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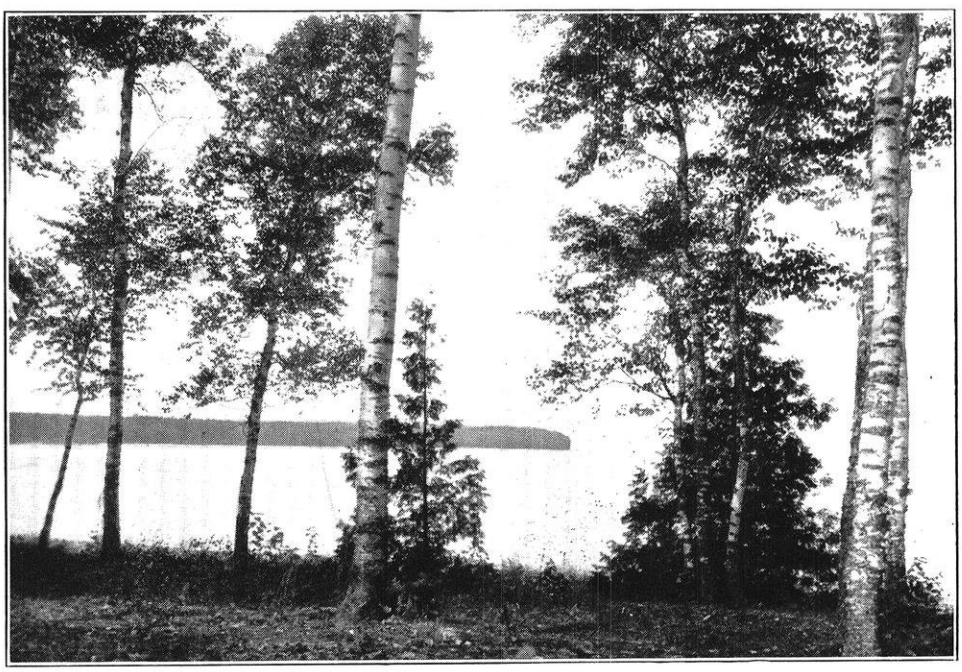
THE WISCONSIN ENGINEER



« MEMBER »
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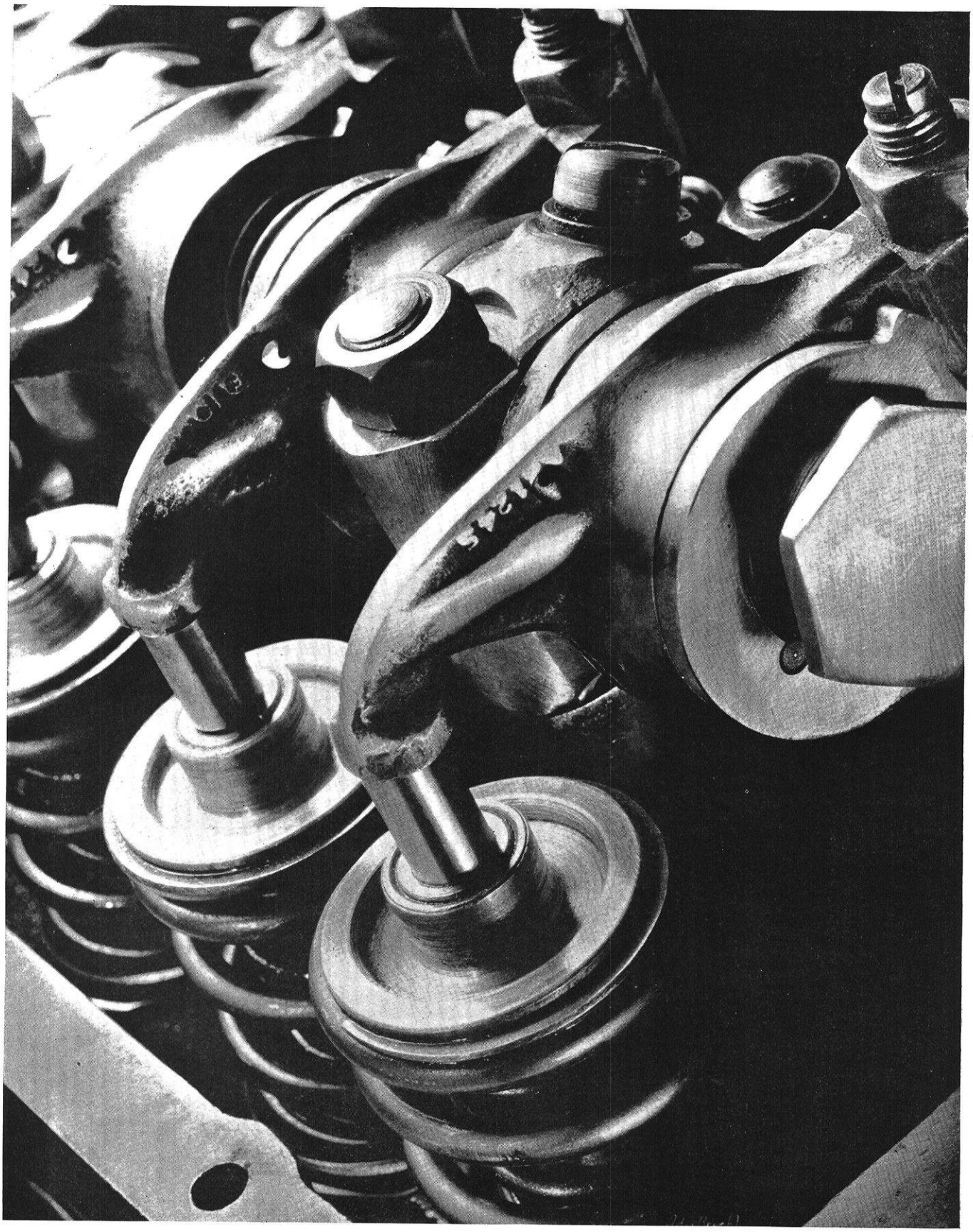


—*Courtesy Metal Progress.*

STUFF THAT MACHINES ARE MADE OF

The Wisconsin Engineer

VOLUME 38, NO. 1 OCTOBER, 1933

Recent Development in the Utilization of Gas

By A. J. Huegel, ch'22*

IT IS rather a wide step from the discovery of the "wild spirit" in 1609 by John Baptist Van Helmont in Brussels to the servant of today which cooks our meals, heats our homes in winter, and cools them in summer, and does the thousand and one things in industry which makes first quality mass production possible. The romantic story of the first inception of gas in Baltimore for street lighting in 1816 to its growth as one of our major industries with an investment of over $4,000,000,000 is too long to incorporate in this article, so we will confine ourselves to the latest developments in the use of gas in industry and in the home.

Manufacturers were quick to grasp the advantages of this fuel. The real impetus to the use of gas in industry came with mass production. Mass production calls for straight-line continuous production. This means that operations cannot be held up due to heating processes which in former times were always bottle-necks, due to circumstances beyond control of the operators. Today, with modern furnaces, work can be scheduled to fit any straight-line production, and modern gas furnaces with temperature and atmosphere control will turn out uniform, quality products hour after hour and day after day.

One reason for effective close temperature control on gas furnaces is due to the fact that the control mechanism can be made throttling instead of full off and on. In other words, there are a vast number of settings obtainable so that an effective balance can be maintained which enables an almost straight-line temperature chart in many types of furnaces. In fact control can be made so close that it is second to none.

One of the newer members to the family of gas furnaces is the continuous gas carburizing furnaces. By the use of this furnace a high carbon case is formed on steel which stands exceptional wear, while the interior or core of the metal remains tough and takes the shocks to which subjected in use. Until a little over a year ago all this work was done in batch type furnaces with the inherent high labor cost and non-uniformity of batch type operations as well as, in many cases, very disagreeable working conditions.

