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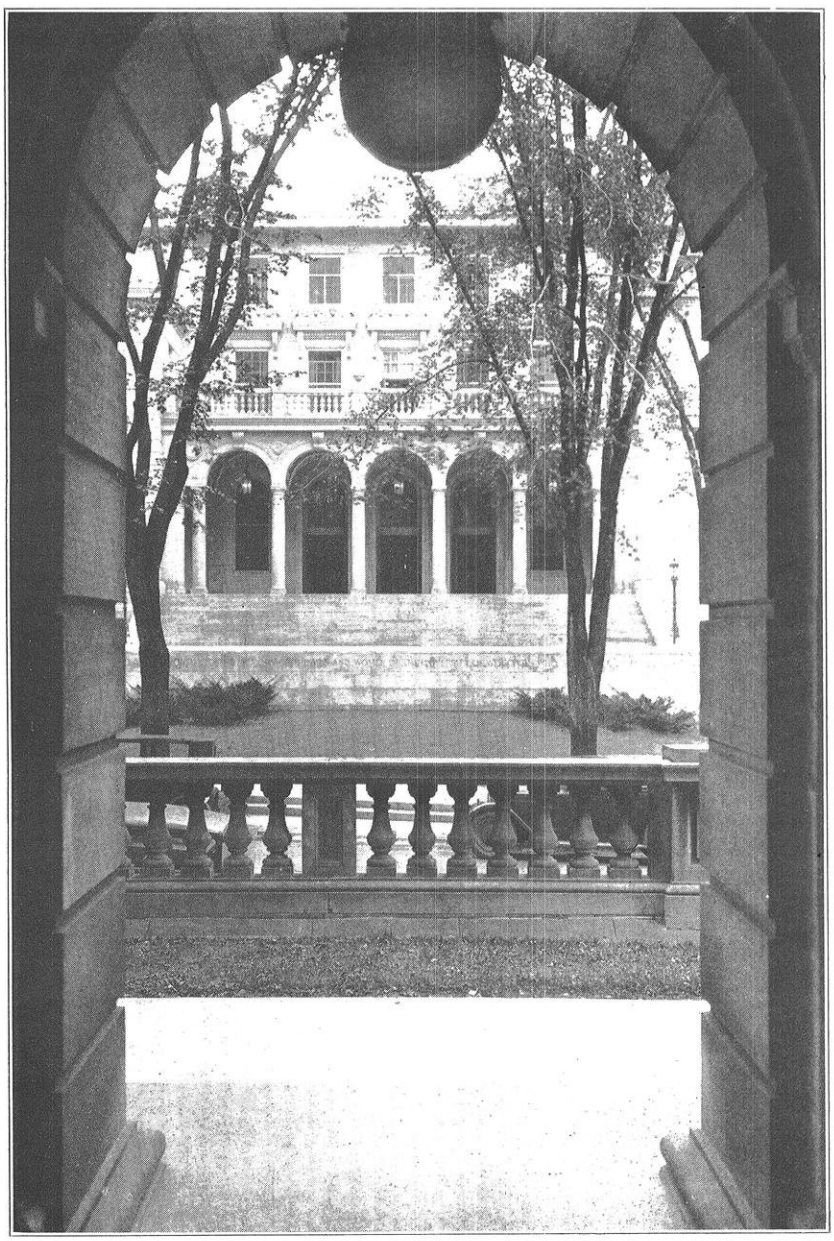
THE WISCONSIN ENGINEER



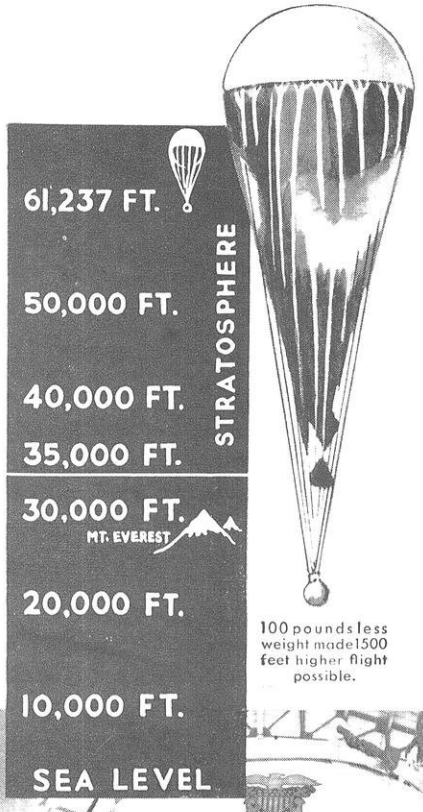
FEBRUARY

1934

MEMBER, ENGINEERING COLLEGE MAGAZINES, ASSOCIATED

11.6 MILES UP—IN SAFETY

IN LIGHT, STRONG DOWMETAL GONDOLA



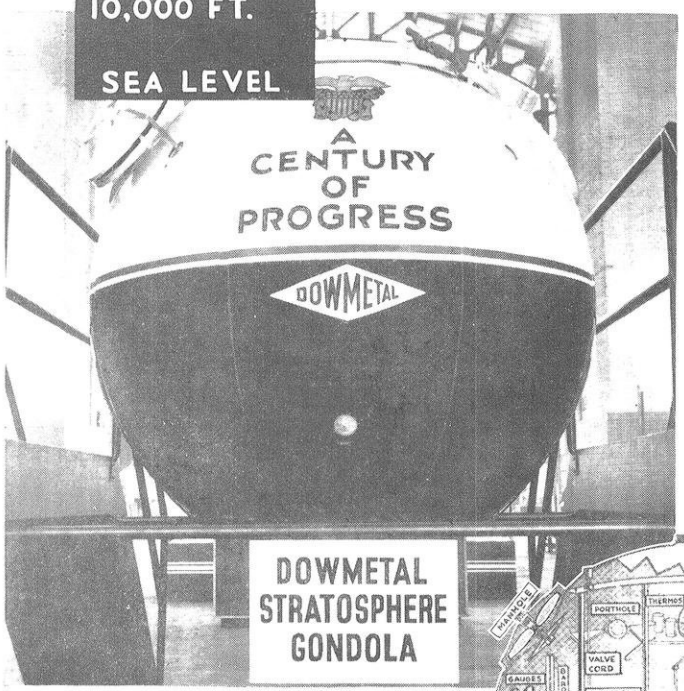
100 pounds less weight made 1500 feet higher flight possible.

AN unusual combination of properties possessed by dowmetal alone caused it to be chosen for the material from which the spherical gondola was made for the stratosphere flight. These properties were necessary to both safety of the occupants and success of the flight.

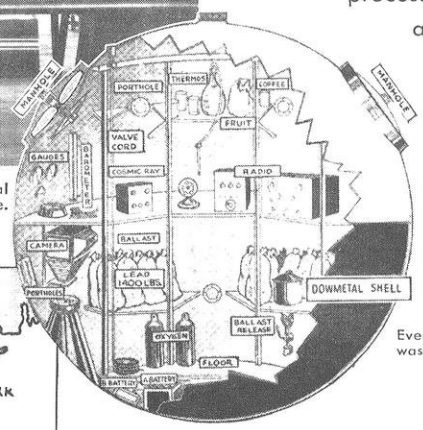
Lightness was sought because every pound saved made possible an additional 15 feet of ascent. This lightness was found in its greatest degree in dowmetal, lightest of all structural metals.

Strength must accompany lightness, so that the natural atmospheric pressures could be maintained inside the spherical laboratory-home without danger of the gondola bursting in the rarified atmosphere existing eleven miles up.

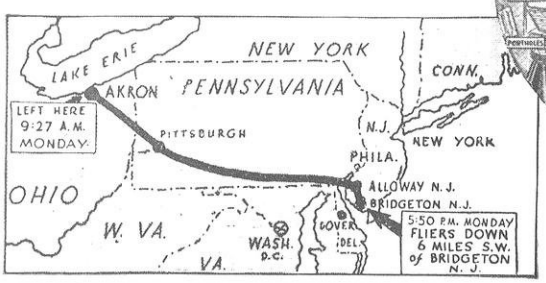
Dowmetal not only met the combined need of lightness with strength, but was also found most practicable for fabrication in the forms necessary. The main walls of the sphere were made of *rolled* plates of dowmetal. These plates were *welded* together. Hatches were dowmetal *castings*. *Sheet* dowmetal shelves were supported by *extruded* dowmetal posts. *Forgings* were used in certain important locations. These parts were fabricated by processes common in industry and equally applicable to the manufacture of more prosaic but very necessary structures and machines where light weight and strength mean less power, less wear and smoother operation. Write for complete data. State your problem.



The air-laboratory of dowmetal used by Lieut.-Commander Settle.



Every available foot of space was occupied in this 7-foot diameter ball.



