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The WISCONSIN ENGINEER

MEMBER OF ENGINEERING COLLEGE MAGAZINES ASSOCIATED

OCTOBER 1935 to MAY 1936

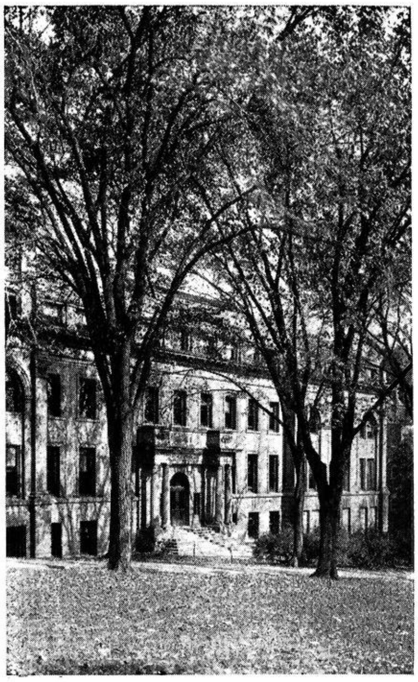
VOLUME XL

FOUNDED 1896

PUBLISHED AT MADISON, WISCONSIN

BY THE

ENGINEERING STUDENTS *of the* UNIVERSITY OF WISCONSIN



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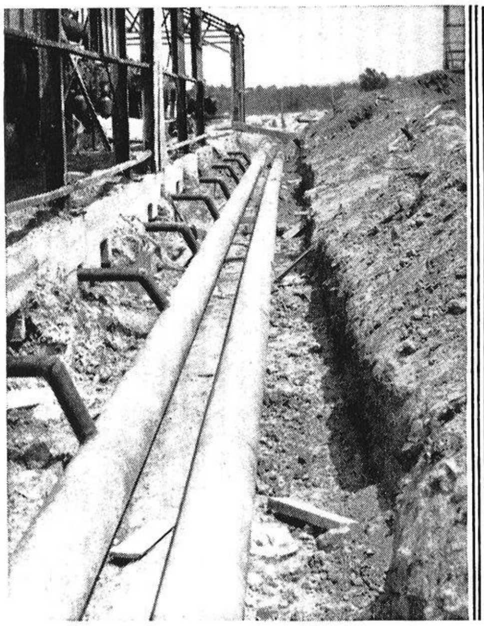
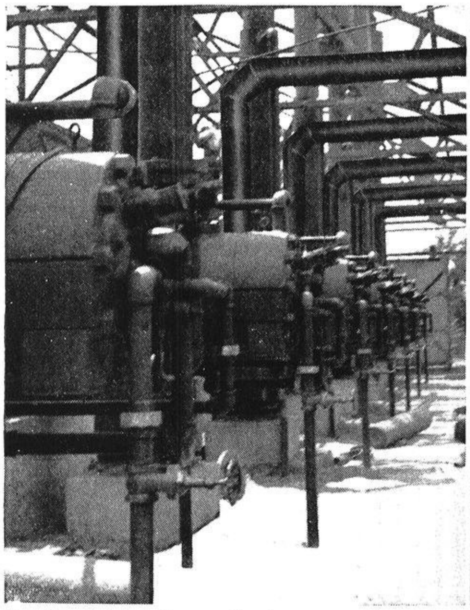
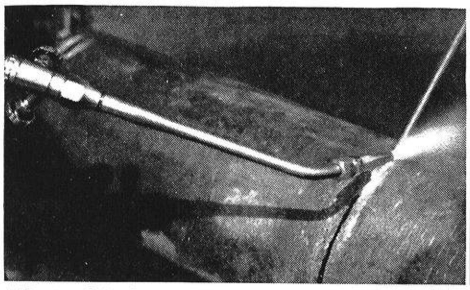


This Lindewelded pipe can be buried and forgotten



Lindewelding also can be done on vertical and overhead lines



The Multi-Flame Lindeweld Head in action

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With the Contributors . . .

△ The much discussed problem of alcohol gasoline blends has occupied the attention of William Gay during the past semester. His article takes in all angles of the problem and if you think that the political side is unimportant you have guessed wrong. Next thing you know they will be making politicians out of us so that we may fight for our principles on the senate floor.

△ After you take your elementary course in thermodynamics, the efficiency of the car you drive begins to intrigue you. Gene Lang tells you how the Cities Service people easily determine how well your car is performing.

△ Engineers — unbutton your ears and get an eyeful of the Dean's philosophy on engineering education in his annual welcome to all of us.

△ Polygon asks for your attention to explain its position and to tell you that we are all involved in this thing known as extra-curricular activities. One and all, read and you will be enlightened.

△ A freshman vectors back on the Critical Angle with his idea on all of the advice given the freshman at this time of the year.

VOLUME 40 — OCTOBER, 1935 — NUMBER 1

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The WISCONSIN ENGINEER

VOLUME 40, NUMBER 1 — OCTOBER, 1935

Alcohol Blends *for* Motor Fuel

By
WILLIAM GAY,
ch '35

THE use of alcohol-gasoline blends for motor fuel as an outlet for surplus farm products has been seriously considered in the United States for the past two years. The original proposals called for a ten per cent blend with the alcohol manufactured from corn, but lately the plans have been modified so that the proposed blend would contain from two to five per cent alcohol that has been made from various farm products. However, such blending is confronted with several problems, which can be separated into three categories; namely, technical, economical, and political. There have been numerous investigations, and many reports on various phases of these problems, and there seems to be much contradictory opinions but, on the whole, everything considered, the idea of mixing a small amount of ethyl alcohol with gasoline as motor fuel seems to be feasible.

Various foreign countries, not so well provided with petroleum resources as the United States, have been using alcohol blends for a number of years, fifty-four million gallons of alcohol being so used in 1931, with the amount increasing rapidly each year. Italy is the latest country to legally require alcohol blends to be used, and their plan calls for the use of over twenty-six million gallons a year within four years or the time required to increase their capacity to fill this demand. Reports from the various countries using alcohol blends have indicated that results have been generally satisfactory, but in practically every case the amount of alcohol blended with the gasoline is ten per cent or more, and consequently these results must be carefully interpreted if we are to apply them to the American plan, where only two to five per cent alcohol would be blended with the gasoline. The opposition of the petroleum industry and the fact that the United States has at present a vast supply of cheap petroleum present additional problems that must be overcome before American motorists will be required to use alcohol blends for motor fuel.

The technical problems are the ones that have received the widest consideration, and they will be the first ones discussed. It is a substantiated fact that although it is impossible to get a stable mixture of ninety-five per cent ethyl alcohol, the common commercial product, with gasoline, absolute or anhydrous alcohol can be mixed with gasoline in any proportions to give a homogeneous and stable blend. Recent developments have been made so that anhydrous (99.5 to 99.9 per cent) alcohol can be made from commercial alcohol at a cost that would be considerably below one cent a gallon if carried out on a large scale. However, if there is any water present in the mixture, there is a temperature known as the critical solution temperature at which the blend will separate into two layers, the lower one containing the water, most of the alcohol, and some of the gasoline. The higher the amount of water present and the lower the concentration of the alcohol, the higher this temperature will be. For a three per cent blend, the water in the mixture must be below (0.10) per cent to keep the critical solution temperature below minus twenty degrees Fahrenheit or sufficiently low enough to allow usage of the blend in the northern section of the United States. This figure was obtained from a graph relating per cent of alcohol and water tolerance at a constant temperature plotted by the United States Bureau of Standards, wherein the curve was extrapolated down to the three per cent line. Certain investigators think, however, that below a five or six per cent blend, the water tolerance increases so that a two per cent blend will stay stable with as much water as a ten per cent blend, but there is not, at present, sufficient proof to warrant accepting this as a fact. The crude source of gasoline has no effect upon the water tolerance of a certain blend, but cracked gasolines are more tolerant than straight run gasolines, and an increase in volatility will also increase the water tolerance.

In spite of the small amount of water that will cause separation, it is possible by using anhydrous alcohol and exercising reasonable precautions to obtain ready for distribution a stable blend free from water. Of course, there is a chance for water to be accidentally introduced before the blend is actually used, plus the possibility of either the blend absorbing water from the air, or of water condensing out on the cool surface of the blend from warm humid air. There has been no little concern over these last two possibilities, but from a careful study of experimental data it seems that trouble from these sources has been over-exaggerated.

Anhydrous alcohol alone will tend to absorb moisture from the air, but when mixed with gasoline, even in concentrations as high as fifteen per cent, is no more hygroscopic than gasoline itself. In fact, the time required for a blend to absorb enough moisture to cause separation is claimed to be greater than that required to cause complete evaporation. The danger from condensation of water from the air on the surface of the blend is very small in underground tanks because of the small variations in temperature, but there is some possible chance for enough water to so be introduced into the blend to cause separation in surface tanks. However, tests performed at the Idaho Agricultural Experiment Station and at Iowa State College where various blends were exposed to very humid air and the temperature changed alternately from 32° F. to 90° F. showed that there was very little possibility of the blend separating from this cause. It might be added here that it would take all the moisture that could be condensed out of forty cubic feet of air by cooling saturated air from 80° F. to 30° F. to cause ten gallons of a two per cent blend to separate. Small amounts of water would not necessarily cumulate in the fuel tanks, but would pass unnoticed into the motor. With reasonable care there would be no trouble with the blends becoming unstable and separating into two layers because of the water content.

The alcohol blends are no more corrosive than gasoline itself, but because of its solvent power will remove gum and dirt from the fuel system. This may be sufficient to cause clogging of the fuel line when the blend is first used, but thereafter the system will remain clean and give no more trouble. Blended fuels also keep the engine cleaner because of the lack of carbon deposit, since the blends burn more completely than plain gasoline. The carbon monoxide content of the exhaust of an average gasoline consuming motor is four per cent, while it is reduced to less than one per cent when a blend containing ten per cent alcohol is used, and proportionately reduced by blends of other alcohol content. This in addition to a lower air requirement for complete combustion, plus lower exhaust losses, makes it possible to get a greater output from a gallon of an alcohol blend than from a gallon of gasoline, in spite of the higher calorific value of the latter. It also has been proven by actual road tests that crankcase dilution, and the use of crankcase oil, has been reduced by using an alcohol blend.

The engine performances when using an alcohol blend containing less than ten per cent alcohol are practically the same as when using gasoline in the same motor. No difference would be noticed by the average motorist in the starting, acceleration, mileage, and related characteristics of the motor when a blended fuel is used instead of straight gasoline. Furthermore, the blends have the advantage of causing the motor to run cooler, and of raising the anti-knock value of the gasoline. The increase in anti-knock rating is proportional to the amount of alcohol added, and is approximately about 0.75 of an octave number per per cent of alcohol added. At the average rate that is charged for premium fuel, each per cent of alcohol added increases the value of the gasoline about one-fifth of a cent, thus helping to pay for itself. Because of their anti-knock qualities, the blended fuels could be used in engines having a higher compression ratio, thereby increasing the efficiency and economy of the fuel.