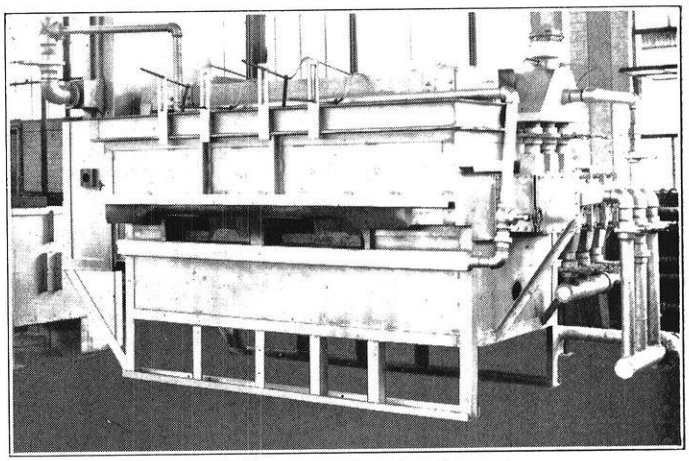


FIG. 1.—*Diffusion combustion forge furnace.*

In this new furnace, work is placed on trays or racks loaded on one end, passed through the furnace in an alloy muffle, and is discharged at the other end at a predetermined rate. A certain amount of CO_2 gas, produced by a gas burning unit separated from the muffle heating burners (for closer control) is mixed with a hydrocarbon gas and this mixture flows through the muffle with the work and in the same direction. There are three distinctive reaction zones in the furnace. In the first, or preheat zone, the hydrocarbon gas breaks down into hydrogen and carbon, the latter depositing on parts to be treated. In the next zone the temperature is somewhat higher, about 1650 degrees F where the carbon dioxide reacts with the carbon on the surface of the metal forming carbon monoxide. In this form, the carbon monoxide is very efficient in combining with steel. This reaction continues progressively until the last or diffusion zone is reached, where atmosphere control makes the atmosphere inert so that no further reaction with the steel can take place, while the carbide just formed diffuses from the case inward to the core.

*Industrial Engineer, Milwaukee Gas Light Company.

The practical advantages of this furnace process from the standpoint of positively controlled processing, are the saving of floor space over batch methods, and the decrease in labor and initial cost per unit of capacity, all of which earn this furnace a high place in line production.

Another process for producing hard wearing surfaces on steel parts is known as nitriding in which ammonia gas is dissociated in the presence of steel at elevated temperatures. This has been done largely in batch type furnaces, but in the recent development of a continuous furnace for this work, the time required for the process has been reduced to below one-half for batch type furnaces with great savings in ammonia and in the improvement in uniformity of the work.

The cry for lower costs by manufacturers has brought about the development of furnaces for the treatment of metals in which the surface of the parts heated should remain unchanged by the heating process. This includes ferrous and non-ferrous metals. In other words, if scaling can be prevented, parts can be machine finished before hardening and subsequent pickling or cleaning operations can be eliminated. This is done in recently developed furnaces in which the atmosphere is controlled. Bright annealing of ferrous and non-ferrous metals, bright hardening of steel, brazing, deoxidizing, scalesless heating of steel for forging can all be accomplished in this type of gas furnace, which are either of batch or continuous type.

The past year has seen much development in the diffusion combustion burner. In this type of burner there is a stream-line, nonturbulent or laminar flow of gas from the burner which can be made to blanket the metal to be treated so that it is possible to heat polished steel to 2400 degrees F without scaling. Fig. 1 is a typical example of a large diffusion combustion slot forge furnace in which the gas blanket is utilized to produce absolutely scale-free work required by modern press forging practice. This type of heating offers a great saving in die expense and a saving in steel by virtue of producing scaleless work. Fig. 2 shows a continuous walking beam furnace. Diffusion combustion has been applied to many furnaces of this type. Some of the newer applications of this type of gas combustion are on glass furnaces, cement kilns and bloom heating furnaces in steel mills.

Another type of heating which has lately become very popular is that known as convection heating by recirculation. With this type of equipment gas is used to heat large quantities of air outside of the oven or furnace through which the work passes. This is used efficiently where temperatures are below about 1200 degrees F. The air is drawn into the recirculating heater either by suction or pressure where it comes in contact with the hot combustion gases and is rapidly heated. The heated air is then forced through the oven or furnace by use of a fan and gives up part of its heat there. It is then passed through the heater to be reheated and the cycle is repeated. Fresh air may be admitted to the system in such quantities that are necessary to maintain proper processing conditions in the oven or furnace. Perhaps the largest field of use for this type of heating is in the japanning field. It is successfully used in many drying processes, in the baking industry, in the steel treating industry for drawing operations, and its field of use is growing rapidly.

In the domestic field, the developments, while probably not as spectacular as in the industrial, have been just as progressive and pioneering. The heating of homes with gas has become a standard method and is growing in popularity by leaps and bounds, because it meets with the modern conception of true convenience. Along with this has marched winter air conditioning because of its adaptability to certain types of gas heating plants. The application of summer air conditioning to whole residences with gas heat energy is one of the developments which is at present in the pioneering stage and is being worked on by research groups of the American Gas Association, several equipment manufacturers, and gas companies. This is literally residence cooling.

There are at least seven possible methods whereby gas heat energy can be converted into a summer gas cooling effect, and each can be interpreted by a number of mechanical systems The most common method is known as the Silica-Gel absorption method. In this system the air is taken from the rooms of the residence, passed through a container filled with Silica-Gel where the moisture is removed to predetermined degree, due to the high absorbtive capacity of this material. The air is then cooled by passing through water cooled coils to the desired temperature, passed through an air filter and then returned to the conditioned areas, the same ducts being used that deliver heated air in the winter time. When the Silica-Gel has

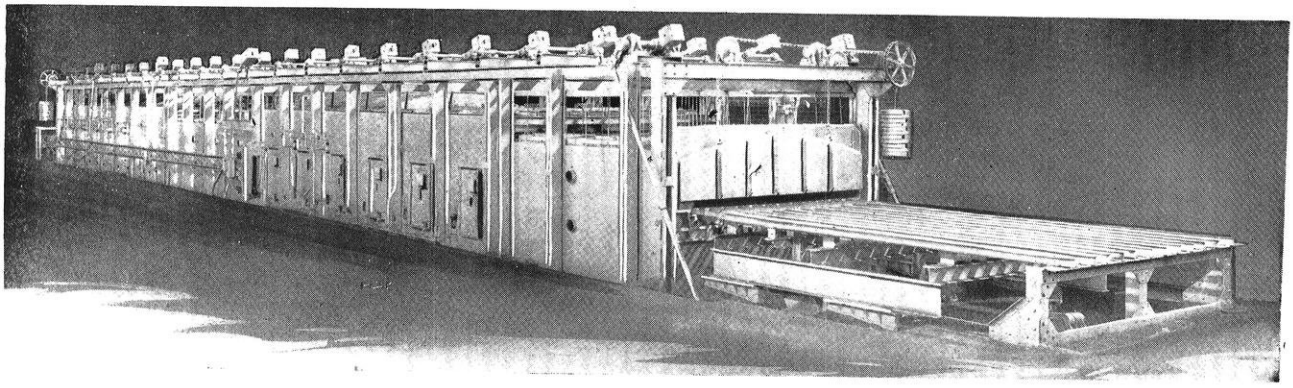


FIG. 2 — *Continuous walking beam furnace.*

(Continued on page 9)

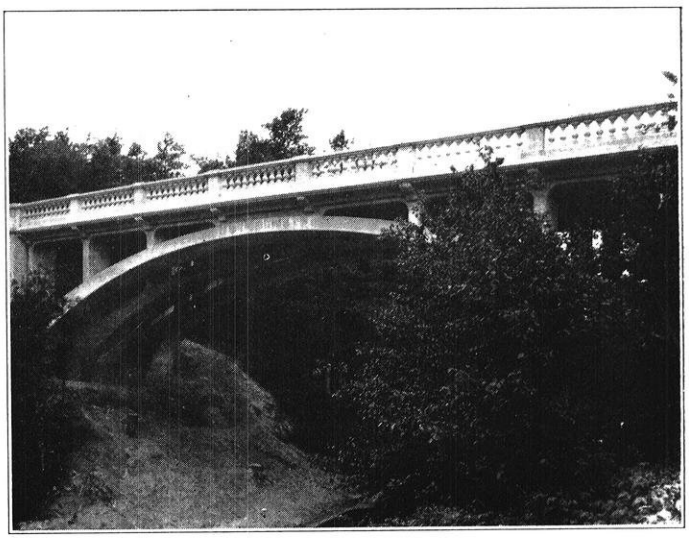
Engineering As a Way of Life

By H. M. Sharp, e'22*

An older and valued friend of mine, a man of prominence in the engineering world, and myself, were discussing one night the increasing number of human activities that demanded the services of technically trained men. With my college years less than a decade behind me I undoubtedly expressed some regret at the lessening solidity of the ranks. "But," exclaimed my friend, "what is engineering but a way of life?" At the time, that statement impressed me merely as being a good definition, but as the days go by I find events, both in and out of my daily work, being evaluated, perhaps unconsciously, by that viewpoint. It becomes increasingly valuable to me as a steadying philosophy for it gives breadth and humaneness to a profession too often regarded by its own members as well as outsiders as unimaginative and prosaic.

