic schedules. But does this excuse our inactivity? One doesn't have to be a squad letterman to participate in athletics. Why not organize intramurals among ourselves?

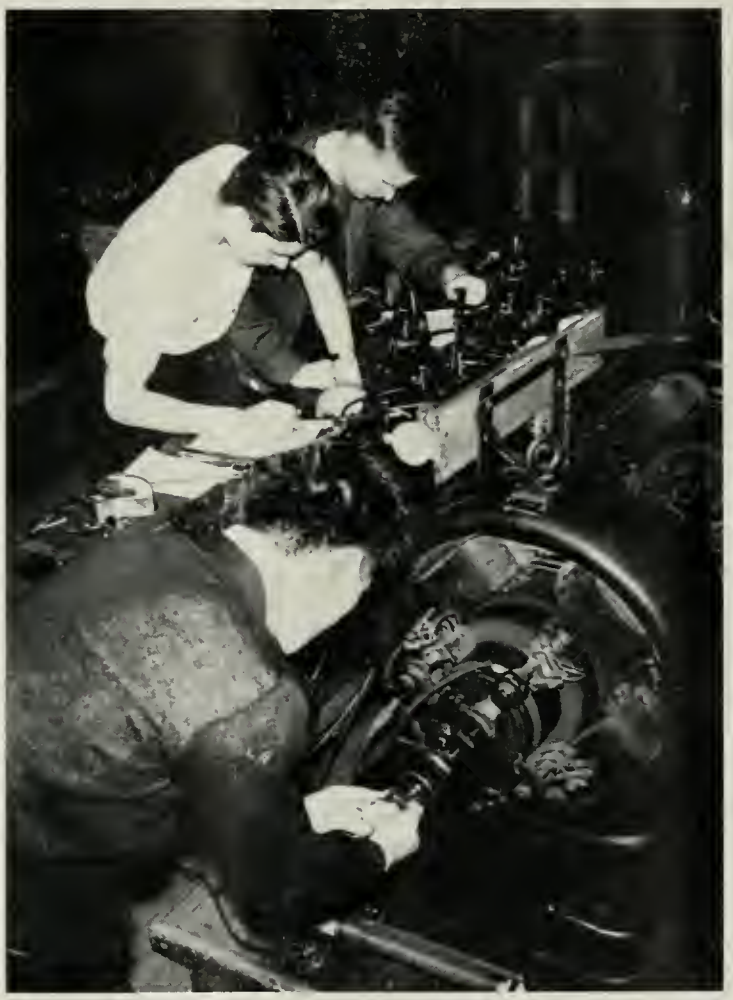
Let's pin a rose on the ceramists. Their society has a winning basketball team going to waste because of a quirk in the University intramural organization. Other engineering societies lack the initiative to present them competition. The student societies are a foundation for an intramural organization within the Engineering College. Why don't the student branches make use of this opportunity to afford their members enjoyable group and individual activity? Athletic competition would create an active, healthy rivalry between the departments. It would promote valuable publicity and recognition for the societies and would foster, in the individual student, pride towards his own group. Engineers would have more contact with members of other engineering classes. At present, a freshman E.E. is as remote from a senior E.E. as he is from a music major.

Perhaps a challenge from the ceramists to the E.E.'s, M.E.'s, or C.E.'s for a hot session of basketball would initiate some lively competition, or properly brand the challenged engineers as cream puffs.—E. L. F.

Illinois

TECHNOGRAPH

established 1885



TRICAL ISSUE

20¢

Engineers

. Tykociner

i Television

n House Dance

n Building

RCH, 1941

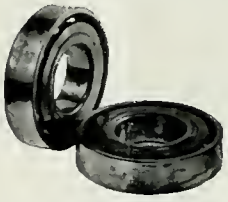
member E. C. M. A.

IN doing this job for machinery manufacturers and users, the *ball* bearing is outstanding.

Because friction is practically eliminated in the ball bearing, there is no adjustment due to wear. This in turn means extreme Accuracy—not only in new machines, but throughout their *longer* life.

So advantageous are New Departure ball bearing applications . . . in lower maintenance costs, in increased accuracy during production, in longer machine life . . . that first costs are hardly an important consideration. Accuracy means greater profits!

Expect Exceptional Performance of
NEW DEPARTURE!



Throughout ten gruelling years, of two and three shifts every day, much of it at high speeds with carboloy tools...these New Departure ball bearings proved their ability to maintain accuracy under severe conditions.

ENGINEERING STUDENTS: For interesting brochure, "Accuracy Pays Extra Dividends," write to New Departure, Division General Motors Sales Corporation, Bristol, Conn.

NEW DEPARTURE

BALL BEARINGS

Nothing Rolls Like a Ball

MARCH, 1941

Staff . . .

Robert Tideman.....*Editor*

Donald K. Stevens.....Managing Editor
Edward L. Foerster.....Assistant Editor
Richard W. Landon.....Names in the News Editor
Joseph E. Foster.....College Research Editor
Edward C. Tudor.....Technoeraeked Editor
Sheldon J. Leavitt.....Art Editor
William N. Cramer.....Photographer

William W. Witort.....*Business Manager*

Victor McMahill.....Advertising Manager

James Francis, Richard W. Landon,
Robert Lankston, Joseph Miller,
James Freek.....Advertising Assistants

Donald L. Renick.....Circulation Manager

Henry P. Evans.....*Faculty Adviser*

THE TECHNOGRAPH

Table of Contents

MEMBERS OF ENGINEERING COLLEGE MAGAZINES ASSOCIATED

Arkansas Engineer, Colorado Engineer, Cornell Engineer, Drexel Technical Journal, Illinois Technograph, Iowa Engineer, Iowa Transit, Kansas Engineer, Kansas State Engineer, Marquette Engineer, Michigan Technic, Minnesota Techno-Log, Missouri Shamrock, Nebraska Blue Print, New York University Quadrangle, North Dakota Engineer, North Dakota State Engineer, Ohio State Engineer, Oregon State Technical Record, Pennsylvania Triangle, Purdue Engineer, Rose Technic, Tech Engineering News, Villanova Engineer, Washington State Engineer, Wayne Engineer, Wisconsin Engineer.

Published Eight Times Yearly by the Students of the College of Engineering, University of Illinois

Published eight times during the year (October, November, December, January, February, March, April, and May) by The Illini Publishing Company. Entered as second class matter, October 30, 1921, at the post office of Urbana, Illinois. Office 213 Engineering Hall, Urbana, Illinois. Subscriptions, $1.00 per year. Single copy 20 cents.

Broadwalk in the Rain

What Price Inertia?

By Charles F. Goldstone
Graduate Student in Political Science

Are engineers narrow? Charles F. Goldstone, graduate student in political science, pulls no punches in dissecting the natives north of Green. Having lived and talked a great deal with many different engineers, he speaks from first-hand knowledge. As Goldie's ex-roommate, the editor knows him to be sincere and unprejudiced, finds it sadly difficult to refute his observations.

"If the world ever makes any progress towards solving its most fundamental problems, it won't be because of anything the engineers do!"

Somewhat hastily, I once made this assertion, which, like a lot of other assertions, is false but contains a kernel of truth. Let's look into it further.

Today, since an engineer first brought on the Industrial Revolution, it is fashionable to talk about the complexity of human society. Because of the division of human labor, with each man acting as one production unit in the great production machine which is the world, it is inevitable that men must and do live together.

And this is where you come in. For you and I and all the other units in the machine aren't simply economic men, working for economic security and living an economic life. We're social animals, too, coming into a constant, every-day contact with each other which we couldn't get away from even if we wanted to. It's this contact, largely, which makes life worth living; I don't want to get away from it, and I don't think you do, either. But the trouble is, the business of living together creates a number of problems which have to be solved in a smooth-running society; so we set up governments to act as our agents in dealing with these problems—fighting crime, disease, poverty, and so on.

But here's the rub: Whereas the people intended the government to act as their servant, yet at one time or another in almost every country you can name, those in control of the government have succeeded in becoming master and in making the people its servants. The result is not the freedom which the people aimed for when they set up the government, but rather slavery. If freedom is to be made secure, then, the people must retain control of the government—and this is called democracy.

But the forces which would subvert popular rule are not open and blustering, but insidious. Indeed, the threat may lie in nothing more than a dangerous doctrine, containing catch words and made effective by its clever manipulation by unscrupulous, or perhaps simply mistaken, politicians.

How defend ourselves against this subversion of our freedom? The Boy Scouts know how: Be Prepared. Eternal vigilance is the word.

It is up to the questioner, which the *inert* engineer can never be, to keep our social and political institutions free. The great molders of public opinion—press, radio, movies, and even governments themselves—by mouthing the words democracy and liberty, have, whether intentionally or not, deceived unthinking people into believing that these ideals actually are part of their own system today, and are permanent and unlosable. Only in a nation of free-thinkers, of questioners, will it be possible to achieve and to hold a truly free, working government over a long period of time. But when great numbers of people in a nation believe unblinkingly all that they read and hear, and let others tell them what ideals they should hold dear and what conditions in society ought most desirably to prevail, or, realizing the undesirability of existing conditions, are too inert to do anything about them—then and then only can freedom fall and a system of regimentation and exploitation take its place. You and I have seen this happen in a number of foreign countries in our own day. See what is going on abroad if you think my arguments "theoretical."

Neither a free nor a regimented system can exist in and of itself. Either can come to be and continue to be only because the dominant political force in the society wants it. The people always could have been and always can be this dominant political force, and can mold their government to suit themselves if they will only be awake and up and around, and stay on the ball.

What has all this to do with you as engineers? Just this—I'll be plain about it. As a group, you are unquestionably the most narrow and self-centered of all the groups on campus. True, there are exceptions among you; but concede me this: Ninety per cent of the students north of Green Street will, if given a couple of hours of elective work, take it either in military or in some technical course. You shun all "theoretical" courses south of Green Street as though a plague lay on them. This might be forgiven if you confined your narrowness to school work; but, if my observations are fair (and I have roomed and associated with engineers more than with any other group), the engineers, again as a group, are the least well-read and well-thought of any on compus.

I think that this is a pretty serious indictment. I am acquainted with the reasons usually adduced in your defense and have given them consideration, but I still maintain the indictment. Assuming that I am right, and that you are as a result mighty poorly equipped to do your part in making your own freedom secure (does this sound vague?—After all, democracy is only a device enabling you to advance *your own interests!)* —then what do you propose to do about it?

What, specifically, *can* you do about it? That, of course, is up to you and your individual tastes. The first thing would logically be to read a newspaper daily, since this is the greatest and commonest omission of the engineer. The University offers the opportunity, not available to most engineering students elsewhere, for a person to extend himself in practically any field of learning in existence: have you ever realized the significance of this, or have you taken the fact for granted and in general just ignored it? The same with the Library—which is a darned good one (although I have known senior engineers who had never been in it except for registration).

But you know what to do as well as I. I'm only asking you to do it.

Founder of Talking Pictures Continues Research with

Photo-Electric Cells

By Joseph E. Foster

Senior in Metallurgical Engineering

Prof. J. T. Tykociner, Research Professor of Electrical Engineering at the University of Illinois, conducted research over a long period of years on photo-electric tubes and their applications. Sound cinemography, or "talking pictures" is one of his contributions to our American way of life. The most recent research of Professor Tykociner, "Photo-electric Sensitization of Alkali Surfaces by Means of Electric Discharges in Water Vapor," was done in collaboration with the late Jakob Kunz, Professor of Mathematical Physics, and Lloyd P. Garner, Research Engineer. The work was conducted in an effort to make photo-electric tubes more efficient. The technical details of this research as set forth in "University of Illinois Engineering Experiment Station Bulletin, Serial No. 325" will not be made here, as reference can easily be made to the original article. Photo-electric tubes, at present, find application in automatic controls, television, and sound pictures.

It is known that metals and their compounds are all more or less photo-sensitive, i. e., they emit electrons under the influence of light, the rate of emission depending upon the frequency and intensity of the light source. Extensive search for very sensitive materials led to no great increase in the efficiency of electron emission, but it was found that by treating metal surfaces, photo-sensitivity could be increased considerably. In other words, light from the same source would cause the emission of more electrons. Such surface treatment, or "photo-sensitization" has become very important in the development of photo-electric tubes. In these processes, a film of molecular dimensions is formed on the metal surface and decreases its "work function," which increases electron emission.

This work was a continuation of long years of effort directed toward the improvement of photo-electric tubes. Its purpose was to develop an efficient method of sensitizing alkali metal surfaces, by means of electric discharges in water vapor. In this research, Professor Tykociner and his collaborators compared photo-electric sensitivities of several alkali surfaces obtained by discharges in purified molecular hydrogen with sensitivities produced by discharges in mixtures of water vapor with molecular hydrogen and with helium. Spectrographic observations revealed that increased sensitivities followed whenever intense Balmer lines (indicating atomic hydrogen) predominated in the spectrum of the discharge. Unless water vapor mixtures were used in the discharge, intense Balmer lines did not appear. Professor Tykociner and his collaborators therefore concluded that dissociated water vapor might be the source of atomic hydrogen and the main factor in the process of sensitization. In order to test the correctness of this hypothesis, they bombarded potassium surfaces with beams of dissociated water vapor in high vacuum. A gradual increase of photo-electric sensitivity, followed by a rapid decrease suggested to Professor Tykociner the formation of a monatomic gas layer, which by interaction with alkali surface atoms, set the condition for maximum sensitivity. Using electric discharges in pure water vapor, he later sensitized lithium, sodium, potassium, rubidium, and cesium photo-electric tubes.

PROF. J. T. TYKOCINER

Some of us think we have had some pretty bold adventures, but few would hold a candle to those of sparkling, white-haired Professor Tykociner, man of experience. For nearly an hour, he challenged the imagination of the TECHNOGRAPH interviewer with only a few of his foreign experiences.

Born in the Russian part of Poland, he traveled to England in 1902 and went to work with the Marconi Wireless Company. After two years he moved to Germany to do research on the entire radio field for a wireless company of Berlin. Came the Russo-Japanese war, and he was called to outfit with wireless telegraphy a fleet of men-of-war for the Russian navy. It was the first time in history that an entire fleet had been equipped with radio. The idea was good, but the introduction of communication could not outweigh the disadvantage created by many obsolete ships facing a more modern and unified Japanese fleet operating near to their bases. The Russian ships, far from their bases, were sunk before even seeing the Japanese.

Soon after, he was called to build the first mobile field units for the Russian cavalry. After finishing this job, he was called to organize in Russia the manufacture and development of radio equipment and to build a radio communication system for Siberia and Kamchatka. Here wire telegraphy was impractical due to sever climatic conditions and to large uninhabited areas. Professor Tykociner was thus active for fifteen years. Still at work at the outbreak of the revolution of 1917, he was subject, for a year, to hardships under the turmoil which followed the great war. He was able, finally, to return to Warsaw, Poland, but again met chaos with the upheaval which followed the armistice.

Immediately after the declaration of independence of Poland, he was called to act as an expert for the new Ministry of Posts and Telegraphs in Warsaw. In this capacity, he prepared plans for the trans-Atlantic communication by radio between Poland and the United States.

Professor Tykociner's great interest in research led him to the United States in 1920. For a time he performed research work for Westinghouse, then came in 1921 to the University.

Professor Tykociner has brought out many revolutionary developments—one of them the now universally used method of photographic recording of sound and reproduction of sound on film by means of the photo-electric cell. At present, he is conducting extensive research into further development of these cells. Enthusiastically, he says he is overwhelmed when contemplating man's forward strides in science and engineering during the last twenty years.—R.W.L.

"SLIDE RULE SHUFFLE"

Highlights Full

1941 OPEN HOUSE PROGRAM

April 4th
April 5th
April 4th and 5th!

This sounds like just a bunch of mumble-jumble, doesn't it, but it's important enough so that every slip-stick slipper on the campus should repeat it to himself several times. Why? Because it signifies the biggest north-of-Green event of the year!

This year, for the first time, we engineers will strut our stuff in an open house and an engineer's dance, all the same weekend! Let it be understood, moreover, that this dance, the Slide Rule Shuffle, is to be no ordinary one. The Dance Committee, under the direction of Chairman Spencer Brown, is making arrangements for the dance itself, but it is up to you, and you, and you to show the rest of the University a social affair that will be one of the high spots of the semester social whirl.

"Figure it out on your Slide Rule!!" *Stant*

The Slide Rule Shuffle will be held Saturday, April 5, following the biennial Open House, April 4 and 5.

It isn't just an accident that this banner event is to be. The whole thing was given an initial acceleration by the Engineering Council—"The Voice of the Engineers"—which was reorganized last fall after a year's lapse. Remember the St. Pat's Ball of old? Last year, for the first time in several years, the engineers had no dance. You, and you, and you didn't wake up until June was nearly upon us, then slowly, out of the silence, came mutterings, questions. Why hadn't we had a dance? What about St. Pat's Ball? Where's our engineer's spirit? What's the matter with us this year? There was no one to answer these questions. There had been no nucleus of leaders to overcome the starting inertia. This year, things are different—very different. This year, we have those leaders, and they're doing a bang-up job. Their work is representative of student enthusiasm. Last fall, when the idea of an all-engineers' dance was presented to the various societies, it was received with unanimous acclaim. This dance is bound to top the success of previous ones, because it has been initiated by aroused student spirit.