Still another advantage that is held by alcohol-gasoline mixtures is the fact that they are more volatile than either component alone. This increased volatility is due to the formation of low boiling point azeotropic mixtures. Consequently, starting and acceleration of the motor will be improved, and lower grade gasolines can be used for blended fuels. In view of the above discussion, it can be said that, technically, alcohol blends are not only quite feasible, but are actually superior to gasoline as a motor fuel, especially if high compression motors are used.

The economical aspects of the question are not as clear and well known, and accordingly more questionable than the technical ones considered. The greatest concern is over the actual cost of the anhydrous alcohol that would have to be used in the blends. At present there are only a few small plants that make alcohol from grains, their total output being less than ten per cent of the total produced. Consequently, the cost of producing alcohol from farm products in large efficient plants cannot be ascertained from data of the present plants. Opinions on what the actual manufacturing cost will be vary considerably. Costs range from five to twelve cents a gallon, with eight cents a gallon as a fair figure for large efficient plants. About two cents a gallon must be allowed for converting the alcohol into the anhydrous state and for denaturing. An additional amount, usually estimated at approximately five cents a gallon, would be necessary to cover the distribution, storage, and other costs, including the manufacturer's profit. Thus the total cost of the alcohol, aside from the raw material, is fifteen cents a gallon, and it can be considered fairly constant. The total cost of the alcohol ready for blending will then be fifteen cents a gallon plus the cost of the raw material.

A bushel of corn will make about two and one-half gallons of alcohol, while it takes about two and one-half gallons of molasses to make one gallon of alcohol. With molasses at five cents a gallon, corn must not cost over thirty-two cents a bushel to give an equal raw material cost for alcohol manufactured from each source. The total cost of the blending alcohol would then be about twenty-seven and a half cents a gallon, which is in turn about the cost of manufacturing synthetic alcohol from

(Continued on Page 18)

The Cities Service POWER PROVER

AN EXHAUST GAS ANALYZER

by EUGENE LANG, m '33

TO UNDERSTAND more clearly the purpose and function of the Cities Service Power Prover it is necessary to first consider the subject of the combustion of gasoline within a gasoline engine along with the problem of its regulation. The finest of engine gasolines, despite the many advertised claims, must give nothing but poor results in a badly adjusted engine. Gasolines now sold by major oil companies are pretty much alike. The quality of their performance rests entirely with the engine.

Gasoline is a mixture of various hydrocarbons distilled or "cracked" from petroleum oils. The amounts of the various hydrocarbons are arranged so that gasoline marketed at the present time approximates the hydrocarbon hexane with the empirical formula C_6H_{14} or 84.8 per cent carbon and 15.2 per cent hydrogen by weight. The heating value of gasoline varies between 20,200 and 20,400 b.t.u.'s per pound depending on the specific gravity. In an automotive engine gasoline is drawn by vacuum or pump into the carburetor where it is vaporized and mixed with air, 23 per cent oxygen and 77 per cent nitrogen by weight. This mixture is then drawn into the cylinder by the downward stroke of the piston. On the following upward or compression stroke the pressure is raised until at some predetermined instant an electric spark ignites the mixture which then explodes and burns, giving off heat. This heat is converted into mechanical energy on the succeeding downward stroke of the piston. On the next upward stroke the spent gases are forced out of the cylinder through the exhaust pipe and muffler.

To use the engine fuel most economically the mixture of air and gasoline must be of such proportion as to provide perfect combustion, that is, the complete oxidation of the fuel with just the theoretical amount of air required. If perfect combustion does take place the carbon in the fuel is completely burned to carbon dioxide and the hydrogen to water vapor with no excess of air.

Then

$$C + O^2 = CO^2$$

$$2\,H^2 + O^2 = 2\,H^2O$$

$$1 \text{ lb. C} + 2.66 \text{ lbs. } O^2 = 3.66 \text{ lbs. } CO^2$$

$$1 \text{ lb. } H^2 + 8 \text{ lbs. } O^2 = 9 \text{ lbs. } H^2O$$

Since the oxygen is provided by air which contains 23 per cent by weight of oxygen, the necessary weight of air per pound of carbon burned will be 11.56 pounds and per pound of hydrogen burned will be 34.7 pounds. But average gasoline contains 85 per cent carbon and 15 per cent hydrogen by weight, therefore the air requirement for perfect combustion will be

For carbon $.85 \times 11.56 = 9.83$ lb. air

For hydrogen $.15 \times 34.7 = 5.20$ lb. air

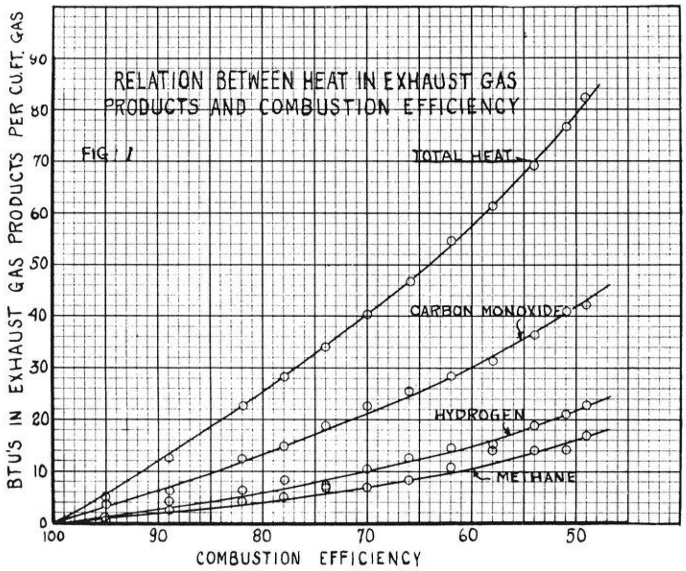
or one pound of gasoline requires 15.03 pounds of air for perfect combustion. Therefore, to obtain maximum economy from the fuel, an air fuel ratio of 15.03 must be maintained. The preceding calculations are from theoretical considerations only. Actually, complete oxidation of a hydrocarbon fuel will not take place until an oxygen concentration of about one per cent in excess of the theoretical is present.

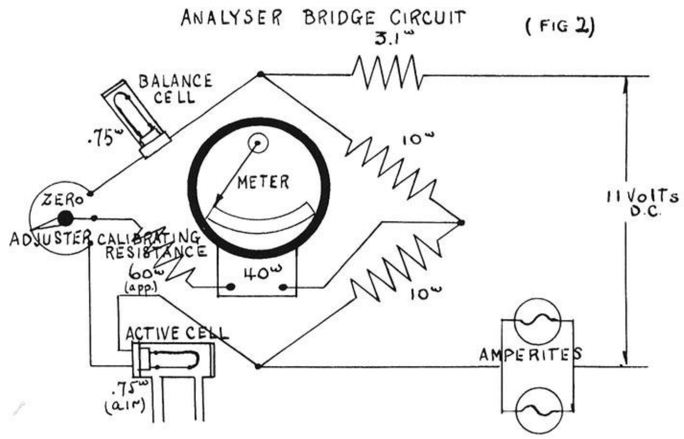
The maximum power developed by the engine, however, does not occur at the point of theoretically perfect combustion but at a lower air fuel ratio. Expressed in other words, engine performance is at a maximum when a fraction of the fuel is wasted. In present day high powered engines a sacrifice in power is justifiable when an increase in economy results. The average driver demands, first of all, power and flexibility of operation. He sets his carburetor rich enough to give good operation for slow driving and heavy traffic with plenty of reserve power for hill climbing. Due to the flat characteristic of the power curve over the range of air fuel ratios from eleven to fourteen, an error on the rich side in carburetor adjustment does not become manifest to an appreciable extent in loss of power but does seriously affect gasoline economy. Any attempt, therefore, towards replacing the customary practice of setting carburetors with "an extra turn for safety," by a scientific method which accurately indicates the optimum of power and economy is to be commended as a step toward better automotive servicing.

With the purpose of obtaining the maximum of power and mileage from a gasoline engine, research engineers have made an intensive study of exhaust gas analysis under the theory that the faults of an engine could be traced through analyses of the gases emanating from the exhaust pipe. Automotive exhaust gas consists mainly of carbon dioxide, oxygen, carbon monoxide, hydrogen, methane, nitrogen and water vapor. Gasoline vapor and unsaturated hydrocarbons exist to an appreciable extent only under abnormal conditions through faulty ignition or a too rich air fuel-ratio. The combustibles, carbon monoxide, hydrogen and methane, depend largely upon the air-fuel ratio of the mixture exploded in the cylinder. Table I comprises a summary of automotive exhaust analyses taken from an investigation of the problem of ventilation in the Holland Vehicular Tunnel. The design of the

Air Fuel	% by volume						Comb.	B.T.U. s/cu. ft.			
Ratio	CO^2	O^2	CO	CH^4	H^2	N^2	Eff.	CO	CH^4	H^2	Tot.
9.0	5.7	1.1	13	1.7	7.0	71.5	49	42.1	17.1	22.9	82.1
9.6	5.9	1.0	12.8	1.4	6.5	72.4	51	41.4	14.1	21.2	76.7
10.1	6.7	1.0	11.2	1.4	5.8	73.9	54	36.2	14.1	18.9	69.2
10.6	7.5	1.2	9.8	1.4	4.8	75.3	58	31.7	14.1	15.7	61.5
11.0	8.2	.8	8.9	1.1	4.4	76.6	62	28.8	11.1	14.4	54.3
11.5	8.9	.7	8.0	.8	3.9	77.7	66	25.9	8.1	12.7	46.7
12.0	9.4	.6	7.0	.7	3.2	79.1	70	22.6	7.1	10.4	40.1
12.6	10.4	.4	5.9	.7	2.4	80.2	74	19.1	7.1	7.8	34.0
13.1	10.7	.9	4.6	.8	1.6	81.4	78	14.9	8.1	5.2	28.2
13.5	11.5	.6	3.8	.6	1.3	82.2	82	12.3	6.1	4.2	22.6
13.9	12.9	.3	1.9	.4	.8	83.7	89	6.1	4.0	2.6	12.7
14.5	13.4	1.1	1.2	.1	.2	84.0	95	3.9	1.0	.6	5.5

Power Prover is a result of calculated and proved determinations of combustion efficiencies after intensive study of analyses of this type. Accompanying the analyses are calculated values of combustion efficiencies and the heat values of the combustibles. Fig 1 is a plot of the results. The Power Prover is an instrument designed to duplicate in a few seconds this tedious and drawn out process of conducting a standard gas analysis to arrive at a calculated combustion efficiency. The function of the Power Prover, then, is to determine engine performance by noting the proportion of the fuel utilized within the cylinder in terms of combustion efficiency, combustion efficiency being the ratio of the heat units consumed in the engine to those supplied.