The other evening I sat down to restudy some of the fundamentals of physics and mechanics underlying my branch of the profession. The familiar but hazily remembered facts took on a new significance, like that of a friend rediscovered through the medium of a sudden crisis or great emotional experience. Presently I was aware of a great and deep satisfaction. The incisive logic of the definitions soothed me with their undeniable solidity, for though they may be restated in the light of new facts or revaluated by means of refined experimental procedure, their essence remains the same. Here were facts that stayed "put;" realities that responded to "sweet reasonability." How satisfactory this contact, how valuable this influence in this day of hasty thinking, great waves of propaganda and prejudice, and human perverseness! I do not mean that Carnot's Cycle is a solace in the midst of a summer traffic jam, or Ohm's law a comfort when the bills come in. What is of value is the objective way of thinking that comes from the application of these fundamental laws and the breaking down of tangled problems into orderly arrays of facts. Because of this engineering approach I can read my paper with some degree of discrimination and discernment; use our multitudinous mechanical tools as tools, not ends in themselves, and out of the welter extract that which is pertinent and useful.

Thus, entirely aside from the utilitarian services which the engineer renders to society, he can and should render an even greater moral and social service. Life today is not the well defined existence the majority of our fathers and grandfathers knew. In those days a man had his profession, business, or occupation and he was left in peace to pursue it, taking a place in the community demanded by his abilities. Today society is much more disorderly, and business knows not from day to day what strange bedfellows it may entertain. An underlying current of fear runs through private and public enterprise. Great masses of people seem to be in a state of continual mild hysteria. The human race is no more stupid than it ever was but the flood of cheap fiction and mass mechanical entertainment plays on emotions and renders sound judgment extremely difficult, if not out of the question. There is much shallow thinking and "reward without merit"



philosophy. Opposed to this is the maladjustment of our rapidly increasing productive capacities, the decline of prideful individual effort, and the problems connected with the tremendous aggregations of capital. People are not yet able to think in terms of the new units of life, and yet stable thinking was never more necessary. This is the engineer's opportunity. The engineering approach will not solve all the problems, but it can be a powerful influence for sound living and thinking. Most of we engineers will never have the opportunity for intimate contact with the great financial, political, or sociological problems of the day, but every one can, in his own circle of friends and in the affairs of his community, exercise judgment, discrimination, and tolerance. By sound living and straight thinking he can demonstrate that engineering is not only a profession but a worthwhile philosophy.

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*Illuminating Engineer, National Lamp Works of General Electric Co., Cleveland, Ohio.

Organic Colloids in the Treatment of Water for Industrial Purposes

By E. C. SHUMAN*

THE problem of selecting a treatment for waters for industrial purposes is difficult for most engineers because of their limited knowledge of chemistry. Consequently, when a treatment keeps the operating engineer out of apparent serious trouble, he is content to let "well enough alone" rather than look for an improvement. As a result there are many plants in which the management is considering almost fantastic means for reducing overhead costs, but overlooking the fact that much money can be saved by investing in proper treament for industrial waters.

The phenomena that make it necessary to treat industrial waters are: (1) Scale formation; (2) Rusting, pitting, and corrosion; (3) Priming, foaming, and carry-over; (4) Caustic fracture.

Obviously all of these phenomena are not found in all industrial uses of water. This article will deal only with the more important factors of internal treatment and the function of organic colloids in that treatment.

Boiler Water Treatment

Scale. All of the phenomena mentioned above may be found in boilers, and are of greater concern in boilers generating steam for power than for heating only. Of these phenomena, scale is the one most commonly found, and occurs in the boiler and some steam lines.

Practically all natural waters contain mineral matter in solution and suspension. Most plants are equipped or could easily be equipped with filtering means for removing the suspended matter. The mineral matter in solution, however, requires special treatment for removal.

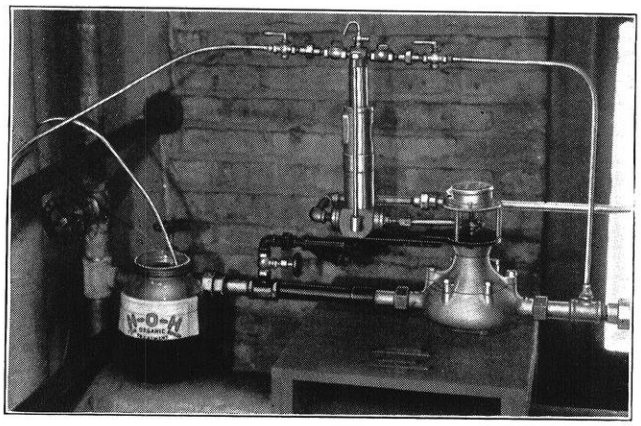
The salts of calcium and magnesium are the ones most commonly found in water and are the ones forming the most bothersome scale.

At room temperatures these salts are quite soluble, but at the temperature of the boiler they are much less soluble and readily precipitate. Since steam is pure water† passing from the boiler, the remaining boiler water becomes increasingly concentrated with mineral matter bcause more raw water must be brought into the boiler to make up for that used. Thus, the high temperature and the increasing mineral concentration cause rapid formation of scale.

To reduce the mineral concentration, a quantity of water is periodically drawn from the boiler and a corresponding amount of fresh water pumped into it. This drawing of water is known as the "blowdown."

Sometimes engineers report that boiler performance has been improved by putting fresh water into the boiler, explaining that the greater ease of raising steam is due to the oxygen brought in by the fresh water. Actually, the improvement is due to the reduced mineral concentration.

In the past, practically all boiler treatments were based on the chemical replacement or water softening principle, i. e., the insoluble scale forming salts of calcium and magnesium were replaced by others having higher solubilities, usually sodium salts. This gave rise to the common use of such materials as sodium hydroxide (caustic soda), sodium carbonate (soda ash), sodium aluminate, the sodium phosphates, and others. These are used either alone or in various mixtures to which other materials are sometimes added, such as molasses, tannin, hemlock extract, coloring, etc.



Automatic Proportioning Device in use at the New Bismarck Hotel, Chicago, injecting an after-treatment into Zeolite Softened Hot Water Supply.

For a specific example of chemical replacement, consider Lake Michigan water which is about 7 grains hard. This means that one gallon of water contains 7 grains of calcium and magnesium salts, or that 1000 gallons of water contains one pound of scale forming matter. Then, one pound of a more soluble salt must be added to the water to replace the scale forming salts. Actually, an excess would have to be added because of the difference in atomic weights. After treatment, the water contains between 2 and 3 pounds of mineral matter, part of which is soluble and the remainder settles as a heavy sludge to be removed from the boiler by blowing down.

The newer treatments operating according to the principles of colloidal suspensoids would add to such a water as mentioned above only 0.05 lb. of solid matter — 0.05 lb. of an organic colloid doing work equivalent to more than

(Continued on page 10)

*Chief Engineer, D. W. Haering & Co., Chicago, Ill.
†Pure water vapor if of 100% quality.

What the Class of 1933 Is Doing

MECHANICALS

Anderson, Donald W., is the assistant to the chief engineer of the Specialty Brass Co., at Kenosha.

Anderson, Stewart C., is back for graduate work in mechanical engineering.

Epple, Arnet B., is also back for more in mechanical engineering.

Eserkaln, Theodore F., was married to Miss Jeanette Barney of Beaver Dam immediately after graduation. The couple reside in Milwaukee where Ted is selling air conditioning apparatus.

Hansen, Ellis P., is working for the A. O. Smith Corporation in Milwaukee as an inspector in the steel barrel division.

Jenny, John P., is back for his master's degree in mechanical engineering.

Kron, Gerald, is back in school for research in combustion under pressure.

Lambeck, Thomas J., is assistant to the general manager of the Wrought Washer Mfg. Co. in Milwaukee, Wisconsin. He writes in to say that his duties are to interview salesmen, write letters of inquiry, compose publicity articles, write reports, and run efficiency tests on machinery.

Martiny, Keith C., is a student engineer with the Madison Gas and Electric Co.

Otis, Charles K., is junior engineer in the erosion control work of the Conservation Commission.

Poock, Albert F., can be reached in care of the City Machine and Tool Works at Dayton, Ohio.

Rieck, John Joseph, is continuing in school for his master's degree.

Sandstrom, Bengt G., sailed for Sweden this July where he may live permanently.

Schifflin, John B., is back for graduate work in mechanical engineering.

Schmid, Ben J., has been given an appointment to the General Electric Co.

Schmid, George C., is in charge of the refrigeration department of the Schmidt Brewing Co. in Pasedena, Calif.

Schubert, Gilbert W., is with the Allis-Chalmers Co. in Springfield, Illinois.

Tessendorf, Charles F., sells furnaces and air conditioning apparatus in Neenah, Wisconsin.

