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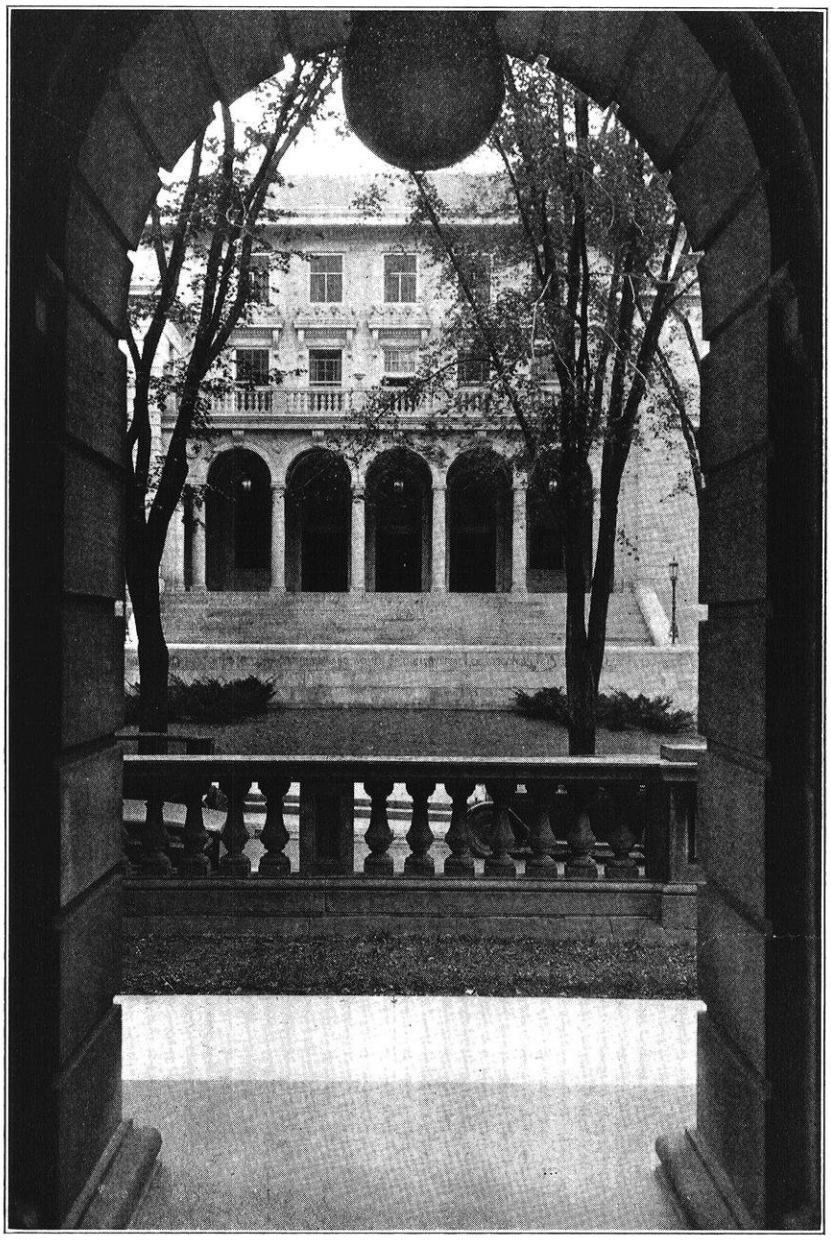

— *Photoart.*

THE MEMORIAL UNION
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The WISCONSIN ENGINEER

VOLUME 36, NO. 8 MAY, 1932

Reclamation of Motor Lubricating Oils

By HUGH L. HEMMINGWAY, e'31 and WILLIAM C. HASSLINGER, m'31

MOST papers on the reclamation or re-fining of used lubricating oils are headed with some such statement as: "Lubricating oils do not wear out with use." This statement is used in an axiomatic manner but conclusive evidence in support of such a statement is not available. Perhaps it is best now to qualify this statement by saying that, as far as is now known, lubricating oils do not wear out in the manner in which a pair of shoes or pants wears out. This means, in other words, that we change oil in the crankcase of automotive vehicles simply because the oil has become contaminated in various ways in the engine, and though the original lubricating value is still in the blackened drainoil, it is counteracted by the presence of various contaminants.

Reclamation of motor lubricating oils is a comparatively new field and has many possibilities. Although at present there may seem to be very little need for reclamation because of the apparent plentiful supply of oil, in the near future when the supply of oil has dwindled, lubricating oil conservation will be of paramount importance.

In this article the authors give a very interesting discussion of the various types of contaminants found in used motor lubricating oils, outline several methods of removing them, and describe several types of apparatus used in the process.

—EDITOR.

Before proceeding with a discussion of contamination, it may be best to give a simple explanation of the nature of mineral lubricating oil from the chemist's standpoint. Oils are composed of various compounds of a series of hydrocarbons. The oils refined from the Eastern or Pennsylvania crudes are composed largely of hydrocarbons of the paraffin series of the general formula $C_nH_{2n}+2$. Oils from Western crudes are composed mostly of hydrocarbons of the naphthene series of general formula C_nH_{2n}. Other crudes yield oils of mixed "base" or, more explicitly, oils composed of hydrocarbons of both the paraffin and naphthene series. Each hydrocarbon in the complex lubricating oil has a definite boiling point, and, of course, the boiling ranges of the hydrocarbons in a good lubricating oil range above the average temperature in a motor. Then too, there are often hydrocarbons of other series, and other compounds in mineral lubricating oils, but they are present in such small percentages that they may be neglected.

With the composition of lubricating oils in mind, we may proceed to a discussion of contamination. Suppose we first take up the subject of dilution. By dilution we mean that the oil has taken up some light, volatile, soluble liquids which have thinned the oil. Dilution in itself does not necessarily damage the oil as a lubricant, for an appreciable quantity of oil is sold prediluted with compounds similar to those which dilute the oil in a motor. However, each motor is built to operate most effectively with oil of a certain viscosity range, and it is, therefore, advisable to avoid letting the oil thin out too much.

Dilution enters the crankcase in various manners. During cold weather especially, when the choke is used frequently and often unwisely, a certain amount of gasoline seeps past the pistons into the crankcase. Though the average oil temperature in the sump of a water cooled motor ranges from 160° F. to 240° F., there are parts of the motor with which the oil comes in contact which are at much higher temperatures. For instance, the centers of the pistons often reach exceedingly high temperatures, and portions of the cylinder walls may be very hot. When the finely divided oil is thrown against these hot surfaces, it is conceivable that light, volatile oils may be cracked off to find their way into the sump in the form of dilution.

Water comes into the crankcase from two sources. One

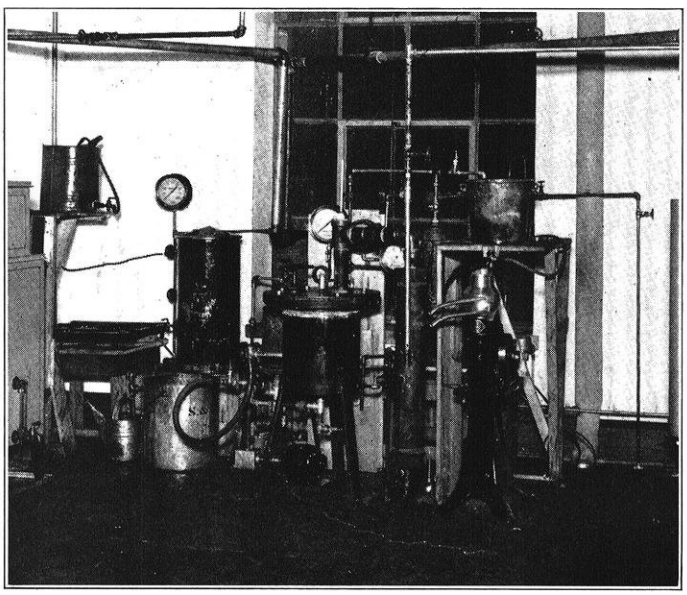
source is the moisture resulting from condensation within the engine while it is cooling. Another source may be water resulting from the chemical breakdown of the oil at high temperature.

Strictly speaking, the water which inevitably collects in the crankcase is not a form of dilution, since it is insoluble in the oil and cannot thin it. However, when drainoils are heated to from 275° F. to 325° F. and the vapors distilled, the distillate contains water which was in the original drainoil. This distillate is generally called the diluent, so that water is often considered under the general heading of dilution.

Water in the crankcase is more undesirable than the volatile diluent, since it may emulsify with the oil. This emulsion has little value as a lubricant, and is troublesome by its tendency to clog feedlines. Part of the water settles out in the crankcase, and in cars in which the oil pump dips deep into the sump, ice may hinder the action of the pump in cold weather.

When certain gasolines or poorly refined oils are used in automotive equipment, sulfur oxides are formed in the crankcase. These unite with water to form acids which are, of course, injurious to the motor.

The amount of dilution varies in oil driven 500 miles or more. Oil from a motor run continuously in warm weather may contain only 5% or 10% dilution, by volume. In winter, with short runs during which the motor does not reach normal operating temperature, the dilution may run as high as 30% to 45%. Drainoils from other motors will lie within these limits.



Motor Lubricating Oil Reclamation Apparatus as set up in the Steam and Gas Laboratory.

Another form of crankcase contamination is that which consists of solid particles. In general, the solid contamination of used motor oils consists of carbon, road dust, and metal particles. Part of the carbon works its way past the piston from the combustion chamber to the oil sump, and part results from chemical breakdown in the oil.

Metal particles and road dust are usually settled out in the oil in the sludge. Carbon is found in drainoil in the sludge, suspended in the oil in small particles, and in colloidal suspension in the oil. These solid contaminants of drainoil are, of course, undesirable since they have no lubricating value whatever, and some are even mildly abrasive.

We have now covered the most easily removed varieties of contamination. The remaining part takes place as a chemical change in the oil inself. This change is quite complex, and not clearly understood. As nearly as we know, some of the less stable hydrocarbons break down at high temperatures forming different compounds. We have pointed out that part of the water and carbon found in drainoil may be by-products of the chemical change. Some of the hydrocarbons are oxidized into compounds of doubtful lubricating value. Some of the hydrocarbons are changed into other hydrocarbons which may retain their lubricating value, but impart a disagreeable odor and dark color to oil.

With the advent of the motor driven vehicle, scientists and engineers became interested in the problem of salvaging the drainoil from the crankcase of internal combustion engines. It was not, however, until about ten years ago that commercial oil reclaiming equipment appeared. Today we have a number of commercial oil reclaimers ranging in size from the "midget" model for the individual user, to machines of large capacity for fleet and bus owners. The field of reclamation or re-refining does not limit itself alone to the salvage of motor oils, but includes transformer and turbine oils, and Diesel lubricating oil. The manufacture of oil reclaming equipment, and commercial reclamation are infant fields with many possibilities in the future.

Probably the simplest method of reclamation is to heat the drainoil until the light, volatile diluent is driven off and then to filter to remove the solid contamination. The diluent is the first and easiest form of contamination to remove. If the oil is slowly heated to 275°F to 350°F, the water and diluent are driven off. Usually a blower is employed to drive away the vapors as they come off. In other systems, the oil is heated in a partial vacuum; with this method it is possible to use lower temperatures and the vapors are effectively pulled off without introducing a large amount of air to oxidize the oil at high temperatures. Often the vapors are condensed and saved. In this case it is possible to study the nature of the diluent, and in large installations, the distillate may be used as fuel oil.

After we have rid the oil of the diluent and while it is still at a high temperature, it is possible to remove the solid materials. In general, there are three methods of doing this; these methods may be used singly or in combination depending on the process employed. One of these methods is simply to filter the oil through cotton linters, but this entails a relatively large loss of oil in the filter pad and the process is not thorough. We may get better results by treating the oil with water mixed with sodium silicate (Water Glass), Gold Dust, or a similar alkaline washing compound. The alkaline nature of the compound neutralizes any acids that may be present in the oil and then the washing solution forms a sludge with the solid particles which is removed first by settling, and then by filtering or by centrifugal separation. This chemical process usually takes

(Continued on page 145)

Light, the Co-Star of the Talkies

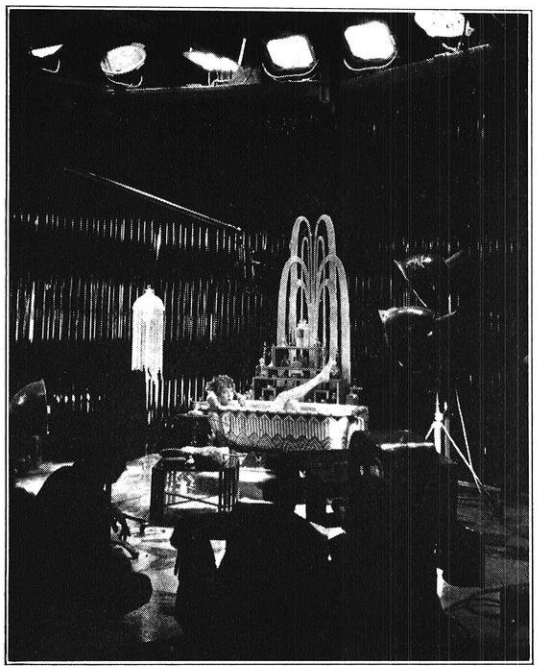
By CARL W. MAEDJE, Wis.'21
Incandescent Lamp Dept., General Electric Company, Cleveland

MERELY whisper the word "Hollywood" and you work a strange magic. Slide-rules are laid aside. Tomorrow's calculus quiz is forgotten. And in a twinkling a series of fantastic illusions flashes across the mind screen. A "skyrockekt" for Hollywood, and why not? Quick fame. Sudden wealth. Happy days. Gay nights. Then, too, that languid, languorous beauty of captivating curves with which to shatter the ennui.

But suppose we look beyond the tinsel of the average photo-play magazine. Suppose we enter the private precincts of the sound stages within the high walls of the Hollywood picture studios, as has been the privilege of this writer. How about such co-stars as light waves and sound—the very warp and woof which, after all, fashion pictures? But before we plunge into the midst of this cinematic sea to see what we shall see, let us go back to the earliest motion pictures and examine the barnacles of lighting that cling to the ancient art of motion picture production. For, light was just as necessary then as it is today in drawing for you fascinating pictures on long easels of celluloid.