After due consideration of other methods of exhaust analysis, such as absorption by chemical solutions, determination of specific gravity, thermal conductivity and determination of effusion and diffusion times, the catalytic combustion or b u r n i n g method was adopted as being the most practical and accurate. In its essentials, the analyzing apparatus of the Power Prover consists of an active and a balance cell electrically connected so that any variation in the electrical resistance of the active cell can be easily and instantly measured. A fine platinum wire is suspended within each cell. Air is kept in the balance cell but the active cell is so arranged that a slow stream of the unknown sample can be forced through it under pressure. In order to prevent convection losses as much as possible, the cells are made with a very small bore and by means of suitable seals the heat conducted along the wire is reduced to a minimum. The two cells are identical in construction so that these convection and conduc-

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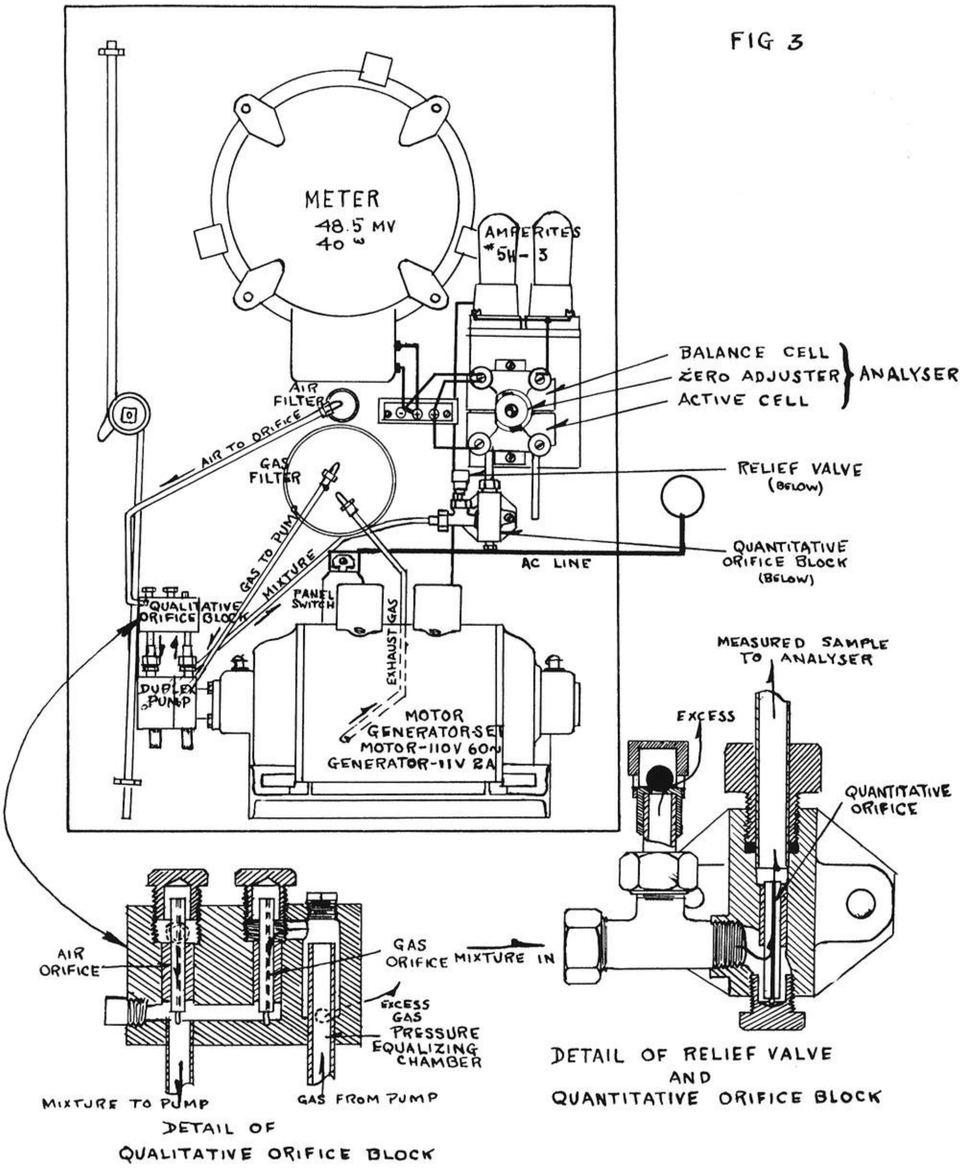
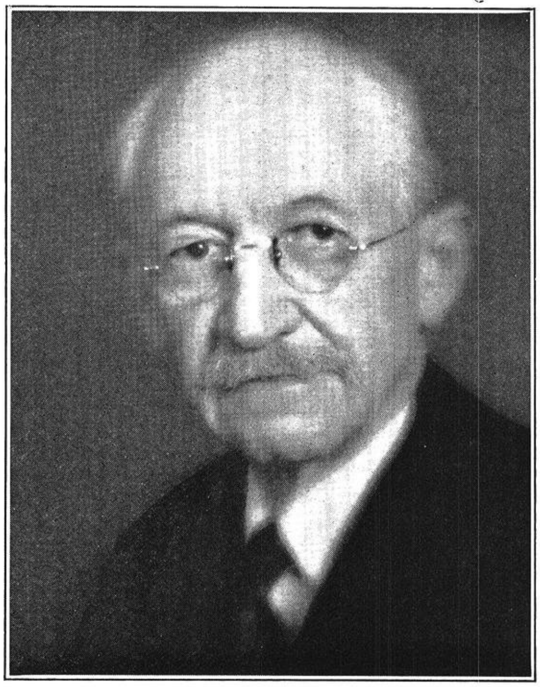


OUR RESPONSIBILITY.... *The FRESHMEN*

THROUGH the pages of the **Wisconsin Engineer** I am very glad to extend to all new and all returning students a cordial welcome to the university family at the beginning of another school year. I would like especially to say a word to those who are just beginning their engineering course. You have come with the definite purpose in mind of preparing yourself for some branch of the engineering profession, and we sincerely hope that you will find your work at the University both agreeable and profitable. It is the function of the engineering college to offer the best possible opportunity to young men to prepare themselves to become engineers. The courses of study provided are the result of many years' experience in many engineering schools, on the faculties of which are men of much experience both in practice and in teaching. In examining an engineering program, it may strike the beginner that there is very little of an engineering nature in the first two years of the course. The program is made up almost wholly of mathematics, science, English, and drawing. The civil engineers get considerable surveying, and the other groups a small amount of applied work pertaining to their particular course, but the fact that so much time of the whole four year course is devoted to fundamental mathematics and science indicates the scientific basis of engineering practice. This means that preparation for the engineering profession is a serious business and is an intellectual process and not a matter of manual skill. English is as fundamental as mathematics, as an engineer must have ability to express himself in his written reports and his arguments with respect to his work.



In the later years of the course are included courses of an applied nature in which methods of application of scientific principles to engineering problems are stressed.

At the beginning of your course it is important to get a good start, and I know of no better suggestion than one strongly emphasized by Colonel Robert Rees, personnel manager of the American Telephone and Telegraph Company, in his address before the engineering students some time ago. He strongly advised students to carefully budget their time. It is so easy for students to waste a lot of time dawdling and accomplishing nothing either in the way of good sport or good work, and it is surprising how much time will disappear in this way if some thought is not given to the matter. This budgeting of time will preferably include some time for outside activities, the particular features depending upon the student's own tastes and abilities. Such activities should, however, be looked upon as of the same relative value and importance as the outside activities of mature life which every good citizen owes to his community, to his profession, and to himself. To ignore all such outside interests leads to narrowness and a self-centered personality, while, on the other hand, too great participation will quite surely lead to a dissipation of energy, resulting in a poor preparation in those fundamentals which are absolutely necessary to later success. The habit of hard work and concentration on the job in hand is a most valuable accomplishment and worth much effort to acquire.

For a considerable percentage of the students, an important activity is that of earning money to meet part of their expenses. This cannot be avoided, and up to a certain point is likely to be of benefit rather than a hindrance, but the engineering course requires for its successful mastery a lot of time and hard work, and there are many students whose college work suffers to an undue extent because of the amount of energy they are obliged to give to earning money. Those who are obliged to work many hours in employment should reduce their college schedule to a reasonable program in order that their work may be effective.

The Engineering faculty looks upon the students in its charge as a large office force of young engineers where the problems are those of engineering training rather than actual construction. And it is their desire that there shall exist the same sort of helpful and frank relations between faculty and students as exist among the staff in a well conducted office. We wish you to look upon your instructor or advisor as a genial "boss" whose business it is to promote the efficiency of the work of the office. Consult him freely about any matter of importance in your college life. We wish you the best of success in your new work.

—F. E. TURNEAURE

Dean of the College of Engineering

ALUMNI NOTES

MINERS AND METALLURGISTS

EKSTROM, DEAN B., '26, and Miss Marian Margaret Banks were married on August 31 at Salon Springs, Wisconsin.

PATERICK, HENRY R., '32, has been transferred to Rhinelander by the Wisconsin Highway Commission.

WALTERS, E. C., '23, acts as camp superintendent of the C.C.C. Federal Flood Control Camp at Viroqua, Wisconsin.

JOURDAN, RALPH L., '21, has been transferred from the Salt Lake City to the New York office of the American Smelting and Refining Company where he will have entire charge of all foreign ore buying for the company.

RAY, OTTO A., '20, is the Salt Lake City representative of the Chicago Pneumatic Tool Company in charge of rock drill, air compressor and coal cutter sales and service.

HOUGHTON, SAM L., '14, is engaged in the development of a group of high grade gold claims in Arizona.

JOSLYN, BERNARD, M.S. '35, has a position as electric furnace melter for the Wehr Steel Company of West Allis, Wis.

ERDMAN, EDWARD, '34, works as inspector for the Cutler Hammer Manufacturing Company of Milwaukee.

JOHNSON, ALVIN, '29, is working as metallurgist for the American Brass Company at Kenosha, Wisconsin.

CHEMICALS

CIRVES, FRANCIS J., '21, was married to Miss Anne Cyra on June 15 in Madison. He is a consulting paper chemist in Madison.

DEQUINE, JR., LOUIS E., '35, and Dorothy Elizabeth, daughter of Mr. and Mrs. Miller of Scotia, New York, were married on July 22. They will live at 44 Plymouth Ave., Montclair, New Jersey.