Wood, Royal H., has a job with the Babcock & Wilcox Co., on the Boulder Dam project.

CIVILS

Borkenhagen, Edward E., has been clerking in a drug store in Milwaukee since June and spending his spare time combing the city for engineering work.

Bryan, Wayne G., has been able to find enough odd engineering jobs in his home town, Portage, to keep busy during the summer.

Buehler, Robert J., after serving as instructor in stream gauging at summer camp, joined the engineering staff of the soil erosion forces.

Freas, Alan D., started to work in the trucking department of the Cutler-Hammer, Incorporated, in Milwaukee. After two weeks of that, he was transferred to the production department where he is at present. He writes: "The first time I dictated a letter to the stenographer, I got so flustered I forgot what I wanted to say."

Hall, George M., is in the engineering department of the City of Janesville.

Kaysen, James P., is with the Conservation Commission at Crandon, Wisconsin. He has been engaged principally in tracing out alleged county roads on the ground and recording them on the map.

Lidicker, Roger K., has returned to Wisconsin for graduate work.

Morgan, Philip F., has been working during the summer on the design of a sewage plant for Marshfield under the direction of Prof. Kessler.

Ottensman, Clarence W., is attendant at a Sheboygan filling station.

Schultz, Edward B., is assistant superintendent at the South Shore Bathing Beach, Milwaukee.

Sollid, Erik, is back at school for graduate work.

Wagner, Aubrey J., is with the soil erosion forces at Lancaster. He was married during the summer to Dorothea Huber at Sioux City, Iowa.

White, Frank P., who is with the U. S. Forest Service, was transferred during the summer from Michigan to Virginia, Minnesota. In Michigan he was locating and constructing roads. The requirement he faced was to locate and construct a mile per day of 22-ft. road. At Virginia he is compassman engaged in running control lines and locating old corners.

CHEMICALS

Griswold, Robert N., is working with the Morgan Dyeing and Bleaching Company of Rochelle, Illinois, as a chemical engineer.

Kettner, Robert O., is employed in the laboratories of the Du Pont Chemical Co., located in Carrolville, Wisconsin.

Knechtges, R. G., is back in school for graduate work in chemical engineering.

Krieger, George R., works in the testing laboratory of the Consolidated Water Power and Paper Company at Wisconsin Rapids. He is also selling life insurance.

Walters, R. G., has returned for graduate work.

ELECTRICALS

Anderson, George C., is working for the Continental Paper Company at Marinette, Wisconsin.

Kieckhefer, Herbert H., former editor of the "Wisconsin Engineer" is working in the testing department of the Industrial Controller Company at Milwaukee.

Moe, Robert E., is with the Allen-Bradley Company in Milwaukee.

Schneller, John, end on the Wisconsin football team last year, has signed a contract to play on the Portsmouth, Ohio, team of the National Professional Football League.

Shirk, Walter B., is in the research department of the Proctor and Gamble Company in Cincinnati, Ohio.

The following men have returned for graduate work:

Esser, Andrew B.; Leifer, Lorenz A.; Mackie, Frederick D.; Schmidt, Vernon W.; Wyss, Walther E.

MINERS

Eisaman, Jack, is in the metallurgical department of the Illinois Steel Company, South Chicago.

Klaesson, Philip, is in the Illinois Steel Company, South Works, where he is rolling mill apprentice, as is also **Piper, John.**

Ramsey, Robert, has a fellowship in the Montana School of Mines, Butte, Montana, where he is specializing in flotation concentration.

« « EDITORIALS » »

THE DEAN'S WELCOME

I WISH first of all to congratulate the *Wisconsin Engineer* for its successful work in the past and now more especially for its continued efforts under the present trying conditions. Its enterprise past and present should enlist the hearty support of all engineering students. It not only serves as a fine representative of Wisconsin engineers but offers valuable opportunity to students to acquire some very useful experience on its editorial and managerial staffs. We strongly recommend its continued support by faculty and students.

DEAN F. E. TURNEAURE

We are still troubled by industrial stagnation and unemployment, but there is much evidence that things are getting better, and we should all be encouraged at the present outlook. Government agencies are becoming a larger factor in the construction field, but whether public or private agencies are in control, the engineer will still be needed, and his job is the same in either case, namely, to do his work honestly and with the best skill at his command. As an engineer, he is not concerned with political questions. As a citizen and voter, he has the same interests and obligations as others and he should be able to act intelligently and effectively on public questions.

It is frequently claimed that the technical man is too limited in his outlook to be of as much influence in public matters as he should be. As a partisan this is perhaps true, as his training and practice requires a recognition of all facts pro and con, — a practice which seems to be contrary to the custom in political circles. But it appears to me that the country needs more and not less of the engineer's method of approach. It is undoubtedly true, however, that the engineer can make himself more influential than he has been by giving more attention to economic and social affairs and the manner by which he may present his ideas in the most effective and convincing way. The art of convincing other people is an extremely valuable accomplishment and one that cannot be learned by confining one's interest entirely to technical problems. We suggest that the engineering student give more attention to these matters if he desires to make the best use of his engineering knowledge and skill. But it should be clear that sound engineering knowledge must be the foundation stone of his equipment. The faculty is at the service of the students to the end that he may get the greatest possible benefit from his four years of college work. To the new student especially we extend our very best wishes.

YOUSE IS A VIPER

An unusual occurrence took place at the meeting of the American Society of Civil Engineers in Chicago this summer when Professor Daniel W. Mead, after presenting a paper upon the proposed St. Lawrence waterway and power development, was the target of personal abuse by a New York politician who had requested the privilege of discussing the paper.

The "discussion," doubtless to the great chagrin of those who had granted them the privilege of presenting it, resolved itself into the usual political hooey. No attempt was made to refute Professor Mead's facts or conclusions; the "discussion" was simply personal abuse and aspersion of motives.

The sort of argument that sways the minds of uninformed voters has little effect, as might be expected, upon the minds of specialists who are informed. If the politician hoped to convince any of those present that Professor Mead

was in error, he was doomed to disappointment. The reaction of the engineers who heard the tirade was one of amusement; when they were informed in breathless tones that Professor Mead was considered a reactionary viper by Senator La Follette, they laughed aloud. Politically the effort was a dud.

It would probably be unwise to bar politicians from future engineering meetings, for most of the big men in politics are eminently tactful or they wouldn't be big men. The incident was probably just one of those things.

IT'S WHAT YOU ARE TODAY

"It makes no difference what you were,
It's what you are today."

The refrain of that old song might with propriety be applied to the case of the University Co-op, which, since the "mauve decade," has dispensed books and school supplies to university students. The Co-op has been rather completely reorganized this summer, under the leadership of Assistant Dean A. V. Millar of this college, and is again serving the students in an effort to reduce the heavy cost of education to the individual. Dean Millar, and the very able people who have assisted him in the reorganization, have done a fine piece of work in a most unselfish spirit. Their efforts have not been publicized and for that reason may not be understood, appreciated, and supported. Every effort should be made to have the students and faculty of the university familiar with the attempt to make the Co-op a success.

The Co-op has its ups and downs. The recent period has been one of downs. The depression took its toll; competitors made life miserable; and customers were alienated by incompetent and discourteous clerks. The problem of bettering these conditions has been handled vigorously and courageously with every prospect of success. A new deal is at hand. A well-managed Co-op, that offers competent and friendly service will undoubtedly win the support of the university community.

TO THE VICTOR THE SPOILS?

Jackson was unrelentless to the vanquished. The engineering world is somewhat Jacksonian today. Many of the men in the engineering profession today have achieved their success as a direct result of being the victors in personality and intellectual contests with their fellow engineers. They have in almost all cases merited their good fortunes. Is it not pertinent that the less fortunate should receive our consideration? Our attention has recently been directed to a campaign being inaugurated by the American Association of Engineers to more thoroughly acquaint youths in academic institutions with the wide panorama of the technical profession *before* they enter institutions of higher learning.

Speaking of the young men who fail in their technical aspirations, Arthur Oliver says, "Even more important than the vast economic wastage is the blighting effect on the lives of the youth of America who are left dazed, daunted, and disqualified on the very threshold of an opportunity which, rightly or wrongly, has appealed to them as the best, easiest, or only way to realize their hopes of a career. If it is their own dereliction, it is bad enough; if they have tried to the best of their ability, their plight is so much the more deplorable."

Vocational guidance in the later years of high school is still improperly correlated with the demands of the professions. What is the picture of the future in the mind of an engineering undergraduate? The answer is obvious to the initiated graduate.

Adequate vocational guidance will not necessarily reduce technical school enrollments due to the elimination of the too rosy hued aspect of the profession; it will fill the ranks with those young men who are the more firmly convinced that they possess the inherent and acquired qualifications for success. The net result should and will be a profession of higher potential ability.