The Slide Rule Shuffle Committee, appointed by the Council, consists of Spencer Brown as chairman, Ellis Knobloch, Joe Smith, Tom Huber, Dean Madden, Harry Czyzewski, Vic McMahill, George Dacey, Dan Wilcox, C. E. Durgee, Don Gerberich, and L. G. Melvin.

At this writing, arrangement details are only tentative, but by the time this issue reaches you, the band (which all you rug-cutters will want to know about), the price, and the special features of the program will have been announced. Look for these announcements in *The Daily Illini*, and on posters!

The following data are already at hand:

The time: 9:00 p. m. to 12:00m.

The date: Saturday, April 5.

The place: The Ballroom of the Illini Union Building.

The dress: Informal.

The companion: Your *very best* girl friend.

The number of couples in the Union Ballroom is limited to 300. Don't be left out in the cold because you waited till the last minute. Get your ticket now! Tell your South-of-Green friends about it too—they are welcome. Remember, for 100 per cent enjoyment efficiency, or an all-around good time, there are only two requisites:

(1) A date. (If you have trouble securing said requirement, call on Ed Tudor. He's ready, willing, and —ready to help you.

(2) A rectangular blue card, measuring 2½" x 4", known as a ticket to the Slide Rule Shuffle.

Bring these credentials when you punch in on the Union Ballroom time clock at nine bells, Saturday evening, the fifth of April.

I'll see you there—

The College of Engineering will be on view before the eyes of the state during Open House, April 4 and 5 (preceding the dance). The equipment of the school and the ingenuity of its students (us) will be on display. It's up to us to live up to the reputation that past Engineering Open Houses have established. We've got to put the stresses in the right places, and at the same time. So join hands with the fellow next to you and pull with him.

Rune Levine, M.E. '41, is General Chairman of the Open House. Others on the committee are Ellis Knobloch, Exhibits; Ralph Kuehn, Transportation; Allan Thornton, Publicity; Bob Rough, Guides.

The exhibition is intended to be interesting and instructive, but not mystifying. Laboratory machines will be running, including the monsters in Talbot Lab and the Locomotive Lab. Open House visitors will include hundreds of high school students, state dignitaries, technical men, and students and faculty of other engineering schools.

It's up to us to show the stuff Illinois is made of. It will require the full co-operation of all to put on a successful show, so volunteer your services now!

ENGINEERS RELAX . . .

in New Illini Union Building

By Fred Royalty

Since February 8, the new Illini Union Building has been the popular spot on campus. The colonial beauty and modern efficiency of the $1,505,000 edifice needn't be told; it is in evidence. But our analytical minds can't let the glamour of the place possess us entirely, so we search for the engineering behind all of it.

The Tavern will be a favorite hide-out of engineers. The name attracts them. The unusual construction features of this room have special significance to them, however.

Top: Pine Lounge welcomes students to restful chairs, checker tables, and quiet luxurious surroundings.
Bottom: Diners are oblivious of engineering in Tavern.

The alcoves shown in the picture are not under the building proper, but extend under the drive and landscaping. The ceiling style of the Tavern was forced on the architects. The slant accommodates the foundation of the main entrance stairs.

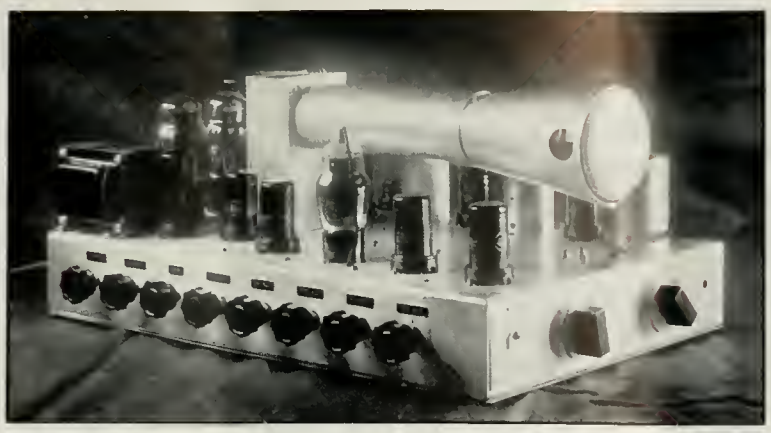
The Florida weather within the big white doors is due to careful air-condition engineering. The same steam that heats campus buildings in the winter cools the Union Building in the summer. Waste steam from the Physical Plant at one pound gauge operates turbines with a back pressure of 25 inches of vacuum. The cooling water pumps are operated by steam under the same conditions. All other power is electric. The turbines are housed in a building apart from the Union Building, so that the shrill whine they produce does not grate upon the ears of music hour listeners.

Conditioned air is produced with the last word in equipment. Chlorine is the refrigeration fluid. The evaporation and condensation both take place in one unit. Water from the centrifugal-drive ice machine is used in the turbine condensers. One conditioner is located above the ballroom and another in the sub-basement. The latter is used to condition the bowling alleys.

Control of the entire air-conditioning plant is from one operation board in the basement. Temperatures in any room may be read here, and the air condition in any room or group of rooms regulated from the same board.

Have you noticed the pleasing brick exterior of the Union Building? Very few passers-by realize that the individual brick are almost one-half again as large in area as the usual unit size. These red face brick were especially prepared for this large structure.

The Pine Lounge pictured has the herringbone flooring which catches the eye and wears (architects hope) "like iron." All furnishings of the building, like those shown in accompanying photographs, are designed for resistance to wear as well as beauty and suitability. The colors throughout the building are typical of the Colonial Period excepting the modern Commons, which is brilliantly yellow and blue.



Improved Television at Illinois

By Joseph E. Foster
Senior in Metallurgical Engineering

Television progress is being made at the University of Illinois with the construction of a new electronic television system incorporating the most recent developments and technical features. This project is under the supervision of Prof. H. A. Brown of the department of electrical engineering. The amateur radio station license, W9YH, of the department permits television transmission within certain limitations and restrictions. The equipment will be used mainly for experimental purposes, but is expected to stimulate considerable interest and provide entertainment for visitors during the next Electrical Show sponsored by the department. The image produced by this type of televisor is approximately 1 1-2 inches square and is remarkably clear and well defined. These unusual results are attributed to the iconoscope camera and reproducer unit. The iconoscope tube is fundamentally a cathode ray tube which scans the subject being televised. It is the picture pick-up tube, the heart of the television transmitter. This cathode ray tube method of subject scanning supercedes the old perforated scanning disk method first used in the early days of television.

The ultra-high frequency television transmitter will be operated on a frequency of 112 to 116 megacycles, frequency stability being controlled by means of a piezo-electric crystal. The unit is of simple, straightforward, ultra-high-frequency design familiar to amateur radio operators.

The iconoscope camera and modulator constitute another component in this television transmitter, producing a composite voice and video signal. Equipment for producing this composite signal includes: (a) an iconoscope, or picture pick-up tube, with a video amplifier capable of raising the initial signal to a level sufficient for modulation, (b) a monitor kinescope (television receiving tube) on which to observe the quality of the picture as transmitted and picked up by some distant receiver, (c) blanking and synchronizing signal generators and means for mixing these signals with the video signal. The figure shows actual size image appearing on the monitor screen. Some loss of definition and resolution occurred in the photographing and printing processes.

A three-inch kinescope (television receiving tube) is used in the superheterodyne receiver to reproduce the image picked up by the iconoscope in the transmitter. The kinescope in the receiver is operated at 1500 volts second anode potential, obtained inexpensively from a small receiver power transformer. The superheterodyne circuit is most sensitive and is very well adapted to television reception. The kinescope is shielded by three layers of thin sheet iron and an outer aluminum shield. The entire receiver, and entire television transmitter in fact, are similarly very effectively shielded.

Remarkably Clear Image, Actual Size

COLOR TELEVISION INTRODUCED

Color television, using a standard type receiver with no additional equipment other than a revolving disk was recently demonstrated by Dr. Alexanderson, consulting engineer.

To bring about the color effect Dr. Alexanderson installed a two-color, 24-inch, transparent revolving disk about a foot in front of the picture end of the cathode ray tube of his television receiver. As this disk rotated at 1800 r.p.m., its transparent field of orange-red and greenish-blue reproduced the studio program in realistic colors. To do this, Dr. Alexanderson explained, a similar color disk revolved before the iconoscope pick-up tube of the transmitter. Other than the two disks, everything was the same as with black and white television at both sudio and receiver. Color television is only in its developmental stage.

NAMES
. . . *in the news*

By Richard W. Landon
Junior in Electrical Engineering

•

Peter Kurlak

Backstroke swimmer Pete Kurlak is a big fellow from Brooklyn with an easy-to-get-acquainted-with air. He's one of the Illini's best swimming hopes, member of Chi Epsilon and associate editor of its paper, member of Sigma Tau and the Tribe of Illini, president of Dolphin, swimming fraternity, as well as ex-president of Sigma Phi Delta, social engineering fraternity.

Pete says the one thing he doesn't like about school is the way time drags. But he does like the way work is "dished out." He says he would like the co-eds if he could get to see 'em, but they don't appeal to him so much this year. Last year dating was a bi-weekly event; this year it's an oddity. Pete says he's not particular about food, but vows that a pecan-nut pie is the best thing anyone ever concocted for the purpose of eating.

Declaring himself upon the present state of national affairs, he thinks we ought to help Great Britain, but should not knock out our democratic methods to do it. "A democracy may not be efficient," says Pete, "but Congress should always retain some powers as a check."

Swimming in meets, Pete has been to every Big Ten school. He like Iowa best. "There's not a cop on every corner staring down his nose at you. All social functions desired may be had, and house mothers have a way of staying very much out of the way." He says it is the most democratic school he has visited; he mentioned a fraternity boy who made expenses by shining shoes.

Pete missed out on the first physical exam for the

PETE CHARLES

naval reserves, but may try again or attempt to get into the army. As a civil engineer, he wants to work on design and construction.

He left us with the thought that everything happens for the best. Although it's hard to believe that things are coming your way when apparenly they're all against you, he believes if you have faith long enough, "everything comes out in the wash."

ELLIS SPENCE

Charles Carson

Charles Carson came to Illinois from Peoria giving as his reason for coming, "Damned if I know why." But, since he has been here, he has been vice president of A.I.E.E., president of both Eta Kappa Nu and Pi Tau Pi Sigma, as well as a Lieutenant Colonel in the Signal Corps. Right now he is worrying with the publicity of the Mil Ball.

Chuck is a robust, curly-haired boy who chews gum naturally. We asked if there was anything he particularly liked or disliked about the campus only to get silence as an answer. He is quite fond of golf and bowling, having organized the E.E.'s bowling team and helped conduct their contests. He "messed around" a little with radio, but time and money kept him from building more than some simple receivers. He doesn't like staying home very well, likes at least one movie a week, yet he thinks that women don't mix very well with engineering. We can't find even one girl in his life, for he says he writes letters only to his mother. He does say though, that it is his opinion, based on observation, that independent girls are more fun than sorority girls.

Charles reads few books; instead spends his time on the *Saturday Evening Post*, *Collier's*, *Readers' Digest*, and *Life*. He especially recommends the *Life* serial, "Out of the Night."

He believes in having good times, but considers it important to keep school work in good order. He feels that ohs are dependent about half and half on activities and studies. However, he doesn't believe that too much time should be spent in study and averages bed by 11 or 12.

Ellis Knobloch

Tall, dark-haired, Ellis Knobloch came to Illinois from Jamestown, N. Y., after "visiting" several local schools. The low expenses were his primary reasons for coming here, but since his entrance, he has come to consider the University engineering school as good as any. He thinks Illinois has a distinct advantage over many of the eastern schools in that "there isn't anything to do around here in the way of social activity."

Well known for perseverance and fight, Knoby is a member of Pershing Rifles, Pi Tau Pi Sigma, TNT, Tau Beta Pi, has been vice president of Sigma Tau, and is now a Major in the Engineer Corps. He is also head of the exhibits committee for the Engineering Open House.

For three years after high school, Knoby worked for his father in his non-ferrous foundry and tool shop. Had it not been for this time of working, he would have gone into medicine. He thinks all high school graduates should take a little time from their schooling to see the practical side of life.

Last summer, he spent six weeks at Camp Custer, held a First Lieutenancy in the engineers platoon during the mock battles.

He says, "Don't mention women," but his roommate belies his mysoginism. With legs over the arm of his chair, he throws his ams into the air and claims that studying is the last thing he wants to do. "We're running on those proverbial Thursday to Tuesday weekends now," says Knoby. With a 4.7 grade average?

Spencer Brown

Civil engineer Bus Brown has managed to be chairman or a member of the committee of most of the dances and special occasions occurring since he came to the University. He is a member of Chi Epsilon and Sigma Tau.

Bus finds that studying takes a lot of time from other activities; he bought his last book about the first of March. He thinks there are quite a few elementary courses that have no bearing on the engineers' specific studies that could very easily be dropped from the curriculum.

When we remarked about the picture of a good-looking girl on his desk, Bus told us he didn't see much of girls down here.

He can't decide which of two hobbies he likes better, hunting or sleeping. For hunting he has two setters and a pointer and delights in the chase after quail, rabbits, and other game. "I've been hunting ever since I was knee high to a grasshopper," he tells us.

Bus doesn't want to work on structural jobs, but imagines he will work in a drafting room for the next few years. There's a new bridge being put up at Chester, his home town. Maybe he'll work on that.

Of course, we wanted to know what he would like to see in the *Technograph*. He said he would like to see it come out oftener if possible, and above all, he would like to see the various societies expend their efforts in making the *Technograph* a bigger and better magazine rather than waste time with small papers of their own that never seem to work out too super.

Bus is chairman of the engineer's dance, The Slide Rule Shuffle, and if his work means anything, it's going to be a real affair. He has spent a lot of time seeing that we get the right band, and only after much delay and trouble he booked the orchestra of Charlie Agnew for this great April 5th event. He says we were lucky to get the Union Building ball room, as Men's League is trying to take it over for every Saturday night from now on. He says, "We've got it though, and we're going to put on a dance that's really a dance!"

Ralph Kuehn

Ralph Kuehn is a tall, brown-haired young man with glasses and a false appearance of shyness. He works during almost all his spare hours; cooks meals for five or six hungry Illini. He says, "They may complain a little about the food sometimes, but none of them have kicked the bucket yet." He spends the rest of his spare daylight hours at N.Y.A. work.

He's been treasurer of Eta Kappa Nu, secretary and publicity director of the A.I.E.E., and is a member of Tau Beta Pi and Sigma Tau. He says the only thing he dislikes about the University is studying.

He reads much, says the only way to get around the book racket is to pay and forget the cost. Poetry is definitely out; too much was forced on him in high school. Ralph likes operettas; often drives to St. Louis in the summer to hear the municipal operas there. He doesn't care for symphonic music; most of it is just too deep. As for dates, Ralph says they are just plain work for him, and as he is lazy (?), he doesn't indulge.

Ralph is providing almost all his expenses for school, yet he finds time amid his work to be quite active in the affairs of the engineering college.

Al Janos

Getting an interview with Al Janos is like getting a free pass to a three-ring circus.

"What's your history?"

"I was born, I know, because I was there. I went to school. Here I am. I won't tell you all of my experiences because you'd need two more magazines for space."—reply a la Janos.

After this outburst, he tells us he's a member of a few organizations—Sigma Tau, Eta Kappa Nu, Tau Beta Pi, and . . . oh yes, he's president of the student branch of the A.I.E.E.

"I have attended this great institution since '38. Before that I worked in Chicago while going to the

RALPH AL

Central Y.M.C.A. night school," come answers to unasked questions.

Then the phone rings and Al dashes off. He speaks, "Hello . . . Janos? Just a minute I'll call him . . . Al! . . . Well, what do yuh know, here he is . . . Hello. Vic."

Once again in the room, he lights a cigarette and gives us the following list.

Hobbies: Blondes, brunettes, redheads.

Activities: Blondes, brunettes, redheads.

Frustrations: Blondes, brunet . . . Oh, that's enough.

"Gee, Henrietta looked cozy tonight." The last is said quietly and with reverence. *The* girl, blonde Dorothy Foster, lives in Chicago.

We have seen the hilarious side of Janos. Now we turn to Janos the serious. He has taken over quite a job with the presidency of the A.I.E.E. and is doing admirably. With his regime have come many innovations—the A.I.E.E. little theatre players and the publication *Campus Currents* with its "Flux Bucket." Al is a hard worker and is doing much to rejuvenate the E.E. student branch society.