The Earliest Movies

"Honky tonky." It is again 5000 B. C. — in China, or in Egypt where this story finds its genesis. Either from a dingy oil lamp or by means of a shaft of sunlight in a darkened room, an ancient motion picture producer projects moving images on a smooth white wall by causing the light rays to rebound from a gleaming mirror of polished steel. His actors are queer figures cut out of buffalo hide, which dance in pantomime before his projection light.



Unique lighting effects in the studio. Incidentally, the girl in the bath tub is Yola D'Avril starring in "Beauty and the Boss".

Between that day and this motion picture lighting has undergone a strange metemorphosis, from the chrysalis shadow-show to the butterfly talkie. Among other high lights along the path of time we note: the discovery of glass; the first glass lens; the optical lantern; the oxy-calcium light; the "Wheel of Life" which was nothing more than a toy consisting of a hollow cylinder with pencilled drawing on the inside. Like the "peep-hole" machine, which came later, this device gave the illusion of motion. Then came C. Francis Jenkins' first practical application of the electrical arc in a motion picture machine. Imaginative men, visualizing a great industry, moved out to Southern California where there was an abundance of natural sunshine and scenic beauty. Dependence on natural light gave way to the new order. The arc lamp entered picture production. Soon it gave way to mercury vapor lamps, and finally to high efficiency incandescent lamps which, in a large measure, played a leading role in lifting the movies from near obscurity to the fourth industry in the world.

In Hollywood

Thus, thanks to new and scientific illumination ideas introduced into the movie studios as well as into motion picture projection booths, "the last word" in artistic screen effects challenges reality itself. But how is this achieved?

And so you are eager to enter the studios in Hollywood, to mingle with the lights and the stars. But don't be too optimistic about "crashing the gates".

The studio folks jealously guard the legerdemain by which new and novel illusions are obtained. Then, too, there is now the sensitive microphone to be reckoned with. Add an extra person to those already on hand and you add just so much more to the possibility of an unwelcome cough or a sneeze engraving itself on the sound film. This would necessitate a "re-take". Overhead expense runs between three and five thousand dollars an hour. Many stars object to the presence of strangers. And as for the idolizing fan, perhaps it is all for the best that not too many of his finer illusions about the picture be shattered. The perils of propinquity, you know. All of which explains the almost impenetrable wall of resistance which the would-be visitor to filmdom encounters.

In the Temples of Light

A wide ramp leads you into a fantasic land of make-believe. They are shooting "the night club scene" —Cocoanut Grove.

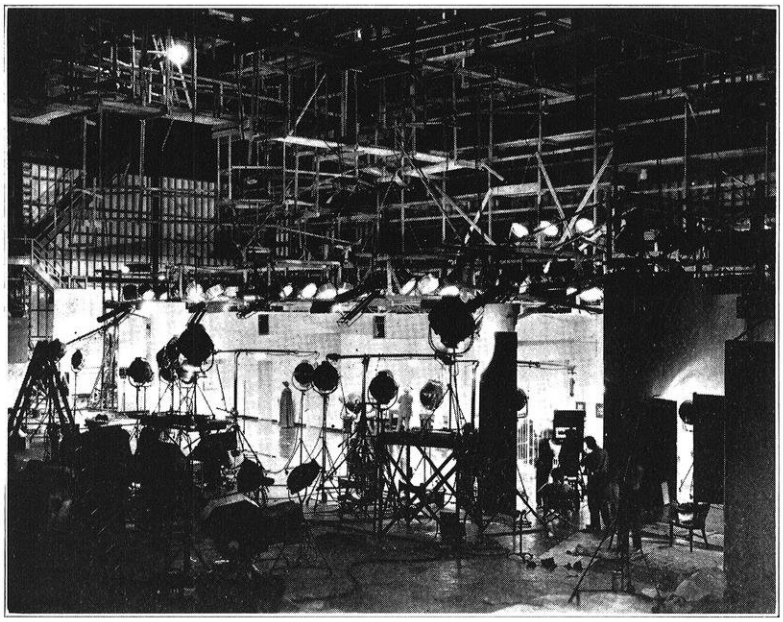
Your attention is divided between batteries of huge 5,000 and 10,000-watt lamps in projectors as big as wash tubs — they're everywhere it seems — and a life-size night club filled to the brim with the most beautiful maidens and handsome men you ever saw.

In the super blaze of light on the stoop of the orchestra platform a charming heroine and a uniformed army officer receive instructions from a director in shirt sleeves. Then

while her highness and her lover listen intently, a make-up man carefully retouches their lips, eyebrows, and applies the powder puff.

Getting back to the batteries of incandescent lamps. They seem to be bombarding the set from every conceivable angle — with light, light, light. From one end of this mammoth tabernacle to the other, a network of wooden scaffolding hangs from the rafters. It is along this aerial bridge-work that most of the lighting artillery is positioned. Cannon on cannon standing shoulder to shoulder volley and thunder with an eerie silence. More than two million watts! Augmenting this barrage of white fire are the local explosions of light occasioned by other big bethas stationed behind the machine-gun-like cameras and by still other lamps concealed in the dense groves of synthetic cocoa-nut trees.

To the camera's eye, the set is reality itself. It doesn't "see" the two cylindrical microphones —mute — eavesdropping over the hero's fair head, nor the mikes suspended over the happy couples at their tables, nor the lamps. It doesn't "see" that the set ends crazily in mid air, looking for all the world as if a freak tornado had blown the tree tops and the "garden" roof into eternity. It doesn't "see" the tangled mass of serpentine cables and snaky ropes coiling through the jungle off stage. It "sees" only that part of the scene which the "twister" chose to leave unscathed.



A view showing how lighting effects are obtained in the movie studio.

Now, above the din of a Fordson hauling in a rubber-tired caravan train of additional lamps and reflectors, above the banging of hammers, the snarling of saws, and above the jumbled tunes from an orchestra at ease, you hear the strident cry to "SAVE 'EM!" In almost the same instant the batteries of big berthas, everwhere, cease firing. Except for a relatively feeble sortie from a nest of a few 1,000-watters overhead, the entire studio is plunged into a Stygian darkness. A prop boy tells you that in a few minutes they'll be ready to shoot "the floor show sequence" for sound and action.

Billions of Busy Rays

Then while the camera functions, twenty-four photographs per second are registered on the continuously traveling film. From a billion parts of the "set", a billion impressions travel each on its individual shaft of light, each to take its proper position with respect to its neighbor on the permanent record no bigger than a postage stamp. The various parts of the heroine's eye lashes, or of the scenery in the background, all travelling on their respective rays, crowd through the camera lens to record themselves on the film once every twenty-fourth of a second.

"Whew, complex," you gasp. But such are the intricacies with which the indefatigable studio technicians are concerned.

"Quiet, please." The shrill blast of a pea whistle. Outside, the red lights are burning again. Inside an almost ominous silence reigns. Despite the terrific bombardment of the incandescents you could hear a pin drop.

"All ready? — Turn 'em over!"

Several camera men, the machine-gun company of the studio, step gingerly up to their posts, to their cameras soundproofed by means of "bungalow" or "blimp" housings.

The cameras — one a far-sighted gadget, the other that "sees big" as if through binoculars — are already turning over, clicking. No sound is permitted to escape.

High over some of these "bungalows" and "blimps", swathed in their dust-gray quilts, you see alert youths manipulating long lance-like poles as if ready to do battle with the man-eating tiger. Their business it is, however, to capture all of the song and dialogue issuing from the two lovebirds immediately below. They accomplish this by moving the "mikes" — fastened to the end of their spear-like poles — here and there, depending on the actors' movements.

Capturing Sound With Light

But what, pray tell, has all this to do with Light? Oddly enough, in the complex process of capturing sound it is again that the incandescent lamp plays a leading part in the filming of the talkies. For it is through artificial light that the experts are able to amplify word and song ten million times and finally fix it as a permanent record on a light-sensitive film off stage. Actually they are taking a continuous photograph of all sounds picked up by the mikes. In studio parlance the finished record on the film is called the "sound track".

Incidentally it is by means of a special incandescent lamp and its second cousin, the photo-electric cell, that the sound-track is able to talk and sing for you in the theatre. The lamp furnishes the light waves that set up the electrical impulses that are converted into sound waves by the loud speaker behind the screen.

A Mighty Industry

Several hundred thousand miles of film will be produced in Hollywood this year. These films will be sent to thou-

(Continued on page 147)

A Wisconsin Man Describes an Engineer's

Field Life in South America

By G. Burton Hanson, *Junior Civil*

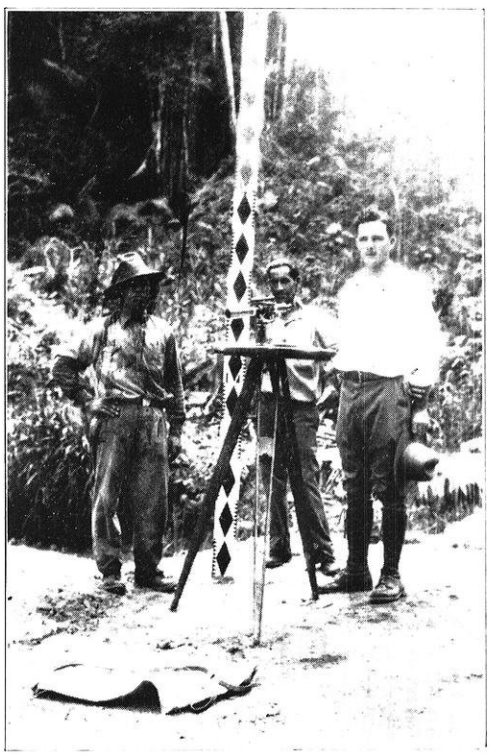
PERHAPS you've read somewhere the old ballad that begins as follows:

"You've decided to come to the Tropics,
Heard all you have to do
Is sit in the shade of a cocoanut glade
While the dollars roll in to you,"

and even though your conception of a job in the Tropics is less naive than the one written of in the above verse, you may still feel a strong attraction for Latin America and may appreciate some first-hand information from one who yielded to that attraction.

After finishing summer camp at Devils Lake in 1929, I left for New York in the employ of the Standard Oil Co. of New Jersey as a plane table operator. My departure was a result of several weeks' correspondence and a successful passing of a medical examination. I had also received my passport and had read over a copy of the contract which I was expected to sign in New York.

Afer a boat trip of thirteen days, including among others, stops at San Juan, Porto Rico; LaGuira, Venezuela; and Curacao, Dutch West Indies, I arrived in Maracaibo, Venezuela, the center of operations of the company in western Venezuela. Just across the bay from Maracaibo the Standard Oil Co. has its permanent camp at Punta de Leiva.



The author on a plane table survey in Colombia. The pattern on the stadia rod was developed for long "shots".

Camp Life

Life in a permanent camp is not much different from life in any small industrial center in the states. A permanent camp is much like a little city, running water, electric lights and refrigeration being common conveniences. Most camps also have adequate provision for recreation in the form of tennis courts, a golf course, and a base ball diamond.

Field life, which will be of more concern to the engineer, is quite different. Our work, for example, being of an exploratory nature, took us into many strange surroundings and called for various means of transportation. For the most part we traveled as light as possible, living under canvas and carrying a minimum of equipment and supplies. We were engaged in making geophysical surveys of company land to aid the geological department in evaluating the property for oil purposes. One job might take us into hot, dense jungle, the next into an arid, desert region, and still a third might be in hilly, wooded country. In western Venezuela particularly, we found a great variety of conditions. The only thing in common for all the jobs was the heat and the mosquitoes. Our native scouts, on reporting on a swampy bit of country which we were about to enter one time, came back with the story that they had found the biggest mosquitoes they had ever seen. One man said, "Those mosquitoes are so large they have bones."

Sometimes we were able to make camp in a native village, although for the most part we preferred our canvas shelters to a palm-thatched hut, because of sanitary considerations. During a short stay in a little town called Barrancas on the Orinoco River, we received a pleasant surprise. We had rented one of the nicest houses in town from the commander of the local army post, and this must have resulted in giving us more than ordinary attention, for about the third or fourth night of our occupancy we were awakened about midnight by some of the strangest music I've ever heard. We opened the door to find a large crowd of natives milling about to the tune of some good old Spanish melody. Pajama clad and still half asleep we were rather at a loss as to just what to do when one is serenaded. But the cool night air, the music and a chorus "Vivas" finally brought us around and we remembered the proper thing. Delving into the commissaries, we brought out a quart bottle of whiskey which we had been carrying about for months unopened (no fooling) — just in case of "snake bite" you know. With a big sigh of regret, but smiling hospitably, we handed it over to the band leader. The musicians had a good drink all around — which didn't leave much to be passed out to the rest of the crowd, then they broke into a Spanish "Tiger Rag", and a little later were on their way to more serenading, "muy contento".

Field life, I believe, is more attractive to the engineer than is his time in the office for it is never monotonous. One day he may travel over vast stretches of level prairie country (the savannas) by car and truck, only to meet with a bad

river crossing where oxen may be needed in fording, or a bridge must be built. Again rough, roadless country may mean changing to mule transportation entirely.

An amusing incident occurred one time when we had travelled by mule far from the beaten track in western Venezuela. Some of the boys had ridden up to an Indian camp and were endeavoring to barter for some arrows and a few trinkets when they noticed that the old chief took an unusual interest in one of the boys. He came up and stared at this fellow's face with a mixture of awe and admiration quite apparent, and soon began to make wild gestures and to chatter rapidly with our interpreter. The boys stood around quite dumbfounded and were beginning to wonder if that was the safest place in the world for them to be, when the interpreter explained that the chief's big interest was in the boy's gold teeth—he had lots of them — all across the front of his mouth. The chief offered to make the boy a member of his tribe, and to give him his daughter, a nice fat young squaw, for a wife. "You see," the interpreter explained, "he's never seen anything so wonderful as all those gold teeth, and he'd like to raise a crop of golden-toothed grandchildren."