" . . . *the tools to him than can handle them.*"—Carlyle

" . . . *there is not jesting with edge tools.*"—Beaumont and Fletcher.

RECENT DEVELOPMENT IN THE UTILIZATION OF GAS

(Continued from page 4)

absorbed a certain amount of moisture from the air, heated air from an auxiliary gas-fired heater automatically is passed over this saturated material to remove the moisture. This moisture-ladened air is discharged to the outside atmosphere. This system is entirely automatic.

A similar system makes use of activated alumina for the absorptive material for the moisture removal, the moisture being removed after saturation by use of a gas burner placed within the system, being lit automatically when material is saturated and automatically being shut off when alumina reaches temperature at which it is thoroughly dry.

While domestic refrigeration with gas is not entirely new, the apparent paradox of "generating cold" with heat to many people seems mysterious. However, this type of refrigeration has earned its place in the foremost ranks of mechanical refrigeration. In the past it was necessary to make use of cooling water for condensation of the ammonia used for refrigeration. This led to its restriction to areas where running water was available. The latest development in this field has been in an air cooled gas fired refrigerator which makes use of natural convection air currents as the cooling medium and broadens greatly its field of use.

Other developments in domestic gas appliances include automatic top burners and oven lighters, as well as automatic timing arrangements of burners and ovens whereby a housewife can start her meal, set the time clock, and go away and return to find her meal cooked as well as if she had stayed right with it.

Constant research and experiment are adding new developments daily, and those of us in the industry feel that the surface has only been scratched in the utilization of a fuel which can be said to be the greatest conservator of our natural resources of any medium of heating in use in our present civilization.

ORGANIC COLLOIDS IN THE TREATMENT OF WATER FOR INDUSTRIAL PURPOSES

(Continued from page 6)

one pound of ordinary chemicals. Apparently, the action of organic colloidal treatments cannot be explained by the usual chemical reactions.

Since there are many colloidal materials, it is necessary to point out that all colloids are not suitable for treating water. The colloidal particles carry electric charges, and when these charges are neutralized, some colloids become precipitated as a colloidal gel. Many colloidal materials do not exhibit this property, although they are true colloids. For example, tannin is a colloid, yet its action probably depends on the formation of soluble tannates rather than on a colloidal get. Only those colloids capable of exhibiting precipitation as gel are, in general, suitable for boiler water treatment.

With an organic colloidal treatment, there is no direct dependence on "softening" the water, or chemical replacement. The mineral matter in the raw water is not replaced or exchanged with other chemicals. Instead, the mineral matter is converted from a true solution to a physical suspension or colloidal suspensoid. The colloidal particles of the treatment combine physically with the mineral matter of the water until they become saturated and slowly settle to the bottom of the boiler during quiescent periods to be blown down. During these quiescent periods, a zone of considerable depth having a higher specific gravity than water is formed, and the blowdown removes water carrying with it a higher proportion of mineral matter than is the case when the heavy sludge of the replacement treatment is blown down. Moreover, since the colloidal treatmnt adds so small a quantity of solid matter to the water, more raw water can be used before the mineral concentration requiring blowdown is reached. In other words, the organic treatment requires less than half the blowdown required by chemical treatments, with consequent economy.

Affected by the change in solution tension produced by the presence of the colloid, the removal of old scale is easily accomplished without dependence upon chemical reactions.

Chemical treatments are usually added in proportion to the amount of steam generated; organic colloidal treatments are added in proportion to the raw water used. Since chemical treatments are dependent upon chemical reactions, it is possible and quite probable that under or over treating will be found. Under treatment occurs because of the greater importance for avoiding over treatment. When organic colloids are used there is no danger from overtreatment, and the amount added need be computed only on the basis of probable maximum requirements over any operating period.

Rusting, Pitting, and Corrosion. Rusting, pitting, and corrosion are due principally to oxygen, carbon dioxide, and electrolysis. Dissolved oxygen is found to some extent in most natural waters. Carbon dioxide is released when the salts producing temporary hardness break down at boiler temperatures, and also by the reaction of many chemical boiler treatments.

To correct rusting, pitting, and corrosion, water should be maintained alkaline. Boiler water pH‡ should be above 8.5. It is quite simple to effect pH control by chemical means, but some organic colloids are available that also remove oxygen and carbon dioxide, the principle causes of the trouble. Oxygen is removed by direct chemical combination to form a stable compound removable by blowdown. Carbon dioxide is removed by adsorption on the surface of the gel. By removing these gases and preventing their escape with the steam, their corrosive action in the steam lines is prevented.

The chemical method for combatting these effects is to add a chemical to the water, usually sodium silicate, which is supposed to form a protective coating on the metal. These coatings are sometimes questionable in effectiveness and instances are known where the corrosive action was more pronounced under the coating than would have taken place in untreated systems. This aggravated action has been explained on the basis of a differential electrolytic action.

Small Plants. While most power plants are cognizant of the problems of boiler maintenance, it is generally assumed that heating plants, especially small heating plants in private homes, do not require water treatment. This mistaken notion results from the fact that scale is sometimes not present in the heating plant in prohibitive amounts. However, the destructive processes, corrosion, pitting, and rusting, are going on continuously in the steam lines and in the boiler. This fact, unfortunately, is not apparent for several years after the plant has been put into operation and is first evidenced by small leaks. The replacement of pipe lines and sometimes radiators to eliminate these leaks usually continues until practically the whole return system has been renewed. This is rather an expensive procedure, especially when one considers the small amount of treatment necessary in heating plants, and the additional life given the plant by suitable treatment. Similar improvement would be found in hot water boilers. Moreover, in small heating plants, colloidal treatment need be added only at intervals of 2 or 3 months, a feature not found in chemical treatments.

Conclusion

While the use of organic colloids offers decided advantages over the usual chemical treatments, one should not look upon the indescriminate use of organic colloids as the panacea for all water treating problems. The treatment of all waters involves an adjustment to meet the requirements of the particular plant in which the treatment is to be used. No single treatment will be reliably effective in a general application. Consequently, the design of a proper water treatment necessitates the co-ordination of an adequate chemical laboratory service with the field experience of a trained engineering staff.

‡pH is the symbol for hydrogen ion concentration; neutral water has a pH of 7, acidity is below this, and alkalinity above.

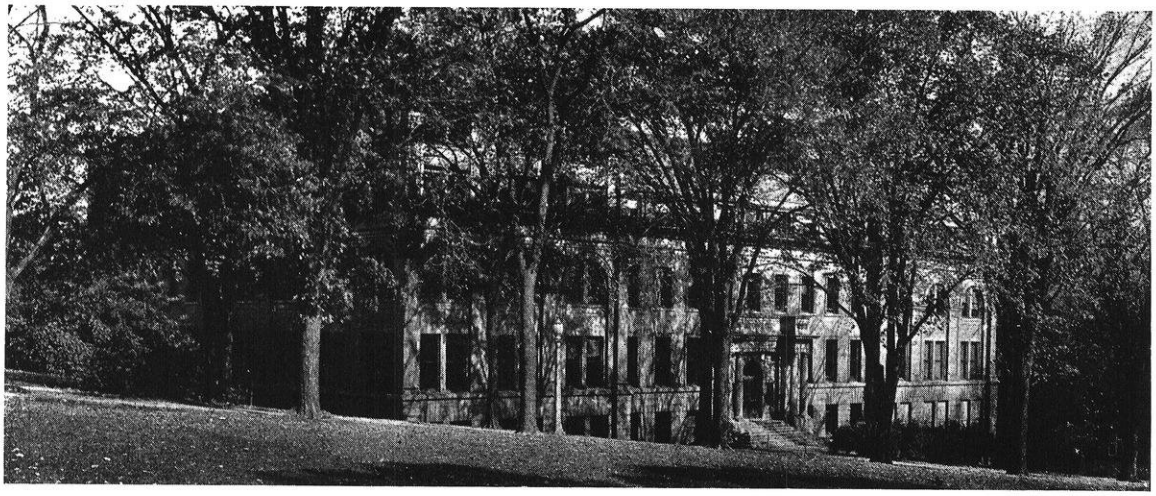
Fit as a fiddle

Telephone service must be kept fit as a fiddle 365 days a year. Thanks to a continuous program of maintenance and replacement, Bell System plant is today more efficient than ever. Constantly improved operating methods provide the swiftest, surest service on record. Plans devised by telephone men fit the service more and more exactly to subscribers' needs.

The result of all this is: the telephone gives you a lot for a little money.

BELL SYSTEM

SAY "HELLO" TO MOTHER AND DAD
— RATES ARE LOWER AFTER 8:30 P. M.