TECHNOCRACKED

By Ed Tudor
Senior in Electrical Engineering

The month of March has finally rolled around with its usual influx of superlative zephyrs. In spite of liberal applications of ear muffs, topcoats, mufflers, and overshoes these days, we would still like to meet the gentleman who invented eight o'clocks with the business end of a Messerschmidt. These campus outdoor men make us wonder about the "great outdoor life." After popping out of bed at the most unholy hours they invariably take brisk walks around the block to their oxygen tents. From this point of vantage they proceed to give vent to numerous derogatory remarks regarding the state of campus health.

Glenn Summerfelt, C.E. '42, recently decided to try the glorious physical culture life after a particularly violent session at Bunny's. Arising bright and early, Glenn proceeded to throw open the window and taking a deep breath promptly fainted. He is now firmly convinced that Charles Atlas wasn't a college man.

We hear via the grapevine that some of the boys were asking Ed DuBois what were the steps in hanging a pin. His reply was that there were no steps, it was more like a greased plank.

We derive a peculiar sort of comfort out of reflecting that even if Hitler is to conquer the world, by the time he finishes the conquest, it won't be worth having.

Anyway, the first time we hear a bomb, nobody is going to locate us by looking in the student directory.

We're not trying to scare you, but we see no reason why both of us shouldn't start even.

We understand they've been practicing blackouts so much at the Triangle house that the boys have learned to shave with rubber boots over their heads.

If the Senate Committee wants to know anything from us about foreign affairs, we're against importing any more.

All of this brings us around to Mr. Willkie. Apparently, his long exposure to intensified publicity has created in him a Messianic urge that will be cured only with equally intense devotion to his Indiana pig farms.

After listening to some of Mrs. Roosevelt's speeches we are firmly convinced that she must *not* have studied the same grammar we didn't.

The following poem is dedicated to Bob Smith, E.E. '41, who has been spending his spare moments flaunting his newly-acquired student license plates.

If I Should Die

(With apologies to Ben King)

If I should die tonight
And you should come to my cold corpse and say,
Weeping and heartsick o'er my lifeless clay—
If I should die tonight,
And you should say in sorrow and in tear
"I made forty miles an hour a' getting here."
I might arise in my large white cravat
And say, "What's that?"

If I should die tonight
And you should come to my cold corpse and kneel,
Clasping my bier to show the grief you feel,
I say, if I should die tonight
And you should come to me, and there and then
Just even hint, that Plymouth made more than ten,
I might arise the while,
But I'd drop dead again.

No offense Bob, we know you have a good car—a rattling good car.

It's a good thing Bob is an E.E., we understand he has the rear axle of his car magnetized to pick up the parts that drop off.

We still think it is a good car though; we recall the time in Detroit when it stopped and an investigation showed that the motor had dropped out. The darned thing had run twelve miles on its reputation.

Vic McMahill has been telling around that at last he has discovered a co-ed who has acquired the secret of perpetual emotion.

(Please see page 18)

2 *Damage to telephone lines* by storm and fire. Then an urgent call to Western Electric for supplies. And a quick answer—deliveries by truck, train and plane.

3 *On the weather front,* repair crews find everything they need at an emergency supply depot and go into action fully equipped. Geared to render such supply service to Bell System companies, Western Electric aids these telephone men to restore service quickly . . .

4 . . . so that the telephone subscriber can say:

"YES, THANKS, MY TELEPHONE'S WORKING AGAIN."

Western Electric

. . . is back of your Bell Telephone service

LETTER TO AN EDITOR

Richard Landon—

Your ability as a reporter is clearly shown in the last issue of Technocrap in your article on Talbot Lab.—you have covered the least and less important investigations being carried on at present.

Did you ever hear of Profs. Moore, Talbot, Wilson, and Richart?

Perhaps you had better investigate their investigations! All of these are the ones, and only ones, the students see and ask questions about—sounds to me like J. O. Smith and Lansford are your instructors or have been and your article is a big tube.

Signed,
Just Interested.

Pretty nice *filler* for the Technocrap!

(ED. NOTE: The *Technograph* reporter was sent to F. B. Seely, head of the T.A.M. department, to cover research in Talbot Laboratory. The particular research discussed was that suggested by Professor Seely. If space permits, the *Technograph* will gladly discuss the important research of Professors Moore, Talbot, Wilson, and a score of others in the College of Engineering. Please see page 7, January, 1941 *Technograph* for the research of Professor Richart.

"CAMPUS CURRENTS"

Vic McMahill, Advertising Manager of the *Technograph* and an E.E. is editing *Campus Currents*, mimeographed dirt and news sheet for E.E.'s, published semi-occasionally. Here is a sample of Vic's brain-child:

(ED. NOTE: This poem represents the view of an experienced senior looking back over a long extracurricular career.)

When I was Younger

There was a time when madam, girl, and miss—
Yea, all in petticoats—to me were holy,
Apparelled in celestial light and bliss,
While I was lowly.

Of sugar, spice, and everything that's nice,
These paragons of virtue were compounded;
And if you didn't think about it twice,
How well it sounded!

But I grew up and found I was at fault,
And learned, through many an amorous fiasco,
That women could be vinegar and salt—
At times, tobasco.

Experience has taught these things to me,
Yet still for woman's fickle love I hunger;
I guess I'm still the sap I used to be
When I was younger.

—R. J. Smith '41.

ANTICLIMAX

The Old Man: "So you want to marry my daughter? Well, my answer depends upon your financial situation."

Young Lawyer: "That's a coincidence. My financial situation seems to depend upon your answer."

Rogues Gallery . . . *meet the editorial staff*

Bob Tideman

Every well-regulated magazine has one—much to the regret of the staff—but have you met our Editor Tideman? Bob is the unassuming, quiet-voiced journalist who knocks off from his E.E. long enough to edit the late copy and hound his roommate, Business Manager Witort, into getting more ads for the next issue.

Have you ever noticed the way Bob wrinkles his nose when he doesn't like a story, or the way he runs his hand back through his hair when concentrating? That's almost the same system he employs when listening to a power factor discussion, but when he joins in the conversation thoughts come a'running, and he quickly seeks the base of the idea. He's a member of Phi Eta Sigma, Eta Kappa Nu, and Sigma Phi Delta, engineering social fraternity. A certain young "Catherine" on the Chicago mailing list is Bob's pretty, blonde wife, an ex-Illinae.

Don Stevens

Managing Editor Don Stevens (short like Napoleon) does the work . . . someone must. Don's a dynamo of thought and action, operates continuously at full load. Not content with his *Technograph* work, he drills with Pershing Rifles, writes minutes for the S.B.A.C.S., sings in the Men's Glee Club, and as a junior in ceramic engineering, hushes a disgraceful 4.77 average. He earned a "five-point" last semester. (What next?) We're just warming up. Quizzed concerning Steven's "heart throbs," Stevens chirped, "Has hopes." He's an active member of Sigma Tau, Alpha Phi Omega, and Scabbard and Blade. Aw, what's the use?

Ed Foerster

We even boast a chemical engineer on the Tech staff —Edward L. Foerster of Alpha Chi Sigma writes and rewrites copy of the technical variety, and as Assistant Editor, is general stand-in for affairs d'state of the entire staff. Ed is the slow-talking dark-haired boy from Maywood who editorialized "cream-puff engineers" in the February issue. Incidentally, not even his modesty can hide a good scholastic record in chemistry. When you drop by the office be sure to look for Ed Foerster.

Richard Landon

Guess who is standing in the spotlight now? . . . Aw shucks, you knew it was elongated, lanky-lad Landon . . . Now Richard W., as his moniker goes, is one of the few perfectly handsome gentlemen on the campus who simply compel a second look, but he's every bit as much an engineer as the men he interviews for you each month—a junior in E.E.

With a judicious chew of his gum, and a casual remark of yesteryear in Kansas City, this tall Missourian is just as adept with Talbot Lab technical features as with his regular Names in the News spread near the middle of the magazine. Seldom hurried, he dates, holds a meal job, writes his feature, and stands at the very top of the junior E.E. class.

Joe Foster

There's a Joe in every phone book and we have one too. Our College Research Editor Joseph E. Foster mans the typewriter when there is need for research and technical skill in writing for posterity (does this mean you?). A senior in metallurgy by trade, Joe writes everything from atoms colliding to streamlined train service. Although older than most of the students, Mr. Foster is a youngster in spirit (he'll get a kick out of this) and his small frame carries him and his usual brief case from course to course with seeming abandon.

Joe is a product of Chicago. When he shifts his voice into gear a certain twang greets the ear that is quite pleasing, and when it comes to ideas—don't ask him unless you are prepared for a landslide by Foster. Every man on the third floor of Student Center will tell you

(Please see page 16)

MEET THE STAFF. . . . *from page 15*

Joe Foster has a way about him—and that's the reason he's been such an asset to the 1940-41 Tech staff.

Sheldon Leavitt

If you've heard the crack of a bull-whip, you'll know the type of fellow Sheldon J. Leavitt is, and you'll know the way he speaks. Words tumble out in profusion, and they have punch and meaning in them. He doesn't go off "half-cocked." As Art Editor, he has charge of securing illustrations for the entire magazine. Sheldon is a busy boy, and as a sophomore in civil engineering, has a scholastic average of 5. for which all of us certainly would settle right now. When the task of securing cuts is well in hand, Sheldon puts his creative ability with a pen point to producing sketches of this, that, and the other. Yes, he is an engineer, not an artist, he claims. There are those who believe he is both.

Ed Tudor

And now comes the pay-off! Do you see the somewhat vertiginous looking gentleman (?) over in the corner? Well, prepare yourself for a shock, for that dear readers is none other than your Humor Editor, the one who is responsible for those monthly travesties on organized wit.

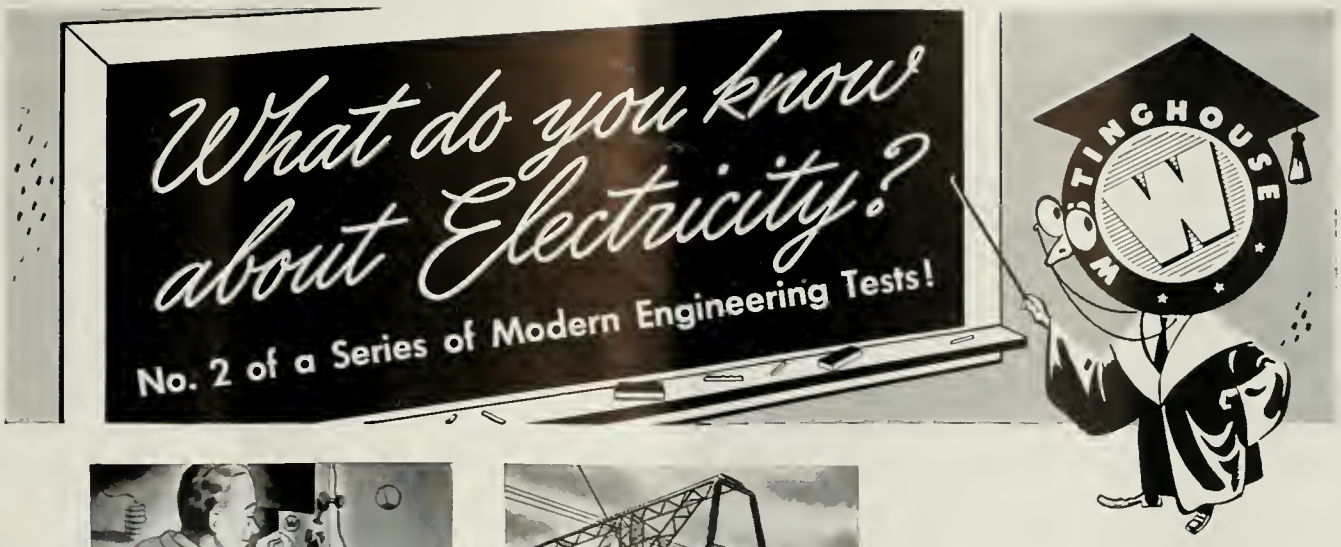
However, disregarding the paronomastic appearance, he isn't such a bad guy. That is, except when he drags out his battered old mill and starts to pound out the current Technocracked page two hours before the deadline. When that happens it's every man for himself, and children and dogs head for the tall and uncut.

His only claim to fame is the fact that despite organized efforts of the engineering faculty he has managed to stay off "pro." (Never fear, they'll get me eventually, if not sooner.)

Oops! That was a mistake. Now you know who's responsible for this little ditty. Don't blame me, it was the Editor's idea.

Bill Cramer

Have you seen a camera-clicker by the name of Cramer? All of the editors look for Bill when a picture is needed. His hobby has made the sheets of this issue more interesting because photographs by William N. Cramer appear on the Names in the News spread. Not that photography is all he does, for Bill is a freshman in electrical engineering, but it does really make a business for him. One night, behind those silver-rimmed round glasses and that sharp chin, Bill *walked* four miles for one picture.



THE OSCILLOGRAPH

The Westinghouse cathode-ray oscillograph makes written records of electrical events occurring in as short a time as:

1. One second
2. One cycle of a 60 cycle per second wave
3. One-thousandth of a second
4. One-millionth of a second.

LIGHTNING ARRESTERS

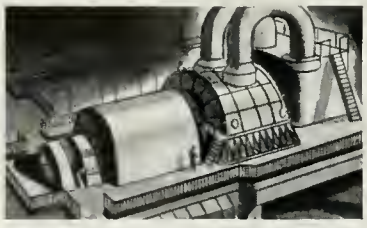
Lightning is a constant threat to transmission lines. Westinghouse has constructed lightning arresters that protect the highest voltage carried, which is:

1. 33,000 volts
2. 66,000 volts
3. 220,000 volts
4. 287,000 volts

DEEP OIL WELL DRILLING

Great depth is being attained with electric rigs using Westinghouse equipment. To date, holes have been drilled as deep as:

1. 1200 feet
2. 4800 feet
3. Two and one-half miles
4. Six and one-third miles.



STEAM-TURBINE GENERATOR

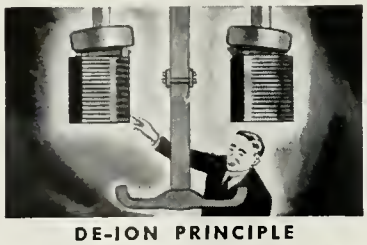
Installed in Philadelphia is the largest single-shaft steam-turbine generator ever constructed. It was built by Westinghouse and can develop:

1. 17,500 kw
2. 72,500 kw
3. 165,000 kw
4. 850,000 kw

SEADROME CONTACT LIGHT

The Seadrome Contact Light, developed by Westinghouse to facilitate night landing of seaplanes, is turned on and off by:

1. A man in a launch
2. An electric eye
3. Radio signals from shore
4. A submerged cable.



DE-ION PRINCIPLE

As pioneered in 1928 by Dr. Joseph Slepian, Westinghouse Research Engineer, the De-ion principle is concerned with:

1. Faster, more efficient extinction of electric arcs
2. A new method of charging for electric power
3. The theory of magnetism
4. Harnessing the power of the atom.

Let's Try It Again!

Regardless of how you came out on the last series of questions, here's another chance for you to see how familiar you are with important developments in the field of electrical engineering.

Optional answers are provided for each of the six questions listed at the left. Your task is to check the correct answer in each instance. To eliminate any peeking, the answers are printed below, upside down.

If you get four out of six correct you'll be doing all right. Five out of six passes you with honors. If you should know all the answers you can give yourself a good pat on the back.

★ ANSWERS ★

The Oscillograph — Ans. 4.

Lightning Arresters — Ans. 4.

Deep Oil Well Drilling — Ans. 3.

Steam-Turbine Generator — Ans. 3.

Seadrome Contact Light — Ans. 3.

De-ion Principle — Ans. 1.

TECHNOCRACKED. . . *from page 12*

We don't know why ye Ed has us writing this hammy stuff; he got off the gag of the month last week. It all came about when one of the Frosh on the staff came breezing into the office and announced: "There's a tramp outside who says he hasn't had anything to eat for six days."

The guiding light of the Tech immediately rose to the occasion by replying, "Bring him in, if we can find out how he does it we can run this rag a while longer."

Some of the boys have taken to arthritis beverages. The kind that makes you stiff in every joint.

Try This One on Your Slip Stick

We wish we had known this when at school they tried to stump us in the "mental arithmetic" class and generally did (mental arithmetic was always too mental for our mentality.)

The instructor was striving to drive home some truths. "Figures can't lie," he declared. "For instance, if one man can build a house in 12 days, 12 men can build it in one day."

A puzzled student interrupted: "Then 288 men can build it in one hour, 17,280 in one minute, and 1,036,809 in one second. I don't think they could even lay a brick in that time."

While the instructor was still gasping, the ready reckoner went on: "And if one ship can cross the Atlantic in six days, six ships can cross it in one day. Figures can't lie, can they?"

FLASH!

As the issue goes to press, Spencer Brown, chairman of the dance committee, announces that Charlie Agnew and his orchestra will play at the Slide Rule Shuffle. Tickets are $1.75.

This famed aggregation, specializing in smooth, sweet swing, comes to us from a series of coveted engagements throughout the nation — among them the Edgewater Beach and Stevens Hotels in Chicago. Charlie Agnew is chiefly known for his NBC, CBS, and Mutual Network broadcasts, and his Victor and Decca recordings.