The above map pictures the course followed by the stratosphere balloon on its ascent from Akron, Ohio

DOWMETAL

THE DOW CHEMICAL COMPANY • DOWMETAL DIVISION • MIDLAND, MICHIGAN

The Wisconsin Engineer

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VOLUME 38 FEBRUARY, 1934 NUMBER 5

CONTENTS

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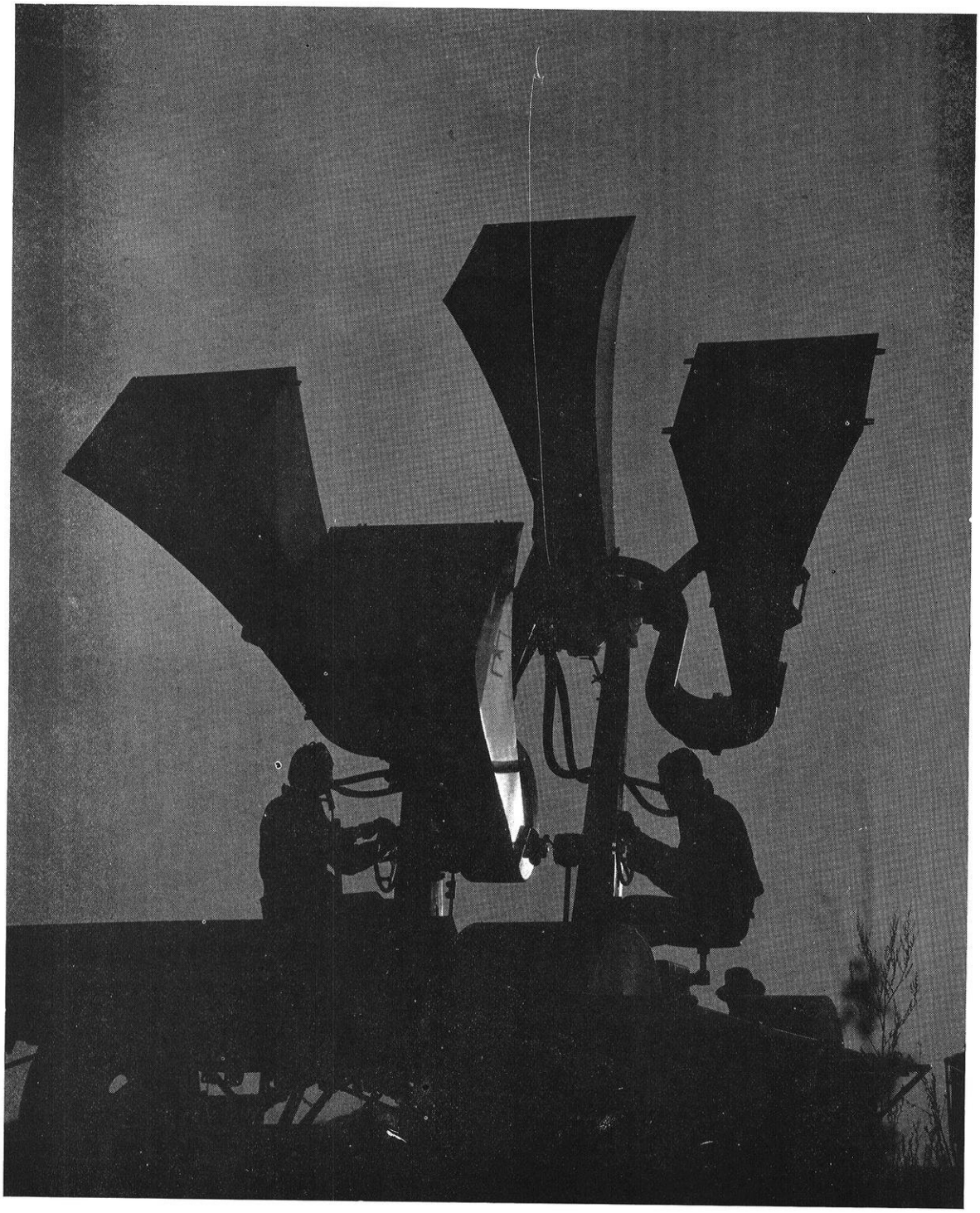


—Courtesy Sportsman Pilot.

Sound Locator Horns Used in Conjunction with Aircraft Detection

The WISCONSIN ENGINEER

VOLUME 38, NO. 5 FEBRUARY, 1934

Ideas Like Plants -- GROW

By OLIVER AJER, e'29,
General Electric Research Laboratory

HOW are ideas conceived? How are ideas treated in a laboratory? Who carries them out? What part does a research laboratory play in the development of a new commercial product? Such are some of the questions frequently asked about a research laboratory.

The simple illustration of the growth of an idea may be found in the development of the electric razor blade sharpener.

When a research fellow was journeying in Italy, he suggested to his companion that they review their daily routine activities and see how they could possibly motorize something. After the alarm clock, what? Starting there, they decided that the tooth brush wasn't worth motorizing unless the rotating rubber disc, or brush, used by the dentist be adopted. But when they came to their morning shave they realized right there that several minutes were spent each day in turning their razor stroppers by hand, or installing new blades. So they wrote to the director of their laboratory suggesting the idea of a motor driven razor sharpener. An idea was conceived!

Knowing that one of the laboratory metallurgists had a hobby of razor blades, the director called him in to read the letter. When it was apparent that this man was interested, it was decided that he proceed with such a development. This is how ideas are treated in a laboratory, and how jobs are distributed so that a man may, if possible, pursue the kind of work in which he is most interested. At first, to carry out this idea quite a few hand operated stroppers were analyzed with the hope of learning the most desirable features of each, and together with the new ideas, incorporating them in one sharpener. The thought was to use a motor driving four rollers — two for each edge of the double-edge type blade and to wrap spirally around each roller a narrow strip of leather with some abrasive adhering to its surface. This would give the same diagonal stroke that a mechanic gives when he sharpens his edged tools with a circular motion. It was found that tungsten carbide, an alloy hard enough to cut glass and almost as hard as diamond, could be made in the form of powder, but the method of applying it to the surface of the leather so it would stay there seemed at first to be quite a problem. One could spread some of the tungsten carbide over the leather for temporary use but this would necessitate furnishing a small supply of the material with the sharpener and instructing the user to apply additional amounts from time to time. This would be an imposition on the user, so some method had to be worked out to permanently keep this abrasive on or in the leather.

One day, one of the experimenters, while seated at his desk examining various samples of leather, noticed that as he bent them he could distend the minute hair follicles so that they were plainly visible as small pores. It occurred to him that nature's way of holding hair in the hide might be a good way of holding tungsten carbide in the leather. He then made a mixture of benzine, Damar gum, and tungsten carbide, applied it to the surface of a stretched leather sample, and allowed it to dry thoroughly. The result was that the tungsten carbide particles had been carried far into the hair follicles and were held there permanently by the Damar gum which was left after the benzine had evaporated. With this much done, let us turn to the razor blade.

The sharp edge of a razor blade as it appears under the microscope is a saw toothed edge. When your razor blade becomes dull either some of the teeth have been broken or pulled out or else those that are present are not lined up properly. We concluded that when a barber hones a razor blade with the aid of an abrasive stone he actually cuts in new teeth. When he strops a blade on leather he lines up the teeth that are present.

The motor driven razor sharpener, with the abrasive impregnated leather, is intended to perform the dual process of honing and stropping in one operation. To find out whether or not it really does so, it was only natural to look

(Continued on page 71)

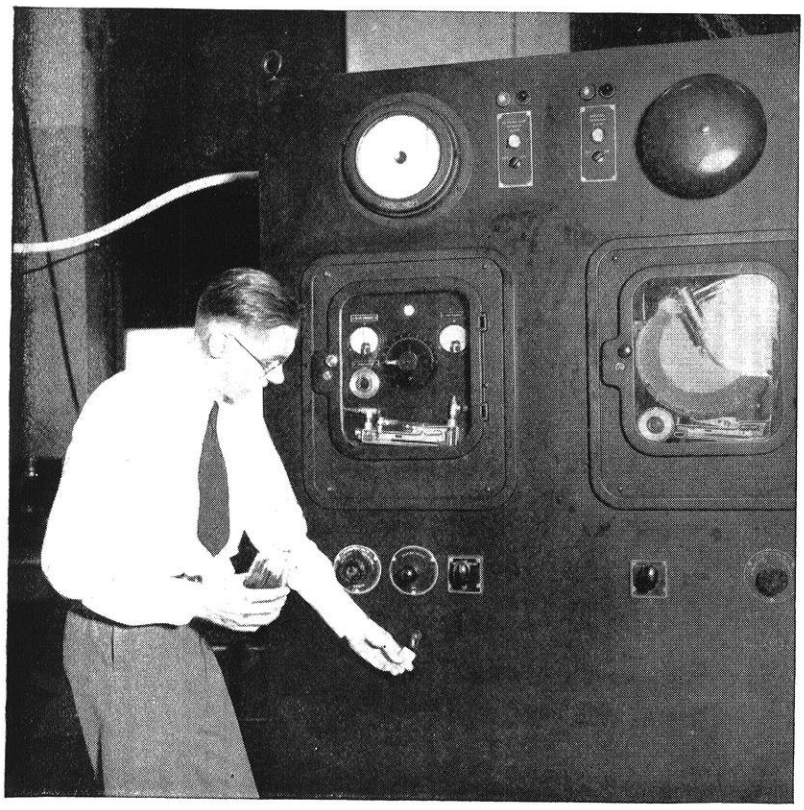
THE "ELECTRIC NOSE" — A HIGHLY SENSITIVE MERCURY DETECTOR

A device, which might well be called an "electric nose," was recently developed for the detection of mercury vapor in flue gases. Even the faint whiffs given off when the cork of a mercury bottle is held against one of its nostrils, a test valve, makes the detector react violently, causing a red lamp to flash and a large gong to ring.

This "electric nose" can smell out only mercury, and will give warning if there is only one part of mercury vapor in a hundred million parts of atmosphere. The most sensitive previous types of mercury detector would give warning of one part of mercury in thirty million parts of atmosphere. Furthermore, the new detector is faster; it responds in a few seconds, whereas the old type detector takes several minutes.

The hypersensitive detector was developed especially for use in connection with the new mercury-vapor turbine. The flue gases from the mercury boiler are first given treatment to remove stack impurities which would nullify the work of the detecting mechanism. The gases then pass through an ultra-violet light beam, coming from a mercury light source, an dof a wave length known as the resonance radiation of the mercury atom.