« CAMPUS NOTES »

ENGINEER SPONSORS SOCCER TEAM

Through the efforts of Herbert Foth, e'34, who learned the game in Germany, the International Club this year is sponsoring the recently organized soccer team. This team, the only one of its kind on the campus, was equipped and a schedule of games was arranged with other universities through the efforts of Captain Foth.

The squad contains five other engineers, four of whom are certain to be regulars. Don Yates, e'35, who learned his job in Buenos Aires, is goal keeper. Gene Tang, e'35, and Alex Jonnassen, m-grad, are backs. Alex Penman, ch'35, is one of the returning forwards. Huzarski, e'34, played with the team two years ago and has indicated to Captain Foth that he intends to play again.

The fall schedule of games includes encounters with Notre Dame, Illinois, Marquette, and Chicago. Captained and staffed as the team is with engineers, it should receive the wholehearted support of the engineers. Incidentally, no lawyer has yet appeared to play with the team. The soccer team should come in handy during the next snowball fight with the lawyers, especially if they remember to wear old shoes with which they can be careless.

REGENTS ORDER BIDS FOR TOWER OF CHIMES

At a recent meeting the executive committee of the board of regents ordered that bids be obtained on the construction of the new tower of chimes which has been under consideration for the past year. Funds amounting to $30,000 have been furnished by graduating classes from 1916 to 1927. The planned tower will be about 85 feet high and will contain 36 bells. It will involve no expense to the University whatsoever, and will probably be built on the high knoll just northwest of Bascom Hall.

CHEMICAL ENGINEER SMASHED UP ON DATE

Last June 6, after a struggle with a particularly tough final exam under Professor Kowalke, D. E. Skogstrom, ch'34, went out to celebrate. He and some friends were knocking off chickens on U. S. 12 in a Ford Rent-a-car when they hit loose gravel. The car turned over several times as it rolled across the 40-foot highway. "Skoggy" was picked up with his jawbone fractured in three places, his left shoulder broken, and part of his scalp missing. He has completely recovered since then, and is now as full of pep as ever.

SOPHOMORE HONORS AWARDED BY FACULTY

Sophomore High Honors

Mechanical Engineering

	Credits	Points
W. J. Van Ryzin	68	191
Frederick J. Bechtel	77	201
Electrical Engineering		
Harold Goldberg	71	203
Chemical Engineering		
Herman F. Hoerig	79	215
Blaine Seaborn	72	191
Mining Engineering		
Philip C. Rosenthal	75	198

Sophomore Honors

Civil Engineering		
Lawrence E. Bidwell	69	164
Alton Lyle Cardinal	68	157
Howard M. Helom	68	173
J. Everett Henry	87	201
Luna Bergere Leopold	68	166
Joseph A. Liska	68	153
James A. Rhodes	68	150
Mechanical Engineering		
Leroy W. Griffith	60	140
Robert J. Huegel	65	151
Charles B. Kniskern	62	158
Harry R. Maytum	68	168
Robert Mercer	68	168
Allan H. Newbury	68	165
Alexander F. Robertson	68	148
Tony P. Traskell	68	156
Rushen A. Wilson	65	146
Electrical Engineering		
Robert M. Bennett	70	158

Jan E. Edelman ---------65		153
Charles Fiedelman ------70		161
Maurice M. Jansky -----70		153
Richard DeWitt Jones --71		167
Frederick J. Kuehn -----70		183
Nean Lund ----------73		190
Elmer Mohaupt ---------67		154
LaVerne M. Poast ------72		161
John Welles Soule ------75		169
Albert Vollenweider, Jr. -62		164
Harry Christ Wendt ----70		169
Chemical Engineering		
Thayer W. Burnham ---70		165
William W. Gay ------70		184
Leslie G. Janett ---------70		162
Robert J. Knake -------72		175
Harry J. McCauley -----70		165
Horace W. Norton -----70		174
Philip W. Rosten ------71		164
Norbert F. Schink ------70		150
Lester O. Wiegert ------70		160
Kenneth R. Wink ------72		181

FRESHMAN HONOR LIST

High Honor Rate

	Credits	Points
*Burroughs, C. W. L. ---13		39
Gordon, Donald -------32		95
Halamka, C. J. ---------34		97
*Mayland, H. C. --------17		48
Whiteside, R. E. -------34		95
Gillies, J. A. ----------33		92
Hertel, R. F. ----------34		94
Williams, T. J. --------34		94
Honor Rate		
Wright, J. F. ----------34		90
Carow, John ----------30		79
Vollenweider, A., Jr. ---38		99
Van Dyke, R. J. -------34		86
Larzelere, J. S. ---------34		85
Wagner, E. C. ---------34		83
Cadwell, J. J. ----------34		82
Senske, Wm. M. -------36		85
*Voss, E. J. ----------15		35
Cole, A. W. ----------34		79
Nieman, G. O. ---------34		79
Nikora, L. S. ----------34		79
*Urschel, J. R. ----------18		41

*Second semester only.

SENIOR CIVILS TAKE TRIP TO MILWAUKEE

The senior civil engineers will spend a day in Milwaukee on or about October 20. The trip is under the personal direction of Professor Kinne of the structures department. At the time of writing, plans for the trip were not definitly settled, but it was planned to include the Milwaukee municipal sewerage disposal plant, the garbage disposal plant, the water works, and at least one bridge and iron works.

SHORT AND SWEET

On September 25, Elwyn Wyman, c'34, turned up at the steam and gas laboratory with a big bump on his forehead. He said that he walked into an awning support. Of course, it's posible—in the dark.

—o—

Floyd Nienow fell asleep during an 11:00 o'clock in chemical engineering recently. Professor Kowalke thereupon appointed Louis Dequine as Floyd's personal guardian and waker-up.

—o—

Harold Gerboth, c'34, fell through the back of his seat in structures class recently. Professor Kinne stated that he didn't mind students sleeping in class, but that he would recommend more precautions in the future inasmuch as people falling out of seats disturbed the rest of the class.

—o—

As engineers, we lend a sympathetic ear when we hear the poor, overworked law students complaining because they must labor under a 12 credit and 13 class hour week. Would that we only had more time to spend with the girls learning how to *schmaff*.

—o—

Incidentally, Win Lefevre, c'34, was overheard while *schmaffing* in Barnard's small parlor one evening. Well, some fellows make noises with their soup, and this is a free country.

—o—

The original government land survey stake hanging on the wall just outside Professor Owen's office in the Engineering Building will be ninety years old in November. Professor Owen plans to celebrate its one hundredth anniversary in 1934 with a banquet to be sponsored by Chi Epsilon, honorary civil engineering fraternity.

ENGINEER APPOINTED TO THE ATHLETIC BOARD

Robert Howes, e'34, captain and coach of the 1934 Varsity Tennis Team, recently received an appointment to the athletic board of the University. For the past two years, he has been a member of the Varsity Tennis Team as well as a ranking player in the state.

In addition to being a leader in tennis, Bob was elected to Phi Eta Sigma, honorary fraternity for freshmen; received sophomore honors; and in his junior year was initiated into Eta Kappa Nu, honorary electrical engineering fraternity.

SENIOR MECHANICALS AND ELECTRICALS TO VISIT CHICAGO

The senior mechanical and electrical engineers will visit Chicago for a minimum period of four days starting on October 16. The trip, according to plans not yet settled, includes three days in and about Chicago on inspection tours and one day at the Century of Progress Exposition. The majority of the engineers have reserved rooms at the LaSalle Hotel. Chicago will have some reconstruction work to do after the engineers leave, even though the faculty committee in charge is experiencing difficulty in finding enough factories in operation to make the trip worth while.

WILLIAMSON AT DEVILS LAKE DIES

John Williamson, long a resident at Devils Lake, died at his cottage on July 11 after a long illness. His personality was strongly impressed upon the civil engineers who attended the past dozen summer camps. When the camp was first established near his cottage he was openly hostile and did what he could to have the camp removed. Other cottagers learned in time to welcome the engineers and enjoy their activities, but the Englishman refused to permit his preconceptions to change. To the end he insisted upon the most meticulous consideration of his rights and privileges by the engineers. He will be missed.

BUILDING PROGRAM OUTLINED

Drawing of preliminary sketches for three new buildings—an electrical laboratory, a law building, and an agricultural short course dormitory—was ordered by the executive committee of the board of regents meeting recently.

Under the terms of its program, the federal government will provide the total funds for the work, with the state government paying back 70 per cent of the total over a period of years.

President Glenn Frank told the regents that the agricultural short course dormitory was needed and would be a self liquidating project, that the law building was the greatest physical need of the campus, and that the proposed electrical laboratory would play a leading part in the industrial and economic development of the state during the next 10 years.