CLARK, MANLEY H., '22, visited Madison in July. He is western manager at Los Angeles for the Le Roi Company, Milwaukee, makers of industrial gasoline and gas engines.

QUALE, IRVING, '30, and **POPKIN, HENRY**, '30, spent a weekend in Madison in July recuperating from the strenuous efforts put forth for the Sinclair Refining Company at East Chicago, Ind.

ALTPETER, ROGER, Ph.D., '34, found employment for the summer at Riverside, Ill., with the Universal Oil Products Company. In September he returned to Case School of Applied Science at Cleveland where he is an instructor in the chemical engineering department.

HANKS, WILLIAM V., '23, died on May 20 in London, England, after an emergency operation for appendicitis. Mr. Hanks had just during this year been advanced by his company, the Standard Oil Company, to an important post in London which position he held prior to his death.

LARSEN, BERNARD M., '21, is associated with the Research Laboratory of the U. S. Steel Corporation. His address is Lincoln Highway, Kearney, New Jersey.

LAUTZ, HAROLD L., '34, formerly employed by the engineering department of the U. S. Forest Service, is now in charge of drying operations at the Eisendrath Tanning Company of Racine, Wisconsin.

SPIELMAN, HAROLD J., '23, acts as air conditioning engineer for the Vilter Manufacturing Company of Milwaukee. His home is 507 Elmore Street, Park Ridge, Ill.

CIVILS

LYNEIS, CLAUDE A., '33, was married on August 17 to Mary Vine Marshall of Fond du Lac. They will reside at Highland, Wis., where Lyneis is stationed on erosion control.

TACKE, WALTER H., '30, who has been instructor in railway engineering for five years, has resigned to take a position as inspector with the Works Progress Administration in District 4, Milwaukee.

GETTLEMAN, WILLIAM F., '14, visited the college on August 27. Since 1931 he has been assistant engineer with the Indian Irrigation Service and has recently been stationed on the San Xavier Reservation near Tucson, Ariz. He was married in 1928 to Lelia Gilmer of Hurdlin, Mo.

ICKE, JOHN F., '00, died July 11 at Madison following an operation. He was city engineer for Madison from 1902 to 1912. Since 1912 he has been contracting. He leaves three sons, Paul, Philip, and George, and one daughter, Mrs. Jerome B. Harrison of Chicago.

STEUBER, MILTON C., '16, has the position of project engineer in the Procurement Division of the Treasury Department with offices in the Federal Warehouse in Washington, D. C.

PARKER, EUSTACE E., '07, state highway engineer for Wisconsin, died on May 17 following an illness of eight weeks. He was city engineer of Madison for twenty-one years prior to his appointment as state highway engineer.

LINDQUIST, KENNETH E., '34, who has been working on his father's farm since graduation, began work on April 1 as junior assistant highway engineer with the W.H.C. at Eau Claire.

STREET, LESTER C., ex'98, lost his right leg just below the knee on May 16 as the result of an accident that occurred while he was supervising the pulling of steel piles on a bridge that he was building across the Rock river at Prophetstown, Ill. The boom of the derrick broke and caught him across the leg. He is making good progress toward recovery. During his college days Street pulled stroke in the freshman crew that beat Yale.

MECHANICALS

KAISER, E. R., '34, has gone to Columbus, Ohio, to work at Battelle Institute where he will do coal research.

FRANK, ORVILLE C., '34, is working as engineer for the Filer and Stowell Iron Works at Milwaukee.

MacARTHUR, ANGUS, '11, holds the position of vice-president of the Koppers Gas and Coke Company of Pittsburgh. His home is at Park Mansions, Pittsburgh.

WAGGERSHAUSER, HERMAN H., '33, has been with the Eastman Kodak Company since October, 1933, where he has been trained for a technical position in one of their foreign plants. He writes that, all in all, he has had a very complete and thorough training and, conditions permitting, expects to leave for Europe either late this year or very early next year.

MATSEN, MORRIS, '31, was married on August 19 to Rowena Witt of St. Joseph, Mo. Matsen is with Kimberly-Clark Company at Neenah, Wis.

ELECTRICALS

NEWBERRY, LLOYD, '34, is employed in the engineering department of the Macwhyte Company of Kenosha, Wisconsin. He is learning all about wire rope and wire products with the idea of eventually going into the sales end of it.

KILE, ROY B., '15, acts as electrical engineer for the Gulf Refining Company at Port Arthur, Texas. His address is 4300 Ferndale Drive, Port Arthur, Texas.

VAN HAGEN, ARTHUR E., '06, died suddenly at Washington, D. C., on June 29, following a heart attack. He is survived by his widow, Lydia Begole. At the time of his death he was engineer for the A. T. & T. Company, with which he had been associated for twenty-nine years. He was active in the early installations of mechanical telephone switching.

ON THE CAMPUS

CHIP OFF THE OLD BLOCK

That Wisconsin men believe in sending their sons to Wisconsin is shown in the list of freshman engineers who entered this fall. Twelve freshmen were found whose fathers graduated from some branch of the College of Engineering.

Edward E. Bauer is taking up his father's profession in entering the mechanical engineering course. His father is Harry E. Bauer, m'15. W. L. Brekenridge, m'15, also has a son, Wm. L. Brekenridge, signing for the mechanical course. John E. Heuser, chemical, is the son of John U. Heuser, e'16. The chemicals have an old name on their roster in Hugh C. Higley, son of Harvey V. Higley, ch'15. Prof. J. B. Kommers, '06, persuaded his son, Wm. J. Kommers, to take an engineering course, but Bill decided he wanted to be a mechanical rather than an electrical. The mechanicals claimed Wm. H. Pugh, the son of another mechanical, Wm. H. Pugh, '11. H. B. Sanford, e'07, has a son, Herbert B. Sanford, chemical, entering this fall. Another freshman, Stewart Pfannstiehl, mechanical, is the son of J. J. Pfannstiehl, g'08. James W. Watson, a recruit of the mining engineering department, is the son of J. W. Watson '02, Professor of electrical engineering. Gene H. Goedgen preferred the mechanical branch to the electrical line of his father, A. J. Goedgen, '07. Kenneth R. Hare '11 is another electrical whose son, James H. Hare, came to Wisconsin but was signed up by the mechanicals.

FIELD WORK

Prof. H. F. Janda spent part of this summer comparing the effect of steel reinforcement in slabs of concrete placed in different types of soil. The tests were made in three parts of the state—on Bayfield sand, on Colby silt loam, and on Superior clay—and were to determine whether steel reinforcement had any effect on the cracking of slabs of concrete. This type of study has never been made before in Wisconsin and it is not known whether any general conclusions of any value can be reached. The project has been partially completed but no results have been released as yet.

SOPHOMORE HIGH HONORS

	Grade Pt. Av.
Civil Engineering	
Eppler, John F.	3.000
Luecker, Arthur R.	2.875
Mechanical Engineering	
Burroughs, Charles W. L.	2.746
Chemical Engineering	
Fontaine, Francis E.	2.871
Mayland, Harrison C.	2.955
Olson, Neal D.	2.9857
Parrott, Frank W.	2.9848
Risser, Gerald J.	2.800
Mining Engineering	
Carow, John	2.712

SOPHOMORE HONORS

Civil Engineeirng	
Davy, Philip S.	2.615
Newbury, Russell H.	2.125
Norris, Arthur S.	2.323
Voss, Edwin J.	2.229
Wilson, Francis C.	2.178
Mechanical Engineering	
Ingersol, Hugh D.	2.480
Sohns, Carl B.	2.289
Wefel, Ellison L.	2.308
Electrical Engineering	
Hafstrom, John R.	2.311
Heinrichsmeyer, Edm'd F.	2.416
Riggert, Marvin C.	2.567
Wallace, Everett C.	2.343
Chemical Engineering	
Christl, Robert J.	2.202
Durdell, William R.	2.282
Rudolf, Chester D.	2.414
Mining Engineering	
Simon, Lawrence E.	2.569

ENROLLMENT

If the way the enrollment in the College of Engineering is increasing can be taken as a barometer of business conditions, the depression must be over. This year's freshman class is one-third larger than that of last year and is practically double that of two years ago. There are about one hundred more students in the college than there were last year. Enrollment by departments is as follows (this list is approximate):

	C.E.	M.E.	E.E.	Ch.E.	Min.E.	Tot.
Freshman	55	109	84	89	12	349
Non-Promoted Freshmen	7	19	14	7	3	50
Sophomores	45	79	54	47	15	240
Juniors	45	58	44	42	8	197
Seniors	50	38	52	44	9	193
	202	303	248	229	47	1029
Graduates	5	3	10	6	11	35

SNAKE BITE CURE

Because of the comments which came up when one student was bitten by a rattlesnake at the T. E. Summer Camp at Devil's Lake this summer, Prof. Owen said the other day that he is thinking seriously of providing a pretty nurse for each civil who attends camp next summer.

TAU BETA PI

By way of record, since it occurred on May 23 after the May issue of the Wisconsin Engineer was out, it is only proper to mention that Tau Beta Pi, honorary engineering fraternity, initiated seventeen new members.

The initiates were: Raymond A. Grange and Wm. O. Ree of the class of '35; James J. Cadwell, Allan W. Cole, Richard E. Davis, James A. Gillies, Jr., Donald H. Gordon, Wm. F. Gother, Charles J. Halamka, Roland F. Hertel, Joachim E. Liebmann, Leo S. Nikora, Earl F. Senkbeil, Eldon C. Wagner, and Tom J. Williams of the class of '36. Prof. Harold F. Janda and Prof. Gordon F. Tracy were also initiated.

SCHOLARS OF '38

The class of 1938 numbers among its ranks many excellent scholars. This is evidenced by the following list of men who did outstanding work in their freshman year.

Henry K. Voigt, Harold H. Kurth, Myron T. Roshar, and Reinhardt N. Sabee are working at the high honor rate.

Those working at the honor rate are Leo A. Herning, Wayne T. Mitchell, Paul M. Ketchum, Peter S. Sarocka, Carl P. Walter, Robert H. Berg, John W. Marston, Clarence W. Eckmann, Fred B. Alexander, Frederick J. Krenzke, Robert B. Hopkins, Ted B. Haufe, Thomas G. Laughnan, John E. Conway, Frederick J. Gunther, Matthew J. Vea, Jesse C. Dietz, Fred C. Neumann, Everett H. Davies, Howard W. Fiedelman, John H. Woy, Lee M. Zawasky, Lewis L. Sheerar, Norman E. Van Sickle, Ralph J. Harker, Richard E. Lohr, Ralph F. Schlegelmilch, Clarence G. Cichocki, Glenn C. Kreichik, Foster B. Whitlock, Aldro Lingard, Richard E. Toellner, and Kenneth M. Beals.