Perija camp. One tarpaulin is placed above the other to provide air insulation from the heat.

To get back to other conditions that we meet with in the field; a good swamp always means some disagreeable work ahead. In swampy regions it is often necessary to pack in supplies and equipment by foot, the men putting a big bundle on their heads and wading and swimming through 'till they get to a place for a terminal on higher ground. Somehow this kind of work, wading around up to my waist in alligator-infested water, never did appeal strongly to me, and the comforting assurance that we never *had* had a man snapped up by an alligator failed to convince me that we never *would* have that experience.

Health Considerations

Every effort was made by the company to keep the permanent camps sanitary and healthful. A small base hospital, providing good medical attention, was almost always available. Malaria, dysentery and social diseases were probably the most dangerous enemies to combat, and constant supervision on the part of the medical force was necessary to get the peon laborers to live in any kind of sanitary surroundings. Loss of time among the American employees because of sickness was, however, very low.

The engineers and other field men carried a small first-aid kit when out on the job, and, by boiling all drinking water and sleeping under a mosquito net at night, they were able to guard against most health dangers. One interesting article in the medical kit was a little sharp-bladed knife which had a rather large-hollow handle filled with potassium permanganate crystals, the idea being that, in case of a snake bite, the flesh about the wound could be well "cross hatched", and the permanganate crystals rubbed in to aid in disinfection. I am glad to say this little instrument was needed only occasionally.

Venezuela and Colombia, the two countries in which I worked, have a tropical climate. The heat and, in some places, a stifling humidity are tempered by fresh winds part of the year, and in many other places by altitude.

Transportation and Convenience

Transportation offers difficulties in most South American countries. What few railroads there are may have tracks of almost any gage, thus necessitating in some cases a transfer and reloading of freight two or three times before it reaches its destination. Auto roads, too, are comparatively few and unimproved. River traffic is the best organized and often most helpful in getting about. Mail and telegraph service is likely to be haphazard in most places, and the field man, particularly, cannot hope to get communications through with any degree of regularity.

In answering the question, "Shall I try to get a job in South America?" one must consider the advantages and disadvantages of such a job. Under the heading of "Advantages" I would put the items: extra pay, travel experience, and, possibly, more rapid promotion. These would have to be balanced against such "Disadvantages" as: separation from home and friends; loneliness (because of a lack of social intercourse and amusements among strangers); physical discomforts (from heat if in the tropics, from mosquitoes, ticks and other insects, and from the primitive living conditions one is sometimes subjected to); and, finally, a possible greater danger from disease or accident. These various items will probably have a little different weght with each individual. The advantages will outweigh the disadvantages, or viceversa. It seems to be, then, a matter of each man weighing the advantages and disadvantages for himself and acting accordingly. If one does not mind small matters such as mail being three months late occasionally, or trying to make a stadia reading when there is a good deal of refraction and a mosquito as big as a house chewing on the back of one's neck, or again if one doesn't mind starting out on a five or six-hour auto ride only to arrive at his destination three or four *days* later, after wrestling a car

out of river bottoms, living on native food, being well chewed by mosquitoes — well, he'll probably get along and like it all, as I did.

JUDGE MAKES ENGINEER REDRAW MAP

By LESLIE A. YOLTON, Wis. '31
Engineer with Wisconsin Highway Commission

ENGINEERS must exercise caution in preparing maps for jury cases. It must be the endeavor of the engineer in drawing maps to make them understandable to the uninitiated jury. Recently a map was prepared showing plan and profile of a certain portion of road upon which an accident had taken place. The map was prepared for a jury case, and the engineer was called into court to testify that the map and the dimensions shown on the map were a true representation of the topography surrounding the scene of the accident.

The map was presented to the court, certified, and its purpose explained by answering questions put by the lawyer for the defendant. After asking for the map, and giving it careful consideration, the judge quizzed the engineer regarding the scales to which the map had been drawn. He was informed that they were noted on the plan. The judge felt that the profile of the road was not clearly represented. It was explained that the profile had been drawn to two different scales, the horizontal scale being 1 inch equals 25 feet, whereas the vertical scale was 1 inch equals 2½ feet. This produces a distorted profile, but, since it is the purpose of the profile to show changes in elevation or depression, the change in scale magnifies the vertical changes. This method allows a longer profile to be drawn on a given sheet of paper.

On this particular map the profile of the road gave the appearance of being steep approaching the scene of the accident. The judge explained that this distorted profile would mislead the jury, since this method of plotting profiles was not understood by the laymen. He then ordered the profile to be cut from the other portion of the map before it was presented to the jury. After this was done the profile was redrawn using the same horizontal and vertical scales.

ENGINEERS IN HISTORY

"The Dutch revolution against Spain in the sixteenth century was saved by the great engineer, Simon Stevin, who, as quartermaster-general of the United Netherlands, organized its defense by flooding. The same thing occurred with the French revolution. Lazare Carnot, who, like Stevin, was a mathematician, organized the supply of munitions to the revolutionary armies. He was the permanent feature of a number of successive governments whose more vociferous members, such as Danton, Robespierre, and St. Just, were guillotined When the real history of the Russian revolution is written, it may prove that Karpov's reorganization of the chemical industry in 1919 was as vital a factor in its success as the more showy activities of Trotsky."

—J. B. S. Haldane in *The Future of Man*
—*Harpers* for March, 1932

RECLAMATION OF MOTOR OILS

(Continued from page 140)

place before the oil enters the still for the removal of diluent, so that water entrained with the oil may be driven off in the still. The third method of removing the solid material is by means of the centrifugal separator. These machines are similar in operating principle and appearance to the familiar cream separator used in the dairy. Water is mixed with the oil before it enters the separator, and being heaviest it is driven to the outside of the bowl by centrifugal force, where it is taken off. The solid material is also driven to the outside, and it is removed later by dis-assembling the bowl and wiping away the dirt. The oil is removed from the inside portion of the separator bowl. When the separator is used, the oil is first heated to drive off the diluent, then stirred and agitated with water or washing compound before centrifugal separation takes place. The separator is quite thorough in its removal of solid particles and water, but it requires more care and expert handling than do the filtering or chemical-filtering processes.

We now come to the difficult question of removing the last variety of contamination — that which takes place as chemical change in the oil itself. In most commercial reclaimers, no attempt is made to remove these compounds. However, if the reclaimed oil is to be sold to a fastidious public, the color must be restored, and the disagreeable drainoil odor removed. The motorist has come to judge the qualities of oils largely from color because he has no real standard; and propaganda along these lines has been plentiful. William C. Hasslinger, who has been studying oil reclamation for the past year gives the following discussion of color and odor treatment as a phase of oil reclamation.

"According to men who have made a study of them, new oils consist of spherical globules when seen under a microscope. The same oil after use as a lubricant in an internal combustion-engine is seen as a series of irregular globules. Very close observation would indicate that microscopic particles — probably carbon — are bonded to the oil sphere and cause the aforementioned distortion. This type of retention of solid impurity within the oil is known as colloidal suspension. This suspension differs from the mechanical suspension in that the size of the particles is much smaller and the bond with the oil much greater. Filtering will remove the latter, but not the former.

"In order to do a superior job of reclamaton, the bond between the carbon and the oil must be broken and the former freed so that it can be removed. This has been accomplished in several ways with more or less success. Sodium silicate, tri-sodium phosphate, sodium carbonate and several other alkalis have tendencies to destroy this bond which is known as interfacial tension.

"When the solid impurities are thus removed, the oil still has a dark color in deep layers. This is probably due to the unsaturated hydrocarbons which result when the oil is decomposed in the high temperatures encountered in the engine. These can be removed with Sulphuric acid or Fuller's Earth, both of which have an affinity for unsaturated hydrocarbons. Both of the above practices are effective in com-

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Editorials

AGAIN, IT'S THE DEPRESSION

The Wisconsin Engineer rises from the mere pamphlet that has been its form during the past few issues, and assumes more imposing proportions. Believe it or not, it's the result of the depression! The engineering societies, feeling that the financial burden of page space in the *Badger* was unwarranted by the benefits received, are using this issue as a means of representation to the student body.

And along with the inability of the societies to take on any appreciable financial problems, the seniors of this year's class are finding the going a little tough when it comes to convincing someone that their services are worth money. Last year the job situation was serious — there were hardly enough jobs to take care of all of the graduating class. This year the situation is almost funny — there are hardly any of the graduating class that have jobs. The rest of us look forward to a long, hard summer of taking in washing or playing nurse-maid to the neighbors' babies. The industrial world does not seem to be in a mood to be revolutionized and led to greater triumphs by our fresh, youthful minds. Rather, it is apparently entirely satisfied to take a rest and catch its breath from the last long hop forward.

But the mere fact that we look forward to nothing in particular seems to strike no terror to the hearts of the engineers. When the lawyers posted their challenge in our lower hall, the crowd that gathered around it milling and shoving moved one of the mechanicals to express the situation with a question. "What's that," he asked, "a job?" Another of the men lifted himself to the level of the immortals on one of the recent languid spring days. "Gosh," he complained, "I wish there weren't any school today. I have to get in practice for being out of a job this summer."

Whence one might gather that the mottoes of the present depression have come around from gloom to stiff upper-lips, and we aren't in such bad shape that we have lost our sense of humor of the situation.

—*R. L. V.*

AFTER COMMENCEMENT?

Commencement but four weeks away — and after Commencement? That has rather a dismal outlook for the graduating engineer who is about to step out from under the shadow of the University into the light of the world. The chances of securing a position of any kind are quite slim. University authorities claim that there will be three graduates to every position in June. Only forty per cent of the graduates were placed last year, this year that percentage will be smaller. This means that many, no not many, but most of us, will be out of work when we leave school in June.

As the parting hour draws nigh some of us look back and ask ourselves, "Why did we come to college when now that we have gained an education we still can't support ourselves or benefit society?" However, let us look into the future and see what it holds for us.

The world is passing through a cycle; a period of lean years, unemployment, and scarcity of money. A period which neither Mr. Hoover and his Reconstruction Finance Corporation nor La Follette and his overhead railroad crossings can change. It seems that time alone can influence this cycle. Yet when time, or some other unknown force, does change the present situation we, with a background of four years of engineering training, will be able to take hold of the new conditions, analyze and solve the new problems that will present themselves. We will be many steps ahead of those who have not gone as far in their education. We have a background which no one can remove, and which can only help to advance us in the work that we will undertake. We realize that it is one of the engineers' big problems to help change the general order of things, do away with the periodic fluctuations in business, etc., and when this condition again confronts us in the future we will be able to combat it with the engineering skill and knowledge which we have acquired here at Wisconsin.

Therefore we leave our Alma Mater, not with sad faces, but with every confidence in the future and full knowledge of the value of the general background of engineering which we have received during the past four years.

—*A Senior.*

It is not the task of the teacher to teach interesting things, as the quacks proclaim. The job is to make interesting the things that must be taught. —C. S. SLICHTER.

IS THE ENGINEERING COURSE NARROW?

Invariably, when students discuss the relative worths of different courses of study, the engineering student is criticized for pursuing a course which is characterized by a kind of specialization which dulls the finer sensibilities and substitutes an appreciation of the materialistic. If narrow materialism is the lot of the engineer, it is indeed a serious matter, for it implies a lack of cultural training. It is not our purpose to discuss the education of the engineer relative to the general aspects of culture; instead we shall content ourselves with a consideration of the so-called materialistic specialization.

The engineering course is, of necessity, specialized to a certain degree; but it is our thesis that the appelation, materialistic, is a misnomer and that an examination of engineering courses reveals the fact that the subjects deal with matters which are general and universal rather than

narrow. This view is ostensibly antithetical at first sight, but suppose for example, we consider the nature of the work entering into the solution of problems in mechanics and electricity. In mechanics, problems relate to such things as beams, mechanical devices, etc. However, the concepts employed in the solution of these problems are not alone those of the properties of matter, but more important, those of force, motion, and energy. Again, the electrical engineering student is constantly dealing with a phenomenon which is anything but materialistic. Moreover, in solving problems relating to the applications and control of electricity, he makes use of methods which in themselves are so highly abstract that the connection with any concrete physical entity is at times so delicate as to be almost imperceptible. As a particular and pertinent example of those methods, we may cite the applications of the calculus and vector and wave analysis to the problems of alternating current circuits.

The foregoing examples show that the engineering student is essentially concerned with the fundamental concepts of science and with the highly rigorous methods of mathematics. In employing mathematics as a weapon of attack upon his problems, the engineer becomes a devotee of logic in its purest form. In making the broad and general ideas of force, energy, and motion his important considerations, the engineer is not only dealing with fundamental concepts of science, but also with the persistent problems of philosophy. *D. E. Z.*

IN APPRECIATION

The staff of the *Wisconsin Engineer* takes this opportunity to thank the faculty, students and alumni for their unselfish support in furnishing us with articles and other material during the past year. Although the depression has affected the magazine quite materially, we have managed to hang on and have tried to give the student body the best that we could under existing conditions. We hope that the student support in the matter of subscriptions will be on the increase next year, for without adequate student coverage in times like these a student publication simply cannot live. We hope that the engineers approve of this issue (a sample of future issues) and that they provide an item in their 1932-33 budget for the *Wisconsin Engineer*.

LIGHT, THE CO-STAR OF THE TALKIES

(Continued from page 142)

sands of theatres throughout the world. Here again, special incandescent lamps away back in the projection booths will star in bringing amusement and recreation to the 250,000,000 fans who attend the movies each week. But let's not wander too far afield.

Suffice it to say that throughout this fourth largest industry in America incandescent light is playing a leading role.

Once having completed your tour of the various Hollywood studios, you almost begin to wonder whether the bright incandescents haven't even had a profound effect on social life in the film colony. For, if Hollywood was ever wild, something certainly must have purged it.

Stars and extras, alike, are aware that the camera records the tell-tale lines from whoopee as a thermograph records the daily temperature. To be up all night, to injure one's looks, to harm ability, and to succeed — well, it just can't be done. Even the thousands of registered and unregistered extras not actively employed by the studios know this. Temperance in all things, therefore, seems to be the watchword.