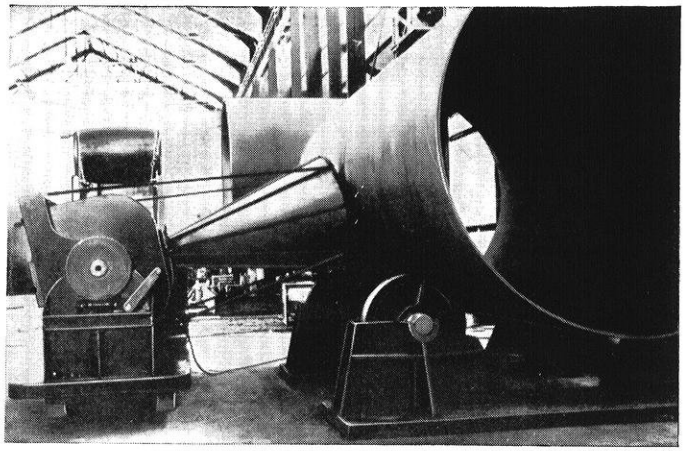
One part of mercury vapor in one hundred million parts of flue gases will dim the radiation sufficiently to actuate the phototube. The small change in the current inside the tube is amplified by other tubes and operates the circuits giving warning of mercury leaks through the flashing lamp and the gong.



The Electric Olfactory Nerve —Courtesy General Electric.

FINDING HIDDEN SECRETS

A piece of apparatus that resembles Mr. Edison's old talking machine is now doing the biggest industrial x-ray job yet attempted, the minute inspection of every inch of steel welds in the penstocks for Hoover Dam, for a total distance greater than 75 miles. It is a special shock-proof x-ray machine, rated at 300,000 volts.



Flaws Beware —Courtesy General Electric.

When the penstock contract for the dam was awarded to the Babcock and Wilcox Company, it was with the provision that all fusian welds pass x-ray examination. The penstock sections range from 8½ to 30 feet in diameter, and the thickness of the steel is three inches in many places. These giant sections are being welded circumferentially and longitudinally, making it necessary to take 159,000 separate x-ray exposures,involving the use of more than 24,000,000 square inches of x-ray film.

To meet this unusual problem and to keep up with the planned construction schedule, x-ray apparatus of a new type was necessary. It had to have a rating of 300,000 volts in order to produce radiographs through steel plates up to four inches in thickness. Yet, despite the high voltage, it had to be safe in operation. It also had to meet certain space limitations and be easily portable.

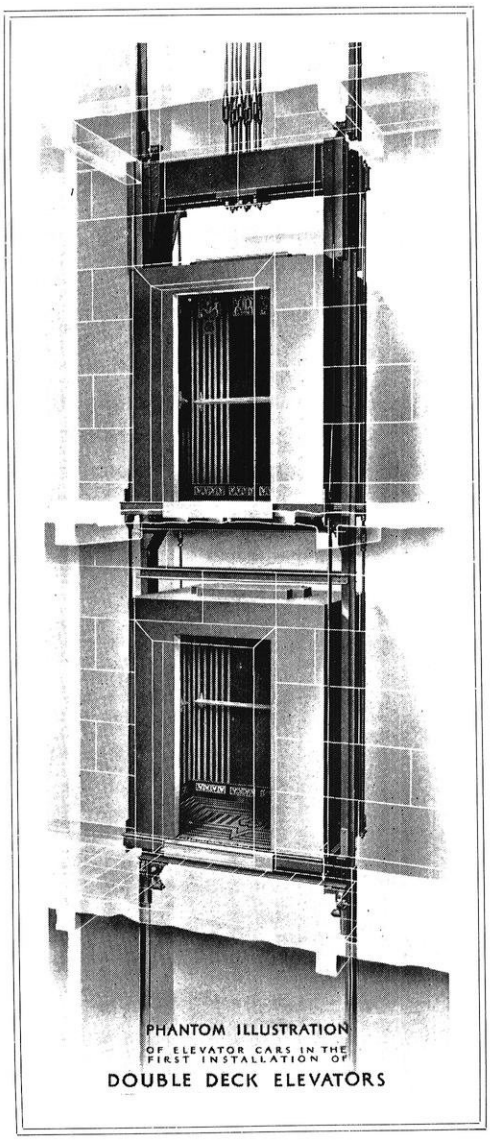
This new x-ray equipment provides electrical safety through the immersion of the transformer, condensers, Kenotron tubes, and the x-ray tube itself in oil within a sealed and grounded tank. It is impossible for anyone to come into contact with the high tension system while it is in operation. A single cable bringing the low-tension power supply is the only electrical connection.

The apparatus consists of three units — a shock-proof head weighing 5000 pounds, the operator's control unit, and an expansion tank. The head is mounted on a special mechanical carriage, so designed that it can work inside or outside of the penstock, traveling on a narrow-gauge track.

High Speed Elevators

By R. C. PRICE, c'34

BEARING passengers aloft in a smooth upward surge with the speed of a rocket is the aspiration of the elevator engineer of today. Toward this end elevator experts are driven to mechanical innovations that lend wings to our vertical movement in modern skyscrapers. Huge, towering buildings are, of course, built for profit; so the problems with which the elevator engineers are confronted are three-fold, to maintain the best possible service to each floor in order to maintain a high rental value for that floor and to encroach as little as possible upon the rental area.



PHANTOM ILLUSTRATION OF ELEVATOR CARS IN THE FIRST INSTALLATION OF DOUBLE DECK ELEVATORS

Luxurious vertical transportation has resulted from the mechanical contrivances fashioned in late years, particularly by the Otis Elevator Company. Their gearless traction machine consists of an extremely slow speed direct current motor, a traction driving sheave or pulley, and an electromagnetic brake, all of which are mounted on a continuous bed plate. Although the elevator travels 1000 feet per minute, the motor turns over but 95 R. P. M. at top speed. This slow speed could not be achieved with an AC motor nor could it be controlled smoothly. A pair of helical springs apply the brake shoes to the pulley; interruption of current or the operation of any safety device breaks the circuit and so applies the brake. Normally the dynamic braking action of the motor is used for stopping, the brake merely holding the cars at the landings. Fast, smooth acceleration is furnished by "unit multi-voltage control," in which the armatures of the generator and the elevator motor are permanently connected electrically. The speed of the motor is controlled by the variable voltage from the generator which in turn is regulated by variation of the generator field. So the controller switches carry only auxiliary and field currents, eliminating heavy resistance losses, making possible a wide range of speed variation, and avoiding sudden changes of speed caused by resitance steps.

Signal control operation of elevators is accomplished by the selector. It stops the cars at the floors for which buttons have been pressed; it levels the car at these floors with micro-drive; and it operates the several signals needed for good elevator service. The device, a miniature elevator holding the equipment and traveling in a miniature shaft, is driven by geared down motion transmitted by a tape from the elevator. This crosshead picks up the signals from the hall and car buttons and initiates the stopping operation on the controller. Final stopping and automatic leveling are done by cams and contacts on the selector.

Double-decker elevators are the latest development to conserve space and to utilize the shaft to its greatest capacity. One structural steel frame supports the two separate compartments of the double-deck elevator. Eight hoist ropes of steel support the frame; and one of these ropes capable of carrying 1.75 times the combined weight of the compartments, the frame, and the full rated loads; the ropes themselves have a factor of safety of at least 12. To compensate for the weight of these steep ropes, which is 2½ tons with the elevator down, iron compensating ropes are attached to the bottom of the counterweight, pass under a tension pulley in the pit, and are attached to the bottom of the car frame. These double deckers are used for the tower portions of skyscrapers, one compartment serving the even numbered floors and the other compartment serving the odd-numbered floors. If desired, the upper compartment alone can be used. Otherwise the double decker operates as do the other high speed elevators, both car operating handles having to be in "Start" position before the elevator will move.

Large installations of these high speed elevators have been made in the Empire State Building, tallest building in the world. The double decker elevators are being operated in the Cities Service Company Building in New York City at the present time. In the Empire State Building provision has been made to transport 15,000 people from their offices to the ground floor between the hours of 5:00 and 5:30 daily. Such is modern elevator engineering accomplishment.

This Teaching Business - -

By Dean B. M. Brigman*
Speed Scientific School, University of Louisville

Milton, in one of his stately verses says:

"Accuse not nature: she hath done her part;
Do thou but thine."

HOW well I recall the emphasis that my old English professor laid upon these words, and like the teachings of my mother, they remain with me, particularly when "all others are out of step" except me.

Looking back over a period of nearly a quarter of a century in educational work, I recall very vividly the advice given me by the revered former President of the University of Kentucky, James K. Patterson, to whom I always went when I needed inspiration and advice. On this occasion, I consulted him when I was considering my entry into school work. He said, "There are no rules in teaching; you must have a belief in the profession; for teaching *is* a profession." Later on he quoted from an author whose name I do not recall; but in substance it was as follows: the problem of teaching a savage some technical or scientific subject would not be strictly a problem of how to give him sensations regarding it, nor would it be a problem of how to give him the mental capacity to understand it; the big problem would be to arouse and stimulate his *interest* in such a way that he would set his mind to work upon it.

Egotistically I have taken pride in my profession, and have always maintained that the best teaching is carried on in engineering schools. I was more than happy to hear Dean Kelly, formerly of the University of Minnesota, now President of the University of South Dakota, and one of the educational experts of the Rockefeller Foundation, make this same statement in Louisville.

When, however, I read and reread the "Report of the Committee on Admissions and Elimination of Engineering Students," I naturally wonder what sort of teaching must be done in other lines of educational work if our record is as indicated in this report. It is alarming, and we need to take inventory of ourselves when the committee raises the question: "Is it or is it not a correct premise to lay down that nearly every student now entering our engineering colleges is endowed with native ability and enough vocational aptitude to undertake and successfully complete the first two years of college work?"