One of the featured performers is Gordy Pettigrew '39, who doubles on vocals and trumpet.

The ticket supply is limited, so get yours now on the first floor of Engineering Hall.

Illinois TECHNOGRAPH

established 1885

ING ISSUE

20¢

r Education

Research

ue's Gallery

hnocracked

er the Ball

RIL, 1941

Spring!

member E. C. M. A.

WHEN fault exists in any type of bearing, high speed will inevitably bring it to light . . . in excess heat and wear. Thus, high speed machine operation is at once a test of the accuracy with which a bearing is made and of the efficiency of the basic bearing design.

Significant then is the fact that each year more manufacturers of machine tools and other high speed machinery standardize on ball bearings . . . on New Departure ball bearings, used throughout industry wherever wheels or shafts turn.

Spectacular Proof
that New Departures
Permit High Speeds

Many high speed machines operate at between 5,000 and 10,000 r.p.m. A notable exception is the Madison-Kipp air grinder which runs at 50,000 r.p.m.—and which runs successfully on New Departure ball bearings.

ENGINEERING STUDENTS: For interesting brochure, "Ball Bearings for Higher Speeds," write New Departure, Division of General Motors, Bristol, Connecticut.

NEW DEPARTURE

BALL BEARINGS

Nothing Rolls Like a Ball

APRIL • 1941

Staff . . .

Robert Tideman.....*Editor*

Donald K. Stevens.....Managing Editor
Edward L. Foerster.....Assistant Editor
Richard W. Landon.....Names in the News Editor
Joseph E. Foster.....College Research Editor
Edward C. Tudor.....Technocracked Editor
Sheldon J. Leavitt.....Art Editor
William N. Cramer.....Photographer
Robert D. Cote.....Editorial Assistant

William W. Witort.....*Business Manager*

Victor McMahill.....Advertising Manager
James Francis, Richard W. Landon, Joseph Miller, James Freck.....Advertising Assistants
Donald L. Renick.....Circulation Manager

Henry P. Evans.....*Faculty Adviser*

THE TECHNOGRAPH

Table of Contents

MEMBERS OF ENGINEERING COLLEGE MAGAZINES ASSOCIATED

Arkansas Engineer, Colorado Engineer, Cornell Engineer, Drexel Technical Journal, Illinois Technograph, Iowa Engineer, Iowa Transit, Kansas Engineer, Kansas State Engineer, Marquette Engineer, Michigan Technic, Minnesota Techno-Log, Missouri Shamrock, Nebraska Blue Print, New York University Quadrangle, North Dakota Engineer, North Dakota State Engineer, Ohio State Engineer, Oregon State Technical Record, Pennsylvania Triangle, Purdue Engineer, Rose Technic, Tech Engineering News, Villanova Engineer, Washington State Engineer, Wayne Engineer, Wisconsin Engineer.

Published Eight Times Yearly by the Students of the College of Engineering, University of Illinois

Published eight times during the year (October, November, December, January, February, March, April, and May) by The Illini Publishing Company. Entered as second class matter, October 30, 1921, at the post office of Urbana, Illinois. Office 213 Engineering Hall, Urbana, Illinois. Subscriptions, $1.00 per year. Single copy 20 cents.

Educating Engineers

. . . *with a Purpose*

By Gilbert H. Fett

Instructor in Electrical Engineering

Author of the junior E.E.'s nightmare, the esoteric, four-terminal "Fett Box"; twice a father; and recent acquirer of a Ph.D. degree; E.E. instructor Fett explains, and in part defends our present methods of engineering education. Queries Doctor Fett the realist, "What is 'culture'?"

Engineering education is almost continuously being examined to determine whether or not it is fulfilling its avowed purpose. Likewise, inquiry goes on to find out what should be the purpose of an engineering education. At the present time the engineering education which you, as engineering students, are experiencing is being criticised because (a) it is too specialized in technical training, (b) it does not provide an adequate foundation in the natural sciences, (c) it does not provide a background of social consciousness (i. e., it does not educate the whole man), (d) it is vocational training and not education in the university sense of the word, (e) it does not provide courses which are technical enough.

Out of the welter of discussion comes this general agreement—engineering education must teach men to think, to be able to reason from cause to effect and from effect to cause. The means to this end are the differences in opinion. I wish to defend, in part, our present curriculum as a suitable vehicle. I realize that there is much to be desired, but that the divergence from the ideal is caused by the practical difficulties of cost and administration. I wish to state as a premise that I assume that the methods of teaching and the individual course presupposes the intention of teaching men to think, and not merely collect information.

The most common criticism of engineering education is that it does not include the social sciences and the humanities. The thesis of this argument is that we live in a complex social order which must be understood if the engineer is to function effectively. Many individuals are greatly concerned because the engineer does not seem to realize the impacts that his developments have on society. Let us examine this criticism more carefully.

An outstanding development of our 20th century was the automobile. The automobile has certainly changed the habits and vocations of most of the people of this country in one way or another, for better or for worse. From its humble beginnings what social scientist could have foretold its effect? No one, for not even the engineer knew where it was headed for. Should Henry Ford and the other developers have spent time in investigating the social impact of their noisy horseless carriages? They would not have had time to investigate the knock in the gasoline engine. I think it is apparent that the study of the social sciences, at least as we now understand them, would help the society and the engineer very little. He cannot be a leading technician and also spend his life studying social trends, when even among experts there is little unanimity of opinion about what we are striving for in the way of a social order.

What about the humanities, the "culture" of this society of which we find ourselves a part? I am tempted to recall the results of a survey of many thousands of college students made in an eastern state, a questionnaire covering the general fields of knowledge ranging from the arts to the natural sciences. (I personally believe that surveys are the collective wisdom of individual ignorances, but I am willing to relate this because it is indicative of a trend.) The engineers were at the top of the intellectual list, according to the results of this survey, and the prospective teachers in this state were near the bottom. Now I do not know what the questions were, nor the relative rates of the questions in the different fields of information. I merely want to point out that the engineering curriculum as it now stands must have value with reference to this ideal of "culture."

I wish to take the offensive on this question. Who shall say that a knowledge or appreciation of literature makes a man cultured? Why do we not say that every cultured person must understand the beauties in the design of a 100,000 kw turbo-alternator? Why do we have such an emphasis upon some of the "finer arts" and none on the finer sciences and techniques? Because for thousands of years man has not been able to do anything better than to tell stories, paint pictures, and make sweet music. Now, however, he has been able to make machines, tools, and products which, in the creation, are as edifying and aesthetic as pictures or music. But the people who set our standards for culture are just the people who do not have the wit or the inclination to appreciate modern engineering techniques.

Another criticism of engineering education is that it is vocational or empirical education and not university education. It is felt that the technical education is too specialized and that it does not provide a sound foundation in the natural sciences. I think that we engineers must admit that the reason we come to school, or at least one reason that we are here is that we do hope to get a certain kind of a job when we are graduated. We also feel that the school preparation should help us get that type of job. But so do the law, medical, theological, and pedagogical schools prepare their students for a definite vocation. I don't think that we need apologize for vocational education. Quite the contrary.

I believe that engineering education does not need more natural science included in its curriculum, but that engineers need a more thorough training than we now provide. We do not need the inclusion of all of the specialized topics of physics, for example, but we need to do a better job of teaching mechanics and magnetism. For the comparatively small group of men who will be pushing back frontiers of technical developments, it seems that advanced study in industry or the graduate school

(*Please See Page* 14)

Metallurgical Research

Continues at Fast Pace

By Joseph E. Foster
Senior in Metallurgical Engineering

Prof. W. H. Bruckner

Metallurgical research carried on in the department of mining and metallurgy is not all of purely academic interest. Much of it has immediate utilitarian value to industry.

The coal mining industry is confronted with the problem of rapid wearing coal-cutting bits. At present, the hardness and abrasiveness of the pyrite in Illinois coal causes very excessive wear and necessitates replacing some tool bits even after each undercut. The cost of new tool bits and the time lost in replacing worn ones is no small item to coal miners. The problem calls for an immediate solution. A definite answer may result from Professor Walker's work in hard-surfacing with a carbide tip some tool bits commonly used in coal mining. Carbide-tipped tools are presently used on metals difficult to machine and stand up quite satisfactorily.

Student Researeh

The study of cast iron glass molds has been carried on over a period of years by senior metallurgists as part of their thesis requirements. Since small defects in molds are impressed in the finished product, glass molds must not develop checks, cracks, or other defects while bottles or other glassware are being molded. The cast iron found satisfactory as a result of this study is a nickel-chromium-molybdenum cast iron which is comparatively heat-resistant at elevated temperatures. The cast iron is chilled in molding, but the chill is controlled so that the iron is still gray and easily machinable. A chill is used permanently to produce fine graphite flakes uniformly distributed and a dense, close-grained surface which will take a high polish. A pearlitic microstructure is the most resistant to checking and crack formation. The pearlite must be stable, however, and must not tend to spheroidize. The mold must withstand repeated heating to 1200° F.

Hardenability

Professor W. H. Bruckner (Page 8, December), made an extensive study of the hardenability of carburizing steels. The results of his investigation were published in the Experiment Station Bulletin. A continuation of this work is now being made, especially to determine what effect differences in the distribution of inclusions, and possible chemical segregation associated with inclusions, has on the hardenability of various steels. In this study, Professor Bruckner has the co-operation of the Timken Roller Bearing Company, which furnishes steel to his specifications.

Welded Joints

Today, welding is perhaps the commonest metal-joining method, and the endurance limit of welded assemblies subjected to repeated loading is of paramount importance. How well does a welded joint stand up under repeated reversals of stresses? That is another problem being investigated at Illinois. Fatigue studies are being made on large welded joints by Professor W. M. Wilson, Research Professor of Structural Engineering. The results of his study bear on design specifications for welded bridges and other large structures. Related metallurgical studies are being carried out in the research laboratories of the department of mining and metallurgy for the purpose of detecting the cause of weld failures and of deriving information leading to improved welding methods and improved design of welded structures. Mr. H. C. Beede, Special Research Graduate Assistant, is carrying out this investigation under the capable guidance and supervision of Professor Bruckner.

Weldability

In Professor Bruckner's recent study of the weldability of various steels, a series of steels with different chemical analyses were welded with a single welding bead placed on the surfaces of ½-inch plates. The heat-affected areas adjacent to the weld deposits were surveyed for hardness, grain-size, and microstructure. These properties and conditions were reproduced by a "weld-quench" heat treatment in Charpy impact test specimens, and a comparison was made of the impact strength of the parent or base portion with the strength of the heat-affected zone. A steel whose heat-affected zone has an impact strength comparable to that of the steel in the "as received" condition is considered weldable. A weldability test was formulated by Professor Bruckner on this basis.

Recrystallization of Alpha Brass

For over six years, Professor Walker studied recrystallization phenomena in cold rolled polycrystalline alpha brass, and today he is one of America's few better informed metallurgists on this specific phase of non-ferrous metallurgy. Recrystallization of this brass is a function of temperature and of cross-sectional deformation in cold rolling. Recrystallized grain size and recrystallization temperature after annealing vary as the per cent of deformation. An accurate understanding of recrystallization and annealing temperature are necessary for satisfactory results in severe forming operations such as those encountered by alpha brass in the manufacture of cartridge shells. Frank A. Ciboch, a graduate student, is writing his master's thesis on this research.

Single Crystals

About three years ago, Professor Walker began studying the behavior and properties of single crystals. Equipment for making the crystals was designed and built in the department under his supervision. Single crystals of zinc, cadmium, and aluminum are now being studied. This study is of purely fundamental academic interest but may throw more light on twinning and slip phenomena in metals.

Rogues' Gallery . . . *meet the business staff*

Bill Witort

Big Bill Witort, Business Manager, has a smooth line, and it's not hot air. Backing up his smooth confidence is a set of strict principles, an uncompromising sense of right and wrong that makes short shrift of seemingly involved questions. He likes to argue because he's so good at it; claims engineering's not his forte. He likes to date, too; says his experiences with women have been extensive, rather than intensive. His roommate, Editor Tideman, claims that if Bill got his head caught in the jam pot, he would talk his way out of it.

Vic McMahill

Always on the move, sporty-dresser Vic McMahill seems an animated bundle of nerves. He's here, he's there, he's everywhere at once—ubiquitous Vic! If he's not getting ads for *The Technograph* or writing copy for his *Campus Currents,* he's publicizing some north-of-Green event. He was publicity chairman for both AIEE and the Slide Rule Shuffle. Vic's from Kansas City; is an SAE, Sigma Tau, Eta Kappa Nu, and Tau Beta Pi member. He divides his time among studies (+.7), *The Technograph,* and sorority Gamma Phi Beta. When we lose Vic to Mr. Westinghouse this summer, gone will be one of the best salesmen that's been around here in a long while.

Joe Miller

Joe is a new addition to the *Technograph* staff—a freshman from Springfield. So far, his main work has been to assist in collection of bills and in work that comes around at mailing time. A rising salesman, he's alert, unquestionably sincere, wears clothes well, and speaks with the liquid voice of a born salesman.

Bill Witort easily convinced Don Renick and Jim Freek, both of Sigma Phi Delta, that the *Technograph's* business staff was the place for them to expend their excess energies. Realizing a good opportunity when it arose, they subsequently became invaluable members of the staff.

Don Renick

Don is Circulation Manager. While he's not one of these burly guys you see in moving picture circulation rooms, he does a fine job of getting your *Technograph* off to you on time. Don is a quiet fellow; likes to eat and exercise his droll wit in attempts to disprove it. Right now he's bemoaning the fact that someone borrowed his brand new tan overcoat and neglected to return it.

Jim Freek

Jim Freek of Rockford is one of our best bill collectors. He's got that now-you-know-you-oughta-pay look that rolls the money in. Decidedly absent-minded, modest to an extreme, he's president of his social fraternity and holds an enviable scholastic record in chem engineering. Jim will graduate next February. After that, he's wondering whether it will be work with some private concern or with Uncle Sam at twenty-one bucks. Right now he contents himself playing with plant physiology.

Jim Francis

You'd think freshman Jim Francis were a senior. He knows which way is up and is steadily climbing there. Originally from Springfield, he's now enrolled in M. E. and is a member of SAE fraternity. Jim doesn't deny he likes girls; recently romped semi-steadily with a Theta. Polished in manner, he's nice-looking; knows his way around.

NAMES
. . . *in the news*

By Richard W. Landon
Junior in Electrical Engineering

Harry Czyzewski

Evading our question about women with the remark that women shouldn't be mentioned in interviews, Harry tells us that he's read every best seller that's come out in recent years. Of course he reads *Esquire;* sometimes even reads some of the articles. *Look, Life,* and technical magazines monopolize the rest of his reading time, except for an occasional glance at the funnies. Says Harry, "Poor Smilin' Jack."

Harry studied at the Chicago Junior College before his arrival at Illinois. Here as a metallurgist, he has risen high among his fellow students; is now a member of Alpha Sigma Mu, met honorary, Tau Beta Pi, and Phi Kappa Phi, all university honorary. He was Program Chairman for the Slide Rule Shuffle. Before the rigors of study began to consume all his time, he went out for freshman track.

Besides a hobby of moderate drinking, which we won't mention, he enjoys all sorts of outdoor activity. At junior college he was captain of the track team and football team, champions of the Northern Illinois League. Before he started working summers, he camped in the woods of northern Wisconsin; had no exciting adventures, barring mosquitos and bugs.

Running a hand through his black wiry hair, he says he hasn't done much down here, because he did everything back in junior college. Among the "not much" he

DAN HARRY

does here is part-time work making national defense X-ray studies of various metals, and dinner-time work as head waiter at Zeta Beta Tau Fraternity.

When asked what kind of work he expects to do this summer, he replied, "My draft number is 76. I haven't any friends on my local draft board. Figure it out." *If* the government doesn't call, he hopes to do research work. He has been offered a job with the Naval Research Laboratory, if he is exempted from the draft.

MARK DAVE

Dan Hang

Here is the antithesis of action—an engineer asleep as we enter. Al Janos, Dan's roommate shouts loud for Dan to awake. Dan slumbers on, so Al supplies information: Dan was born in Cleveland, moved at a tender age to Miami Beach, where he won several prizes selling newspapers—one a trip to Cuba. Dan attended the University of Miami, but because it lacked a full engineering course, transferred to Illinois as a junior. Perhaps, now bestirred by his history, the lad will waken . . . alas, he does not move. Let us continue . . .

He is now president of Eta Kappa Nu, electrical engineering honorary, was secretary of the student branch of AIEE, and handled the high voltage lab for the engineering open house. He also has a girl friend with whom he is very active. (This word will bear investigation.) At present the draft situation is affecting their plans for marriage. (Investigation complete.) It is also creating a question as to what sort of job he will accept. He would go into power distribution or manufacturing, but thinks that under present conditions he may enter the navy.

Dan works several nights a week at a local gas station. Spare daylight hours he spend at his bit of research—testing insulated cable for corona discharge under conditions of varying humidity.

Hush, child, the great Hang awakens!