As for quick fame and sudden fortune, see what the Central Casting Bureau recently had to say:

"Our records for a period of a year show that out of all our registered men and women only 178 averaged three days of work a week or better."

All of which helps to explain why no keen-eyed director stopped me in the pursuit of my lighting duties to say: "Young man, we need you. This document is a contract. Sign here!"

"Whew, the movies. A cruel racket," I mused to myself. Pleasantly disillusioned, I was tickled to death to be a mere messenger of light, a somewhat obscure extra in the electrical industry.

We cannot become a great democracy by giving ourselves up as individuals to selfishness, physical comfort, and cheap amusements. . . . I have little trust in the wise paternalism of politicians. . . . It is useless, save by the rarest of happy accidents, to expect a politician to rise higher than the source of his power. —JAMES TRUSLOW ADAMS in *The Epic of America.*

Campus Notes

CHI EPSILON INITIATES

Chi Epsilon, national honorary civil engineering fraternity, held its initiation banquet in the Memorial Union on April 14. The new initiates are: Allan D. Freas, G. Earl Harbeck, James P. Kaysen, Phillip F. Morgan, Vernon J. Palmer, Alfred J. Steffen, George Thurner, and Clarence O. Wagner.

A special award of national honorary membership was conferred on Professor Daniel W. Mead. This national honorary membership is granted annually to a prominent engineer or member of the civil engineering faculty. Franklin T. Matthias acted as toastmaster, Frank P. Erichsen gave the president's welcome, and Vernon J. Palmer responded for the initiates. Professor Grayson L. Kirk, of the Political Science Department gave the main address of the evening.

FRANK PALMER WOY
1879 - 1932

The death of Frank Palmer Woy, professor of engineering administration, on March 30, has removed from the ranks of this faculty an able teacher who, for the past twelve years has contributed effectively to the training of the youth of this commonwealth. The sorrow of his students and colleagues at Wisconsin will be shared also by many members of the profession which he served with honor and distinction, for his ability as an engineer in a difficult field was known and recognized throughout the country.

Frank Woy was born on December 9, 1879, at Sparta, Wisconsin. His father was John L. Woy, a German, and his mother was Emma Palmer Woy, an English woman. He was trained as an electrical engineer at the University of Wisconsin, being graduated with the class of 1903.

Following his graduation, he entered upon the active practice of his profession. His activities were of an unusual nature and developed out of his remarkable qualities of mind. He was what might be called a business physician; his particular field was diagnosing the ailments of sick business enterprises, chiefly utility companies, and suggesting and applying proper remedies. He was successful because of an ability to analyze a situation accurately and a further ability to synthesize money, brains, and effort into successful achievement. Only four years after he was graduated, he was made manager of a utility in New England for the purpose of saving it from bankruptcy. It was the first of a long series of similar positions that he held during a practice of nearly thirty years. His activities extended to thirty states and even to foreign lands.

In 1920, Frank Woy returned to the university as a teacher. His experience had been largely in the field of management, and his teaching fell naturally into that field. His courses were new at Wisconsin; in fact, there was little precedent anywhere in the country to guide him. It was necessary to prepare a text; so, in 1920, he published "Engineering Administration." As a teacher, he brought to his work an unusual background of practical experience. His theories had passed through the fires of practical application, and his students recognized that fact and accorded them a corresponding respect. Those who passed from his classes into the field of management are outspoken in testifying to the soundness and value of his teachings. He gave unstintingly of his time and was happy in the fact that many students turned to him when in need of council and encouragement.

FRANK PALMER WOY

Not long after his graduation Frank Woy was married to Mary (Midge) Hobbins, of Madison. They had four children, Frank, Margie, John, and Grace. He married Ruth N. Smith, September 14, 1929. The son, Frank H., followed his father into the field of electrical engineering and was graduated from Wisconsin in 1926.

During the present year his health gradualy failed and it became evident before the beginning of the second semester that he could not continue with his classes. A trip to Florida was made in the hope that his health would benefit thereby. He made some improvement and finally decided to return to Madison, but the strain of the trip proved fatal.

Professor Woy was one of those fine characters who go through life serene, cheerful, and helpful. He was efficient, but not aggressive; he could judge people accurately, but was not intolerant of human weaknesses; he was at home in the world of men and business, but preferred the privacy of his family and the company of a few close friends toward whom he was always most thoughtful and considerate. He was loved by those friends for his simplicity and strength of character. Success did not make him hard and arrogant; trouble did not crush him. He will not be forgotten by those who had the good fortune to know him well, nor by the students who came under the influence of his common sense and cheerful courage.

MEAD TO RECEIVE DOCTOR OF LAWS DEGREE

Professor Daniel W. Mead, for twenty-eight years a member of the faculty of the engineering college and nationally known consulting engineer, has been voted an honorary degree of Doctor of Laws by the university. The

honor is to be conferred at the commencement this June.

Professor Mead will most likely give up teaching at the end of the year, although there is a possibility that he will continue his course in contracts for the first semester.

MUSEUM DISPLAYS GEOLOGY MODELS

The geology students and mining engineers of the University will be greatly aided in the study of their professions by a newly constructed group demonstrating the work of nature's forces, at the University Geological Museum. The background for the group is between Black Earth and Blue Mounds on County Highway 11.

The group is very complete and realistic and its builder, Fred Wilhem, spent months of painstaking labor in constructing the display. Mr. Wilhem, who has been commissioned by the University to construct a series of such groups, is at the present time working on the second of this series.

SECOND ALL-ENGINEER SMOKER FEATURES PROF. KAHLENBERG ENGINEER DANCE MAY 14

One of the best-liked of all the engineers' instructors, Prof. Louis Kahlenberg, described "The Joys of Being an Engineer" at Polygon's second All-Engineer Smoker. Professor Kahlenberg was only one part of an extremely interesting program, however. Professor Charles Gillin of the French department gave a very able interpretive reading. Miss Clarice Olson, of the Wheeler Conservatory of Music amazed the engineers with an acrobatic dance, and Leonard Keller, '32, accompanied by Margaret Rupp, '32, provided the music of the evening with a violin solo.

The second Engineers' Dance was just as successful as the smoker. The dance was held in Great Hall of the Memorial Union on May 14. The chaperons were Mr. and Mrs. McNaul and Lieut. and Mrs. Mead. As the saying goes, a great time was had by all.

TE 2 student (endeavoring to explain to Law student what he is doing): "You see, we are trying to find how high a bench mark 2½ miles from here is above sea level."

Law student (trying to collect all the facts): "About how high is sea level, anyhow?"

EMILY HAHN CROSSES AFRICA WAS ENGINEER HERE IN 1926

Emily Hahn, one of the first women to study engineering at the university of Wisconsin has added a new achievement to her list. This March, in the company of one negro maid and a few porters, she crossed the continent of Africa from west to east through areas never before seen by a white woman.

The purpose of the trip was to study the geology of Africa and to get material for a new book which Miss Hahn is writing. Two years ago she published a book called "Seductio Ad Absurdum, the Principles and Practices of Seduction, a Beginner's Handbook." The book was an amusing bit of satire on the art of lovemaking.

She began the trip two years ago when she left for London. She began the adventure at Matadi in the Belgian Congo and spent several lonely months in the Ituri forest region, where there are numerous gorilla and pygmy tribes.

ENGINEERS SUFFER DEFEAT AT HANDS OF THE LAWYERS

In answer to the challenge of the barristers to play them at diamond ball on the lower campus on Sunday, May 1, the engineers hurled back a defiant aceptance. The lawyers proved to be the better at this particular sport, however, for the score ended with the score 9 to 8 in favor of the lawyers. John Rieck pitched nobly for the honor of the profession, but it seems his efforts were not backed up sufficiently to turn back the boys from across the hill. Few of our famous athletes were in the lineup. Mark Catlin, of football and Haresfoot fame, was one of the main cogs of the law outfit.

It has been suggested that the game between the law and engineering students become an annual affair. This seems to be a good suggestion in view of the fact that there has been a search for some tradition to replace the St. Pat's parade of former years. The game was not marred by any display of fists or rotten eggs but the old rivalry was manifest and was vented in swinging bats rather than fists.

SENIORS HEAR LECTURE ON DIESEL DYNAMICS

On Friday, April 29, Mr. Frederick Porter of the Fairbanks-Morse Co. gave a lecture on Diesel dynamics in the auditorium of the new Mechanical Engineering Building. Mr. Porter discussed the detrimental effects of unbalance in Diesel engines. "Unbalance in Diesel engines," said Mr. Porter, "causes extra wear on bearing surfaces and objectionable vibration of buildings or ships in which they are installed."

EXTENSION DIVISION OFFERS HEATING AND VENTILATING COURSE

Opportunities in the heating and ventilating field, calling for adequate preparation to meet important contract demands when building construction is revived, are outlined in a bulletin issued by the University of Wisconsin Extension Division at Madison. The subject is taught by correspondence study for students in any state. Prof. C. L. Dean, of the department of mechanical engineering, is the instructor.

A LITTLE SLIDING RULE

Would you belave my word now,
Nick,
They's got an eddicated shtick.
Me bhye's in schule and wid his rhule
He's havin' fun in 'rithmetic.
Then shlips and shlides a bit—me eye.
It hunts out cubes and finds square
rhoot,
And lots of other things to bhoot.
One thing is bad; it cannot add.
For that me heard it does not suit.
When I was young and wint to
schule,
The teacher oft called me a phule.
Ah me, me bye, if only I
Had had a little shliding rhule.

—*Arkansas Engineer.*

Alumni Notes

CIVILS

Egger, Oscar O., c'32, who completed his requirements for graduation in February, is working with the Highway Commission at Eau Claire.

King, Ben, c'30, who attracted attention by getting himself elected city engineer of Watertown before he was graduated, was defeated for re-election on April 5. Watertown is one of the few cities of the state that elects its city engineer.

Levin, J. D., c'27, construction engineer with the Treasury Department, is engaged in building a Customs and Immigration Station on the U. S.-Canadian border at Babb, Montana. It is an isolated spot, and he reports that he has had lots of snow-shoveling and mushing across country.

Smith, Judson P., c'26, is doing chemical engineering service work for the Hooker-Electro-Chemical Company of Niagara Falls, N. Y. His work calls for extensive traveling. His home address is 911 Tenth Street, Wausau, Wis.

Field, George H., c'25, is chief engineer and estimator in charge of structural design, estimating, and supervision for the Robert L. Reisinger and Company of Milwaukee. His address is 4224 N. Woodburn Street, Milwaukee.

Loverud, Earl K., c'23, is leaving about May 15 for six months in Europe, where he will act as commercial agent for a number of American manufacturers of industrial equipment. He expects to visit Sweden, Norway, Denmark, the Netherlands, and Belgium.

Webb, Robert B., c'25, has been with the Milwaukee Electric Railway and Light Company, since 1929, as a designing engineer in the Way and Structures Department. His work includes bridges, buildings, sub-stations, car stations, and power plants.

Amundson, H. C., c'24, has just recently become city engineer of Baraboo, Wis. He is with the French and Amundson Company, Civil Engineers at Baraboo.

Sogard, Lawrence T., c'24, visited the engineering school on April 25. He is now with the Acoustical Engineering Corporation at Milwaukee.

Shaw, Ralph, c'23, M. S.'24, who has been with **L. F. Harza**, c'06, for some years, visited the college on March 12 and reported that the depression had caught up with him.

Schuyler, Philip K., c'21, president of the Federal Bridge Company of Washington, D. C., is secretary of the newly-formed American Toll Bridge Association.

Filtzer, Robert L., c'17, has been chief engineer for the Truscon Steel Company, of Milwaukee, since 1924.

Weaver, Warren, c'16, C. E.'17, on February 1, was appointed director for the Natural Sciences of the Rockefeller Foundation and the General Education Board. He, with his wife and two children, have planned to go abroad late in April.

Schwada, Joseph P., c'11, city engineer of Milwaukee, is the author of a paper on "Street Names and House Numbers" that was presented before the City Planning Division of the American Society of Civil Engineers at the meeting in New York on January 21, 1932. The paper was abstracted in "Civil Engineering" for March.

Kruell, George J., C. E.'10, is Deputy Commissioner of Public Works for Milwaukee. His residence is 1832 East Rush Avenue, Milwaukee.

CHEMICALS

Langlykke, Asgar F., ch'31, is working for the Proctor and Gamble Company in the glycerine division, Chicago district.

Altpeter, Roger J., ch'31, has been working all year as a fellow under the grant of the Gas Section, Wisconsin Utilities Association at the University.

Peterson, Chester H., ch'31, is with the Firestone Tire and Rubber Company.

Ellis, Pierce G., ch'31, was appointed instructor in chemical engineering last September.

Spicka, Edward A., ch'31, has a position in Milwaukee with the Palmolive-Peet Company.

Zimmerman, Gordon B., ch'31, returned to the Universal Oil Products Company, Riverside, Ill., after his graduation.

Kinney, H. J., ch'30, has transferred to the patent department of the Vacuum Oil Company at Philadelphia.

Lacker, J. H., ch'30, together with **Ross, George H.**, ch'26, are at Old Hickory, Tenn., in the cellophane plant of the Du Pont Company.

Voigtman, H. E., ch'30, is completing his second year of graduate study in the Paper Institute at Appleton, Wis.

Demmon, N. K., ch'29, is still with the National Carbon Company at Cleveland, Ohio.

Thomas, Walter E., ch'24, has been connected with the Walter Department of the City of Milwaukee for the past year as an inspector.

Golley, Frank B., ch'22, is now Superintendent at the Bloomingmill Wisconsin Steel Company in South Chicago.

MINING

Granger, Robert, min'32, and **Weckmueller, Gerold**, ch'32, will both have positions with the Illinois Steel Company after graduation.

Schwartz, Ernest H., min'18, is now Superintendent of the Open Hearth Wisconsin Steel Company at South Chicago.

Scofield, L. M., min'21, and **Zapffe, Carl**, g'07, M. S.'08, visited the mining department recently. Scofield is with the Pickands-Mather Company, Newport Mine at Ironwood, Mich. Zapffe is at Brainard, Minn., as manager of the Iron Ore Properties of the Northern Pacific Railway Company.