Since this report was issued, I have changed my opinion. I now believe our teaching methods require an overhauling. My observations also confirm this belief. I have noticed with grave concern the lack of personal interest in the students' welfare by the faculties and executives. I have noticed with concern the ever-growing demand for more equipment and less instruction. I have noticed with concern the investments in buildings and the lack of investment in teachers. In like manner, an observant person must view with alarm the tendency that Professor Curtis Merriman decries when he states "that teachers are impatient with slow students." Too often, I believe the slow student is unfairly treated. I often wonder what would happen if all the slow students were children of the teachers themselves. I sincerely doubt, then, that the slow student would be a problem.

Dean James E. Russell of the Teachers' College of Columbia University says, "Leadership in the future will not come by chance. Scientific precision will replace guesswork. Exact knowledge must prevail in high places. Something may be done to improve scholarship in our secondary schools on the part of those who can use it; but the American secondary school has other duties besides the making of scholars. Granting the necessity of scholarship, the heaviest load must be carried by our colleges and universities. They have no need to encourage initiative in thought or action in their students; young Americans exhibit independence enough when left to themselves. But what our students do need is to learn how to study, how to do straightforward logical thinking, how to round out an intellectual task in a scholarly fashion; in a word, they need discipline in learning. The only way to attain this result is straightforward instruction under a master. Desultory teaching with the assignment of tasks to be done at home will not do it. Threats and brow-beating will not do it. University teachers might well learn a lesson from business, where the responsible heads train their subordinates in all kindness, but tolerate no mistakes and permit no guesswork." Master teachers, what a term to conjure with. Are we to let the species die, or shall we aspire to reach that stage?

The day will come; yea, it must come when it will be a privilege to teach. No person is fit to teach, at any time, unless he can put his whole heart into his work.

John Palmer Gavit, in his book "College," says, "The great teacher is not he who tells his students most, but he who by the magic of personal inspiriation most thrills them with eagerness to find out for themselves. This is why one *teacher* in a college is worth a dozen 'scholars.' As you go about among colleges, you hear *ad nauseum* about the distinction between them. The controversy is an old one. It is the 'scholars' who display the bitterness. I suspect that a good deal of the bitterness arises out of a guilty con-

*In the *Journal of Engineering Education* published by the Society for the Promotion of Engineering Education.

science. It is a good deal of trouble to teach if you don't love young people."

It is my opinion that the man or woman who attempts to teach merely because it is a "scholarly vocation" is a parasite to any educational institution. "If the instructor of any grade," says Gavit, "holds the medieval idea that education is the prerogative of a caste and resents the invasion of a horde of ordinary youth of all sorts, he may still be in some sense a profound scholar, but he will not do much *teaching*. If he views the students either socially or intellectually as beneath his condescending contempt; if he resents and despises hand-to-hand contact with them as an interference with his work as a researcher or author, or as in some way derogatory of his dignity as a scholar; he will not get far with students."

As a student I have been forced in contact with this type; I have dozed in the classes of such; I have been snubbed; and I have felt the contempt with which they abound. And as a teacher, I have been associated with them; I have been criticized by them because I failed to "uphold the dignity of the profession" when I remained after hours to give aid.

It is my observation, gleaned by contact, that the besetting sin of our institutions is that there is by far too much "lecturing" and "giving of courses" in place of simple face-to-face teaching.

There is no doubt that lecturing is easier. A teacher can prepare a "course" and keep it up-to-date, and "from his pedestal drop it down on his students' heads." Not so with teaching; "the personal contacts" require him to keep awake. Hence to the common-place question "why don't the professors get closer to their students?", Gavit bluntly, and I think, truthfully answers, "They don't want to; it is too much trouble."

"Education," James says, "is the influencing of man by man, and has for its end to *lead* him to actualize himself through his own efforts." The real teacher is the influencing agent of whom James speaks; he is the leader who makes it possible for the student to actualize himself, not the lecturer. The teacher is the gardener who digs about and nourishes the plant which grows of its own impulse. His function is not to make pupils learn, but to make learning attractive. To do this requires effort, interest, and a heart filled with love for the youth entrusted to his care."

IDEAS LIKE PLANTS - - GROW

(Continued from page 67)

for some method of determining sharpness of razor b'ades. The sharpness of a razor is usually determined by its quality in shaving, but there is such a great variation in beards that a good blade to one person may work like a hack saw in the hands of another. In other words — how sharp is sharp?

As long ago as the time of the Crusades, a famous swordsman boasted of a weapon so keen that the flimsiest gossamer veil placed on its upturned edge could be severed by a single forward thrust. Was it sharper than the sharpest modern swords we use for shaving and if so, by how many degrees or other units of measure?

You see, we haven't had any real scientific way of calibrating this important attribute of all cutting instruments, and the answers to the query as to how sharp a certain razor blade is brings answers as varying as those in reply to the questions as to the *apparent* size of the moon. Through some recent work, however, there is a possibility of measuring sharpness. It takes a greater force to cut something with a dull blade than it does with a sharp one so a measure of this force would be an index of sharpness. One can readily see how ideas are conceived, how they grow, and with painstaking research lead from one thing to another. The world is full of potential ideas if only the individual would grasp them, foresee the importance of them, and, even though they look insignificant, have courage enough to go ahead and sacrifice time and hard work for development.

The purpose of the laboratory is to develop new ideas, steer them to the point where engineers responsible for commercial design can learn the fundamentals and put them in marketable form. The laboratory is not responsible for the commercial design but acts in an advisory and consulting capacity. The razor blade sharpener development is only one of hundreds of developments going on in a laboratory every day. Although it is one of the simpler developments compared to the incandescent lamps, vacuum tubes, x-ray tubes, mercury turbines and boilers, sodium lamps, refrigerators and a host of others, I hope it has served to illustrate the part a laboratory plays in the growth of a new idea.

ECONOMICS 1A AND B

Economics A and B, I am sure you will agree
Is the toughest course they teach the engineer.
You are lucky if you last; many students don't get past,
And the outlook for the sophomore's quite drear.

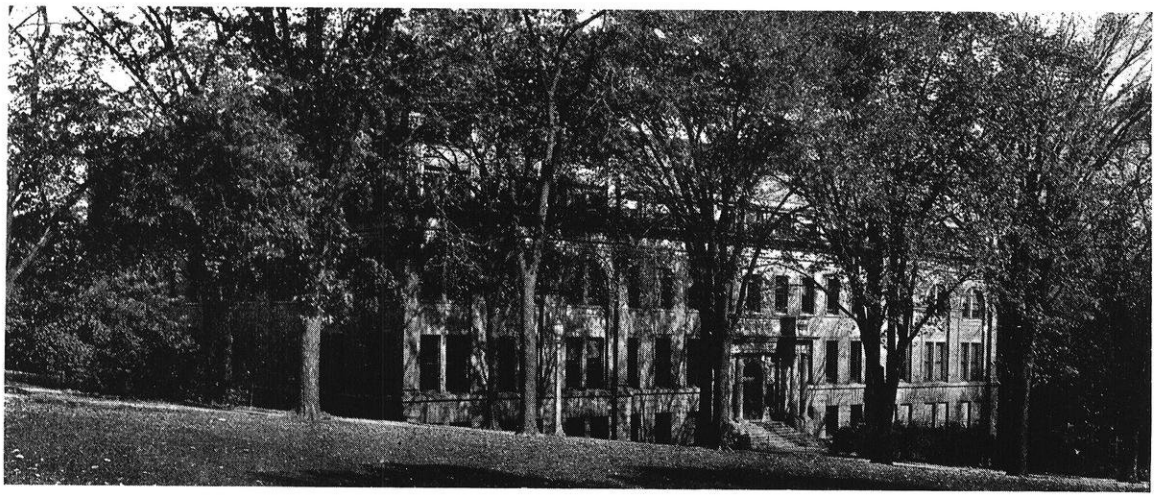
Now they use Kiekhofer's Outline, and they never fail to assign
Lengthy readings in both Rufener and Ely,
There it speaks of foreign nations and industrial relations
Also competition and monopoly.

Forty pages in a lump is enough to make you jump,
If you want to rate some other grade than E.
Composition, intuition, ammunition and ambition:
All are used in Economics A and B.

If your good grades are your pride, you will wish that you had died
'Ere you took that awful economics course.
When they're handing out the grades, they have three distinctive shades,
And they label them as rotten, bad, and worse.

I'd go on like this forever, if I thought that my endeavor
Would serve to stop your going on a spree.
If you haven't got the guts to take chances going nuts,
Stay away from Economics A and B.

—*With apologies to Michigan Technic.*



« CAMPUS NOTES »

WATERTOWN SONGSTER ENTERTAINS AT A. S. C. E.

Arthur A. Lemke, c'34, who hails from Watertown, the home of the goose and duck dinners famous a generation ago, performed some vocal gymnastics at a recent A. S. C. E. meeting. Art sang four songs and revealed vocal talents hitherto unsuspected and unsought for amongst the Plumbers. He was accompanied on the piano by Miss Katherine Gregg. We wish to congratulate Art and hope that he will not allow such an asset to become frozen.

SOCIAL COLUMN

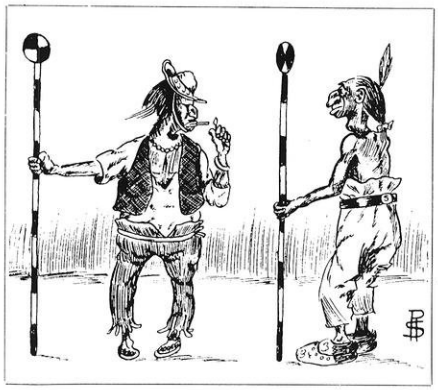
Harold Goldberg, e'35, was treated to a surprise party by several of his friends on January 31, the date of his twentieth birthday. Upon being surprised, Harold said: "My goodness!"