« ALUMNI NOTES »

MECHANICALS

Azpell, Edward W., m'29, M. S.'30, is with the Barber-Colman Company in Rockford, Illinois.

Case, Clinton D., m'29, is now an instructor in the Extension Division of the University of Wisconsin in Milwaukee.

Conry, Clifford Ellsworth, m'29, was married to Miss Ann Ralston Palmer at Beloit on June 28. Dr. Irving J. Maurer, president of Beloit College officiated. Conry is the former football star and crew man. The couple will reside in Springfield, Ill.

Cowie, Alex, m'31, is an instructor in the shops of the University of Minnesota.

Hartenberg, Richard S., m'28, instructor in the mechanics department, was married this summer to Miss Elna Mygdal, an instructor in the physical education department. They honeymooned in California.

Jonassen, Aaki, m'32, is back for an M. S. in mechanical engineering.

Koch, Norman F., m'24, M. S.'29, was married to Miss Edna Haentzschel who is a '28 graduate of the school of music.

Kubasta, Robert W., m'30, formerly an instructor in the Steam and Gas labs is a sales engineer for the Byrant Heater Co., 17825 St. Claire Avenue, Cleveland, Ohio.

Whitfield, Kyle C., m'32, M. S.'33, got a job with the Westinghouse Electric and Mfg. Company in East Pittsburgh, Penn.

ELECTRICALS

Gluesing, William A., e'23, according to a press story, is "that tall, handsome blond who gives the lecture at the General Electric 'House of Magic' at the Century of Progress."

Henningsen, E. S., e'12, formerly engineer in the A. C. department of the General Electric Company has recently been appointed engineer-in-charge of the newly created motor and generator department of this company. The new department takes over all the responsibility of the former A. C. and D. C. engineering departments.

Howes, Edward W., e'29, marched up the aisle with Miss Emma Stanton of Newark, New Jersey, this summer. They will reside in San Diego, Calif., where he is technical advisor to the air conditioning department of the General Electric Company. In this capacity he becomes technical advisor to all Pacific coast dealers handling G. E. air conditioning apparatus.

Kelly, Thomas F., e'07, was elected a member of the executive board of the New York chapter of the Institute of Scrap Iron and Steel.

Leow, E. A., e'07, E. E.'22, professor of electrical engineering at the University of Washington since 1920, has just published a new book on "Direct and Alternating Currents." He is also the author of a book on "Electrical Power Transmission" (McGraw-Hill, 1928). Before going to the University of Washington, he was employed as electrical engineer by the Chicago Telephone Co., and by the American Nitrogen Co., at La Grande, Wash.

Trippe, Maj. Harry M., e'96, received word that he had been promoted to the rank of lieutenant colonel. The news of his promotion came on Sept. 15, 1933, his 61st birthday.

CHEMICALS

Bidwell, Lloyd H., ex ch'32, was commissioned a lieutenant in the Army Air Service in June, 1933. He is now stationed at Selfridge Field, Michigan.

Drake, Ronald J., ch'20, manager of the collapsible carton plant of the Marathon Paper Mills, Menasha, Wis., visited the University recently.

Grenfell, Donald S., ch'14, continues to make lithopone at Patosi, Missouri.

Pickford, J. M., ex ch'23, lives in Hammond, Indiana, where he is employed by the Gas and Electric Co.

Ritzenthaler, Phil, ch'32, reports satisfactory business conditions in his electroplating business in Milwaukee.

The following men have returned for graduate work:

Altpeter, R. J., ch'31, Wisconsin Utilities fellowship.

Harr, R. E., ch'26, Wisconsin Alumi Research Foundation fellowship.

Watson, C. C., ch'32, engineering fellowship.

Williams, G. C., ch'31, research fellowship.

Wolf, H. W., ch'32.

MINERS

Buchner, Carl F., min'23, M. S.'24, recently in Madison enroute to his former home at Mayville, reports interesting developments in the oil and mining fields carried out by the McBride Syndicate, for whom he is chief engineer. His office is in the Missouri Pacific Building, St. Louis, Missouri, care of W. C. McBride, Inc.

Eastwood, Laverne, min'28, Ph. D.'31, is in the Department of Metallurgy, Michigan College of Mines and Technology, Houghton, Michigan.

Granger, Robert and **Weckmueller, Gerald,** both min'32, are in the blast furnace department of the Illinois Steel Company, South Chicago.

Jones, T. D., min'22, has been promoted to chief metallurgist in charge of the Omaha, Nebraska, and Selby, California, Smelters of the American Smelting and Refining Company. He was transferred to this position from the Perth Amboy Plant of the same company, at which he was chief metallurgist.

Link, Marcus W., min'21, visited his mother in Madison recently. He is superintendent of the Klondike Fluorspar Mining Company, Mullikan, Livingston County, Kentucky.

Lorig, Clarence H., min'24, Ph. D.'28, visited the Department of Mining and Metallurgy during the summer. He is metallurgist at Battelle Memorial Institute, Columbus, Ohio, and his work there in connection with research in the foundry industry is attracting attention. He is also metallurgical abstractor for "Metals and Alloys" and "Chemical Abstracts."

McCaffery, Philip, B. S.'30, M. S.'32, is in the Department of Metallurgical Development, with the Illinois Steel Company, South Works, Chicago. During the summer he married Virginia Manchester of Madison.

Nelson, Floyd, min'22, is field geologist with Shell Oil Company, Shell Building, St. Louis, Missouri.

CIVILS

Berg, Louis L., c'32, has a son, James Moore Berg, born May 7, 1933. Louis is with the soil erosion forces as engineer.

Boeck, Ralph E., c'27, was married to Miss Fern Hinstorff, July 1, at the Edgewater Beach Hotel in Chicago. Mr. Boeck did graduate work at M. I. T. The bride is an alumnus of the University and was a member of Alpha Gamma Delta.

Erichsen, Frank P., c'32, has been engineer on the soil erosion work during the past summer.

Halbert, Charles A., c'08, state chief engineer was named a member of a joint administrative board by Governor Schmedeman to direct the expenditure of the $50,000,000 fund to be spent on public works in Wisconsin.

Margoles, Harry, c'21, is field engineer for the Supervising Architect's Office of the U. S. Treasury Department, engaged in the construction of federal buildings. He has been resident engineer for the new building at Monroe and has visited Portage in connection with the layout of the new post office there.

McDonald, Walter E., c'31, after being laid off by the Wisconsin Highway Commission in the fall of 1932, reentered the service of the U. S. Engineers at Detroit. He has been living on a survey boat and cruising up and down the Detroit and St. Claire Rivers laying out dredging work for contractors.

Parker, E. E., c'07, city engineer of Madison, Wisconsin, has been given leave of absence to take up the duties of deputy state highway engineer. Under his new job, Parker will have charge of street paving work which will be done by the state in various cities in connection with the federal emergency highway program.

Van Hagan, Robert L., c'32, former editor of the "Wisconsin Engineer," is structural designer for the Kimberly-Clark Company at Neenah, Wis.

Hamel, Vern, c'32, L'32, was married to Merle Owen, daughter of Professor R. S. Owen of the surveying department, on September 29, 1933, at the Owen home in Frost Woods. The couple will reside in Madison where Mr. Hamel will practice law.

Matthias, Franklin T., c'30, instructor in topographical engineering and a former winner of the Sterling Day Award, was married to Reba Baumgartner, also an alumnus of Wisconsin, on August 1, 1933. They reside at 227 Clifford Court in Madison.

Plotz, Rezin S., c'30, visited in Madison this September. His wife and daughter accompanied him. Mr. Plotz is in the inspection department of the Bell Telephone Laboratories with offices at 463 West St., New York City.

Laurgaard, Olaf, c'03, C. E.'14, was a campus visitor the last week-end in September. Mr. Laurgaard was with the U. S. Reclamation Service for a number of years, but for the past seventeen years has been city engineer at Portland, Oregon. One of his undertakings is the Front Street intercepting sewer and drainage system, the design, constructing and testing of which is described in a recent paper by Mr. Laurgaard. Thanks to the author's kindness a copy of the report has been added to our Engineering library. Mr. Laurgaard's son, Glenn O. Laurgaard, is a senior in the course in Civil Engineering.

« ON THE CAMPUS »

MINING DEPARTMENT HOLDS SUMMER SCHOOL

The Department of Mining and Metallurgy was host to about fifty professors of Mining and Metallurgy who gathered here during three weeks of July to attend the Summer School for Engineering Teachers, conducted by the Society for the Promotion of Engineering Education with the cooperation of the University of Wisconsin. Previous sessions at other institutions have been designed for teachers in the other engineering groups, but none has been more successful than that held at Madison this summer. H. P. Hammond, director of the Summer School, and Richard S McCaffery, Professor of Mining and Metallurgy of the University of Wisconsin shared the responsibility and the credit for the results.