Madison, Frank H., min'13, is now in charge of the valuation work involving all metal, non-metal, and coal mines in the Bureau of Internal Revenue. His headquarters are at Washington, D. C.

ELECTRICALS

Feldhausen, Cyril, e'28, who is connected with the Cutler-Hammer Company in Milwaukee, visited the school early in April.

Sargent, John, e'28, meter superintendent for the Wisconsin Public Service Corporation at Green Bay, attended the convention of the district section of N. E. L. A. at Chicago, April 13 and 14. He gave a report as chairman of the Educational Sub-Committee for Wisconsin. Sargent was married to Miss Ruth Miller on September 12, 1931.

Germond, Hallett H., e'23, M. S.'24, is an assistant professor of mathematics at the University of Florida at Gainsville.

Andrew, Edwin L., e'16, is sales manager of the Dobechmun Company of Cleveland, fabricators of Du Pont cellophane in many forms.

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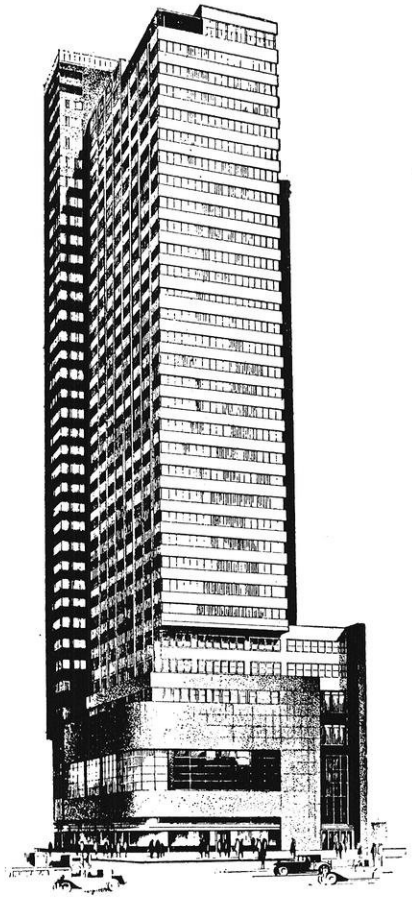
Engineering Review

SOMETHING NEW IN BUILDING DESIGN

Great architectural dissention has developed in Philadelphia, Pa., over the design of a new bank and office building in the center of that city's shopping district, for the Philadelphia Saving Fund Society. Its architects, Howe and Lescaze, claim that it has definite functional beauty, since it more clearly expresses its use than do the more staid buildings in its neighborhood.



Structurally, the unique feature of this building is its unusual area of window space, deliberately planned to admit all possible useful daylight. This is obtained by stepping out from the structural a series of "balconies" and connecting them by uninterrupted windows, innocent of even corner supports. In this way the Market Street wall is 65% glass.

The banking office is one flight up from the street — to allow store space on the ground level — and this floor has very few internal volumns. Therefore the office floors above it rest on a giant truss which fills the entire floor. This truss space is useful also to house part of the massive machinery used to air condition the entire building. Other machinery takes up the entire twentieth floor, and this is expressed architecturally by narrower windows than on the rental floors. Vertical communication between floors, including elevators, pipe shafts, and air ducts, is all centered in the rear of the building. Therefore that section has been clothed in glazed brick to serve as a backbone for the lighter office floors which branch from it like so many ribs.

MOTOR OF UNIQUE DESIGN RUNS TWO REVOLUTIONS PER DAY

An interesting piece of mechanism has just been announced by the research department of the Westinghouse Electric and Manufacturing Company. It is a timing motor that will revolve only twice a day. According to engineers working on the project there is, theoretically, no limit to the slowness that can be achieved.

All the mechanics of the strange time keeper is visible through a celluloid face about 10 inches in diameter. The mechanism stands about six inches high from the box containing the condensers and resistor which produce the rotating magnetic field.

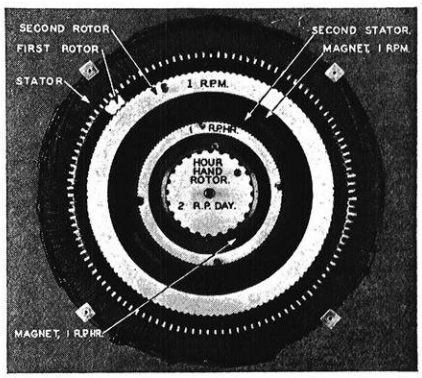
Just below the outer rim of the clock is the wire wound iron circle known as the stator or stationary portion. This stator is so wound as to produce a magnetic field around which magnetism revolves 3600 times per minute. It has 118 iron teeth around its inside edge.

Inside this ring, near it but not touching it, is the rotor or rotating portion of the motor, around the outer edge of which are 120 iron teeth. The tendency of the magnetism is to jump across from the stator to the rotor and to do this when the teeth are directly opposite each other.

With different numbers of teeth on the two parts, only two teeth are synchronized at any one time and there is a vernier effect around the rest of the circle. This causes the motor to move only the distance of the two teeth for each revolution of the magnetism.

In other words, the magnetism is whirling around 3600 times a minute but the rotor revolves only 60 times a minute. This is the speed required for the split second hand.

Around the inner edge of the rotor ring are 122 iron teeth pointing toward a second rotating iron ring of still smaller diameter with 120 teeth around its outer edge. In this second reduction of speed the first motor becomes the stator for the second, but while the first is running 60 revolutions a minute the second is running backward 59 revolutions a minute relative to the first one, so that its net progress forward is one revolution per minute. This is the speed desired for the second hand.



Slow Motion Motor
—*Cut courtesy of Westinghouse Electric & Manufacturing Co.*

Attached to the second hand rotor is a permanent horse-shoe magnet which creates a new rotating field in 118 iron teeth driving still another ring with 120 teeth at the rate of one revolution per hour. This runs the minute hand. Attached to the minute hand rotor is a second permanent magnet creating a rotating field in 22 teeth and driving a 24 tooth rotor one revolution every 12 hours for the hour hand.

The entire operation may be explained by saying that each rotor travels only two teeth for each revolution of its magnetic field. By changing the number of teeth, any desired speed may be obtained.

RECLAMATION OF MOTOR OILS

(Continued from page 145)

petent control and are used in new oil refining practice. However, it is questionable whether the expense entailed in this color treatment is warranted. Oil which is suitably reclaimed otherwise, except for color treatment, will furnish just as good lubrication as it would with color treatment. This fact has been born out in actual test."

A study is being made of reclaiming equipment in the Oil Testing Laboratory of the Steam and Gas Department. At present, there are three types of commercial reclaiming equipment being studied. The simplest of these consists of a heating system in which the oil is heated to about 325°F or 350°F and then filtered through three sets of filter pads. A fan is used to drive away the vapors, part of which are condensed in a special chamber in the machine.

A second type of machine first heats the oil slightly and then passes it slowly through a series of baffle plates in a tank containing an alkaline washing compound. Next, the oil is passed through a still where it is heated and the vapors driven off by a motor fan. From the still, the oil drops to a filter pad where it is filtered before entrance into the storage tank. Part of the sludge settles out in the drainoil storage compartment; the rest is removed in alkaline solution and on the filter pad.

The third type of apparatus studied is the centrifugal separator. This is combined with a steam heated still in which various mixtures such as drainoil and Fuller's Earth, drainoil and an alkaline washing compound, or drainoil and acid are heated and agitated before centrifugal separation takes place.

All of these forms of commercial apparatus are effective in removing the mechanical suspension and diluent, but none solves the problem of restoring color and removing the drainoil odor. For installations in which the oil is used by the company which is doing the reclamation in its own fleet of cars, taxi-cabs, or buses, color restoration is an unimportant point, since the oil retains its lubricating value after reclamation. However, if oil is to be sold to a skeptical public, the color must be good and the odor agreeable. Reclamation equipment is now in use quite extensively by large bus and cab companies and fleet owners. A cab company in the city of Milwaukee reports a saving in lubricating costs of $2000 annually due to its reclaming equipment. In a large installation of this kind, oil can be reclaimed or refined at a cost of from seven to ten cents a gallon. Optimistic users claim that the oil actually improves with use and reclamation, and such a phenomenon is quite possible since the unstable portions of the oil break down and are removed. Thus the oil goes through a treatment in the motor whereby the more stable portion of the oil remains.

With the small sizes of reclamation equipment being studied here at the University, recovery of oil runs between 65% and 75% of the original drainoil. Considering this and the costs of reclamation, the cost per gallon of oil averages between fifteen and twenty cents a gallon.

Oil reclamation seems to have been retarded unnecessarily in the Middle West. On the West Coast reclamation has grown into a respectable industry. The need for reclamation of oil will receive more and more attention as the stress of economy increases and a dwindling oil supply forces us to a more intelligent conservation.

ALUMNI NOTES

(Continued from page 150)

Bassett, W. B., e'09, will have his residence in Philadelphia after May of this year, where he will be in charge of Marine Activities of the Westinghouse Electric Company. He has formerly been with this company in Pittsburg.

Johnson, Clarence N., e'09, has been transferred from Philadelphia to New York by the Westinghouse Company.

MECHANICALS

Daniels, Charles J., m'30, is supervising electric arc welding of gasoline storage tanks for the Chicago Bridge and Iron Works.

Johnson, Clarence W., m'27, was transferred, on January 1st, to the Canadian Division of the American Blower Corporation. His headquarters are now at Montreal. Previous to this transfer, he was manager of the Milwaukee office of this company. On June 27, 1931, Mr. Johnson became the father of a son, Richard Wesley Johnson.

Pagenkopf, Walter H., m'26, was presented with a daughter, Margaret Ann, on November 4, at La Grange, Ill.

Krueger, Carl H., m'16, is associated with the Wisconsin Telephone Company, Milwaukee, Wis.

Barron, Lester S., m'31, has been with the Wisconsin Foundry and Machine Company at Madison since October, 1931.

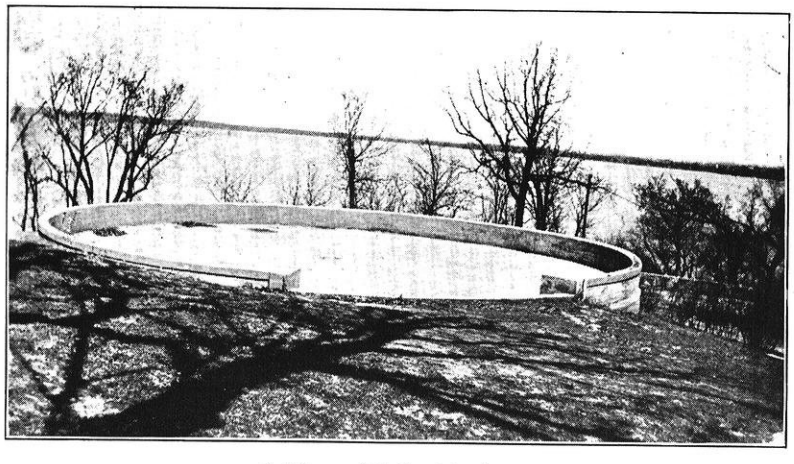
Steckler, Norbert, m'31, has been awarded an American German Exchange Fellowship for study in Germany to extend from November 1, 1932, to July 1, 1933. His main interest in Germany will be in the power plant field, but he also expects to study heating, ventilating, and air conditioning as it exists in Germany and other parts of Europe. Since graduation, Steckler has been a laboratory assistant in the Mechanical Engineering Department of Yale University.

"Do I bore you?" asked the mosquito politely, as he sunk a deep shaft into a man's leg.

"Not at all," replied the man, smashing him with a book. "By the way, how do I strike you?" —*Penn Triangle.*

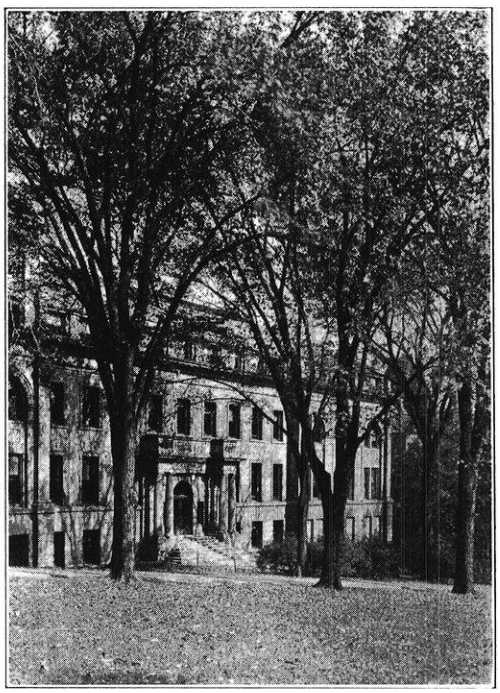
Physics and calculus seem to strike us just about the same. Sick of one and half a-dozin' of the other.

—*Penn Triangle.*



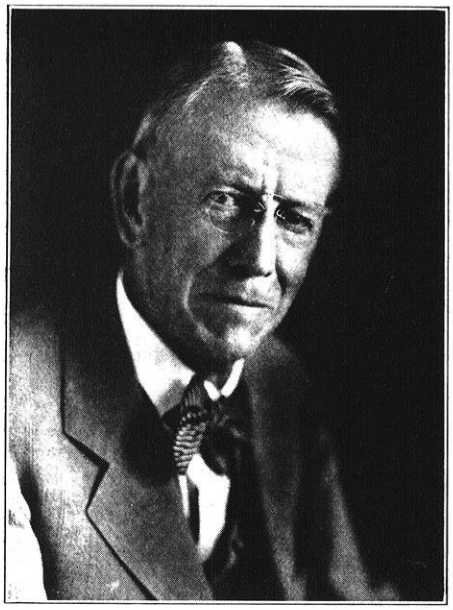
A View of Lake Mendota

First Annual Yearbook Supplement



— *Photoart.*

1931 -- 1932



Daniel Webster Mead

An Appreciation

BACK in December, 1904, this magazine announced the appointment of Daniel Webster Mead, then a prominent consulting engineer of Chicago, as professor of hydraulic and sanitary engineering at this university. Now, twenty-eight years later, we announce, with extreme regret, the retirement of this well-loved teacher-engineer, who, in the long interval between his coming and his going, has made a deep imprint upon the character and reputation of this college and has imbued many generations of Wisconsin engineering students with something of his wisdom in matters technical and ethical.