You AND We

IT IS time, gentlemen, that Polygon and The Wisconsin Engineer had a serious talk with you.

Last year, Polygon proposed a plan which would directly benefit every engineering student on the campus. We decided that, in order to give engineers more for their money, a plan could be devised and submitted to the whole engineering college for acceptance by vote. That plan arranged to, for the sum of one dollar per semester, brings the Wisconsin Engineer magazine to you once a month, gives you membership into your local society, gains you free admissions to Polygon's smokers and dances, and helps you establish yourself in your professional national society. You accepted the plan last semester with a wonderful majority vote.

That plan, gentlemen, was conceived by a group of engineers, human like the rest of you. We were elected to represent you. There are ten men in Polygon — two upperclassmen representing each type of engineer. We ten have given hour upon hour of our valuable time and energy to something we firmly and sincerely believe is worthy and excellent. We have gone through one worry after another, disappointment after disappointment, puzzle upon puzzle. And with no remuneration whatsoever! We are getting no money nor special credit for such services

So here we are — ten men. Each of us has looked at the plan with an open mind, and we have been so convinced of its common sense and merit, that we have been filled with a desire to spread the news. We are positive that no engineer in his right mind could possibly fail to see the logic and convenience of the plan. Certainly you cannot deny that you are getting your money's worth — if money is your gauge of quality.

But, alas, we have been shown the sad side of the engineering mind. All the calculus in the university could not show some of the students the reasonableness of the plan. Some of the engineers are star examples of puerility prolonged — they sneak past the collection tables with the smirk of a high school boy stealing into the circus. Some lose their senses when the very name of Polygon is mentioned. Those marvelous engineers with their ice-cold, steely reasoning have brilliantly refused even to hear a statement of the proposition.

By this time, you may well imagine, we have about come to the end of our rope. While our engineering students indifferently ignore the activity fee, the Ag school calls us for full particulars of our plan and decides to adopt such a system for themselves. The Ag and Home Ec schools are very highly pleased with their plan, which is modelled exactly like our own, and report an almost one hundred per cent success. Meanwhile, the handful of ten men from Polygon are spending hours and hours trying to approach and convince one thousand engineering students—through papers, magazine articles, editorials, collection desks, distributed writings, convocations, and actual personal contacts. Add this Polygon task to the already too full schedule of the upperclassman engineer and you can see the work of a Polygon man is prodigious in its enormity. Were everything going along perfectly smooth, the combined efforts of twenty men would be well taxed.

So why do you not try to help us? True, almost all the engineers have their activity fee cards now. But that is not enough. To make this plan any kind of a success we must, simply must have every engineer with us. It is that small contingent of non-participants which is blighting the success of the Polygon Plan.

It is readily seen that this system benefits not only the present generation of engineering students, but helps even more the ones after us. And what are we engineers for, but to make things easier and better for posterity!

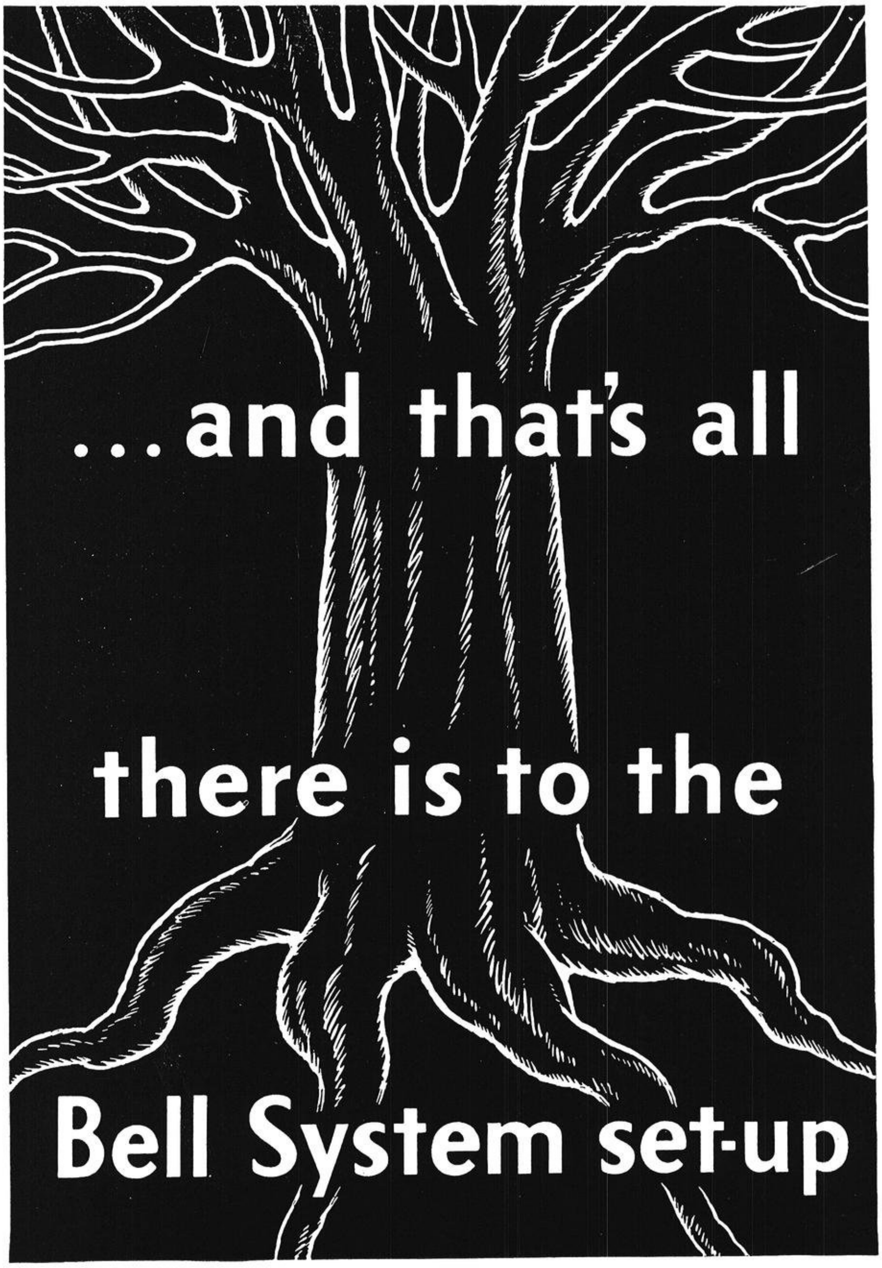
And then there is the Wisconsin Engineer Magazine. There, friends, is something that is a continual draw upon the time and strength of another handful of men. Nor do they receive any kind of pecuniary recompense for their unselfish efforts. They are one dozen; unseen, unsung, and unheard. Polygon stepped in to help the Wisconsin Engineer staff because the staff was given such shabby treatment by the students — treatment of poor support and ignorant indifference, such as the engineering students have given almost every form of activity introdueed into their circle. Just imagine a handful of men canvassing classes, approaching a thousand engineers and pleading with them to make them see the worth of the Wisconsin Engineer, compiling information and writing, getting advertising, writing articles, contacting concerns for articles and advertising, collecting subscription money, gathering bits of news, following the alumni, and finally setting up the magazine at the end of each month! Considering material work alone, you must admit this was a Herculean task. In addition, then, take account of all the mental labors expended in following the tortuous trails of financing, in avoiding an impasse where money and material meet, in solving the innumerable problems with which such a project is encumbered! Indeed, the staff members had to work!

About this time, you can see that, for the men in Polygon or on the Wisconsin Engineer staff, homework and schoolwork have become mere "chores."

Now we are waiting for that insipid question to arise, "Well, then, why do those men work that way?" If that question had been mankind's maxim, there would be no history.

Let us assure you, in closing, that we are not trying to arouse any sort of pity for ourselves. Nor do we want it to be taken that we are martyrs in a cruel world — absolutely not! But we do want it to be clear that we cannot carry out our functions without your complete cooperation. For years, engineers went on unorganized, while the other professions banded themselves together for common

(Continued on Page 19)



THOUGH large, the Bell System is simple in structure. You can think of it as a tree.

Branches: 24 associated operating companies, each of them attuned to the area it serves.

Trunk: The American Telephone and Telegraph Company, which coordinates all system activities.

Roots: Bell Telephone Laboratories and Western Electric, whose functions are scientific research and manufacture; Long Lines Department of A. T. and T., which through its country-wide network of wires links together the 24 operating companies, handles overseas service; Advisory Staff of A. T. and T., which advises the operating companies on all phases of telephone operation and searches constantly for better methods.

Working as one, these many Bell System units enable you to talk to almost anyone, anywhere, any time.

Why not call your folks tonight? For lowest rates, call by number after 7 P. M.

BELL TELEPHONE SYSTEM

THE CRITICAL ANGLE . . .

> ***I disagree with every word you say, but I will defend to the death your right to say it.***
> —VOLTAIRE.

STARTING AGAIN Once more you find yourself about to partake of that sacred feast, the assimilation of knowledge. Certainly, nothing could have been more fitting, both for engineering upperclassmen and freshmen as well, than that very fine talk presented by Mr. E. J. Mehren. That human side of engineering, the thing that seems to be least necessary to the student in the engineering college, was made beautifully clear in that speech. And surely it is time that we start a school year with that view in mind. To elaborate on Mr. Mehren's words in this editorial would be a useless task — almost all the engineering students who crowded into the engineering auditorium took notes, so much were they impressed. For the upperclassmen, then, the opening thoughts for a new semester have already been excellently presented. One of Mr. Mehren's finest statements, one which he himself asked be herein placed, is certainly worth repeating — "All life is a contest; if there is no contest, we make one."

The freshmen we refer to the cover of this issue. It was designed for them. In it appear all the emblems of the various professional societies and national honorary fraternities. Such representation should indicate to the freshman that there are other things in this engineering college besides studies. Phi Eta Sigma has not been included. Too many freshmen have stopped working after receiving the Phi Eta Sigma key — they have thought it an end, when it was only a milestone. That key should impress upon the freshman that he is but on the threshold of a long and hard study. When he has won another honor key, he will know that he has completed the first stages of his study as successfully as one could. And then his life has but begun.

Engineering is a hard study. But life has never been easy, no matter what phase of it was chosen. So, as will every one who has been through the mill, we say to you freshmen, "Plug for all you are worth! And, whatever you do, do well!"

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AN INVITATION This year the **Wisconsin Engineer** celebrates its fortieth anniversary, a record of continuous publication for four decades. Perhaps there have been as many editors and business managers who have taken over the responsibility of making the deadline for copy as well as financial solvency. We pay tribute to those who have in the past "stuck to their guns" when conditions were much gloomier than they are at present; subscriptions were low, the advertisers flown, and perhaps no feature articles in sight for the next issue.