—o—

The Sons of Erin attended the Prom in various capacities. As usual, some of them had charge of the air cooling and circulating apparatus. The electricals in charge of the lighting did a pretty good job. And many of the less fortunate put on stiff shirts and paid their way in. "Torchy" Couch, carrot-topped ski jumper, after losing a ski meet by losing his balance when he jumped, took the girl to the Prom.

Several of the Lawyers "forgot" their tickets and had to buy some.

GRADS WORK ON STATE SURVEYS



The U. S. Coast and Geodetic Surveys now in progress in several states with the aid of CWA funds are going ahead in spite of cold weather and many other difficulties. Under the able direction of Ray S. Owen, Chief of the Wisconsin Division, precise levels and accurate triangulation surveys are progressing. At present, the average salary is about $23.00 per week. The payroll for the week ending January 26 was $4,188.32 for 188 men. The quota for Wisconsin is 320 men, so there is still opportunity to secure a job on the state surveys.

To whom it may concern, the U. S. G. S. benchmark at Sun Prairie has been hit by an automobile and is slightly cockeyed.

THE ELECTRICAL'S CODE FOR GETTING ALONG WITH CO-EDS

1. When she is sulky and won't speak they *exciter.*
2. If she gets too excited they *controller.*
3. If she comes halfway they *meter.*
4. If she comes all the way they *conductor.*
5. If she wants candy they *feeder.*
6. If she gossips too much they *regulator.*
7. If she is all wrong they *rectifier.*
8. If she wants to be an angel they *transformer.*

—*Kansas State Engineer.*

ENGINEER'S WHISKEY TEST

Connect 20,000 volts across a pint. If the current jumps it the product is poor. If the current causes a precipitation of lye, tin, arsenic, iron slag, and alum, the whiskey is fair. If the liquor chases the current back to the generator, you've got good whiskey.

—*Oregon State Technical Record.*

IN KEEPING WITH THE TIMES

Irv Kramer, m'35, the handsome crewman, gave his E. A. 105 class a laugh the other day when he got so interested in his accounting that he acted natural. Irv was debiting away in conventional fashion when he suddenly exclaimed: "Cash? The fool paid cash!", and snorted in disgust.

ENGINEERS WAR ON RADIO ADVERTISING

A device that automatically takes the talk, including advertising, out of the radio programs has been developed by Prof. Gleason W. Kenrick, of Tufts College, Mass., who demonstrated his radio talk eliminator to the American Association for the Advancement of Science.

Seemingly endowed with intelligence and discrimination, this robot radio censor looks like a supplementary radio set that is hooked up with a conventional radio broadcast receiver. Actually, the talk eliminator works automatically and utilizes a combination of electrical devices which result in the impartial suppression of all talk and announcements, along with advertising "plugging," that some radio listeners find objectionable.

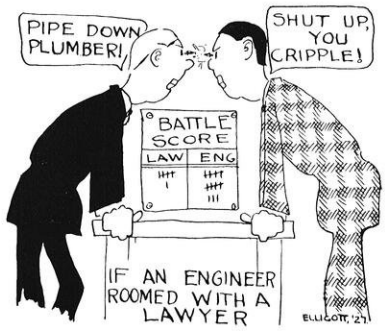
The radio talk eliminator hookup is such that whenever there is a quarter of a second silence in the program, the radio set is silent for ten seconds. When a speaker stops for breath, his momentary silence, detected by the talk eliminator, in turn silences the radio to his message for ten seconds. The detecting "Brain" in the talk eliminator is a detector amplifier similar to the automatic volume control devices now commercially incorporated in radio sets. Whenever the current in the "brain" tube drops to zero for the predetermined fraction of a second, a selective relay comes into action that silences the radio for a predetermined length of time.

Prof. Kenrick has found that setting the talk-hating robot for ten seconds of silence is an effective antidote for most radio chatter. A very fast talker, like Floyd Gibbons, can beat the eliminator which can not silence him until he stops for breath. Music, which is usually continuous, passes inspection by the censor robot except in the rare instances when there are dramatic pauses as there often are in symphonic compositions.

Radio broadcasting stations will be able to counteract the use of the talk eliminator, if many listeners equip their sets with them, by supplying a musical background to all announcements and advertising speeches. But if the talk eliminator is thus thwarted, Prof. Kenrick promises to improve it by adding some sound filters which will have the ability to differentiate between musical sounds and the sound of the human voice.

FROM THE FACULTY

According to Mr. Cottingham, Professor of Structural Engineering, engineers are apt to be partial to parabolas and blonds. He wouldn't state just how the two fitted together, but he indicated that there was some connection.



According to Colonel R. S. Owen's plans, the St. Patrick's parade of 1935 will be a tame affair from the standpoint of the ancient Engineer-Lawyer feud. Colonel Owen plans to present a pageant of early engineering in the state with the aid of the Madison Chamber of Commerce and the State Historical Museum. The pageant will commemorate the one hundredth anniversary of the first survey made in the State of Wisconsin.

This year, however, there is no reason why we shouldn't have a real old-fashioned get-together. St. Pat's day is only a little more than a month away, and there are plenty of Shysters handy, so let's go.

THEY DON'T SPEAK THE SAME LANGUAGE

Professor Gus Larson related the following tale in his Steam and Gas 105 class:

It had come to pass that one of the instructors in the fold met a coal dealer of the town and began to query him about the coal he sold.

Ques. About how much moisture does the coal contain?

Ans. Well, not so much — when it rains it gets pretty wet, but it is not bad now.

Ques. How much ash?

Ans. Well, I guess about average. And finally —

Ques. How about the BTU'S.

Ans. Not a darn BTU in the lot.

Hey! Campus Notes needs news, dirt, and digs. Items concerning the Lawyers will be given special consideration.

FACULTY MEMBERS LEARN HOW TO MAKE BEER

The monthly meeting of the Technical Club of Madison was held Monday, Feb. 5, in the Park Hotel. Mr. H. W. Rhode, Chief Chemist of the Schlitz Brewery, lectured on the art of beer making with the aid of many liquid samples. Professor Kahlenberg, who was once Mr. Rhode's instructor at the University, spoke briefly about the kinds and use of beer in Germany.

After an official investigation of Mr. Rhode's samples, the club members rendered Sweet Adaline with Mr. L. H. Kessler supplying the appropriate harmony. The rendition of this classic was quite satisfactory considering the length of time during which Prohibition supposedly placed it upon the shelf.

Beer is made from barley, hops, and water. It has been found that hard waters make the best tasting beers. The barley is soaked in water and allowed to germinate. After it has germinated, it is called "malt" and is placed in a kiln, dried, and the rootlets produced upon germination are removed. The dried malt is crushed and mixed with the water to make "mash." At this point, the malt of cheaper beers is sometimes mixed with crushed corn or rice to increase the quantity. The mash is cooked and digested in the cookers. Hops are added which give the bitter taste to the beer.

The liquid or "wort" is drawn off, filtered to remove the mash, and allowed to cool to 45 degrees F. Yeast is added to the "wort" and the whole is allowed to ferment. After fermentation, the beer is aged from 2 to 4 months before bottling.

The entire process takes from 3 to 6 months depending upon the brewer and the kind of beer desired.

The amount of alcohol in beer or in any liquor is expressed in one of three ways. The amount present is expressed in per cent by volume, in per cent by weight, or in "Proof degrees". The "proof degrees" are obtained from the formula (2 x % by volume).

Thus, a beer which contains 4% of alcohol by volume would contain 3.2% by weight. Such a beer would be of 8 degrees proof. It is well, therefore, to note the standard used as well as the percentage, which is usually stated in large numerals.

« ALUMNI NOTES »

CIVILS

BECKER, ELMER W., '24, is a senior engineer in the employ of the city of Milwaukee.

BIRD, BYRON, C. E.'15, formerly city engineer of Fort Dodge, Iowa, has been appointed professor of hydraulic engineering at the University of Iowa.

His previous experiences include serving as assistant engineer on the Miami conservancy district work from 1915 to 1917. In 1919 he went to the Texas A. & M. College as an instructor in highway engineering, later becoming professor of structural engineering.

BORKENHAGEN, EDWARD H., '33, is a junior engineer on soil erosion work at Richland Center, Wis.

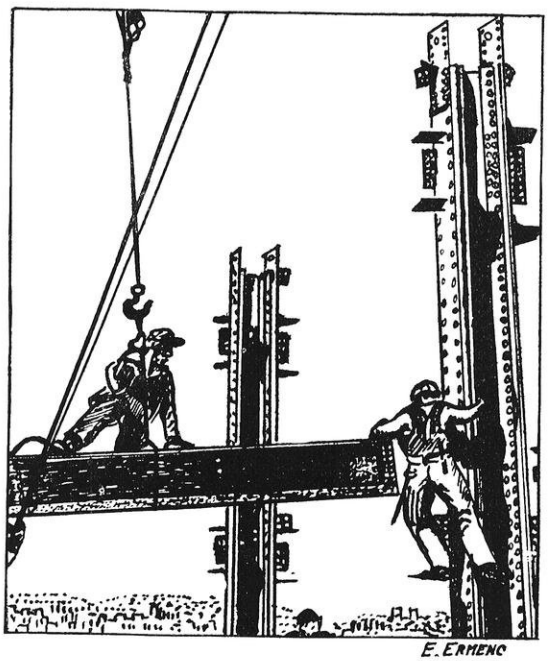
CALKINS, ROBERT S., '31, is a highway engineer for the Wisconsin Highway Commission.