Professor Mead was brought to Wisconsin to create a department of hydraulic and sanitary engineering. Prior to his coming, the work was scattered among four departments, and the hydraulic laboratory consisted of some modest equipment in one end of the materials laboratory. Water power development was, at that time, beginning to assume importance, because of the advances made in the generation and transportation of electricity, and Dean Turneaure believed that the college should have a strong department in that field.

One of the first accomplishments of Professor Mead was to build a hydraulic laboratory that would give Wisconsin the best possible facilities for teaching and experiment. The laboratory was completed in 1906, and experiments were begun immediately to establish the laws of flow in centrifugal pumps and to determine the features that result in high efficiencies and permit the attainment of high heads. This was the first of a long series of valuable investigations that have been conducted in the laboratory.

The introduction of laboratory demonstrations into the teaching of theoretical hydraulics at Wisconsin was, so far as known, a new thing in engineering education in this country. Professor Mead believed that, "No subject can be so thoroughly well taught that it will become fully the mental property of the student until he has had the opportunity of putting it into active use in his practice in many places and at many times," and he developed his laboratory with the idea of making the laws of hydraulics perfectly clear and familiar to his students.

The subject of hydrology was introduced at Wisconsin by Professor Mead. So far as known, it had not been taught previously at any other institution. It was considered by him to be an essential preliminary course, that should precede any advanced work in hydraulic engineering. It was necessary for him to prepare a textbook for this course, so, in 1919, he published *Hydrology*.

Hydrology was the third of the text books written by Professor Mead. His *Water Power Engineering* appeared in 1908, and *Contracts, Specifications, and Engineering Relations* in 1916.

When he came to Wisconsin, Professor Mead demanded the privilege of continuing his private practice, and he has, throughout the entire time, maintained a downtown office. He had already had "extensive experience in the design and construction of hydraulic works and had shown unusual ability in the direction of careful scientific investigation and in new and economical solutions of the problems involved." His practice and reputation continued to grow to national proportions. He was a member of the engineering board sent to China in 1914 by the American Red Cross and the Chinese Republic to study the problem of floor control on the Huai River; he was consulting engineer for the Miami Conservancy District during the planning and construction of flood protection works in 1915; he was a member of the board that investigated the last great Mississippi flood; and he is now a member of the Colorado River Board.

Professor Mead brought to his teaching the ability to conduct a scientific study of a problem and the ability to make a practical application of his results. His students have ever been impressed with the necessity for investigating their problems with thoroughness and for applying their findings with common sense. His teaching has been respected by the students and has commanded their utmost confidence, a confidence which has never been betrayed.

Professor Mead has accomplished the task that was set before him when he was brought to Wisconsin. The department of hydraulics is firmly established and he can pass on the work to other hands with confidence that what he has builded will endure. He has set a high standard as a teacher, as an engineer, and as a citizen, and one which will long remain among the best traditions of our college.

L. F. V.

A Review of the Past Year

By Dean F. E. Turneaure

IT has been suggested that it would be of interest to the readers of *The Wisconsin Engineer* to have presented in the last number of this volume a brief summary of the events of the year from the standpoint of the faculty. It is not possible, in the brief statement contemplated, to cover all the interesting activities in the College, so I shall refer only to some of the high spots as the picture presents itself to me.

Without doubt the most important event that has occurred during the year, and in fact the most important for several years, was the completion and occupancy of the new Mechanical Engineering building. Now that it has actually become a part of the working plant of the College, the event is worthy of celebration. The new building is of great value, not only to the instructional work of the College, but also in the fact that it will make possible the carrying on of testing and research work in the field of mechanical engineering that has not heretofore been possible. The completion of this building has also indirectly provided additional space facilities for several other departments. The Testing Laboratory fell heir to the old Steam and Gas laboratory and is now very adequately provided for. Two rooms on the fourth ffoor of the Engineering building have been assigned for the joint use of the Highway Commission and the Highway Engineering department of the College for a chemical laboratory for road materials. This co-operative arrangement is proving to be of great value to the engineering students as well as to the Highway Commission. The College of Letters and Science has come in for a share of the vacated space and several members of the faculty of education are now our neighbors in the Engineering building, and we have a good opportunity to observe laboratory methods peculiar to the field of education. A further improvement resulting from the construction of the new building is the release of considerable space in the old shop building for the use of the electrical engineering department.

The instructional work of the college has shown very little change during the past few years. Student enrollment this year is slightly more than last. The freshman class is smaller, but this decrease is more than made up by the increase in some of the upper classes and graduate group. Various comments from members of the faculty indicate a rather superior grade of work being done this year by the student body. At any rate, the spirit is fine and the relation between faculty and students all that could be desired.

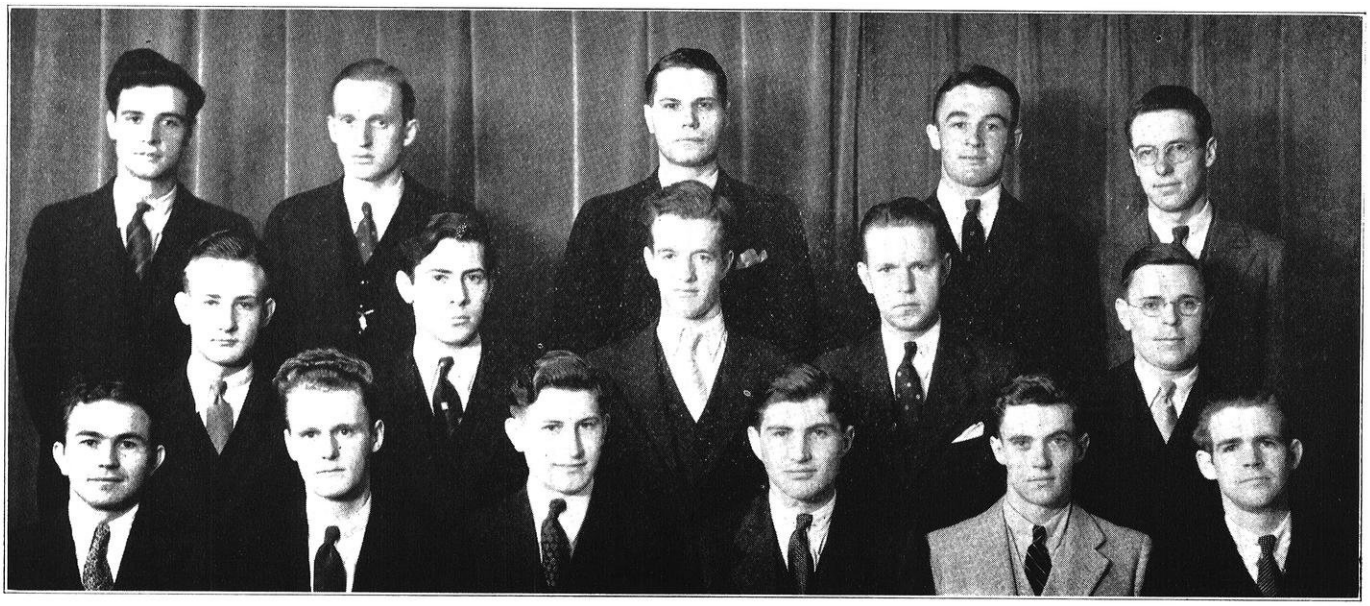
The research work of the college has been progressing about as usual. It includes a number of projects of interest to seniors and graduate students. A project in heating and ventilation is being carried out by the mechanical engineering department in co-operation with the American Society of Heating and Ventilating Engineers. This society is conducting some co-operative projects in other engineering schools under the supervision of its research committee. Professor G. L. Larson of the mechanical engineering department is now chairman of that committee, and finds himself with a considerable amount of extra work on hand.

Professor H. F. Janda has done a very interesting piece of work during the past two years for the Wisconsin Highway Commission on the action of frost on road surfaces — the so-called frost boil action. This is a serious question in construction and maintenance, and his work is the first systematic study of this problem. It is a good illustration of what could be accomplished by a careful analysis of all the factors concerned in a very common phenomenon which has not heretofore been very thoroughly studied.

Another interesting piece of work is that of Professor Edward Bennett in the application of well-known electric phenomena to the useful purpose of electric welding. This is a real invention and its development by the Alumni Research Foundation may be of considerable financial value to the research work of the college.

Several interesting and valuable conferences and short courses that have developed as a result of the regular work of the college have been held during the year. These include the subjects of electric welding; hydraulics of plumbing fixtures; foundry practice; lime manufacture; clay products manufacture; and, not least, the holding of the annual meeting of the Oil and Gas Power Division of the American Society of Mechanical Engineers in the new building last June.

(Continued on page 168)



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The Wisconsin Engineer

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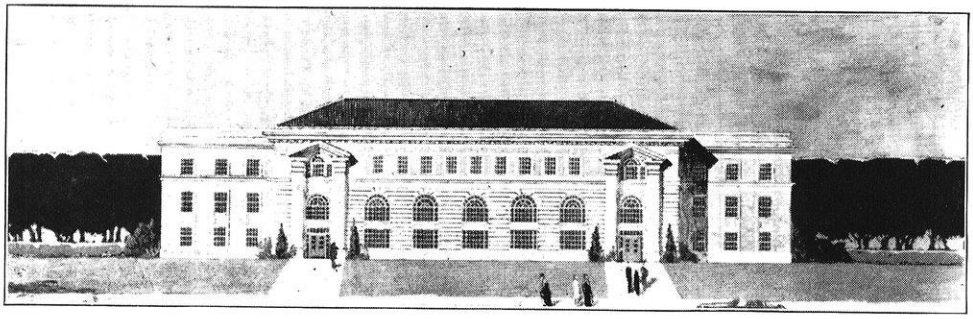
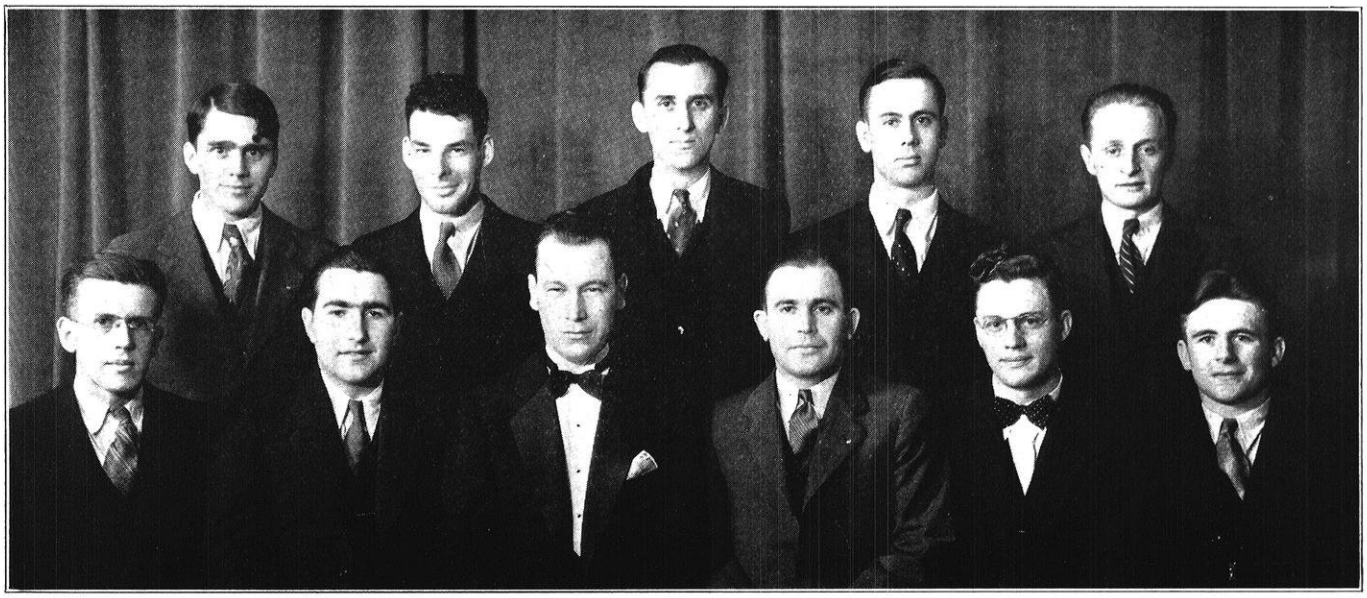


Mechanical Engineering Building



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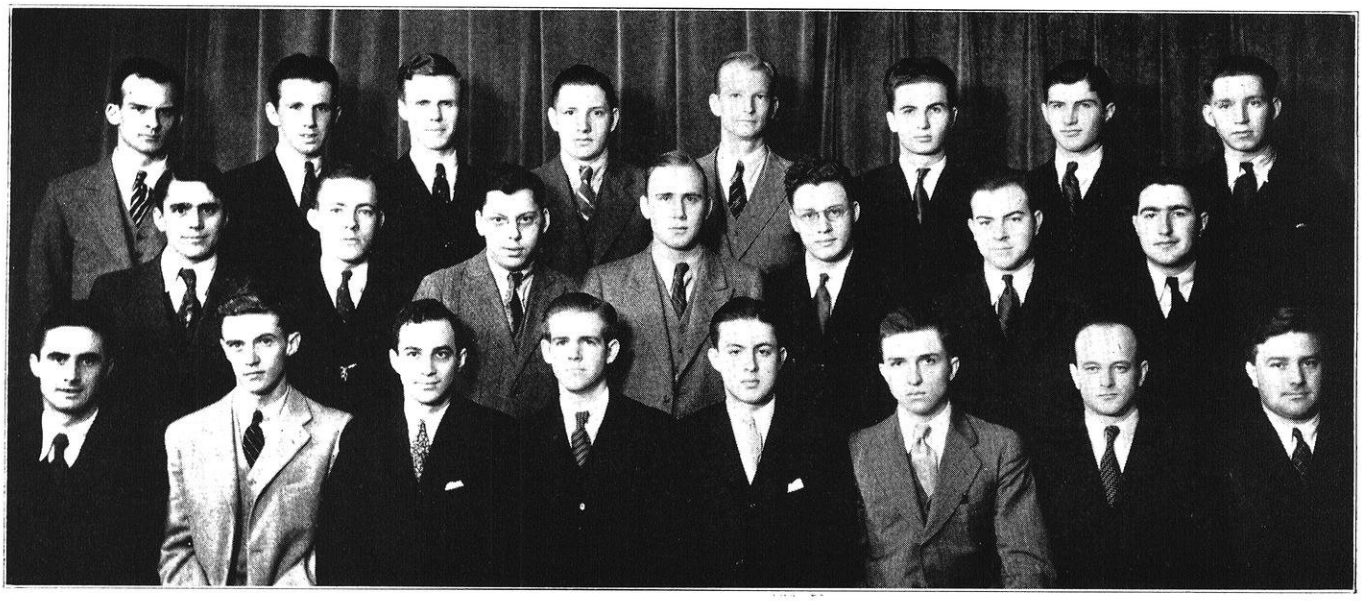