Today we have the support of national advertisers who realize the value of putting their name and policies before student engineers and have confidence in us. The faculty continues to give us their wholehearted support as they have in the past. Through the medium of the Polygon Plan, the majority of the engineers are subscribers to the **Wisconsin Engineer.** But that is not where your responsibility ends. To make this publication a greater magazine and to be of more value to you, it is necessary that all of the students in the college of engineering be considered the staff of the **Wisconsin Engineer.** True, it requires a personnel of about a dozen men to assume the responsibility of getting the magazine ready for the printer, but do not let this inner circle scare you. Let it be your pleasure and duty to contribute as much as you please to make volume forty a milestone in the history of the **Wisconsin Engineer.**

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THE FRESHMAN ANGLE* Many unfamiliar phases of university life and habits instantly attract the attention of one attending a large institution for the first time. Some of them are amusing, some pathetic, and others puzzling to the one thrust suddenly into their midst.

I have been out of school for three years, and upon returning to my studies after so long a period of absence, my viewpoint is naturally colored by the methods of procedure which have ruled the line of business in which I have been engaged. However, I believe, many who have at some time been employed — no matter in what capacity — will agree with me when I say that the first thing one must learn in the business world is thoroughness.

When a foreman or employer assigns a task, he wants the job done well and completely finished. He doesn't want a slipshod makeshift which is seventy, eighty, or ninety per cent right. If the assigned piece cannot be completed in one working period, it isn't to be hurried in order to come as close to finishing as possible when that hurry means that there are flaws in the amount which is supposed to be done. "What you do, do well," is the maxim.

Here at the university there is always the element of time involved in whatever study, experiment, or task on which one is working. For that reason the tendency is to hurry, hurry, hurry. Consequently, sooner or later, one of two methods of study begins to develop. Either the student begins to skip parts, which he considers unimportant, and concentrates on certain portions which catch his eye; or, he gets the hopeless feeling that, no matter how much he succeeds in doing, there is always more to be done than he can accomplish. Therefore, he starts to slacken the pressure of study from sheer discouragement.

The former case is, in the long run, the better. There are, at least, some certain parts, of which he is sure. In the

**Submitted by a freshman in reply to current advice.*

latter case the man tries, so to speak, to live by his wits. He acquires the knack of making out that he knows more than he does, and of using any means, fair or foul, to "get his marks."

I realize that the university is no place for sluggards and men who are unwilling or unable to work under pressure. However, I do believe that the ideas of thoroughness, and of confidence in one's knowledge, should be emphasized to a much larger degree than they are.

If the desire of the university is to show its students where to find facts and data needed in their future occupation, well and good. However, if its idea is to instill that knowledge in them, it should be put in firmly and solidly so that it won't leak out.

Whether a man is developing a formula, winding an armature, installing a machine, shoring a tunnel, or building a bridge, accuracy is required. The calculations and construction must be either right or wrong. There can be no work turned in which someone thinks, "ought to do."

Here, then, is the kernel of the argument which I am presenting. The university spirit is—cover as much ground as possible—when it should be—cover as much as you can do thoroughly and completely.

At some time, in one way or another, all of us have earned varying amounts of money. Think back to those days when you were working. Was not the man who gave a definite, correct answer to a question, or who turned in thorough, reliable work the one who was looked up to as a leader and was the one to whom responsibility came?

We all want to get ahead, after graduation, and earn good salaries, but no man can do either without occupying a position of responsibility. However, no employer gives responsibility to a man whose work he can not trust. Therefore, when the temptation comes to do half the lesson or part of the experiment, remember that the question asked by the men who supply the pay checks is not, "How much of a showing did he make?" but, "What is the quality of the work he turns out?"

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WISCONSIN ENGINEERS TO BE REGISTERED

The examination and registration of "professional engineers" in Wisconsin is provided for in a legislative Act signed by Gov. Phil La Follette on September 5. A previous Act, passed in 1935, provided for the registration of civil engineers. Under the amended law, any person practicing or offering to practice professional engineering must qualify before an examining board and be registered.

The amendment was secured through the activities of the engineers omitted under the previous act. The mechanical and electrical engineers came to the conclusion that they needed registration. The registered civil engineers were willing for the law to be amended, being animated chiefly by a desire for professional solidarity.

Six states, Connecticut, Maine, New Mexico, Oklahoma, Utah, and Washington, were added this year to the list of states that provide for the registration of engineers. There are now thirty-four states in that group. The movement toward nation-wide registration is almost complete, so that the question no longer is: Shall we have registration? Now it is: What sort of registration shall we have?

The college graduate must show, in Wisconsin, three years of professional experience in addition to his diploma before he is eligible for examination by the Board. Up to the present time the Board has not required a written examination if the applicant is a graduate engineer.

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The university is at once society's organ of conservation and its origin of criticism. It must conserve the golden heart of the great traditions in which the race distills the wisdom of the centuries and gives expression to the truth mankind has hammered out on the anvil of experience. But the university must also blaze trails into the future. It is this quality of its role that propels the university into rough seas when society runs into a phase of social uncertainty. In normal times this dual role of the university is little questioned. But when old truths they prize are in danger, men tend to fear the search for new truths. And while this fear is in the ascendant they tend to forget the obligation to discover, upon which progress depends, and to stress exclusively the obligation to defend, upon which stability depends. — **Glenn Frank**

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. . . A man that is young in years may be old in hours if he has lost no time . . . And yet the invention of young men is more lively than that of old; and imaginations stream into their minds, better and, as it were, more divinely. — **Francis Bacon**

Bachelors of Science . . . *Engineering*

Class of '35

CHEMICALS, 1935

BLACK, R. G., is working as temporary consulting chemist with the Parma Dye Company of Madison.

GRANGE, RAYMOND A., found a position with the Illinois Steel Company located in Chicago.

McCAULEY, HARRY; GAY, WILLIAM; WINK, KENNETH; and **KNAKE, ROBERT,** are all employed by the Kimberly-Clark Paper Company.

GINSBERG, SAUL, had a job for the summer.

GAPEN, CLARK C., has a position with the Corn Products Refining Company at Argo, Ill.

JANETT, LESLIE G., received employment with the Ross Engineering Company (Consulting and Sales Engineers) of Chicago.

MORRIS, PHILIP, is with the Morris, Windmuller and Enzinger Advertising Agency located at Chicago.

SCHAPER, RALPH, '35, has obtained employment with the Sivyer Steel Company of Milwaukee.

SCHINK, NORBERT F., works for the Chromium Corporation of America in Chicago.

SMART, JOE, has returned to take Sanitary Engineering.

MECHANICALS, 1935

ALBERT, HAROLD R., is back in school this semester, studying law.

AMUNDSON, R. H., has a position with the Louis Allis Company of Milwaukee.

BARNEY, EDWARD B., came back to school this semester.

BECHTEL, FREDERICK J., is also back in school.

FOSTER, ARLAND G., received employment with Gisholt's of Madison.

JASPER, CLETUS L., works for Kimberly-Clark at Neenah.

KNISKERN, C. BRADFORD, is employed by the Northwest Engineering Company of Green Bay.

KRAEMER, IRVING R., is with the Allis-Chalmers of Milwaukee.

McMAHON, WILLIAM R., enrolled for graduate work.

MEADE, WILLIAM W., obtained a position with the Deere Company of Rock Island, Ill.

MUSOLF, CLAUDE E., is in the employ of Gisholt's at Madison.

NEWBURY, ALLAN H., is working for the Northwest Engineering Company at Green Bay.

PHARO, JOHN O., works for the Pharo Heating Company in Madison.

ROBERTSON, ALEXANDER F., is in the employ of Fairbanks-Morse of Beloit.

QUINN, CHARLES J., has employment with the People's Gas, Light & Coal Company of Chicago.

VAN RYZIN, WILLIAM J., cast his lot with the U. S. Marines.

ZIEN, BURTON, is located at present down in Knoxville, Tenn.

METALLURGISTS AND MINERS, 1935

HAVARD, JOHN F., is employed by the U. S. Gypsum Company as geologist.

HORTON, WILLIAM H., sails from New York this month for Tupiza, Bolivia, S. A., where he will be employed as junior mining engineer by the Aramayo de Mines en Bolivia Cu, a subsidiary of Kennecott Copper Corporation.

MOOG, HUBERT, is metallurgist with St. Louis Spring Company.

MULLIN, ELI, has a position in the metallurgical department of the Illinois Steel Company at Chicago.

LIBERT, WILLIAM B., is assistant metallurgist with Hubbard Steel Co., East Chicago, Ind., a subsidiary of Continental Roll and Steel Foundry Company.

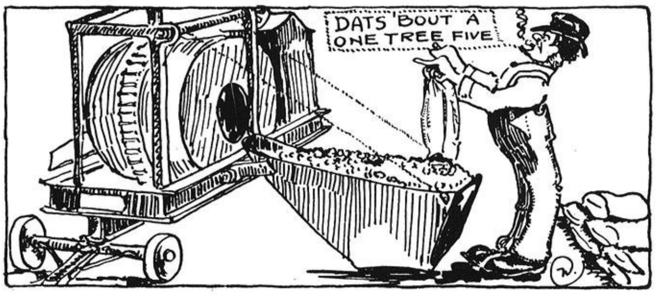
SCHULTZ, ROBERT F., is with the Peru Mining Company at Deming, N. M. Schultz has been assisting in the erection of a Curtis four stage turbo generating station at Deming since his arrival there.

WILLOUGHBY, ROBERT A., acts as ore dressing chemist for the Eagle-Picher Company at its Montana Mine at Ruby, Ariz.

E. E., 1935

BENNETT, R. M., is back at school doing graduate work.

BOESEWETTER, C., has a position as teacher in the Milwaukee School of Engineering.



BRITZKE, L. A., found employment with the American Can Company of St. Louis, Mo.

FORBES, S. S., works for the Northern States Power Company at Eau Claire.

FRANK, E. R., is with the French Battery Company of Madison.

JAMES, E. W., received employment with the Wisconsin Public Service Corporation at Green Bay.

JANSKY, M. M., is continuing his schooling by entering the Law School.

JONES, R. D., is back in school for the first semester.

KASKA, ROBERT, acts as salesman for the Chicago Electric Company.

MALLORY, R. R., is employed as a Transmission engineer for the A. T. & T. Company of Madison.

NELSON, ROLLAND, serves as student engineer at Line Material Company of South Milwaukee.

POAST, L. M., obtained employment in the engineering department of Jansky and Bailey, National Press Building, Washington.

ROLLIS, R. T., is an aviation cadet with the U. S. Naval Reserve at Pensacola, Fla.