We pile questions on him. Yawns Dan, "I came here mostly because they were prompt in answering letters. Besides textbooks and comic sheets, I read very little." As we walk out the door, he tells us he is a dilatory member of the MHDA Council. Then he puts another chocolate drop in his mouth, and for all we know he's back asleep again.

Mark Knight

Vital statistics: Born 1918 in Leland, Ill. Present home: Sheridan, Ill. Six feet tall, capped with dark curly hair—St. Pat's gift to the women north and south of Green. Obviously, all Mark's time isn't spent with a slipstick.

Mark is working his way through school as Saturday vacuum cleaner pusher and head waiter in an east campus sorority house. He knows how girls look in the morning with hair down and faces bare . . . "too sleepy even to order breakfast." Unabashed, he dates semi-frequently; prefers dances to movies.

After much prying, the interviewer made him admit some of his honors: president of ASCE and member of

Phalanx. He recommends the Advanced Corps. "There's nothing like it," says Mark. "There's pay in it, and it's good training . . . excellent for shyness, because you have to command a group of twenty-seven men to march, when they would probably rather turn around and walk out of the Armory." Mark holds the highly esteemed position of Captain of the "Awkward Squad," made up of flunkers and others who can't seem to get along in Military.

Appendicitis in his freshman year held Mark back a semester, so he'll graduate next February. His present average is about 4.25. This coming summer he may work with the Chicago Steel and Bridge Company. Expressing his estimation of the University, Marks thinks the teachers are "o.k."; likes the comparative freedom and the engineering open house.

Dave Pearl

"This is quite unusual." Dave was surprised when we met to talk him over and get the lowdown. He didn't realize "Pearl" was a name in the news. "Grades? . . . oh fair," he mumbles, "about 4.9." Yes, pretty fair. He's a member of Tau Beta Pi, member and prexy of Pi Tau Sigma, and was chairman of the Guides Committee for the engineering open house.

Dave's unusual hobby is table-top photography. He likes to fiddle with pipe cleaners, sugar, and the other makings for his settings and characters; finds building the setting more fun than taking the pictures. A handsome husky fellow, he enjoys softball and outdoor sports. In university life he has found no courses that he is extremely passionate about, and none that cause him to "tear out his hair and crack his head against walls." "I just took them," says Dave, but he considers Illinois a great school. He once held a summer job as correspondent for a chain food store; wrote letters to customers.

Dave is a conscientious engineer; reads trade magazines, *Aero-Digest*, *Time*, and books on speech and job-hunting. In June he will enter the Hamilton Propeller Company of Hartford, Connecticut. Having worked on machine design in the M. E. department, he has a fine practical background, so don't worry about Dave and the wolves.

On girls (the final subject of every bull-session), he says he rather likes them, dates often, but isn't yet alter-bound. He's going to call us if he decides his time has come.

Walt Numrich

It's pretty hard to get Walt Numrich to talk about anything but his recent trip south with the baseball team. He started playing baseball two years ago after coming to Illinois from Valparaiso University in Indiana. After pitching only three games that year, he got his letter. Last year, he was forced to forego baseball because of a leg injury, but he's back in there really pitching this year. He says this southern trip was the best vacation he ever had in all his life. "The weather was swell, and all you wanted to do was lie around and sleep."

Walt told us quite a lot about the beautiful campus at L.S.U. Although it's considerably smaller than Illinois, it's away from the city and has a lot to offer as far as beauty goes.

Since coming here on a scholarship, Walt has earned a good share of his school expenses—working for N.Y.A., helping on the concrete slab investigation over in Talbot lab, and more recently working for the City Engineer of Champaign. He rather expects to enter the Naval Reserve this summer, but if he misses that, there's always the draft waiting.

If it weren't for the draft, he would like to try his hand at baseball, save up a good sum of money, then just travel around the country until it was all spent. After thus enjoying himself, he would like to get down to serious work with a construction company where he could apply some of this stuff he's been learning these past few years.

Walt told us not to mention study to him. He forgot all about it on this big trip and is having a time getting back into swing again. Anyway, he says his two roommates do enough studying for the three of them. Even if he doesn't like study, he likes to read. He tries to keep up on the latest novels, and just finished *For Whom the Bell Tolls*. After having tried for some time to get a copy of *Memoirs of Casanova*, the big trip brought one to light, so he's been indulging in its silvery passages of late. Maybe he's studying up to be more smooth with those girls he assures us he likes to be with.

WALT BILL

Bill Ehorn

Red-head Bill Ehorn comes from Danville. If you cant find him over weekends, it's because he's in Danville visiting his girl—THE girl. Bill doesn't support the theory that women and engineering don't mix. Member of Phalanx and secretary of TNT, Bill is also a Lieutenant Colonel in the Advanced Corps. He was the boy out in front when the Engineers marched by the stand for President Willard April 18. He also works in the Dean of Men's office.

Next summer, after graduation, Bill will enter either the army or the G. E. Test Course, testing marine power plants and airplane superchargers. Bill feels that Illinois offers a fine background; believes it is hard to see this until you become a senior and apply the stuff you struggle with as an underclassman. Yet he thinks that freshmen and sophomore math courses are too impractical for engineers and that not enough opportunity is offered for students actually to tear down machines and see what makes them tick. Just a little too much book larnin!

All in all, Bill thinks his college life has been pretty good. Student and faculty friendships, a good engineering background, and lots of fun are the main things he got out of a college education—and what more could one ask?

TECHNOCRACKED . . .

By Ed Tudor
Senior in Electrical Engineering

Here we are again, another month—another deadline, and as usual we are beautifully stumped for some decent gags. Spring of course is here, and the usual campus columns have effectively covered that subject. That doesn't leave much except the war which can usually be kicked around for 500 words or so since there are more laughs in the current headlines than in a freshman rhet theme.

We still can't figure out, if nature is so wise, why she supplied man with so many things to think about and so little to think with? However, we have resolved not to devote all of our time to worrying over the international situation until Hitler promises to protect the United States against invasion by Great Britain. Many of the campus sages are worried because they think the world is going to the dogs. If the dogs thought this, they'd be worried, too. But we refuse to string along with the astronomers who are trying to blame the world's troubles on sunspots. We get more fun out of blaming most of it on the governments. On the other hand there's the broker's son we were arguing with recently. When we asked if he were insinuating that we might be a trifle half-witted, the advice came back that if we ever went to three-fourths to be sure and sell. All of this seems to boil down to the asinine conclusion that the reason the average man is so jealous of his right of free speech is that he hopes to attain the point some day where he won't be afraid to exercise it.

The history of a neutral in contemporary times can be divided into three parts: short of war; short of weapons; short of friends. The old method of war used to be "Divide and rule." The present Balkan situation (there's always a situation in the Balkans) has changed it to "Surround and scare."

Recipe for taking anything by force: Assemble a number of Australians and say, "Sic 'em." But these Australians evidently aren't so tough. We see in the paper where seven Italians and four natives licked one.

It begins to look as if we will have to learn how to say, "Lafayette, we are here," in Chinese, Turkish, and Low Hottentot.

The one consolation in the international situation is that if the Japs take the Philippines from us, we'll take California away from them.

Mrs. Roosevelt says, "Life moves so fast now it is impossible to keep up with it." If Mrs. Roosevelt can't keep up with life, the rest of us might as well give up the pursuit and sit down and take a long-needed rest.

If the world can only manage to hold itself together for a few more weeks, the June graduate can sally forth and set it right.

Formula to avoid a miserable old age: Join the Russian Reds and tell their secrets and your problem is solved. A Russian was liquidated on the fifth floor of a Washington hotel. That's the European plan with room service thrown in.

Science is wonderful. Germany is now making fabric for army uniforms out of wood. Let's hope that Washington's secret weapon is a particularly vicious species of termites which would really give Hitler ants-in-the-pants.

They tell us that it takes four men at home to hold one man at the front. It will probably take eight in our case—we're a little nervous.

Among the News Items

In Mexico City there is a surgeon who is using phonograph records in lieu of the usual anesthetic. We cant imagine a more dreadful ordeal than having an appendectomy to the tune of "Beat Me Daddy, Eight to the Bar."

Another physician asserts that it isn't work, but worry, that kills you. It amounts to the same thing with us, Doc. We have to work, and that worries us.

Thieves took $500 out of four fraternity houses at Kansas University. The *Kansas City Star* makes the appropriate remark, "If the boys can get that much money together at one time, there's no need for further education."

From the *Salt Lake Tribune*: "Tom O'Neill of Ely had brought some home-brew along for the thirsty members of the party. He put it in the entrance of the cave to cool, and an hour later the echo had the hiccoughs."

It looks as though we made the deadline by the pink on our toothbrush, but before parting dear reader (if any) we want to leave you with the idea that a wisecrack is simply an epigram without a college education. Wisecrackers aren't familiar with the word epigram.

"After the Ball"

It has been proved. The Slide Rule Shuffle has answered the threat that the engineers might not dance again. St. Pat's proteges tripped gaily over the Uni-ballroom floor to Charlie Agnew's very suitable music, and engineers are happy. After a year's lapse it appears that a real and very vital part of the program north of Green will be preserved.

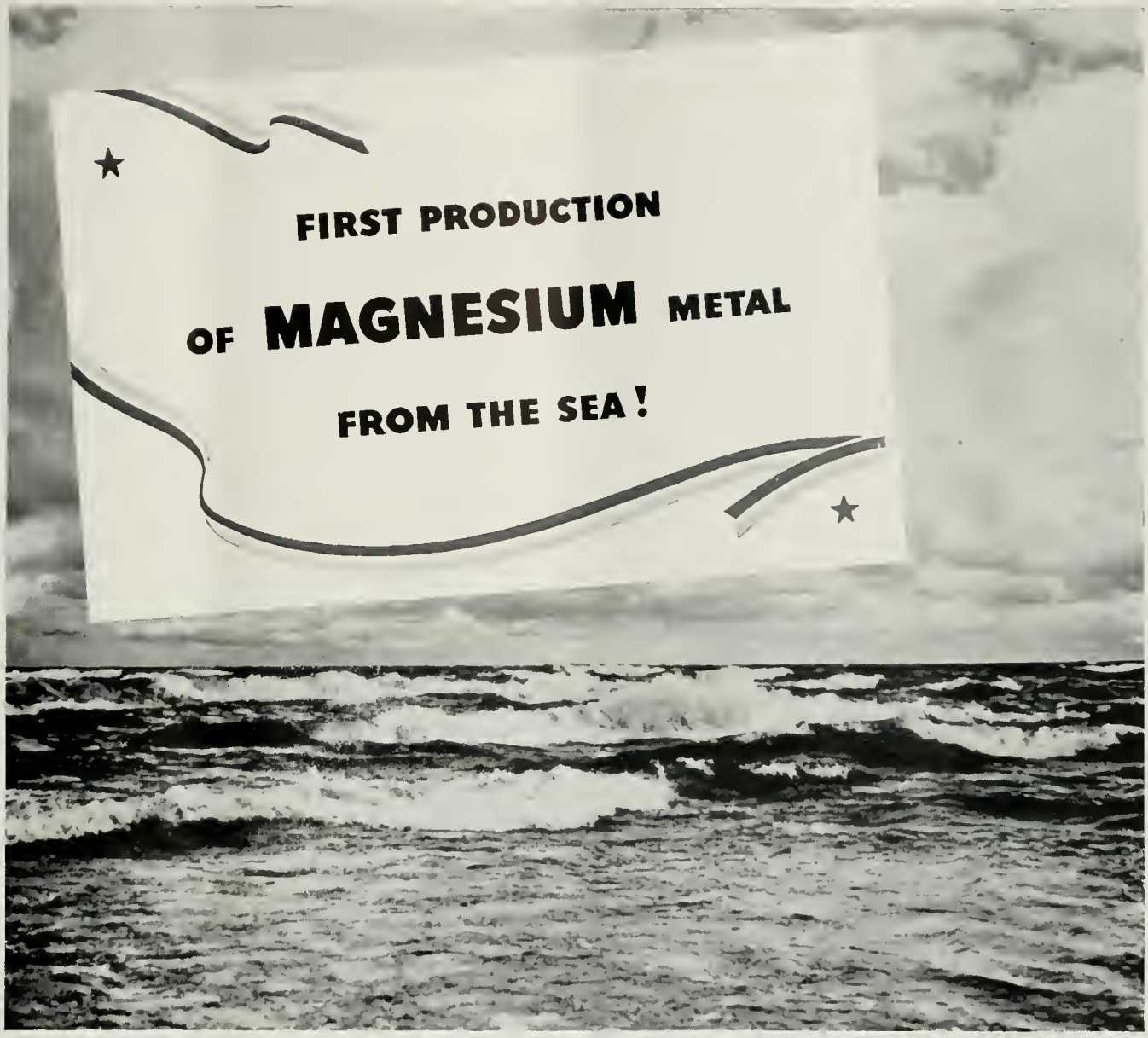
Spencer (Bus) Brown and his cohorts have resold the idea of an engineers' dance to the campus, and we are grateful. Most of the seniors have long been in favor of the idea and the juniors have caught the spark which should recreate the Shuffle next year, probably in modified form.

Not every feature of the dance appealed to all of those who attended, and we might begin to consider changes to be included next year. Should the shuffle of '42 be the same type of informal, or should it be made a costume party—with overalls, mine helmet, lab aprons, and slide-rules? Would a costume dance be out of place in the Union Building? Should any engineering stunt be a part of the program?

Early closing of Open House paved the way for the successful dance and seemed to simplify ISEE arrangements in general. That system could well be repeated next year with the Electrical Show. It was a real pleasure to see the engineering BMOC's scattered among the rest of our friends. And we were glad that the place was not overrun by South Campus lads who usually appear at every exercise of the light fantastic. The Slide Rule Shuffle was just what it set out to be—an engineering college dance for all engineers.

It is always difficult to find an orchestra which pleases and yet which can be obtained within the budget. We heard a few kicks on this year's band, but they came from devotees of Kay Kyser, Tommy Dorsey, Glenn Miller and other expensive outfits. On the other hand there were the majority of the dancers who vigorously applauded both waltz and rhumba, and swayed, well pleased, to good, solid, danceable fox-trots, etc. Our hats are off to Charlie Agnew's aggregation. We hope next year for as good entertainment.

When next year the Electrical Show comes to the fore, let's hope that the revitalized engineers' dance will bow as plasantly to the interested public. The Slide Rule Shuffle of 1941 has been a notable accomplishment.—D.K.S.



Recording an epoch-making achievement in chemical engineering

January 21st, 1941, will remain an historic date on the calendar of chemical engineering progress.

For on that day, at Freeport, Texas, a truly epoch-making achievement was accomplished—the first production of magnesium metal extracted in commercial quantities from the waters of the sea.

Metal from sea water—magnesium—lightest of all structural metals in common use.

This achievement is the fruition of Dow's 25 years of experience in the continuous development of magnesium metal production. For at Midland, back in 1915, Dow began extracting magnesium from Michigan brine by its own processes.

A quarter century of effort in developing uses and applications for DOWMETAL* (Dow's name for its Magnesium Alloys)—creating demand that has permitted a progesssive lowering of price—has made magnesium metal indispensable to American industry. Now demand is suddenly increased enormously. For magnesium is essential to airplane construction; vital to national defense.

The successful production of this all-important metal from sea water marks an epoch—the beginning of a new era in the production of metals.

THE DOW CHEMICAL COMPANY
MIDLAND, MICHIGAN
Branch Sales Offices: New York City—St. Louis—Chicago—San Francisco—Los Angeles—Seattle

*Trade Mark Reg. U. S. Pat. Off.

TRADE MARK DOWMETAL MAGNESIUM ALLOYS
LIGHTEST OF ALL STRUCTURAL METALS

EDUCATION . . . *from Page 5*

will solve the problem of the greater technical knowledge required.

Specialized courses come into an engineering curriculum for many reasons. Some are demanded by industry, others are the result of research interest or the hobby of an instructor, and still others are requested by the students themselves because of their particular interest. Does the specialized course require a large and new vocabulary which must be memorized? Does it explore a very narrow field with few connecting links to other lines of thought? If so, the value of the special course may be questioned. Does the course engender honest enthusiasm on the part of the student? Are the answers to the first two questions "no"? If so, the value of the special course is great. Few of us are willing to sit down and think just for the uplifting effect of thinking, but most of us are willing to think if the medium is an enjoyable one.

Sometimes we get the criticism that our engineering curriculum is not technical enough. Occasionally it comes from an employer. Usually it is a recent graduate. A man has a job with a battery manufacturer. He writes back to the University stating that the school should offer a course in storage battery maintenance, his immediate interest. It is evident that the school is justified in introducing this type of specialized course only if an appreciable number of its students will be expected to make use of the vocabulary to be developed. Most schools are forced to use great restraint in the direction of specialized courses through the medium of the budget.

To summarize, I believe that the present effort to humanize and socialize the engineering curriculum should be discouraged. A thorough grounding in the fundamentals of the natural sciences, better than the job we do now, is desirable provided that it does not lead to intense specialization in the field. Specialized courses in engineering are justified provided that they are in harmony with the premise stated in the second paragraph and the comments given previously. Engineering courses are frankly vocational in nature and this means that engineering education is definitely of a professional character, like law and medicine.