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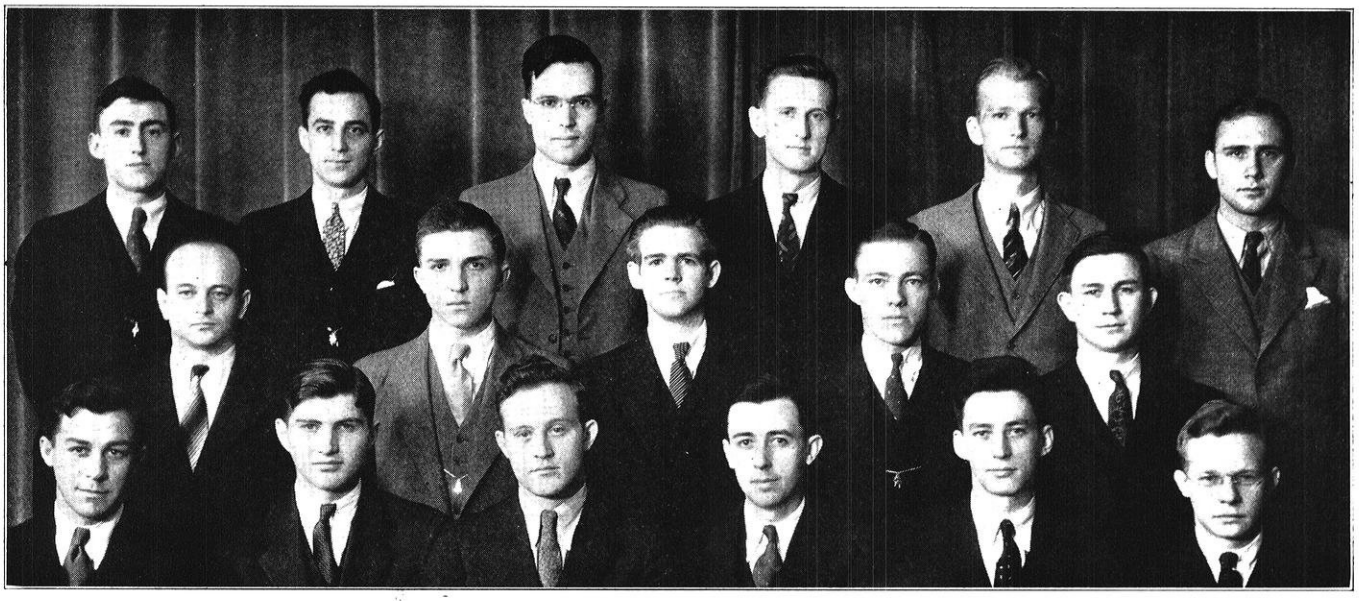

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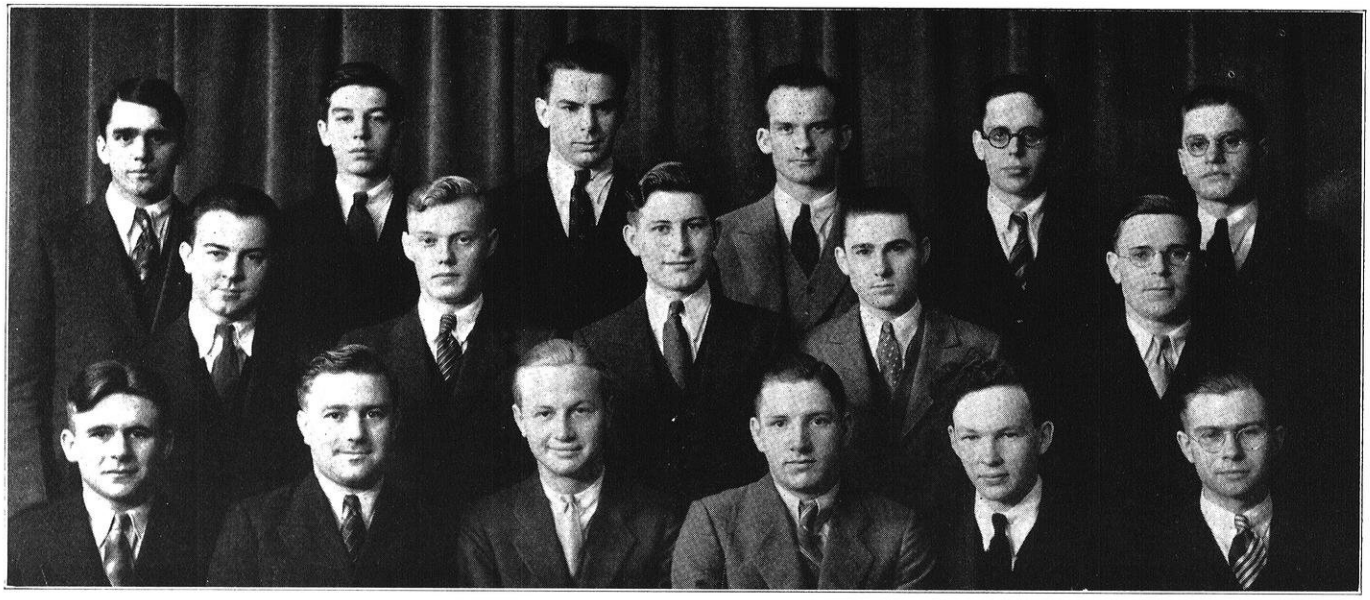

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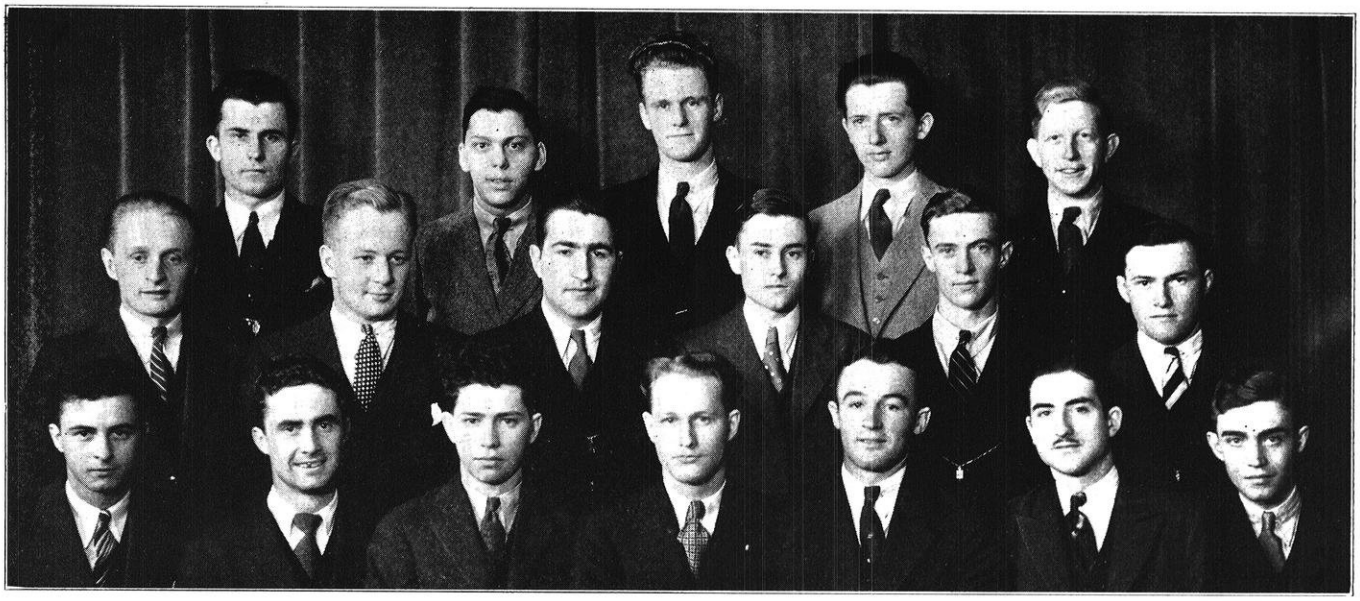

Top Row: Kalinski, Herrmann, Strand, Steffen, A. J. Wagner. — Courtesy Badger Studio.
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Bottom Row: Freas, Dever, Buehler, Erichsen, Lyneis, Ginsberg, Harbeck.

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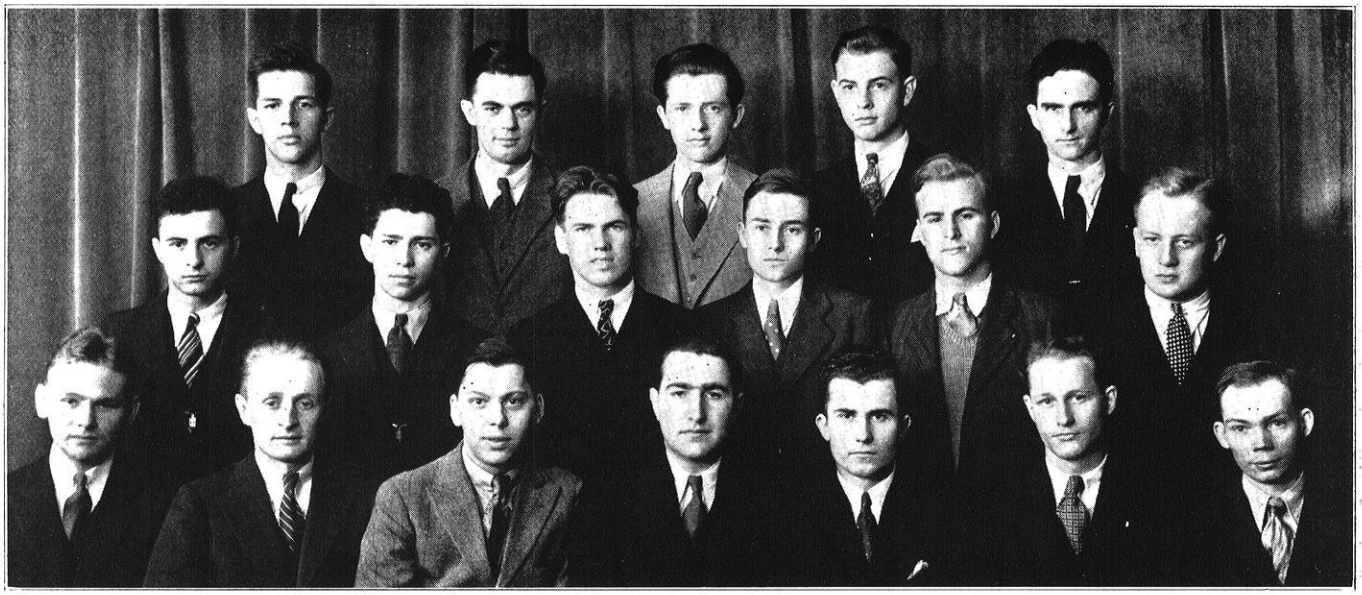

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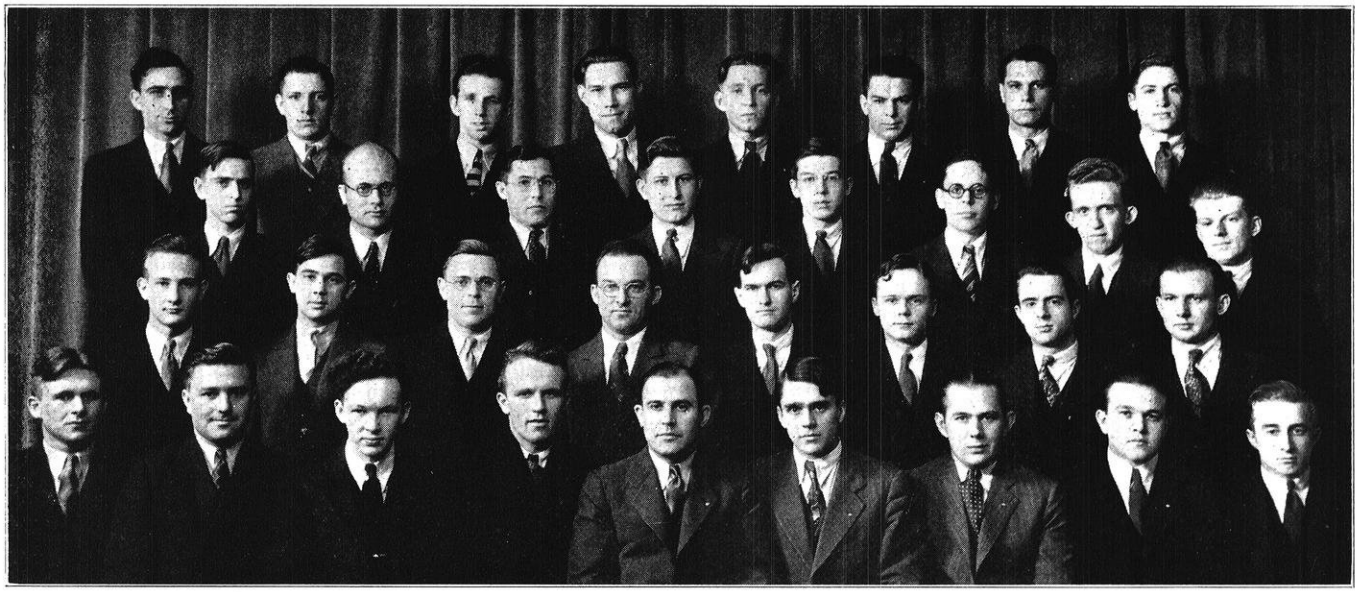