COX, GLEN N., '__, has written an article in the October 12, 1933, "Engineering News-Record" entitled "Resistance to Flow of Molasses Found to Agree with Basic Laws." Tests performed under his direction have shown that the loss of head through long pipe is in accordance with laws governing resistance to flow of other viscous fluids.

Mr. Cox is associate professor of mechanics and hydraulics at Louisiana State University, Baton Rouge, La.

CURWEN, WILLIAM H., '11, is a highway engineer for the U. S. Bureau of Public Roads. He resides at 240 Colorado Blvd., Denver, Colorado.

DEVER, HARRY C., ex-'32, is with Robert Fulton, a Nebraska contractor, engaged on various construction jobs. Harry can be reached in care of Miss Barbara Thorpe, Mc Cool Junction, Nebraska.



ORDWAY, ALONZO B., '09, is civil engineer and consulting engineer of the Kiser Paving Company, 1522 Latham Square Bldg., Oakland, California.

DUFFY, WILLIAM F., '84, died at his home in Montgomery, Alabama, on November 1, 1933.

Mr. Duffy had spent practically his entire life since graduation doing railroad engineering work in Tennessee, Kansas, and in Jamaica, West Indies. More recently, until ill health forced his retirement, he served as engineer for the Louisiana Railway and Navigation Company.

HARZA, L. F., '06, consulting engineer, Chicago, was named a member of the technical committee representing the American Committee of the World Power Conference in the work of the International Commission on Large Dams.

STEINHAGAN, E. D., '11, is supervising the building of a 16 span bridge which his firm is building across the James River in Richmond, Va.

VAN AUKEN, CLAUDE L., '10, is listed in the last edition of Who's Who in America. He was elected mayor of Elmhurst, Ill., on April 18. He served on the City Council from 1919 to 1927 and at one time was chairman of the city's commissions of fire, water, light, and finance.

WASSON, COL. JOSEPH H., '12, was fatally injured in an automobile accident, January 5, 1934, at Brighton, Michigan. He was employed as sales engineer with the Peerless Cement Company of Detroit, Michigan.

Military services were held in Detroit on Jan. 9th, and interment was made near his home in Hoxie, Arkansas.

He is survived by his wife and a son, John, age 11, who reside at 12780 Eirwood St., Detroit, Mich.

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

WIEPKING, C. E.,' 21, writes, "I am also engaged on CWA work right now. The city has over 20,000 men working on 120 projects in 30 city departments. . . About a dozen regular city men form the key organization; most of them are U. W. men. It's some job."

BIRKENWALD, EDWARD, '27, who was with the bridge department of the Maine Highway Commission until last June, has been appointed appraiser for several of the closed banks of the state. His address is 26 Sewall St., Augusta, Maine.

DRUML, FRANK, '30, who was engaged on river work at Council Bluffs, Iowa, until the middle of August, is at present clerk on a CWA job near Wathena, Kansas.

MEDLER, SAMUEL, '31, was construction foreman at a CCC camp near Ashland until the end of November. He was married in July, 1932. His address is 567 S. Oak Park Court, Milwaukee, Wisconsin.

CHEMICALS

The following men are engaged on Civil Works Administration projects at the University:

BRANDLHOFER, A. L., '33, **DE VOS, W.**, '33, **IVERSON, J. O.**, '33, **NEWELL, O. M.**, '32, **RICK, T. T.**, '29, **RIDGEWAY, L. L.**, '27.

EARL, C. R., '33, has a position with the Sherwin-Williams Paint Company, Chicago.

GAHNZ, A. F., '33, joined the technical staff of the Central West Coal Company, Menominee, Michigan.

JANICKE, E. A., '33, works for the Cutler-Hammer Company in Milwaukee, Wisconsin.

PLEWKE, WALTER H., '24, is the owner of a sales agency for gasoline equipment in River Forest, Illinois.

RYAN, GEORGE P., '22, is an engineer with the Ryan & Hackett Company, oil field testing and engineering company, in Los Angeles, California.

TRUEBLOOD, WILSON D., '23, is a sales engineer for the Leeds Northrup Company at Chicago.

MINERS

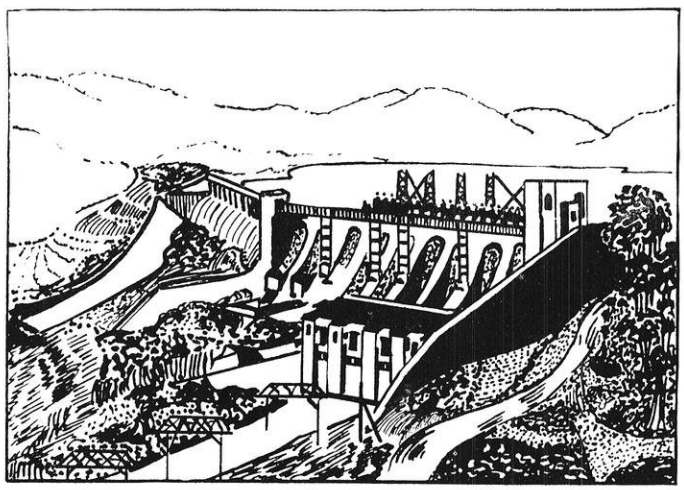
BUCHNER, CARL F., '23, is chief engineer of the McBride Syndicate with offices in St. Louis, Missouri.

JONES, T. D., '22, has been appointed chief metallurgist in charge of the Omaha, Nebraska and Selby, California smelters of the American Smelting Company.

LORIG, CLARENCE H., '24, M. S.'25, is a metallurgist at Batelle Memorial Institute, Columbus, Ohio, and his work there in connection with research in the foundry industry is attracting attention.

NEWELL, ARTHUR T., '15, is with the Mutual Chemical Company of America at its Jersey City plant.

The company is one of the country's largest producers of sodium bichromate, potassium bichromate, and chromic acid.



ELECTRICALS

ANDERSON, G. C., '33, reported Jan. 8 for his first assignment as a student engineer of the General Electric Co. at Schenectady, N. Y.

COBINE, JAMES D., '31, received an assistantship in the Electrical Engineering Department of the California Institute of Technology for the year 1933-34, where he is continuing his research and advanced studies.

EVANS, S. O., '32, recently entered the testing department of the General Electric Company at Schenectady, New York, as student engineer. Mr. Evans received his M. S. at Iowa State last June.

MORACK, MARVIN M., '28, was recently granted a patent by the United States government for an "electric value converting system and excitation apparatus therefor." Mr. Morack assigned the patent to the General Electric Company.

OSIUS, EDGAR F., '24, is factory manager of the Globe-Union Mfg. Company at Seattle, Washington.

PLUMB, HYLAN P., '01, acted as toasmaster at the Founders' Day Banquet of the Inter-Mountain Alumni Association of Theta Tau, national professional engineering fraternity, held at the University of Utah Union Bldg., Salt Lake City.

Mr. Plumb is consulting engineer with the General Electric Company at Salt Lake City.

POST, GEORGE G., '04, vice-president in charge of power for The Milwaukee Electric Railway and Light Company, Milwaukee, Wis., and also vice-president and director of the Wisconsin Electric Power Company, has been nominated to serve the Electrical Institute of Electrical Engineers as vice-president representing the Great Lakes district. He was born near Madison, Wis., in 1881. In 1904 he graduated from the University of Wisconsin. The two years following graduation were spent as an inspector in the electrical engineering laboratory at the University of Wisconsin. In June 1906 he entered the service of The Milwaukee Electric Railway and Light Company as an assistant in the lighting department where he worked as draftsman, material clerk, and statistician; in 1909 he became superintendent of electrical testing for this company and in 1910 became electrical engineer for the lighting department. When there was a change in the management in 1911, he was made head of the electrical distribution department and held this position until late in 1929 when he was appointed to his present position as vice-president in charge of power. Mr. Post has served the Institute as a member of the committee on power transmission and distribution 1922-1926 and the committee on power generation 1932-1934. He also has been active on technical committees of the Associations of Edison Illuminating companies, and the Edison Electric Institute. He was chairman of the underground systems committee of the former National Electric Light Association, and vice-chairman of the engineering national section 1932. He also has been active in local engineering circles in Milwaukee and Wisconsin, and is director of the Milwaukee Engineer's Society.

SOMMERVILLE, HARRY, '29, is an electrical engineer and service representative of the RCA Victor Co. in Denver, Colorado.

WECKWERTH, HERBERT F., '23, is public utility manager of the Kaukauna Electric and Water Departments.

MECHANICALS

EDMUND, HARVEY W., '11, is now living in Santa Cruz, California. He was recently appointed sales manager for the public utilities of the Pacific Public Service group.

SWEET, CORLISS M., M.S. '32, is now a student engineer in the testing department of the General Electric Company at Schenectady, New York.

WILSON, WALTER T., '30, was wed Sunday, Nov. 26, to Miss Esther M. Scheel at the home of the bride's parents, Janesville, Wisconsin. The Rev. W. Ross Conner of Whitewater officiated.

* * * * * * * * *

VAN HAGAN, ROBERT L., c'32, who has been working with the Kimberly-Clark Company at Neenah as structural designer, has been transferred to the company's mill at Niagara Falls, N. Y., where he is being given experience in mill operations. He drove to his new location with his family and household goods on January 27. His address is: The Jefferson, Apt. 301.

* * * * * * * * *

JENKS, ROBERT J., c'33, is doing appraisal work with the Washington Water Power Co. of Spokane. His address is: 1803 W. Pacific.

RESCUE SQUAD

A committee of three was appointed to consider the problem of establishing a motorized rescue squad in Madison such as is used in many other cities for assistance in various kinds of accidents. Such a trained squad would render an invaluable service both in Madison and on the lakes. At present no such service exists except that which is maintained on Lake Mendota by the University.