TANG, C. K., has a position as assistant engineer with the Canton Power Company, Canton, China.

TIETZE, M. W., is working for Hornishteger Corporation of Milwaukee.

TOM, A. Y. C., has employment in the Government Testing Laboratory of China.

VOLLENWEIDER, JR., A., is taking graduate work at the University.

ZIMMERMAN, J. A., obtained a position with the Kimberly-Clark Company at Neenah.

CIVILS, 1935

ACKERMANN, WILLIAM C., is in the engineering department of Kimberly-Clark Company at Neenah, Wis.

AMUNDSON, CARL H., obtained employment in the Soil Conservation Service.

BIDWELL, LAWRENCE E., acts as technical foreman in the S. C. S. at West Salem.

BRINKMAN, LORIS B., works for the S. C. S. at Platteville.

BUSH, WILLIAM L., is instrumentman with the Wisconsin Highway Commission at Green Bay.

CARDINAL, ALTON L., has a position in the bituminous laboratory of the Wisconsin Highway Commission at Madison.

DONALDSON, JAMES R., received employment with the Highway Commission at Madison.

GFALL, GEORGE J., is with the Highway Commission at Eau Claire.

GILBERT, THOMAS L., sells insurance in Madison.

GOELZER, VERNON G., works for the Works Progress Administration at Stevens Point.

GOLLNICK, ALBERT J., is with Allis-Chalmers at Milwaukee.

GRADT, EUGENE W., found employment in the bridge department of the Highway Commission at Madison.

HALVERSON, GERRY M., acts as surveyman with the W. P. A. at the Transient Camp at Mather, Wis.

HART, WILLARD H., works in the bridge department of the W. H. C. at Madison.

HOLWAY, ORLANDO G., is doing appraisal work at St. Paul.

HOSIG, IRWIN B., is working with Bureau of Reclamation at Denver.

HUZARSKI, RICHARD G., is in Canada awaiting an opportunity to return to the U. S. on the quota from Poland.

JONES, ROBERT G., found employment with the Kohler Company.

KNEEVERS, VICTOR A., assembles radios in Sheboygan. He has a daughter, Victoria Ann, born late in August.

KRONE, ROBERT H., works for the Highway Commission in Madison.

KUMMER, MILTON F., has a position with the Kohler Company.

KURTH, JAMES A., has employment in the sales department of the National Cash Register Company at Sioux City, Ia.

La CHAPELLE, HARRIS A., has been sick.

LAURGAARD, GLENN O., is working on the All-American Canal in the testing laboratory at Yuma, Ariz.

LINDNER, NORMAN J., acts as stenographer in the engineering department of the Johnson Service Company at Milwaukee.

MAURER, EDWARD J., is touring in Alaska. He plans to return about the end of the year.

MEYTHALER, HAROLD E., spent the summer as engineer for the contractor on the Madison-Middleton Road. At the end of that job he joined the staff of the W. H. C. at Madison.

MILLER, FRANK A., serves as junior engineer with the S. C. S. at Coon Valley.

NERODA, EDWARD K., acts as technical foreman with the S. C. S. at Durand.

NIEDERER, EDWARD, was sanitary engineer for a pea canning company during the packing season. No later information available.

OLDSTAD, ORVILLE A., entered the Naval aviation training course.

PAPE, VICTOR G., is with the S. C. S.

PRICE, REGINALD C., spent the summer building a swimming pool near Wheeling, W. Va. Is now tending store in Madison for his father, who is sick.

REE, WILLIAM O., is draftsman for S. C. S. at La Crosse.

SCHIPPOREIT, GEORGE P., went to Fort Sheridan in June for active duty as 2nd lieutenant in the C. C. C.

SHOREY, ROBERT E., acts as foreman in the S. C. S. at Highland.

STANEK, EDWARD R., has no work as yet.

STERBA, WILLIAM J., has a position as junior foreman with the S. C. S. at Viroqua.

SUTTON, MICHAEL F., after going to the West coast with the crew in June, went to work in the office of the W. H. C. at Green Bay.

TRESTER, HAROLD C., works for the W. H. C. at Green Bay.

VILLEMONTE, JAMES R., is senior engineering aid with the W. H. C. at Lancaster.

WERNISCH, GEORGE R., holds a scholarship at Lehigh University at Bethlehem, Pa. He is doing research work for the Concrete Reinforcing Institute.

WERNER, MAX A., is with Mead, Ward and Hunt of Madison.

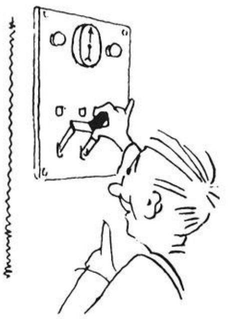
WEST, PAUL H., found employment in the bridge department of the W. H. C. at Madison.

ZACK, JOSEPH W., is on the invalid list.

ZIEHLSDORF, ERNEST R., works in the office of the W. H. C. at Green Bay.

"STATIC"--

***By* ENGIN EARS**



● Mr. Kelso will tell you of how, the other day, a couple of "dumb mechanicals" tried to make current flow through an open switch. But have you heard how Koller had water running into and out of a condensate tank during a test run of a steam turbine?

»» ««

● Humor has it that Dave, the driver of the one and only "W" car (you know, the red model T with the white W's on the sides), attempted passing a big Olds the other day. A local garage reported a wreck of a wreck a few minutes later. However, undaunted Dave and his car are functioning again. Since the "red peril" has also earned a parking ticket, it would seem wise to repaint the car — red is rather dangerous.

»» ««

● If any of you E. E.'s were wondering how Joe Rice gets his good grades, you may be interested to know that his secret is a private "concentration compartment." It's a small hole in the wall provided with a lamp, and it is just big enough for Joe, a typewriter, and a book.

»» ««

● Van Vleet, the notorious M. E. 4 of Kappa Sig and Stanley Steamer fame, found himself swaying luxuriously around corners in his car (not a steamer) after the South Dakota game. This time, the buggy was harmlessly overloaded with scrap iron. Van got a ticket the last time it was overloaded.

»» ««

● The lawyers evidently fear an invasion of their stronghold. Last Wednesday night about forty of them were stationed in the Law building as late as 8:30 p. m. under the pretense of holding a class.

»» ««

● When Harry Wells, sophomore chemical, called for his date to go to 770 Club opening, he found, much to his chagrin, that she had moved during the summer. A telephone call soon located her on the opposite side of town. Armed with this information, Harry and chauffeur (Taxicab - 10c) proceed to destination after seeing the city, only to discover that both have forgotten the address. The remarkable mind of the cab driver suddenly remembered that it was in the 1000 block on Sherman Avenue. As Harry was pushing the nth door-bell, the girl friend inquires from the porch two doors away, "Were you looking for me?" Harry, you will have to do better than that when you take Organic Chemistry.

● In S&G 105, Tom Murphy and Herb Stuewe were overheard arguing about who was putting the other through school. Since they help each other so much, even G. L. Larson was unable to settle the question.

»» ««

● Unbeknownst to her, the new office girl in the M. E. Building was interviewed the other day.

Upon being asked how she liked working in the engineer office, she replied, "Swell." She hastened to add, also, that this was her first month's anniversary at the job. She cleverly evaded making a direct answer to the question of how she liked engineers by replying, "Oh, well, I guess I have to like them."

In the interest of some of the boys who have been seen in that office much too often, the following information is herein conveniently compiled. I think the faculty have most of it already. Her name is Margaret Lindergren. Before working for the engineers, she worked for five years in the vocational office in the Capitol Annex. She liked the job immensely, but was frightened into accepting her present position by the fact that every office girl in her office got married within three weeks' time.

It might interest you to know that Polygon is very much concerned about her. You see, one of the Polygon collectors was given a dollar by a Mr. Lindergren — the Polygon man heard him remark that his sister was losing another dollar. In their fight for fair play, Polygon is at a deadlock about whether to award her an activity fee card or not. 'Twas a sorry day for Polygon that two women entered the engineers' sacred territory.

»» ««

● Among the anti-apple polishers is Jerry Stanick, who made the break of asking Prof. Kelso why mechanicals had to take E. E. The answer was too sad to relate.

»» ««

● Found in the main Engineering building, one freshman pocket note book. Contents:

Six fraternity rushing invitations.

The name and addresses of several coeds. One, in particular, was interesting. It read: L. H.* (we don't know what the * is for) Aunt Emery Hall, fair, not so good looking, good dancer.

Remedy for colds: One glass of water every half hour, two aspirin every three hours for two days.

A rough sketch of an anvil and an explanation of how to hit things on it.

Number of cigarets smoked after breakfast—11.

Item in expense account: Kleenex 15c (he should try his own remedy for colds).

And a few, a very few, class assignments. This younger generation . . . tsk, tsk!

The City Service Power Prover

(Continued from Page 6)

tion losses are equal in each. The cells are placed in a Wheatstone bridge circuit as shown in Fig 2. The resistance of the platinum wire varies directly with its temperature and the temperature of the wire in turn varies directly with the rate at which heat is carried away by the surrounding gases. With air passing through the active cell the current through both cells will be equal. However, when the unknown sample of exhaust gas is introduced through the active cell, the burning of the gases at the surface of the platinum wire increases the resistance of the wire proportionately. The millivoltmeter in the balance arm of the bridge circuit is calibrated to measure this change in resistance in terms of combustion efficiency.

Referring to the rear view and diagram of the panel (Fig. 3), the exhaust gas is drawn under suction supplied by the first stage of the duplex pump up through the cotton in the gas filter where it is cleaned. It is then pumped positively into the pressure equalizing chamber in the qualitative orifice block. This chamber is vented to the atmosphere at the rear through a port sufficiently large to establish atmospheric pressure within the chamber. This feature makes the instrument independent of pressure fluctuations in the automotive exhaust. A portion of the gas sample then passes through the gas orifice which measures a definite amount of gas. At the same time air is being drawn under suction through the cotton in the air filter. Here it is cleaned and then drawn into the orifice block where it is measured by the air orifice in a three to one ratio to the gas with which it mixes in the mixture chamber. The pressure of the air-gas mixture is then raised after passing into the second stage of the duplex pump. The mixture then passes into the quantitative orifice block where a relief valve maintains a constant pressure of ten inches of water to the inlet of the quantitative orifice. The quantitative orifice passes a constant quantity of air-gas mixture through the active cell of the analyzer. Here, as explained previously, the analyzer measures the exhaust gas heat in terms of combustion efficiency.

A 110 volt-60 cycle A. C. motor is directly connected to a D. C. generator. The generator supplies a line current of 1.1 amps at 11 volts. The ballast lamps keep the current flow at a constant value.