Prof. J. T. Tykociner

Prof. E. H. Waldo

MUSTACHE AND GLASSES

Editors of *The Technograph* recently were delighted to discover that its readers well outnumber its subscribers. After the appearance, by mistake, of non-electronic Professor Waldo's picture on page 6 (March), otherwise devoted entirely to Prof. J. T. Tykociner and his photoelectric research; the number of corrective comments (all gratefully received) was staggering. Commented Professor Tykociner characteristically on the boner, "That's a good joke. Maybe you'd better apologize to Professor Waldo, too." *Technograph's* apologies to alert friends of Professors Waldo and Tykociner.

The Technograph regrets the impossibility of printing several excellent unsigned letters of opinion. Only signed contributions will be acknowledged.

Illinois

TECHNOGRAPH

established 1885

IOR ISSUE

20¢

he Army Now

l Your E. Q.

tron Microscope

Tech Leaders

nnocracked

Y, 1941

member E. C. M. A.

AFTER THE DIPLOMA — WHAT?

● The choice of a career is unquestionably one of the most important decisions a graduate is required to make. It is generally conceded that a man's success in a chosen career is usually the result of a happy alignment of his inherent abilities with the work he undertakes.

This organization, the world's largest manufacturer of ball bearings—now in the forefront of the defense effort—each year employs a limited number of graduate engineers.

This profusely illustrated book will give you a quick, but vivid picture of the past, present and future of this interesting and essential industry. A copy will be sent gladly upon request.

New Departure, Division General Motors Corporation, Bristol, Connecticut. 3003

NEW DEPARTURE BALL BEARINGS

MAY • 1941

Staff . . .

Robert Tideman.....*Editor*

Donald K. Stevens.....Managing Editor
Edward L. Foerster.....Assistant Editor
Richard W. Landon.....Names in the News Editor
Joseph E. Foster.....College Research Editor
Edward C. Tudor.....Technocracked Editor
Sheldon J. Leavitt.....Art Editor
William N. Cramer.....Photographer
Robert D. Cote.....Editorial Assistant

William W. Witort.....*Business Manager*

Victor McMahill.....Advertising Manager
James Francis, Richard W. Landon, Joseph Miller, James Freek.....Advertising Assistants
Donald L. Renick.....Circulation Manager

Henry P. Evans.....*Faculty Adviser*

THE TECHNOGRAPH

Table of Contents

MEMBERS OF ENGINEERING COLLEGE MAGAZINES ASSOCIATED

Arkansas Engineer, Colorado Engineer, Cornell Engineer, Drexel Technical Journal, Illinois Technograph, Iowa Engineer, Iowa Transit, Kansas Engineer, Kansas State Engineer, Marquette Engineer, Michigan Technic, Minnesota Techno-Log, Missouri Shamrock, Nebraska Blue Print, New York University Quadrangle, North Dakota Engineer, North Dakota State Engineer, Ohio State Engineer, Oregon State Technical Record, Pennsylvania Triangle, Purdue Engineer, Rose Technic, Tech Engineering News, Villanova Engineer, Washington State Engineer, Wayne Engineer, Wisconsin Engineer.

Published Eight Times Yearly by the Students of the College of Engineering, University of Illinois

Published eight times during the year (October, November, December, January, February, March, April, and May) by The Illini Publishing Company. Entered as second class matter, October 30, 1921, at the post office of Urbana, Illinois. Office 213 Engineering Hall, Urbana, Illinois. Subscriptions, $1.00 per year. Single copy 20 cents

"—Keep us marching and singing with true Illini Spirit . . ."

Pride of the Illini

You're in the Army Now

By Gilbert Van Buren Wilkes
Lieutenant Colonel Engineer Corps, U.S.A.

•

Heading for the Army? If you want to get along in camp, says army-man Wilkes, keep cool, stay good-natured, use your brains. And he adds a few special pointers for advanced corps men.

I have no doubt that University students and young Americans everywhere find the subject of military service particularly interesting at this time. They want to know what will happen in their near future and how they can best prepare for their lot. As to what will happen, no one can see very far ahead, but it is safe to say that a large number of young men will soon be called to the colors, some as privates and a few as officers.

There is but little you can do beforehand to prepare yourself for the new life. Before you leave home, you should try to arrange matters so that you will not be bothered with unfinished business and can give your undivided attention to the army work. The best preparation you can make is psychological. Go to your station with full intention to accept things as they come, cheerfully and with common sense. Many amusing and instructive experiences are in store for you. Some of them may be disagreeable, but take the bitter with the sweet and make the best of both. The life of a soldier is not unpleasant.

It is probable that your first experiences will be similar to those encountered by young soldiers in the past. The young draftee has little or no control over his assignment after his number is called. You will probably be sent at once to a replacement center to be classified, fitted with uniform and other personal equipment, and given the basic training required by your arm or service.

Army authorities try to fit all draftees into the details for which they are best fitted. This is the purpose of the system of classification. Perhaps you will find yourself assigned to duty that you consider unsuitable for a man of your superior qualifications. Your work probably will not be along the line laid out in courses you have pursued at the University, and you may not see how it will help your future. If so, my advice is do not take it too much to heart, carry on with your best, keep your balance, and stay good-natured.

A military camp, I think, is man's natural habitat. The average young man soon adapts himself to the life and enjoys it immensely. He likes the association with other men of his own age. He likes the jokes and repartee. His physical well being is cared for by experts, and he is relieved from many of the vexatious responsibilities and cares of civil life.

You college men will have many advantages over average draftees because of your training. The path of promotion will lie open before you if you care to tread it. You owe it to your country to give your best, but if you wish to enjoy army life thoroughly and to get the most out of it, do not let ambition run away with you. Play the game fairly without injuring others, and if you should not get the promotion to which you think you are entitled, do not mope or sulk.

You who are lucky enough to have been enrolled in the advanced course of the ROTC and are now on the point of graduation are almost certain to be called to the colors. Your problems are somewhat more complicated than those of the draftees. First you must decide what equipment you will need and what part of it you should take with you to your station. You should be able to carry everything that you will need in a suitcase or clothing-roll, a bedding-roll, and a trunk locker. The uniform that you have used in the ROTC will be satisfactory to report in. You will need plenty of cotton shirts, both white and khaki, socks and underclothes, and one or two good serge or flannel shirts. I don't think that I would get very much more until I reached my post and found what was needed. By all means take your ROTC text books to your station with you. You will find them invaluable. Don't forget to supply yourself with many true copies of the order directing you to report.

When you arrive at the railroad station nearest your camp, make sure that your bedding roll and trunk locker are received and that arrangements are made to get them out to you at the camp. Things do not always run so smoothly at a war-time camp as they do at a regular army post, and it is an easy matter to lose your baggage for two or three days. You have no idea how inconvenient this is until it occurs.

After you have reported to the camp commander and to your own commanding officer, you will find yourself one of the officers of some organization with certain specific duties to perform. Of course you want to do these duties as well as they can be done, and thus make a good record for yourself. Almost every assignment that you are likely to receive is fully covered in the regulations. You should look up the regulations that apply to the jobs assigned to you and comply with them to the best of your ability.

A junior officer should expect to have most of the routine jobs assigned to him. Second Lieutenants do most of the real work in the army. Whatever your assignment, try to do it as well as it can be done, and you will learn much from it. You are bound to make some mistakes, and you will be told about them in no uncertain terms, but "don't let it get you down." All young officers make mistakes and get "bawled out."

Keep cool, use your brains, follow the regulations, and make the best of all that happens to you; and you are bound to get along and will soon come to like army life very much. I am sure that you will find at the end of your service that the time has not been wasted. If this country should be forced into war, and your tour of duty should be accordingly lengthened, be assured that when the war is over the returned soldiers will run the country as they have done after other wars and army service will be a most valuable asset.

Semi-Finals . . .

WHAT'S YOUR E. Q.?

Seniors! Find your probability of success.

Engineers! Get an estimate of your final average.

This quiz is scientifically designed to determine your E. Q. (Engineering Quotient). Knowing your E. Q., you can calculate your probability of success (P_s) from equation (A) and your final average from equation (B). Your E.Q. is the sum of the points indicated under each question you answer correctly. Perfect E.Q. is 160; if you get a perfect score, you've seen the questions before.

Equation A: $P_s = (E.Q.)\ (D)$

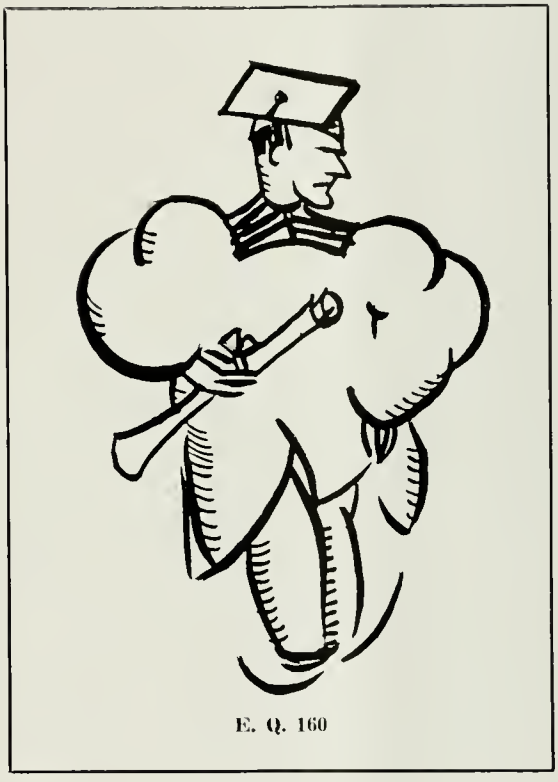
where P_s is the probability of success (highest possible is 40,000 to 1).
(E.Q.) is your Engineering Quotient.
D is your local order draft number.

Equation B: $G_f = 5K/(E.Q.)$

where G_f is your final average, and
K is an empirical constant depending upon your ability to guess answers and look over your shoulder while plagued with a hangover. It varies with individuals.

(Author's note: Since any questions originating in the writer's fertile mind would give the subject of the quiz an unfair advantage, we must admit that most of these questions have been time-tested by other publications.)

Answers are given at right, below.



E. Q. 160

(1) Chemistry.

If the flame test for potassium is violet, what people are accredited with the discovery of glass?

If the first statement is incorrect, name the three raw materials from which Nylon is manufactured.

7 points

(2) Biology.

An entomologist in Omaha placed two bugs in a five-gallon jar last year at ten p.m. on the last Saturday in April. The bugs reproduce with great speed, doubling their number every minute. Six hours after the bugs were placed in the jar, the jar was full. At what time was it one quarter full? 13 points

(3) Mustn't tell.

U-235 is:
(a) A German submarine
(b) A new dive bomber
(c) A uranium derivative
(d) The most used structural beam

8 points

(4) Electronics.

In tuning your radio you adjust:
(a) A voice coil
(b) A variable condenser
(c) An audio transformer
(d) An electrolytic capacitor

8 points

(5) Geography.

Yale University is in:

(a) Connecticut.
(b) Massachusetts.
(c) New Jersey.
(d) Maine.
(e) Vermont. 9 points

(6) History.

If Edison invented the air brake, what is the product of the Solvay process? If Edison did not invent the air brake, what is the formula for the area of an ellipse? 10 points

(7) Sociology.

In preparation for a small stag, Joe goes to Tony's for four gallons of beer. Tony has plenty of beer, but only two kegs, one a five gallon and the other a three. Joe brought no container, and turns to leave, but Tony insists he can accurately measure out four gallons in the five gallon container. Can he? If so, How? 14 points

(8) Electricity.

Given a cube, each edge of which contains a pure resistance of one ohm, what is the resistance between corners which lie on a straight line passing through the cube? 10 points

(9) Hydraulics.

The hot water tap will fill a certain bathtub in four minutes, the cold water tap will fill it in six minutes, and the drain will empty it in eight minutes. An absent-minded professor turns both taps on full, and then goes off to read a scholarly treatise on "The Psychometric Effects of Parabolic Concentrations of Cold." How long is it until the tub runs over? 14 points

(10) Thermodynamics.

If an isothermal process is one in which there is no exchange of heat, what is the cosine of 30°?

If an isothermal process takes place with no change in temperature, what is the distance from the earth to the sun? 7 points

(11) Finance.

Decode the following addition, using only one number for any one letter, and only one letter for any one number. The arithmetic sum of the numerical code for SEND and MORE must equal MONEY.

```
  S E N D
  M O R E
---------
M O N E Y
```

14 points

(12) Athletics.

What is the difference between "walking" and "running"? 11 points

(13) Rhetoric.

Punctuate the following: That that is is that that is not is not that that is is not that that is not that that is not is not that that is is that not so 12 points

(14) Ceramics.

If a tile weighs nine pounds and a half a tile, what is the weight of a tile and a half? 10 points

(15) Chronology.

Cathie is twice as old as Jane was when Cathie was as old as Jane is. Cathie is twenty-three. How old is Jane? 13 points

The Answers

(1) The Phoeneicians.
(2) 3:58 a. m. Sunday morning.
(3) A uranium derivative
(4) A variable condenser.
(5) Connecticut.
(6) The product of the semi-axes times pi.
(7) Yes. Fill the three-gallon jug and empty it into the "five." Refill the "three" and from it, fill the "five" full. One gallon now remains in the "three." Empty the "five" back into the tank, pour the one gallon left in the "three" into the "five." Fill the "three" from the tank and again empty it into the "five."
(8) Five sixths of an ohm.
(9) 3 3-7 minutes.
(10) 93 million miles.
(11) 9567
1085
10652
(12) When walking, one foot is always on the ground.
(13) That that is is; that that is not is not; that that is is not that that is not; that that is not is not that that is is; is that not so?
(14) 27 pounds.
(15) 17¼ years.

New Electron Microscope for Illinois Research

100,000 DIAMETERS MAGNIFICATION POSSIBLE WITH NEW INSTRUMENT PURCHASED BY STATE FOR UNIVERSITY AND GEOLOGICAL SURVEY

By Edward L. Foerster
Senior in Chemical Engineering

Setting the pace for modern chemical laboratories, the University of Illinois chemistry department is awaiting the arrival of a new electron microscope. Purchase and operation of the $9,500 instrument is under the direction of G. L. Clark of X-ray fame, Professor of Analytical Chemistry (Page 9, December). At present there are only two or three such instruments in operation. The microscope expected by the department is one of twenty under construction at the R.C.A. Research Laboratories.

Industrial application has already been made with an electron microscope at the Stamford Laboratories of the American Cyanamid Company, and a multitude of uses were found. Here at Illinois, although the instrument will be in the chemistry department, it will be available to all departments. Valuable investigations are expected in the fields of bacteriology, physiology, medicine, ceramics, agronomy, and all divisions of chemistry.

An ordinary optical microscope is limited to a magnifying power of 1000. This may be increased two or three times with a microscope employing ultraviolet light and quartz lenses. The wave length of light places a lower limit on the size of the smallest detail that can be seen, regardless of magnification. The electron microscope employs fast moving electrons which have a frequency approximately one hundred thousand times that of ultra violet light. This makes possible magnification of one or two hundred thousand times actual size, or observation of equal detail in objects one-hundredth to one-fiftieth the size of those seen with visible light. These limits may be substantially increased with future development. Thus, the electron microscope practically bridges the gap between optical microscopes and X-ray diffraction.

The body of the microscope is a metal tube about four feet long. The electron source is an electrically heated tungsten filament. The stream is given a high velocity by an electric field of 50 thousand volts.

Instead of glass or quartz lenses, magnetic "lenses" are used to focus the electron stream. The electrons are projected upon a flourescent screen, which glows in proportion to the density of electron stream striking it, revealing the image of the object. A photographic plate is substituted for the flourescent screen for permanent pictures. Two air locks are necessary to introduce the object and the photographic plate into the instrument, which is under vacuum.

Work already done has revealed heretofore unknown details, shapes, and sizes of colloidal particles, polymer molecules, bacterial bodies, viruses, and finely divided crystalline materials. Photographs have been made in the microscope showing objects magnified 20 to 30 thousand times. Details are so clearly pictured that photographs can be enlarged to give a magnification of 100 thousand times. A human hair magnified to these proportions would appear to have a diameter equalling that of a giant redwood tree. Micro-organisms which exhibit jelly-like appearances under an ordinary microscope, prove to have intricate structures when seen with the electron microscope.

DON STEVENS

Introducing 1941-42 TECHNOGRAPH *Leaders*

★

RICHARD LANDON

STEVENS by LANDON

From time to time we've been seeing editorials by Donald K. Stevens. From now on we'll be reading quite a few of those editorials, for next year Don will be *The Technograph's* guiding light. He will take over the Editor's job.