« « EDITORIALS » »

CULTURE AND THE CURRICULUM

"Why take Psychology? What has that to do with engineering?" writes an interested father to his son in the engineering school. Students themselves wonder what english, music, languages, economics, history, philosophy, etc., have to do with engineering. Foresight, of course, is generally lacking when the value of such subjects to the engineer is questioned, for many successful practicing engineers will stress the importance of these broadening subjects to the freshman and the undergraduate. Unfortunately for those that lack the ability to look ahead, regrets will come to mind when college days are well in the back ground, that a more cultural education was not undertaken.

The engineering curriculum requires that an engineer major in a large number of technical courses pertinent to the profession he desires to study, but a very minor part of his program consists of cultural subjects. These latter courses the student is permitted to elect, and few realize the importance of them to his future professional and social life. One will eventually discover that the quality which differentiates between the brilliant and the ordinary engineer is the capacity to think conceptually in verbal form. Even the ability to work with numbers is overshadowed in professions involving the direct dealing with objective things, by a good foundation of verbal intelligence. Clear and conceptual thinking are the prerequisites for clear speaking. These abilities cultivated along the correct lines enable the engineer to make his ideas and conceptions clear to other people as well as to himself. Although english composition, speech and philosophy will serve to develop these qualities, the engineer must also have an understanding of human nature and psychology so that he may face the actual human situation of desires and circumstances in his own and other occupational environments.

The present day "going away to college" is too much of a convention. It is true that a college education should serve to "round out" the student, but how is this possible if the student does not conceive of any real benefits to be derived from subjects "on the hill." The appreciation of the arts is not a gift as is sometimes erroneously believed, but is really to be cultivated and learned. Those who have a greater appreciation of art, music, and literature than we, can point out to us the finer shades of colors that pass by unnoticed to the casual observer. The education of an engineer should not only be for his professional interests but for his social interests as well. Boring indeed would be the engineer in society who could speak only of his work and technical problems. Music and arts serve to balance a technical life, offering something different and restful as divertisement and pleasure. Colleges may offer many opportunities in their courses in history, appreciation of music, literature, fine arts, the drama, and so forth, but except for those students who have a desire to use these forms of art as a creative medium, the present college system can do very little in rounding out the student. It is in this respect that the mass methods of education fail most conspicuously, for in the creative arts the student does much of his work alone, assistance and guidance only being added by the professor.

It is commonly believed that four years in college aid in social and personal development. This aid does not come to any great extent from the colleges but from the student and his educational interests. A liberal college can help in developing and enriching the interests of engineers in many directions. But there are many things it cannot do simply because initiative and desire on the part of the student is not sufficient to make him successful both in his college career and in the private and personal career which he looks forward to. The engineer is the sole selector of those studies which will temper him for the world in our present educational and business civilization, and it is these studies that are transformed into manners which in the future will mark him either a brilliant engineer or an ordinary one.

ADJUSTMENT VERSUS REVOLT The struggle between human personalities which are at variance with each other may be plotted as a rising scale in which the magnitudes of the differences will vary from a matter of mere whim and eccentricity to the other extreme — open hostility. In our cosmopolitan college community we are led to practice conservative repression of our impulsive emotions. Our differences are temporarily shelved as we go through a period of disciplinary training. Those who guide us on our educational ventures indicate that conformity on our part will teach us the true significance of the term toleration, respect, and retrospection. Herein lies a means of adjusting one's self to this thing called life.

Contrast with the foregoing line of reasoning the theme of William Allen White's statement, "The ideal student is always in revolt. Conformity is death to youth. Later in life youth will learn to conform with wisdom; but at the home plate, with the bat in its hand, before the bases are run, youth should revolt, free, on its toes, rarin' to go." One cannot firmly refute this antithesis because it is true that many of our most worthy social changes can be directly attributed to the progressive and well-nigh radical school.

Is it not logical, however, to allocate one's sphere somewhere between the plane of the deplorable 'yes' man and that of the babbling down-with-everything irrationalist. To lie down in the leaky, old boat will not save you from drowning. Neither will it avail you to frantically plug up the myriad of small cracks. Your life will be worth a good deal more if you spend one minute to think clearly, one more minute in hunting for the *big* hole, and the rest of your strength and material resources in blocking that incoming stream.

We are sadly kidding ourselves if we attempt to further ourselves in a university or a community by reverting to a policy of aimlessly and eternally chattering along in a radical, shallow manner on those nice-weather-today topics under which one might group these recent outbursts of free speech, free press, and censorship which may be classed as 'patter' by the ninety-nine per cent of us who are not directly affected. Nor can so-called humorous, biting, muckracking satire directly or indirectly serve to integrate student life and welfare. Is it not advisable to stop beating the air with the hammer and to hit the spike on the head instead?

LAST MONTH

May we again call your attention to the January issue of the *Engineer* which carried a story on the ten million volt generator now in operation in Boston. Material and facts for this article were obtained from the December issue of the *Tech Engineering News,* published at the Massachusetts Institute of Technology, to whom we unfortunately overlooked giving due credit in the article. We regret our oversight in the matter and shall attempt to prevent the occurrence of any similar negligence in the future.

OPPORTUNITY Vents enabling one to branch off onto untrodden paths are desirable in almost any group environment. In our own college we have a good many such diversions whereby students might find profit and pleasure in working at something not directly connected with the classroom.

The staff of the *Engineer* feels that many underclassmen are not coming out for work on the staff because they think the work requires experience and special ability. Nothing could be farther from the truth. Literary and business geniuses are rare in engineering colleges which places almost any average student on par with his colleague. At the present time there are a number of staff positions that are to be filled. In addition to eligibility, a willingness to work and a sincerity of purpose might be classed as the chief prerequisites for these positions. Freshmen and sophomores might do well to recall that maxim, "When opportunity knocks . . . ."

I believe we will get further if we mix sentiment with business, if we have ideals as well as ideas, reasons as well as rule, and use our hearts as well as our heads.

—*W. G. Lee.*

POLYGON SOCIETY

A constant endeavor toward unification of the body of engineering students flourishes in our midst sponsored by Polygon, unsung, but continually engaged in making the engineering student body more coherent. We present here a brief statement of its objectives and membership.

The purpose of the society is to assume the function of acting as an organized body of engineering students:

1. To present to the faculty matters of special interest or concern to the student body.
2. To assist in organizing various activities of the College of Engineering.
3. To form a closer union between the various professional societies.
4. To promote the interests of the Engineering College.

Membership in the society consists of two representatives from each student engineering society. Each society elects one junior member each year for a two-year term of office. The present membership roll is as follows: Civils — Harold Trester, Charles Clark; electricals — Walter Fritts, Wallace Gates; chemicals — Walter Woods, John Smithwick; mechanicals — Joseph Ermenc, Royal Thern. The officers of this group are: President — Walter Woods, and Secretary-Treasurer — Royal Thern.

Publicity regarding semester events to be sponsored by Polygon will be forthcoming in a future number of the *Engineer.*

If a man write little, he had need have a great memory; if he confer little, he had need have present wit; and if he read little, he need have much cunning to seem to know what he doth not. Histories make men wise, poets witty, the mathematics subtle, natural philosophy deep, moral grave, logic and rhetoric able to contend.

—*Francis Bacon.*

« CAMPUS ORGANIZATIONS »

A. S. C. E.

The organization of the United States Coast and Geodetic Survey parties in the Wisconsin CWA project of completing an accurate state survey was explained by Prof. R. S. Owen of the Topographical Engineering Department before the assembled members of A. S. C. E. at the last meeting of the first semester, held in the Men's Union Jan. 16. Professor Owen has been directing the project on behalf of the state, and it has been his duty to plan the work and to initiate field work activity.

A student contribution to the entertainment of the evening was provided by Max Werner when he read a paper on the utilization of natural heat in Italy. One source of material for the paper was a letter from Italy, received in response to the writer's request for information.

Following the entertainment C. O. Clark c'4, president of the student branch of A. S. C. E., reviewed the aims of the group for the benefit of the new men present. A hearty invitation was extended to all men present to become members. This sentiment is reiterated now; the members hope that all civil engineering students will avail themselves of the opportunities offered by the discussions and programs of this group. Help A. S. C. E. grow!

Officers elected Feb. 6 for this semester are:

President ---------- Max Werner c'4
Vice-President ---------- Harold Gerboth c'4
Secretary-Treasurer ---------- Lloyd Dysland c'4
Polygon representative ---- Ernest Ziehlsdorff c'3

MINING CLUB

The Mining Club, in keeping with tradition, held their monthly meeting on Dec. 21 at a banquet prepared by the members under the direction of chief cook, Bob Schultz.

The club was fortunate to have as guest speaker Robert Johnson, then CWA administrator of Wisconsin, who spoke on the preparations for the Wisconsin CWA projects and on the inauguration of the program itself. In addition reasons were given which enabled Wisconsin to achieve its place in the forefront of the other states in the inception of this proect which gives work to more than 100,000 men.

The hand must be quicker than the eye, because the banqueters were astounded at the magic feats of Prof. Einstein, alias Mr. Dunn, and pleased at his ready fund of snappy retorts for all questions asked. Many CWA research workers were among the forty men who attended the banquet.

At a previous meeting the following officers were chosen:

President ---------- Bob Willoughby
Vice-President ---------- Phil Rosenthal
Secretary ---------- Lloyd Severson
Treasurer ---------- Jack Gillett

A. S. M. E.

To observe the birth and growth of a new diesel engine is an opportunity not afforded most of us. This was one of the worthwhile undertakings of A. S. M. E. last semester, when the group of 30 members motored to Beloit where Fairbanks-Morse Co. played host for a joint meeting of the Milwaukee section of the S. A. E. and the Rock River section of A. S. M. E. The visitors, after being shown the progressive stages in the manufacture of the diesel engine, were given talks on the technical history of the diesel engine and on high speed diesel engines.