In operating the panel, the procedure followed is to first allow the panel to run on air for a few minutes. The meter pointer is then adjusted to read exactly 100 per cent combustion efficiency by manipulating the zero adjuster. When the operator is satisfied that the bridge circuit is balanced he places the sampling tip of his sampling hose into the exhaust pipe of the engine to be tested. Within thirty seconds he reads the combustion efficiency at which the engine is operating. He therefore has at a glance analyzed the efficiency of the prime function of an engine, its ability to use effectively the heat supplied. The next step is to correct faulty conditions referring to the Power Prover as a check on the results of the adjustments made.

Alcohol Blends for Motor Fuel

(Continued from Page 4)

ethylene. However, the present price of corn is about thirty-five cents a bushel, and is expected to rise to about fifty cents by the time a plan for the use of power alcohol actually gets under way. Therefore, the cost of anhydrous alcohol from corn would rise to thirty-five cents a gallon, and on the surface would seem to need some artificial aid, such as differential taxes or a specific law stating the source of the alcohol to be used in the blends to enable it to successfully compete against alcohol made from either molasses or ethylene. Since molasses is a necessary by-product of the sugar industry, its price is set by that which the alcohol industry will pay for it and so will tend to stay low. However, more than ninety per cent of the molasses used in the alcohol industry is imported, and so a tariff could effectively control the competition from molasses. There is still the synthetic alcohol, made from ethylene from the gases produced in the process of making "cracked" gasoline, that could be obtained more cheaply than alcohol from fifty cent corn, although the total production from this source is limited, in addition to requiring a large amount of capital to develop the industry.

This is not the total picture, since no consideration has been made of the possibility of utilizing by-products from corn or grain alcohol to offset the cost of the corn and of processing. The common by-products that could be obtained are corn oil, high-protein stock feed, and carbon dioxide. If the present prices for these products could be maintained, it would be possible to earn as much as twenty-five or thirty cents per gallon of alcohol produced. The additional amount of these products that would flood the market would undoubtedly lower their value, and so it is estimated that probably the largest amount that could actually be realized would be about fifteen cents per gallon of alcohol. Thus it is quite conceivable that alcohol made from corn or other grains could be made as cheap or cheaper than that made from any other source, even without the artificial aid which at first sight seems necessary.

There is a new process of manufacturing absolute alcohol that is claimed will cut the production costs to a new low figure. It is called the Arnstein (after its founder) continuous mold fermentation process, and is in use in Argentina, Germany, and Cuba at the present time. It is claimed that this process can utilize any starchy raw material and will produce sufficient by-products, principally carbon dioxide and high protein stock feed, which on paper, at least, will more than offset the cost of the raw material and production costs, yielding anhydrous alcohol as a waste product that could be given away without any loss. In addition, this process is more efficient than the ones used at present in converting the raw material to alcohol. Inasmuch as the present capacity is not large enough to take care of the additional demand that would be placed on the alcohol industry if the alcohol blend law is passed, it would be possible to build the new plants so they could use this cheaper and more efficient process.

The use of a three per cent blend would demand 450,000,000 gallons of anhydrous alcohol, and since the excess of present capacity over demand is under 150,000,000 gallons, it is seen that it would be necessary to build new plants capable of producing 300,000,000 gallons of alcohol a year. This would necessitate the investment of a large amount of capital. Before this would be done, the government would have to insure, at least to a fairly certain degree, the future of the industry and make the use of alcohol a permanent proposal and not just a temporary farm relief measure. Only if continuous operation over a large number of years could be expected, would it be possible to get private capital interested in the industry and to make investment of the necessary money a wise move.

The cost of a new plant has been estimated by various persons to range from sixty to one hundred and fifty dollars per gallon of daily capacity, with ninety-five dollars a fair average for plants of 25,000 gallons daily capacity. The erection of the twenty-seven such new plants needed to supply the additional capacity would therefore cost sixty-six million dollars, and the conversion of present plants so as to make them capable of producing alcohol from farm products would cost an additional fourteen million dollars, or a total of eighty million dollars to get the new industry started. This figure could be reduced by the erection of larger plants, but the additional cost of shipping the corn or other farm product that is used to make the alcohol would more than offset the saving effected by erecting the larger plants. Furthermore, these plants would, once they were running, employ some twenty-seven thousand men, use 1,400,000 tons of coal per year, and create thirteen million dollars' worth of freight each year. Thus there would be many other people besides the farmers that would benefit if the program compelling the use of alcohol in gasoline is accepted.

This brings up the question of just how much the farmer will really gain, as he is the one whom the plan is primarily intended to benefit, and who will pay the bill. If corn alone was used to produce enough alcohol for a three per cent blend, it would take about 180,000,000 bushels a year. Since the total market corn, exclusive of inter-farm trade, is approximately 200,000,000 bushels although the total production is over 2,500,000,000 bushels, this increase in demand is expected to raise the price of corn by twenty per cent. This estimate takes into account the fact that under such a program the amount of corn sent to market and the acreage raised will both be increased, which will, in turn, reduce production in other lines of farm products and so increase their prices. This would spread the benefit out over a large number of farmers, and give them increased buying power which would benefit all industries including the petroleum industry. As a matter of fact, this new planned industry might be just the push needed to put business back to real prosperity. Several people, including the president of the Barnsdall Oil Corporation, have stated that they believe the increase in the farmers' buying power alone will pay for the cost of the alcohol put into the gasoline, and the other benefits that would be obtained would be pure gain.

The blending of three per cent of alcohol with the gasoline would only increase the price of the motor fuel about 0.75 cents per gallon even if the alcohol cost thirty-five cents a gallon, but from 0.40 to 0.60 cents a gallon would be made up by the increase in value due to higher anti-knock rating and increased volatility. The remaining cost would be paid by the gasoline consuming public, but it would be only a slight extra charge, much lower than any of the other taxes carried by gasoline. If the alcohol was produced at twenty-five cents a gallon, as it can well be expected, the increase in value of the motor fuel will pay for all of the cost of the added alcohol and thus really not be a direct tax on the motoring public at all. Economically, the blending of alcohol with gasoline would be a benefit to the country if the program is made permanent so that it would pay to invest the capital necessary to finance the new industry.

Although the political difficulties that must be overcome before the plan becomes effective are not so tangible, they present the real, immediate obstacle that must be hurdled. The petroleum industry, which is very large and powerful, as a whole, opposes the plan, although some of the oil companies are now swinging in favor of the program. It is from this quarter that most of the opposition to a bill requiring the use of alcohol in the gasoline will come. The plan has a great following, and if Congress has time to consider such a bill, there is a good possibility that it will be passed. Great care must be taken, though, in the drafting of such a bill, as it would very probably be declared unconstitutional and void if it boldly seems to subsidize one group at the direct expense of another.

All in all, the blending of alcohol made from farm products with gasoline to be used as motor fuel has many points in its favor, and since there are really no insurmountable obstacles, it is quite possible that the plan will become a reality in the future.

You and We

(Continued from Page 10)

causes. The engineer has both taken and been given too much credit for his intelligence, for only in recent years has he come to the realization that combined effort is a necessity, a thing that had been going on around him for years.

Gentlemen, we need that combined effort. We want a conscious and intelligent participation. It is just as bad to get an activity fee card without spending time to recognize its significance — we repeat, that is just as bad as sulking away from what is open to you and remaining in the hebetude and lukewarmness that has thus far shamefully pervaded the entire situation. Like a professor striving to enlighten and broaden the student's mind, we beg of you to act the part that you profess to play, that of an educated man. "An educated man looks at all propositions objectively." Therefore, we want you to critically examine the Polygon Plan from a completely detached perspective. All we ask is that you but look, for we are certain its inherent goodness and sensibleness will, if you are a reasoning animal, lead you to help along — that is the participation which we ask.

CAMPUS ORGANIZATIONS

TAU BETA PI

At the meeting of Tau Beta Pi, Monday, October 7, Luna Leopold was elected to represent the local chapter at the National Convention to be held in Detroit, Mich., October 10 to 12, inclusive.

The officers for this year include: President, Earl Senkbeil; Vice President, Luna Leopold; Recording Secretary, Roland Hertel; Corresponding Secretary, Donald Gordon; and Treasurer, Tom Williams.

At the next meeting it is hoped that Luna will have some interesting tales to relate about his trip to Detroit.

PI TAU SIGMA

Pi Tau Sigma held its first meeting of the year on Tuesday, October 8. The main topic of discussion was the purchasing of furniture for the study room in the new Mechanical Engineering Building. Gross and Cadwell were appointed a committee to buy the new furnishings. The room will be decorated in a modernistic trend consisting of steel tubing furniture with leather cushions. From time to time more articles will be added to the room, including lamps, pictures and books.

CHI EPSILON

At the meeting of Chi Epsilon, it was announced that an Engineering Handbook would be presented to the freshmen of last year who made the highest average for the year. The name of the winner will be given in the next issue of the Wisconsin Engineer.

MINING CLUB

The last meeting of the Mining Club was held just before the close of the school year, in May. Officers were elected for the coming year, as follows: President, Gilbert Nieman; Vice President, Wayne Hunzicker; Secretary, Frank Bemis; Treasurer, Harold Grange; Activities Chairman, Thomas Ockerhauser; and Polygon Representative, Clifford Brooks.

It was decided to inaugurate departmental luncheons at which Juniors and Seniors of the school would attend, held at the Beefeaters Room of the Union, Tuesdays at 12:00 noon. So far, these luncheons have proven interesting and enlightening.

ALPHA TAU SIGMA

The annual banquet of the Wisconsin Engineer staff and board of directors was held under the auspices of Alpha Tau Sigma, honorary technical journalism fraternity, on the 28th of May, last. Before the banquet, eight men were initiated into the fraternity, and it is only fitting that their names be recorded here:

Leo Nikora	John Smithwick
Tom Williams	Ernest Ziehlsdorf
Burton Zien	Herbert Wilson
Harold Albert	Howard Holm

At the next regular meeting, officers were elected for the ensuing semester; George Cook was elected president, and Leo Nikora was elected secretary-treasurer. At the present time the national secretary of Alpha Tau Sigma is corresponding with the other active chapters for expansion program and convention following the E C M A convention at Philadelphia this week.

E C M A Convention Meets This Week

This year Engineering College Magazines, Associated will hold its annual convention in Philadelphia on the 16th and 17th of this month under the auspices of the Pennsylvania Triangle. The majority of the twenty-five member magazines will be represented when roll call is taken to begin a discussion of the editorial and business problems confronting a student engineering publication. Various activities have been planned for the visiting editors and business managers, the highlight of the program being the concluding banquet with Mr. Philip W. Swain, editor of Power, as speaker of the evening. George Cook, editor, and Tom Williams, business manager, will represent the Wisconsin Engineer at the convention.