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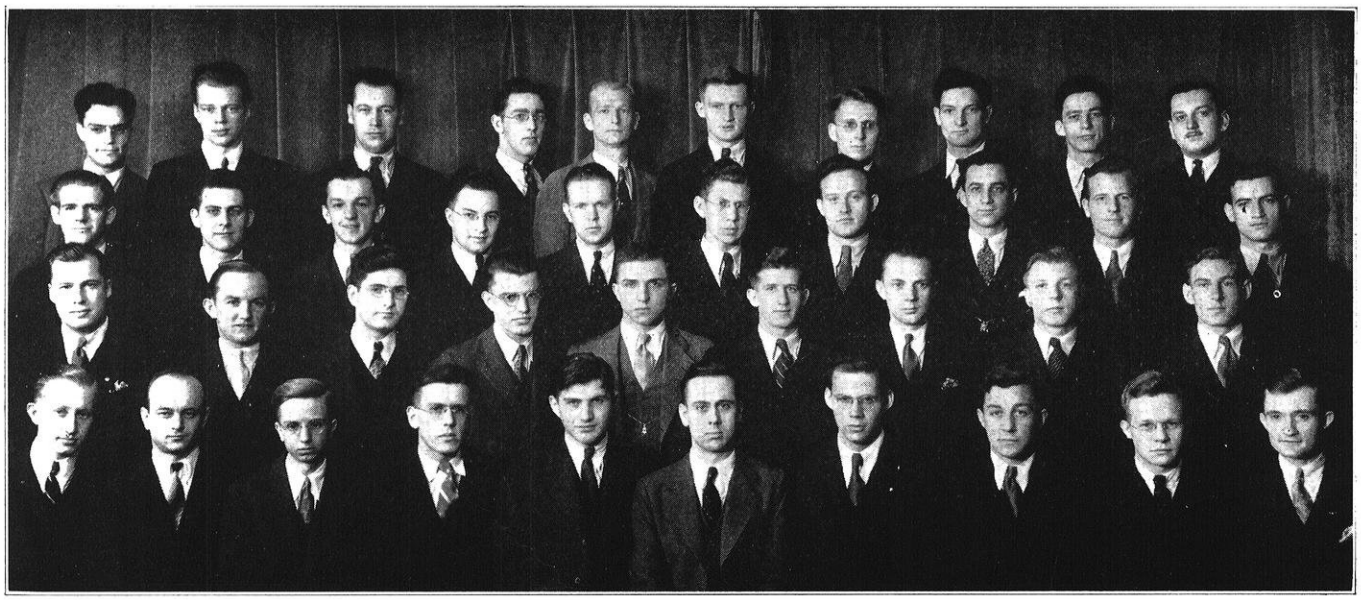
F. M. Weinhold, Jr.
P. H. Werner
C. W. Wright
W. E. Weiss
H. H. Zabel
D. E. Zilmer



— Courtesy Badger Studio.

Top Row: J. Dries, E. Icke, G. Lorenz, R. Grobe, A. Jonassen, J. Brennan, E. Hansen, J. Robertson, S. Hicks, H. Mohn.
Second Row: K. Whitefield, B. Schmid, J. Erminc, G. Mercer, E. Skinner, A. May, C. Novotny, R. Kehl, H. Koerwitz, L. Pfankuch.
Third Row: B. Sandstrom, R. Beverli, R. Matteson, C. Malischke, R. Dobrogowski, L. Meyer, D. Zeigler, C. Clausen, R. Thern.
Bottom Row: C. Stoeling, B. Dittmer, K. Rusch, G. Bayley, R. Wood, A. Epple, L. Allan, F. Stolz, R. Hoyle, D. Hambel.

A. S. M. E.

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R. Thern
J. Dries
D. L. Zeigler
C. W. Wagner
T. R. Moyle

A REVIEW OF THE PAST

(Continued from page 157)

Publications by the faculty during the year include research Bulletin No. 73 on "The Flotation of Southwestern Wisconsin Zinc Ores", by E. R. Shorey and L. W. Eastwood; and research Bulletin No. 74 on "Stresses Produced in a Circular Plate by Eccentric Loading", by R. J. Roark. Professor Dawson is editor of the Section of Hydraulics in the new General Engineering Handbook published by McGraw-Hill Company. The textbook on Mechanical Drawing by Messrs. Orth, Worsencroft and Doke has been enlarged to a loose-leaf publication of about 200 pages. A very interesting book has recently appeared, entitled, "Jobs, Machines, and Capitalism", by Arthur Dahlberg, formerly assistant in the machine design department. As its title indicates, this is a book on modern economic problems and is of especial interest because of the engineering viewpoint of the author.

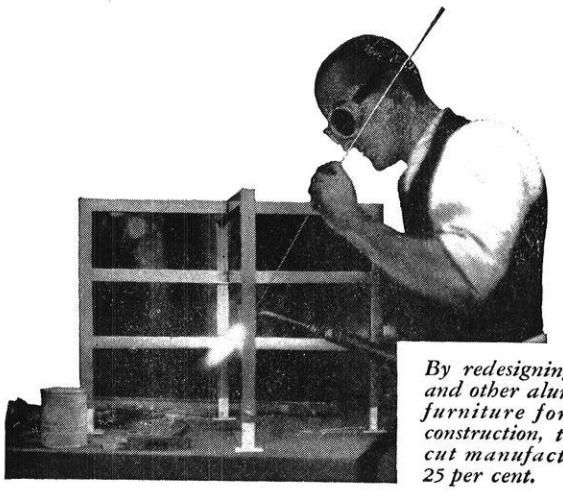
Activities of members of the engineering faculty outside of their regular university work include some points of interest. Perhaps the activity of Professor R. S. Owen, member of the city council, is the best known in Madison. His plan for a revision of the ward arrangement of the city was carried at the recent April election by a large majority and Owen was re-elected to the council. The city is to be congratulated for the good work being contributed by Professor Owen. D. W. Mead, who retires from full active duty in June after a service of twenty-eight years, has been notably honored in various ways during the present year. Of special significance to engineers was his election to honorary membership in the Amercan Society of Civil Engineers last June. This honor is now held by only eighteen engineers in the entire membership. From the university standpoint perhaps a more significant honor is the degree of Doctor of Laws to be conferred on Professor Mead next June. I believe also that Professor Mead is receiving several other honors but he is too modest to say much about them.

On March 3, the American Concrete Institute awarded Professor M. O. Withey the Wason Research medal for 1931. At the same time the writer was awarded honorary membership in this society.

This review should not be ended without a note regarding the activities of the engineering students. In proportion to their numbers, I believe they rank high in athletics, notably football and track and in the R. O. T. C. Polygon has also again become active after a period of quiet, and has offered the engineers two favorable opportunities during the year to get together socially. I note also that a student group has presented the electrical engineering department with a framed picture of Michael Faraday. This sort of thing is very desirable indeed, and along this line it may be mentioned that it is the expectation of the faculty, as soon as practicable, to secure proper furnishings and decoration for the student room in the new Mechanical Engineering building.

Get the "WISCONSIN ENGINEER" next year!

Design for OXWELDING

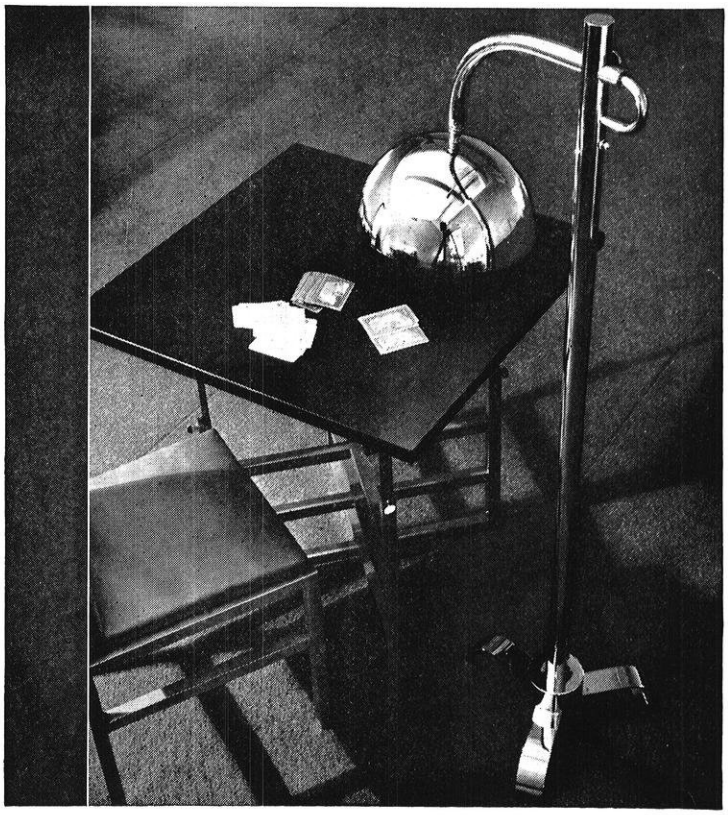


By redesigning this table and other aluminum alloy furniture for oxwelded construction, the producer cut manufacturing costs 25 per cent.

and lower production costs

OXY-ACETYLENE welding lowers production costs because it provides a method of fabricating metal without slow and expensive mechanical jointing . . . By making joints stronger than the metal itself, it permits the use of lighter material or the substitution of shape-cut fabricated parts for castings... And by making a smooth, invisible joint, it makes painting, lacquering, enameling, or polishing easier and quicker.

Tomorrow's engineers will be expected to know how to apply the oxy-acetylene process of welding and cutting metals. For their assistance, we have prepared several interesting technical booklets explaining how this modern metal-working process is used in the design, construction, and fabrication of metal parts and structures. These books contain newer and more practical material than most texts and will form a helpful addition to your personal library. Write to us and we will send them to you without charge.



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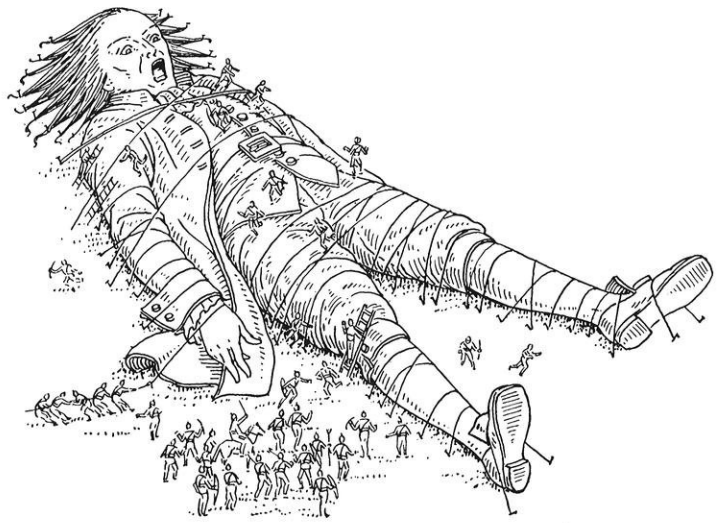
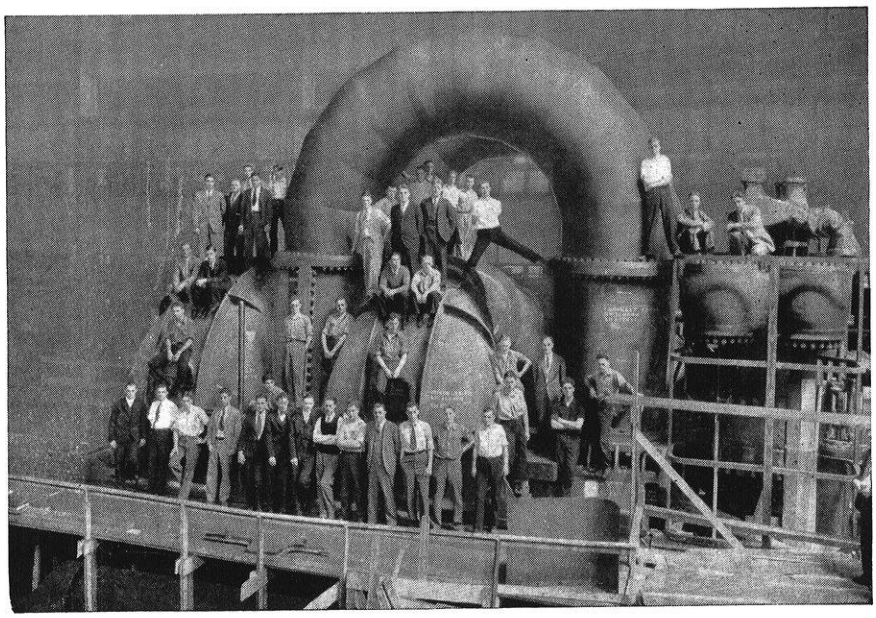


An Electrical GULLIVER AMONG LILLIPUTIANS?



160,000-kw. G-E tandem-compound turbine-generator set on test.

No—but the immense size of this 160,000-kilowatt turbine-generator dwarfs the 44 test men who test such apparatus. This turbine-generator for the Brooklyn Edison Company—the largest single-shaft unit yet developed—is capable of furnishing muscle power equal to all the inhabitants of New York City. Its 214,400 horsepower operates both day and night, lifting heavy burdens from human shoulders, and supplying electric energy to countless devices in homes, in offices, and in factories.

The 44 test men shown above represent 31 colleges and universi ies from New Mexico to New Hampshire, including the University of Porto Rico. Each year many college-trained men join the General Electric Testing Department, which trains them for future responsible positions and electrical leadership on land, on sea, and in the air.

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