Local talent supplied papers for the last meeting of the first semester. "Oil Reclaiming" was discussed by J. E. Brennan, while an illustrated talk on "Coal Dust Diesels" was given by E. R. Kaiser. Considerable interest in these subjects was evidenced by listeners, judging from the lengthy discussion which followed the presentation of the topics.

CHI EPSILON

Officers were installed at the January meeting of Chi Epsilon, honorary civil engineering fraternity as follows:

President ---------- Burr Randolph, Jr.
Vice-President ---------- Robert Schiller
Secretary ---------- J. Everett Henry
Treasurer ---------- James Rhodes
Assoc. Editor of Transit ---------- R. C. Price

Chi Ep will again have the honor in the spring of assisting with the registration at the annual convention of the Wisconsin Society of Engineers.

Various and sundry inspection trips are to be taken by the group during the second semester. Examination of hydroelectric developments holds a host of timely and auspicious opportunities before the budding civil engineers for learning just what is in store for them.

ETA KAPPA NU

Several alumni of Eta Kappa Nu, honorary electrical engineering fraternity, were good enough to "come back for more" during the initiation of new members on Dec. 20. B. E. Miller, e'11, of the Wisconsin Power and Light Co. conducted the informal initiation in the EE laboratories. The subsequent formal initiation was followed by a banquet at the University Club, with R. R. Benedict, e'25, presiding as toastmaster. Harold P. Day, e'20, of the Wisconsin Telephone Company, Milwaukee, addressed the 37 attending members in the main talk of the evening. The following men were initiated: Edward J. Hopkins '34, Warren D. Mischler '34, Harold Goldberg '35, Harold Jury '35, Albert Vollenweider '35, Frederick Kuehn '35, Nean Lund '35, and La Verne M. Poast '35.

America's favorite SHORT CUT,

LONG DISTANCE

Miles shrink when you turn to Long Distance telephone service. You can get "there and back" in record time.

Improvements are constantly fitting the service more and more closely to the public's needs. Faster connections, higher quality transmission, "bargain hours" after 8:30 P. M.

Business today finds Long Distance a reliable and economical short cut to sales. You'll find it a pleasant short cut back home.

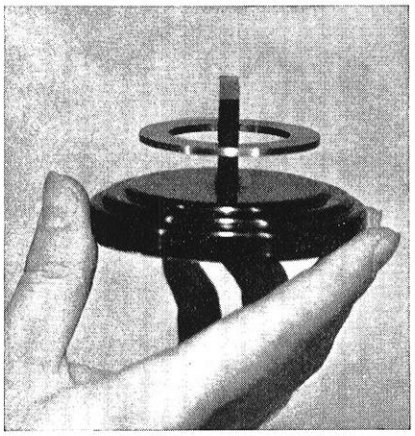
BELL SYSTEM

WHY NOT SAY "HELLO" TO MOTHER AND DAD?
—RATES ARE LOWEST AFTER 8:30 P. M.

STEEL FLOATING ON AIR!

Cobalt steel, an unusual magnetic material developed by P. H. Brace, is so powerful that it floats itself on air by magnetic repulsion. Cobalt steel has from four to five times the magnetic strength of ordinary steel.

To demonstrate its remarkable "floating" ability, Mr. Brace has arranged two ring-shaped magnets of the material in a framework, one above the other. The lower magnet is enclosed in the base and the upper magnet, free to move up and down on a celluloid guide, "floats" at rest about an inch above the base.



—Courtesy Westinghouse.

This steel ring apparently defies gravity by "floating" on air! Magnetism is the explanation. The ring is of cobalt steel whose magnetic strength is four to five times stronger than ordinary steel. A second magnetic ring is located in the base of the framework. The two magnets repel each other and the upper one "floats" on the air.

If undisturbed, the upper magnet would float without movement for an indefinite period. If the top ring is given a slight push, it bobs up and down like a cork on choppy water until it slowly comes to rest in its original position.

The principle of the floating steel magnet is simple. Each cobalt ring is magnetized in such a way that a point on the circumference is the north pole and a point at the opposite end of a diameter is the south pole. The one magnet is placed above the second with the north pole over north pole and south pole above south pole.

Since like poles repel each other with a force which increases as the distance between the poles becomes less, the free-to-move ring is forced upward. At the sam time, gravity is continually exerting a fixed pull downward upon the upper ring. When these two opposing forces balance, the upper ring becomes stationary. Having no visible means of support, it appears to "float" in the air.

Cobalt steel is used wherever a very strong permanent magnet is required. Principal among its uses are in the all-electric speedometer for trains, buses, and automobiles and in the portable oscillograph which enables engineers to determine easily the stresses in structural members of buildings, track rails, various parts of machinery and numerous other mechanical structures that are subject to strain.

FRONTISPIECE

The sound locator horns shown in the frontispiece are used in conjunction with the detection of airplanes. The horns are of the exponential type similar to those used in the talking pictures. Instead of connecting a receiver to the horn throat, transmitters are used for picking up the sound which is amplified and heard in head phones. The operator is enabled to focus the horns in the direction which the sound of an airplane appears to be coming from, by means of an elaborate gear arrangement, and the battery of horns, mounted on a truck, may be conveniently moved.

DRAFTSMEN TO BE -- Sharpen Your Drawing Pencils!

Rules for the *Wisconsin Engineer*

MECHANICAL DRAWING CONTEST

1. All students who are freshmen in the college of engineering of the University of Wisconsin excepting members of the staff of the *Wisconsin Engineer* are eligible for competition.

2. A pencil mechanical drawing to be assigned by the instructional staff of the drawing department as a part of the regular work in Drawing 2 will serve as the entry to be judged in the contest.

3. Entries will be received up to and including April 25, 1934.

4. The three best drawings shall be awarded first, second, and third places, respectively, by the judges. The three winners will receive material prizes as announced in the March issue of the *Wisconsin Engineer*.

5. The entries will be judged under the general headings given below, which are listed in the order of their weighted values, the first receiving the greatest weight:

1. Technique and theory
2. Accuracy
3. Lettering
4. Neatness

6. The judges of the contest will be:

R. W. FOWLER, *Assistant Professor of Drawing, Extension Division*

J. W. MCNAUL, *Assistant Professor of Machine Design*

L. F. VAN HAGAN, *Professor of Railway Engineering*

The decisions of these judges shall be final.

7. The winning entries will be exhibited to the public after the close of the contest.

8. One or more of the winning entries will be reproduced in the pages of the *Wisconsin Engineer*.

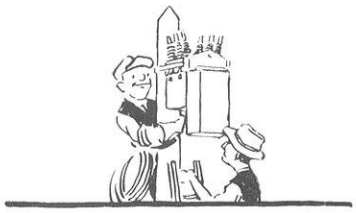
G-E *Campus News*

MOTOR TROUBLE

The lady in 856 had tossed and turned for hours. Finally, she called the room clerk: "There's a motor under my bed! I can't sleep!"

The motor wasn't under the bed. It was several floors away. Vibration, inaudible at the source, was transmitted and amplified by the building structure. Instead of a hotel, this might have been an office building, a school, a library, or a hospital. Instead of a sleepless guest, it might have been a patient.

For some time General Electric has built quiet motors, which do not sing, throb, hum, whir, or mutter. But, even so, good intentions are nullified unless motors are so installed as to check transmission of vibration. (Every rotating machine vibrates.) Now General Electric has made another contribution—*sound-isolating bases,* to isolate vibrations within the motor. E. H. Hull, Yale, '24, and W. C. Stewart, Washington U., '26, working with A. L. Kimball, Harvard, '14, did most of the laboratory work on this development.



CIRCUIT SURGERY

That well-known situation of the tail wagging the dog has a parallel in the distribution of electrical power. And General Electric engineers recommend that the tail be cut off.

To be specific, electric distribution circuits which supply current to large groups of customers should not have their reliability put in danger by less important circuits. This is fundamental. In many cases, circuits supplying outlying districts, where they are exposed to damage by lightning and the elements, cause most of the interruptions that raise Cain with the more important service. The tail-cutting-off device to remedy this situation is a new General Electric oil circuit breaker for automatically chopping off the less important circuit when damage occurs, and restoring service when the damage is repaired. General Electric engineers designed the circuit breaker especially for this service, and it can be mounted easily on a lighting pole.

"I'LL SEND MY BOY TO NELA"

Amid the popping of static in a nation-wide broadcast, the new G-E Institute at Nela Park, in Cleveland, was dedicated just before Christmas. It cannot boast of a football team; it has no stadium or band. But it does have laboratories and classes under the direction of a distinguished faculty.

Two former G-E "colleges,"—the Kitchen Institute and the Lighting Institute—have been combined to form this new school at Nela Park. It is a clearing house for down-to-date information on the electric home, and a training school for home appliance sales representatives and home-service directors of power companies and appliance dealers. It is also a laboratory where new ideas in kitchen management, meal preparation, home lighting, and the like may be developed and tested.

Besides the laboratory kitchen and classroom kitchens, there are model kitchens of every type, from the *de luxe* kitchen for a large home to the tiny apartment-house kitchen. There is also a model laundry, and an architectural planning department which not only assists home owners, builders, and architects in modernizing and planning kitchens, but also trains specialists to go out into the field. The Institute has 22,000 square feet of floor space for exhibits and demonstrations.

This new school is under the co-direction of L. C. Kent, University of Illinois, '13, and Paul H. Dow, Kenyon, '26.

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