Don's a town boy now, but he originally hailed from Danville, the town of many stories. He assures us that some of them, anyway, aren't true, at least where he came from. Besides being a fair student (we've had a hard time finding any B's among all the A's he marked down so far), Don is a Second Lieutenant in advanced military, First Lieutenant in command of the Pershing Rifles Drum and Bugle Corps, and will receive this year the Grand Army Memorial Sabre for being runner up in competition for student colonel. Don's key chain is quite loaded with the keys of Sigma Tau, Tau Beta Pi, Phi Eta Sigma, Alpha Phi Omega (scout fraternity), Scabbard and Blade, and the Sigma Tau medal for highest freshman scholarship. The guy won't even stop with all this though, for he's a member and secretary of the student branch of the American Ceramic Society. He was floor marshall of the late Mil Ball and is a member of the University Glee Club. Yes, and he's made college honors once and class honors twice.

Don is a short fellow with wiry brown hair that defies to be combed back. Underneath his glasses grows a smile that spreads from ear to ear. You can judge his humor from some of his lighter-veined *Technograph* articles. Date? Sure. No pins are out yet, but the batting average is high. Women are of the more beautiful things in life, and as an engineer's life is full of the drabness of machines that offer no comfort or affection, the tenderness of the female is to be coveted—reason for dating.

We're sure that Don will do all in his power to present to the engineers a *Technograph* full of the enjoyable parts of college. He knows that engineers like to get away from engineering once in a while, and thinks that *The Technograph* can be a medium for the escape. The magazine will still present technical articles and important engineering developments, but according to Don, will have as its main goal, interest to the engineering student.

LANDON by STEVENS

Tall, stalwart E. E. Richard Landon from Kansas City, Missouri, has been named Business Manager of *The Technograph* for 1941-42. Best known for his feature, "Names in the News," for which he has interviewed some thirty-five outstanding seniors, hard-working Richard has been prominent in AIEE and engineering open house. His average is highest among the junior E.E.'s.

First, let's pry into Richard's personal affairs. As he prefers to be called "Richard," it seems strange he should get along so well with a certain Gamma Phi Beta who calls him "Dick." He's a Phi Gamma Delta and acts as sort of seventh assistant pledgemaster, he quietly admits.

Both activities and honors he has accrued in his short time at Illinois. Richard perused the books at Kansas City Junior College before coming here, and already he is a member of Sigma Tau and Eta Kappa Nu. In line with his electrical interests, he is active in AIEE and has added his journalism bent to work on *Campus Currents* of the E. E. department, as well as departmental and radio publicity of the recent open house.

In answer to a question regarding the draft, smoothie Landon advised "As far as I'm concerned I'm glad that I won't be subject to the draft for a while yet." He also intimated that he was Captain of his high school ROTC unit down Missouri way. Does Kansas City realize what it's missing when Richard spends the summer working for the Dayton (Ohio) Power and Light Company?

Although he likes the great outdoors and plays along in many sports, Dick (ouch) claims he's not good at any of them. We finally got him to admit he's good at swimming "in a mild sort of way." Although the fairer sex are a magnetic attraction, Richard finds good music a real indoor sport. None of this Tommy Dorsey and Benny Goodman for him —but ah, the sweet strains of Andre Kostelanetz! He says he can "really go for that chorus of Fred Waring's," and symphonic music is tops.

This should be fair warning to advertisers, for the interesting man you have just met is Scotch in more ways than one. Almost censored was a report that he averages 75 cents per date.

To improve *The Technograph* next year will require increased circulation. Fee-slip subscriptions are among his proposals, and Richard Landon has other ideas too. In fact you may count on him to be a very conscientious, hard-working fellow.

NAMES
. . . *in the news*

By Richard W. Landon
Junior in Electrical Engineering
and Richard H. Horning
Sophomore in Mechanical Engineering

Bob Jaeger

We wonder—can Bob Jaeger keep his black hair brushed back in that pompadour while he's playing polo? Bob also rides in the Cavalry Corps; he's a captain. Originally from Chicago, he's studying metallurgy; is a member of Beta Kappa social fraternity.

He has one main gripe about the school; the polo team isn't supported. He works his best to get people to come out, but there just isn't enough co-operation. He says once a person comes but, he never quits; the difficulty is in getting him to come the first time.

Bob has three main reasons for not dating much on the campus: studies keep him fairly close to home during the week, he's hung his Beta Kappa pin on a little Chicago Miss, and weekends usually find him in Chicago. Immediately upon leaving school, he's going deep in the ole hole to buy himself as smooth a convertible as he can find. We quote: "That's the real life." Bob likes picture shows, the funny kind. He doesn't like to see movies that require thinking; wants to be entertained all the time. He thinks ther's nothing so nice as a good old belly laugh.

Most interesting course to Bob is one in metallography in which he polishes metal pieces; then etches them so that they can be studied under a microscope or photographed to determine their construction, etc.

He's another sales engineer; wants to get into the development of metallurgy. But he's letting things ride

GEORGE

BOB

until he learns how the draft will affect him. He has asked to enter the Ordnance Department of the army, hoping that in this way he may come into closer contact with the phases of metallurgy he has studied.

Bob's parting remark was not to study the way he does. He says he never does anything before it's due and always crams before exams. But he didn't tell how he thinks we ought to do it.

BILL

AL

George Kirkpatrick

If we had to wait for George Kirkpatrick to tell us about himself, we'd be devoid of material. After much prying we found that he has quite a list of activities to his credit. He has been vice-president and engineer of Synton, and member of Tau Beta Pi, Eta Kappa Nu, Sigma Tau, and Sigma Xi. He made Bronze Tablet, highest scholarship award in the University.

He is now working under Dr. Reich on a low-distortion oscillator. The idea isn't new, but such an oscillator has never been built for practical use. For this research he was asked into Sigma Xi.

George is subject to the draft all right, but he's way down on the list, so he's going to work this summer and hopes he'll be able to get in a lot of work before Uncle Sam calls him. He will be in the G. E. test course and there hopes to uncover his inclinations further. At present he plans to work on frequency modulation.

Radio has been George's hobby for a long time. At his home in Roseville, he built a transmitter with full wave coverage and approximately 100 watts input. Here at school he kept a station for the first two years—until the pressure of studies called him away from it.

He doesn't like dates; thinks they're too much trouble. "I guess I'm the studious type that doesn't get around much," he says. We can understand the studious part, but his list of activities belies his claim of not getting around. George has no particular likes or dislikes about school—that is, with the exception of a few M. E. courses. And he doesn't think the University needs quite so many police around. It sorta makes people feel like nobody trusts 'em.

Bill Fellows

Bill Fellows has all the assurance of one who has long been used to meeting people. Easily he sits down and tells of his career here and at Alfred, New York, where he attended Alfred University for two and a half years. Bill came out here to take the administration course offered in ceramic engineering, the only one of its kind in America.

He was quite a politician at Alfred; became treasurer of the sophomore class and vice president of the junior class—the highest position attainable by a junior male. He also was elected manager of the freshman football team and chaplain of his social fraternity, Lambda Chi Alpha.

Bill says he wants to go into administration; most of his life has been spent in organizing something. In high school he organized his own band; led it on the trumpet. At Alfred U. he organized a small scale co-operative boarding club; gradually expanded his control to five different clubs. Here he started a boarding club which now has 55 members. Expenses are paid in cash and in work; profits are returned to participants.

Bill says that the 24-hour day limits his hobbies to tennis alone. He'd like to read more, but studies demand too much time (he's taken 41 hours these two semesters). For relaxation, however, Bill's steady girl has a 1940 Packard—it's extremely useful on special occasions, notably picnics at the Polly-Wogs. She's a town girl, but Bill doesn't mind. He always thought those closing hours a bit ridiculous anyway.

This spring at the American Ceramics Society convention in Baltimore, Bill saw that students and employers had little opportunity to meet each other, so he formed a "Contact Bureau," where employers could seek students to interview. His idea was discussed by the society; now is an integral part of the convention program.

Al Schneider

Al Schneider, finding his Alpha Chi Rho pin too heavy for his shirt, left it at Gamma Phi Beta sorority for safe-keeping. Al is a captain in advanced military, and a senior track manager; a member of the Athletic and Inter-fraternity Councils; of Star and Scroll, Sachem, and Mawanda, class honoraries; as well as Phi Eta Sigma, freshman honorary, and Phi Lambda Upsilon, chem honorary.

Al says he has no hobbies other than dating and playing bridge. If time allows, he likes to read. In the movies, he likes Betty Davis. But if excellent acting isn't to be seen, comedies suffice, though he finds them quickly tiresome. He refused to comment on his idea of "the perfect date"; said that he once had to give a lecture to some freshmen on the subject, and since then has been leery of telling anyone anything about dating.

Being in advanced mil, Al supposes he will be called to camp soon after summer vacation begins. If he is deferred or if he can leave camp before too long a time, he will work with the Monsanto Chemical Company in East St. Louis in the heavy chemicals department. He eventually hopes to do technical sales work. Monsanto has quite a long program for getting into sales, but big money is made there, and money's what he's after.

After visiting most of the Big Ten campuses, Al has decided that chem engineers here at Illinois get a lot more chemistry than those at other schools. "We're more chemists than engineers here." He thinks the University shouldn't care whether or not students ever attend classes. "About my biggest gripe," says Al, "is punching the time-clock over in the M. E. Lab. Too much like a prison."

Landis Hurley

Landis Hurley, burly footballer, would lead you to believe he has done nothing in school but read a few books and attend classes occasionally. Truth is, he played guard on the varsity football team, made Tribe of Illini and Phi Beta Kappa, and turned down a bid from Tau Beta Pi. He is also treasurer of his social fraternity, Theta Delta Chi. He likes sports of all kinds; takes in as many athletic contests as time allows. "Weekends were created just for fun," so Landis spends them seeing games, consuming a little beer, or throwing parties here and there. He says he can't get along with or without women. Result: he plays the field; stops long with none. For a good date he specifies "not the Friday evening movie club variety, but a girl who's out for a good time."

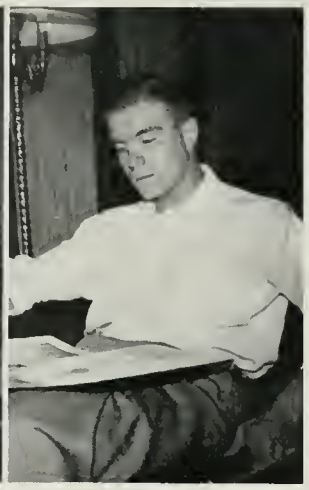
Landis isn't worried about the draft yet; he's only twenty. This summer he plans to work in the Seagram plants in Peoria. After graduation next February he wants to go into sales work and become an executive "right quick." He thinks he wouldn't care much for straight engineering, because he likes to meet people.

Says Landis: "There's too much work and too high a scholastic requirement for students to get most out of the chem school. Independents often are kept too close to their desks and don't learn enough about people. Courses should be tough to produce good engineers, but if requirements must be so very high, make it a five year course—after I leave."

Elwyn King

Stepping off on the wrong foot, we discovered that Elwyn's pet gripe is the misspelling of his name. We had it with two "l's." Elwyn is secretary of ASCE and a member of Tau Beta Pi. He comes from Elgin,

ELWYN



LANDIS

where he claims window bars bothered him none at all. He likes sleeping, swimming, and other indoor and outdoor sports. Last two summers he spent in summer school and at the National Music Camp at Interlocken, Michigan. This summer Elwyn will work with the Chicago Bridge and Iron Company.

Elwyn believes that studies are worth all your time, if you can get along with people. He gripes about fellows who think they can get ahead by chiseling on exams.

Elwyn has his musical side too. He plays clarinet in the band; occasionally gets in the mood and goes for a little jive by the Philharmonic. When this wears off, as it usually does after a few days, he goes back to the same old boogie-woogie.

One of his main hopes for the future is to finish school before finishing off Hitler. When he does go after Hitler, it will probably be by air, for Elwyn is in the advanced course of the C.A.A. He claims not to have the flying bug; says he'd about as soon walk as fly.

TECHNOCRACKED . . .

By Ed Tudor
Senior in Electrical Engineering

With finals on their merry way and spring zephyrs whispering through the cloistered corridors of Engineering Hall, the lads North of Green Street are beginning to let their fancies lightly turn to the thoughts that Illini Coeds have harbored all winter. Evidently there is no cure for spring fever—thank goodness!

We see seniors on all sides, with vague expressions on their faces, daydreaming of sheepskins. This is the season when many bright young men wish diplomas were edible, and many fathers discover that their sons have not let education go to their heads. College-bred refers to something which requires a fearful amount of dough, is seldom self-raising, and usually proves to be nothing more nor less than a four-loaf. A college education is like an automobile. You never know what to do with it when you go to work. Some colleges are trying to find out what graduates do after graduating—and a lot of employers are too.

And there are those who go to college and never get out. They are called professors, men who are paid to study sleeping conditions among students.

An eastern college dean contends that automobiles are damaging the present generation of school age. Well—turn about is fair play.

School histories, while accurate in the main, still spread the fallacy that our tax oppressors stopped with George III. We are of the opinion that we don't build for the future any more, it is billed for us—as hard as it is to save a penny these days, it's even harder to hide it from a tax collector. With the new tax on cigarettes there will undoubtedly be a boom in the cornsilk market. Cheer up! Things could be much worse—and they probably are.

George Washington, who threw a dollar across a river, was a piker. We're throwing billions across the Atlantic.

This brings up the question of whether or not England could use any of our over-age swivel-chair Napoleons.

If you don't think this is a queer age, how can you discount the fact that the makers of toy electric trains made more in 1940 than the big railroads?

Some of the campus hasheries are serving doughnuts with a handle for dunking. All we need now is a stack of griddle cakes with a six-point automatic lubricating system.

We would like to dedicate the following poem to Bill Lorenz, who *must* be a good engineer to keep that thing running.

The Ford is my auto, I shall not want (another);
It maketh me to lie down beneath it;
It soreth my soul.
It leadeth me into the paths of ridicule
For its name's sake.
Yea, though I ride through the valleys,
I am towed up the hills.
I fear much evil; my rods and my pistons discomfort me.
I annoint my tires with patches;
My radiator runneth over;
I repair my blowouts in the presence of mine enemies.
Surely, if this thing follows me all the days of my life,
I shall dwell in the bug-house forever.

Among The News Items

"A physician is experimenting in giving patients transfusions with their own blood"—press report. If this proves successful, there may yet be some hope for the anemic taxpayer.

"Only two per cent of the people in the United States are morons," says a sociologist. Well, well; they certainly do get around.

"Scientists say that the more ancient coal is, the better it is"—news item. No fuel like an old fuel, eh?

"Architects tell us future homes will have no windows"—headline. Of course not. How can you have windows in a cave?

Detroit has been declared the healthiest city in the United States. Evidently dodging automobiles and picket lines is good exercise.

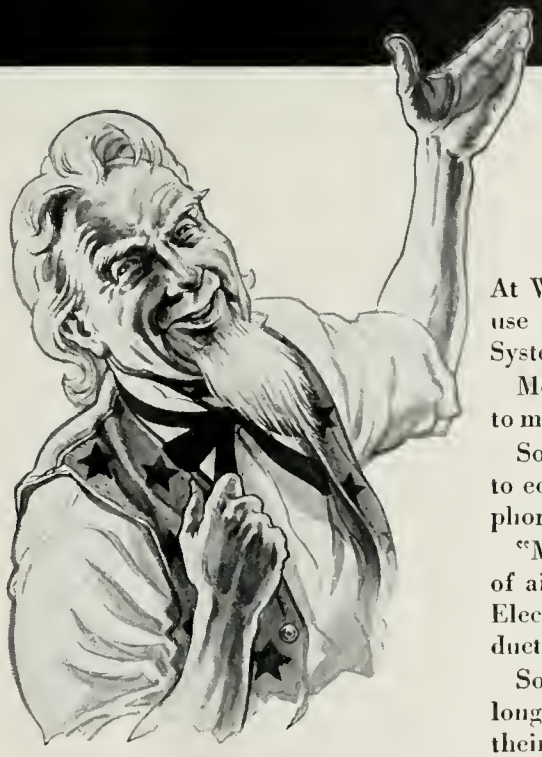
Miami is having a monster spelling bee. This must be a serious effort to interest the people down there in words other than "straight," "place," and "show."

Revised: If an atom should split a scientist, that would be news.

After Saturday night it seems that there are more pills carrying bottles than bottles carrying pills.

We fold up with the observation that the reader's gastronomic satiety should by now have admonished him that he has reached that state of deglutition consistent with dietetic integrity.

Tha's O.K., we're fed up too!



"and that's good news for the National Defense!"

At Western Electric we're producing telephone equipment for use now which normally would not be required for the Bell System's nationwide service for two or more years.

More than a year ago we began to plan for the impending need—to make ready our people, our plants, our machines, our materials.

So we're prepared when a rush order comes from Uncle Sam to equip Camp Edwards or Camp Beauregard with adequate telephone facilities. Thirty million feet of wire? Yes, in a single order.

"More telephones for these new plants," is the urgent demand of aircraft manufacturers and other defense industries. Western Electric's response cuts weeks and even months out of usual production schedules.

So in this time of need, as in calmer days, Western Electric's long experience and manufacturing facilities are demonstrating their worth to the nation.

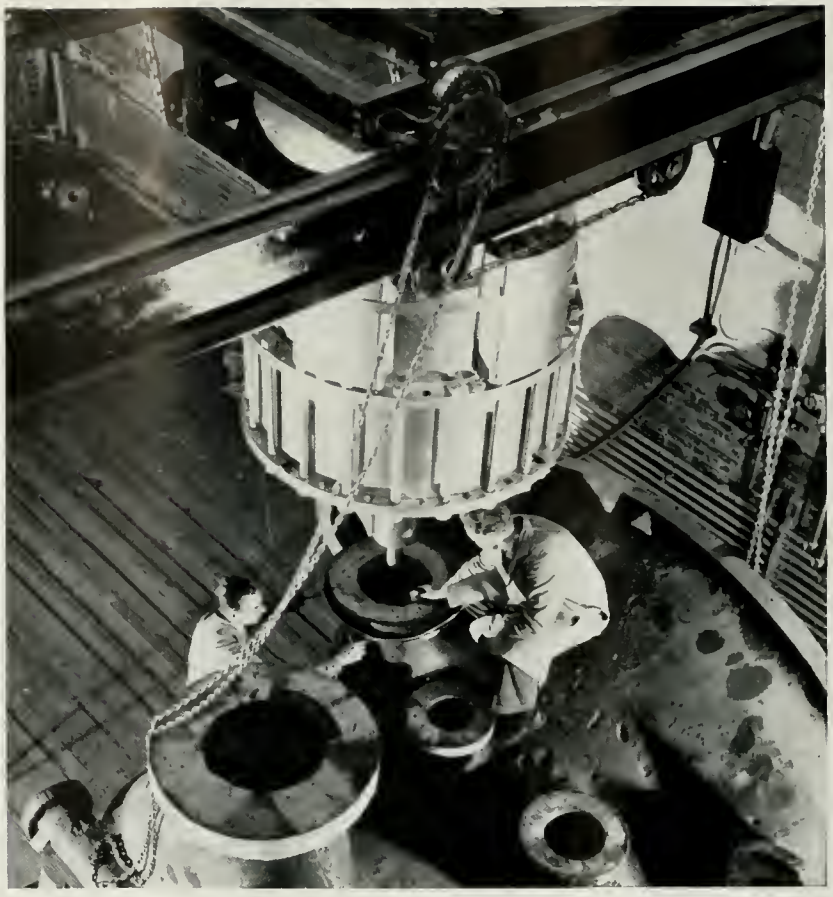
Western Electric *. . . is back of your Bell Telephone service*

Million Volt X-Ray Unit is World's Largest

The world's largest industrial X-ray unit, producing energy equal to $90,000,000 worth of radium, is now in use in General Electric's research laboratories. This unit is rated at 1,000,000 volts, which exceeds by 600,000 volts the rating of the previous largest industrial unit. This reduces the exposure time in the making of an exogram through four inches of steel from one hour to less than two minutes. X-ray examination of steel castings has been an established practice in the foundry industry for approximately ten years. The new machine will be of immeasurable value in improving foundry technique on enormous intricate castings.

This X-ray unit is housed in a separate building, the walls of which are solid concrete 14 inches thick. In addition there is 12 inches of brick on the

(*Please see page* 18)



—*Courtesy General Electric*

ENGINEERING COUNCIL

Last year saw no engineers' dance. The reason given was that the St. Pat's Ball of the year before had lost money. This year, that financial reason again was valid, and adding to it was the fact that no engineers' dance had been held for *two* years. Yet this year's "Slide Rule Shuffle" was a success—engineers had fun, and debts from the last dance were almost entirely paid.

Then why was no dance held last year? The answer is clear when we view the organization behind this year's dance. Plans for the "Slide Rule Shuffle" and the open house were initiated by the Engineering Council, an informal, close-knit group composed of the presidents of the departmental societies and the editor and business manager of the *Technograph*. The Council elected the dance committee, which made all arrangements for the dance. Last year there was no Engineering Council, no dance committee, so of course no dance.

This year's Engineering Council leaves a creditable record. Only two events were undertaken, open house and the "Slide Rule Shuffle," but both were carefully planned and successfully executed.

Part of the Council's success may be attributed to its exceptional organization. It was not an executive group, but merely planned and supervised, and the chairmanship rotated alphabetically. Thus the already busy heads of the departmental societies were not over-burdened.

Who will state the limit of the Council's potentialities? With a finger on the pulse of student opinion and with the authority to speak for the engineers, the Council certainly is capable of much more than an annual dance and a biennial open house.—R.T.

THE *Chemistry* OF THE HOME!

Among life's "big" moments, few compare with the joy of stepping into a brand-new home! Feminine hearts flutter with excitement—masculine hearts swell with pride. And well they may with all the betterments built into the home of today!

If you are one of the 250,000 people who are buying or building a new home this year, you will be interested—and probably surprised—to learn how much chemistry means to the enjoyment and satisfaction you are going to get out of your new dwelling.

From the very foundation to fitments and furnishings, chemistry is responsible for numerous advances in home building, furnishing and maintenance.

Just to take a few instances out of Dow's innumerable chemical products that may well be used in your home: Dowflake* Calcium Chloride makes concrete faster-setting and stronger—lumber treated with Dowicides* resists mold and rot—paints, varnishes and enamels made from certain raw chemicals produced by Dow are tougher, more weather- or wear-resistant, easier to apply—

Dow produces dyes for fabrics—plastics for household equipment and furnishings—protective materials for treating paints, wallpapers and awnings against mildew—calcium chloride to allay dust on driveways, control ice on steps and walks—and for the garden there are also Dow spray materials.

These are but a few of the key instances where Dow chemicals contribute to better homes—better living—a better America.

THE DOW CHEMICAL COMPANY, MIDLAND, MICHIGAN
New York City—St. Louis—Chicago—San Francisco—Los Angeles—Seattle

*Trade Mark Reg. U.S. Pat. Off.

WORKING WITH YOU FOR AMERICA

DOW

CHEMICALS INDISPENSABLE TO INDUSTRY

Janney Top Senior

Every so often there appears a man who's achievements are so outstanding, who makes such remarkable news, that *The Technograph's* "Names in the News" cannot cover his exploits. Such a one is Clinton Janney, five-point senior physicist, who stands at the very top of the senior class. He is a member of the concert band and six honorary societies, including Sigma Xi, science honorary, and Pi Mu Epsilon, math honorary.

Clinton labored under the sarcasms of the physics instructor at Kansas City Junior College, disliked it for a while; then decided to make physics his life work. He selected Illinois because it had the best known engineering school in the Middle West and had intimate contact with many of the large business and engineering concerns. Clinton finds the instruction here quite different from that at the junior college, but it seems not to have hurt his grades.

In the physics deaprtment Clinton has been working on the beta-ray spectrograph described in the December issue of *The Technograph.* This summer he is going to the University of California at Berkeley, where he will study physics and perhaps indulge in some research. He wants to take part in academic or industrial research. Says he, "It seems to be easy to go between the two, so somewhere I ought to find plenty to keep me busy."

Clinton is of average height, rather stout, with sandy hair that seems to defy combing. He thinks there is nothing much more fun than hiking about the countryside. Then when there's only a little time, tennis is next best. Do girls interest him? Once in a while. "Social life and I get along, but I don't let it get me down." Clinton says he spends his time at home when the weather is bad, so that he'll be able to get out when the sun appears again.

He doesn't like picture shows and listens to the radio as little as possible. He likes music, even swing, but says he wants to be right in there making part of it, if he has to listen. "When I am entertained," says Clinton, "I want to be able to do part of the work myself. There's no point in sitting around, letting everyone else do the work for you."—R.W.L.

Butler National Winner

Paul L. Butler, Met. '40, was recently awarded first prize in the national contest sponsored each spring by the American Institute of Mining and Metallurgical Engineers. Paul's prize winning entry, "Case Hardening of Carburized Steels by an Interrupted Quenching Method," won first prize of $100.

While at the University, Paul was an outstanding member of Gymkana. After graduation last June, he was employed as a Metallurgical Observer by the Wisconsin Steel Company, subsidiary of International Harvester. After a short time he went to work as Development Engineer with the Linde Air Products Company in Buffalo, N. Y., where R. A. Wilde, who received his M.S. in metallurgy at Illinois last June, is also employed. Mr. Wilde, incidentally, won first prize in the Chicago Section Contest for graduate student papers and third prize in the national contest, with his paper "Metallurgical Study of the Welding Cycle." Recently Paul Butler accepted an appointment as Research Engineer at the Battelle Memorial Institute at Columbus, Ohio. He married last April 17.

"PIPING"

Means to a Power Man!

To most people, "piping" conveys nothing more dramatic than ordinary straight pipe used in heating and plumbing.

But not to a power engineer! He thinks in terms of complex super-piping systems engineered to handle steam at thousands of pounds pressure . . . of special-alloy tubing fabricated to perform exacting chemical processes on a large scale!

When such systems are required today, leading engineers prefer to "give the plans to Grinnell." Pioneers of prefabricated piping, Grinnell engineers accurately interpret layouts into metal . . . prefabricate complete systems in Grinnell's fully-equipped shops...and ship pre-tested sub-assemblies that can be erected with a minimum of time-consuming field work.

Super-pipe prefabrication is but one of many Grinnell services. Others include: automatic sprinkler fire protection, Thermolier unit heaters, Amco industrial humidifiers, pipe fittings and pipe hangers. Grinnell Co., Inc., Executive Offices, Providence, Rhode Island.

GRINNELL

WHENEVER **PIPING** IS INVOLVED

Grinnell Company, Inc. • Grinnell Company of the Pacific • Grinnell Company of Canada, Ltd. • General Fire Extinguisher Company • American Moistening Company • Columbia Malleable Castings Corporation • The Ontario Malleable Iron Co., Ltd.

X-RAY . . . . . *from page 14*

interior, making a total thickness of a little more than two feet. The protection this wall offers from X-rays is equal to that of approximately four inches of lead. The foundations of the structure extend five feet below the surface of the ground in a solid mass to minimize secondary radiation. This type of construction for the X-ray unit represents an enormous saving over a lead-lined housing. The X-ray unit at the Rock Island Arsenal, rated at 400,000 volts was housed approximately eight years ago in a cubicle of somewhat similar construction.

The housing structure is 100 feet long and 35 feet wide. At one end of the building is a huge door built of solid concrete 18 inches thick encased in a one-inch steel plating. The door is opened and closed vertically with a motor hoist and effectively insulates against secondary radiation.

The X-ray equipment, tube, and necessary operating devices are contained in a large cylindrical-shaped tank suspended from the rails of a crane. The crane can be moved the entire length of the building, and the tube can be moved horizontally, vertically, or it can be rotated to place it in the best position to make the X-ray exposure.

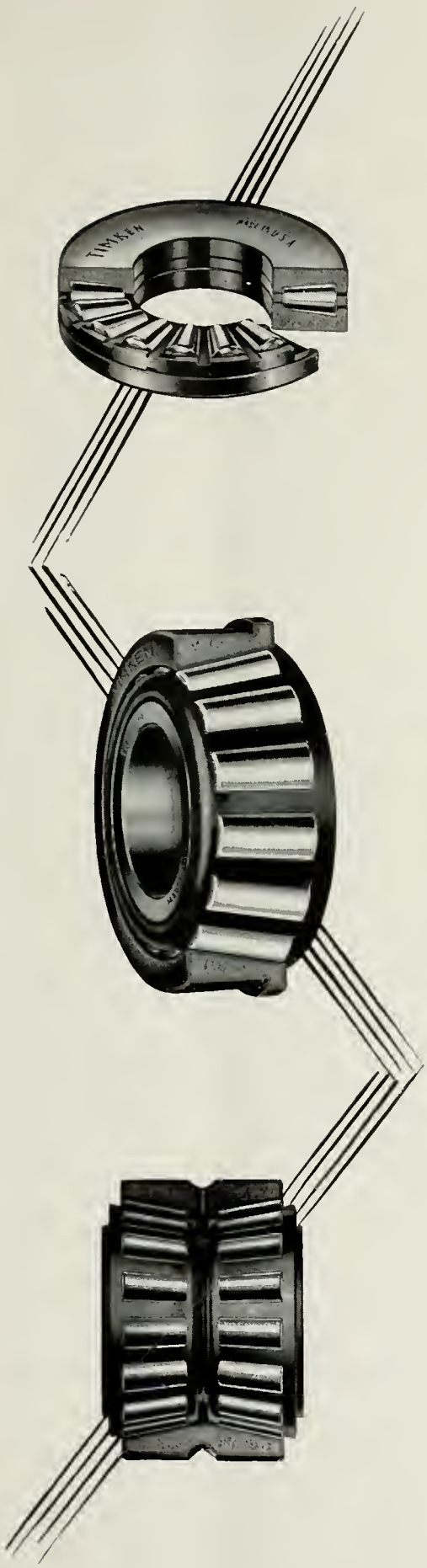
Operation of the X-ray equipment is by remote control. No human being is within the X-ray housing while the tube is operating. A periscope at the control switchboard outside of the structure enables the operator to view the job as the exposure is being made.

Small films, the size of dental X-ray films, are placed at various locations on the exterior wall of the housing. These are also worn by the X-ray technicians. After a period of time these films are developed and negatives viewed to determine whether the technicians are being exposed to the injurious rays.

Rogue's Gallery

This fellow is having fun. He just turned in his petition for a position on the 1941-42 *Technograph*, and look what Landon & Stevens set him to doing.

He happened to be an artist. Do you happen to be a writer, or a salesman, or a typist? Or are you just ambitious? Then apply now, there's a job for you. Call Don Stevens, 7-2820 or Richard Landon, 6-1819.



GET A FREE COURSE ON BEARINGS FROM BEARING SPECIALISTS . . . . .

When the ink has dried on your diploma and you have settled down to your career as an engineer you'll be glad you accepted our offer to learn the fundamental principles and application of TIMKEN Tapered Roller Bearings.

By taking up the subject of bearings now you'll save yourself a lot of time and trouble in the future. You'll be prepared for all bearing problems that ever may come up. You'll be worth more to your employer because you'll be a better engineer.

TIMKEN Bearings are known and preferred the world over wherever wheels and shafts turn. They are used in all kinds of machinery throughout all industry; in railroad locomotives, cars and streamlined trains. They eliminate friction, carry radial, thrust and combined loads, promote precision.

The Timken Reference Manual is a complete course in the fundamentals of Timken Bearing design and application. We will be glad to send you a copy. When writing mention the name of your school.

THE TIMKEN ROLLER BEARING COMPANY, CANTON, OHIO

TIMKEN

TAPERED ROLLER BEARINGS

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.

G-E Campus News

JUNGLE JIVE

MISSIONARIES working among a newly discovered tribe of savages in Netherlands New Guinea, which has many times been called one of the "earth's remotest spots," had a strange experience.

They invited natives into their bamboo hut and turned on their short-wave radio. The tribesmen looked at one another in frightened amazement. Rev. C. Russell Deibler, one of the missionaries, says this of what happened: "As they heard voices coming from the receiver, they crouched over close and jabbered back, utterly bewildered where the strange voice was coming from."

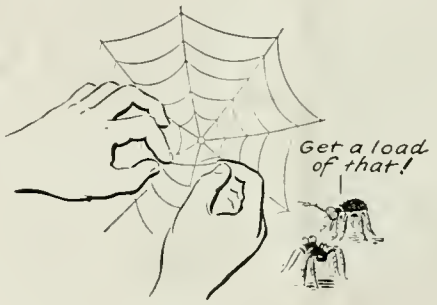
The missionaries wrote their experience in a letter to Station KGEI, G.E.'s short-wave station in San Francisco, which sends its radio signal into Asia, using special directional antennas.

PRESTO!

THREE tiny 1000-watt mercury lamps, mounted in the new television floodlight developed by G-E laboratory engineers, yield as much light as 225 ordinary 60-watt bulbs. For the same amount of illumination these powerful little lights produce only one-fourth as much heat as do incandescent lamps. Water cooling dissipates much of the heat and so makes possible the very small size.

The new lights are equipped with motors and gears for remote control, so that they can follow the movements of studio performers.

These tiny lamps were developed at G.E.'s Lamp Department at Nela Park, Cleveland, which each year selects promising young engineering-college graduates from "Test" to train them in the lighting game.



SPIDERCRAFT

COULD you spot-weld wire one quarter as thick as a human hair?

That's the problem G-E engineers faced in producing filaments for thermocouples, those little super-sensitive devices used in measuring high-frequency alternating currents or voltages. These dainty filaments are 1/2000 of an inch in diameter—so small that they are almost invisible—and have to be welded into a "K" shape.

The work is so fine that it must be done under a microscope, using a pair of tweezers to hold the wires.

At Schenectady there's a whole section of the G-E Industrial Department devoted entirely to welding. Practically all the men in this section are graduates of the G-E Test Course. General Electric Company, Schenectady, N. Y.

GENERAL ELECTRIC

953-19-211