Speakers and members attending came from institutions in all parts of the country.

The meetings were held in the Mining and Metallurgy Building of the University. The members attending the sessions were comfortably housed in a group of rooms in Tripp Hall, and ate together in the refectory.

The Summer School for Engineering Teachers is an enterprise growing out of the general investigation of enginering education conducted by the Society for the Promotion of Engineering Education from 1924 to 1929, inclusive. Its general purpose is the improvement of the teaching of engineering. Sessions of the school are held each year in different institutions throughout the country. Each session is devoted to the study of methods of teaching a particular subject of instruction or division of the engineering curriculum.

KOMMERS PUBLISHES RESULTS OF FATIGUE TESTS

The results of a four-year investigation into the fatigue properties of brass, made by Professor Jesse B. Kommers of the College of Engineering, have just been published as bulletin No. 76 of the Engineering Experiment Station Series under the title of "The Static and Fatigue Properties of Brass." A summary of the results was presented to the American Society for Testing Materials at the annual convention in June, 1930.

The tests were made by bending brass bars back and forth until they failed. A total of 199 bars were tested in this manner, and each bar was bent from ten million to fifty million times. This tremendous number of stress reversals was made possible by the use of a machine designed for that service.

Prof. Kommers made the tests personally during the period from 1926 to 1930. Professor Roland Ragatz of the College of Engineering made the metallographic examinations and prepared the micrographs that illustrate the bulletin.

McNAUL WELCOMES HEIR

Prof. J. W. McNaul, of the department of machine design, is glowing with elation over the arrival on August 20 of a son. Resisting pressure to name the child Blue Eagle, he has given him the more conventional appellation of James Pascoe McNaul.

PROFESSOR MEAD TALKS AT TECHNICAL CLUB MEETING

"Water Power Development of the St. Lawrence River" was the subject of a talk by Prof. D. W. Mead, renowned civil engineer, at a meeting of the Technical Club of Madison, Oct. 2, in the First Congregational Church. As a disinterested engineer familiar with water power development, Professor Mead was requested by the Power Division of the American Society of Civil Engineers to examine the various reports on the St. Lawrence project and to analyze the comparative values of the principal plans in these reports. His talk was based on his paper which was presented at the joint meeting of the A. S. C. E. with the A. I. E. E. and the Hydraulic Division of A. S. M. E. in Chicago on June 29, 1933.

The next meeting of the Technical Club will be held early in November. The program will consist of a talk on the Ceramic Arts.

« SCIENCE AND ENGINEERING »

DEAN TURNEAURE AWARDED HONORARY MEMBERSHIP IN A. S. C. E.

Dean F. E. Turneaure has recently been notified of his election to honorary membership in the American Society of Civil Engineers. Honorary membership is accorded to those members of the society who have achieved outstanding eminence in their profession. Not more than five members may be awarded this distinction yearly. Of the fifteen thousand two hundred members of the society listed in their latest bulletin only nineteen were listed as honorary members.

Dean Turneaure has achieved wide recognition for his contributions in the field of mechanics and engineering. Professor D. W. Mead, well-known professor of the college, received honorary membership in 1931.

UNIVERSITY PROFESSORS SOLVE PROBLEMS OF HOME PLUMBING

Mr. Francis M. Dawson, professor of hydraulic and sanitary engineering, and Mr. James S. Bowman, instructor in hydraulic engineering at the University of Wisconsin, recently published a bulletin of interest to those engaged in household plumbing but who lack a knowledge of the theory of hydraulics.

The bulletin contains information on water supply fixtures, water pressures and distribution, flow of water in pipes, and considerable information on friction loss in pipe fittings and fixtures, all of which have been experimented with at the University.

WITHEY REPORTS TESTS ON BRICK BEAMS

The results of tests upon the strength of reinforced brick beams were presented to the American Society for Testing Materials at the June meeting in Chicago by Professor Morton O. Withey, who is in charge of the materials laboratory at Wisconsin. The tests were made as a thesis study in the spring of 1932 by three senior civils, L. E. Angoli, L. L. Krasin, and B. F. Ludowise.

The tests showed that it is possible to construct brick beams that will have a high bending strength. The formulas used in the calculation of stresses in reinforced concrete beams may be used also for reinforced brick beams. It is also possible to obtain excellent speeds in laying reinforced brickwork. The durability for brick beams under long-continued load and under the effects of fire and frost remain to be determind. During the past summer, a number of brick columns have been built and tested to destruction, but the results of the tests will not be available for some time.

MILLION VOLT STATIC MACHINE

Electrical engineers will be interested to learn that Professor C. E. Mendenhall, of the physics department, is supervising the construction of a static electric machine which will produce potentials up to a million volts. The work is being carried on in the basement of Sterling Hall.

Although the principal upon which the machine is based has been known a long time, it is only recently that attempts have been made to put it into practice. The apparatus consists of a hollow metallic sphere to which small electrical charges are carried by a belt constructed of some insulating material. This belt enters the sphere where the charges are collected from it by brushes and conducted to the sides of the sphere from where they are distributed equally over the outside surface of the sphere. This is possible because the inside of the sphere is shielded from the charges on the outside of the sphere and thus the small charges can be brought up to the sphere and deposited upon it, without having to overcome the force due to the large charges already accumulated on the outside of the sphere.

A new feature of this machine is that the sphere will be enclosed in a highly evacuated tank to minimize corona losses which run very high at potentials of a million volts.

When completed the machine will be used in the study of neu-clear physics, and attempts will be made to break down the neuclei of atoms.

WISCONSIN ENGINEER NOW $1 OR 8 ISSUES

It was decided at a recent meeting of the Board of Directors of the *Wisconsin Engineer* that the subscription rate for the magazine be reduced from $1.50 per year to $1.00 per year for eight issues. The price reduction, in conjunction with an intensive subscription campaign under the able management of Wayne Volk, c'35, resulted in a greatly increased student circulation. In contrast to former years, the freshmen were the reluctant customers and the seniors the easiest. It is evident that the seniors are taking an increased interest in the activities of their college, possibly because of the revival of the ancient engineer-lawyer feud last spring.

HYDRAULICS TEXT IS REVISED

Prof. F. M. Dawson of the department of hydraulics and Prof. E. W. Schoder are engaged in an extensive revision of their text on hydraulics. The first edition was published by the McGraw-Hill Co. in 1927. It is expected that the new edition will be ready for use by February.

EAR SENSITIVITY INVESTIGATED

The differential pitch sensitivity of the ear, a subject of concern to psychologists, has recently been investigated by the acoustical research department of the Bell Telephone Laboratories. The majority of previous determinations were obtained with tuning forks and organ pipes, but these measurements were subject to inaccuracies due to the methods used. The present results were more reliable since modern oscillator equipment and specially designed receivers insured pure tone quality. The results of the tests indicate that the ear is extremely sensitive to frequency differences, and that the percentage difference discernable, varies not only with the frequency, but with the intensity of the sound as well. A difference of about 1/16 of a semi-tone at two octaves above middle C, and 1440 separate pitch levels, are capable of being distinguished by the human ear.

G-E *Campus News*

BEMOTORED BEHEMOTHS

The same sun which never sets on an unshaved Englishman's chin likewise never finishes its daily round without seeing electric motors put to some new use.

In the Sinclair Refining Company's exhibit at "A Century of Progress," you can see five prehistoric monsters. Largest is a Brontosaurus, 70 ft. long and 22 ft. high, with a steel skeleton and welded joints, posing on a mountain. Little motors operate his eyelids, head, neck, mouth, breathing apparatus, and tail. A motorized Tyrannosaurus rocks back and forth, blinking and running out his tongue. A 30-foot Triceratops lunges forward; a Stegosaurus waves his fins; and a Duck-billed Dinosaur sits in a lake and churns water with his tail.

Interviewed recently, and speaking for the group, Brontosaurus shrewdly winked an eye and recommended G-E motors, on the basis of his 80 million years of experience.

WATCHDOG

Like Malone of the Mounted, old PM-13 always gets its man.

When the storm king rides roughshod along transmission lines, this new G-E automatic oscillograph waits to see the whites of his eyes. Then it starts recording within a half cycle (of a 60-cycle wave), a speed made possible by a special little mirror with a movement all its own. On a single roll of the sensitized paper, PM-13 can handle as many as a hundred oscillograms of chance transients and surges, and they can tread right on one another's heels or follow months apart.

When power surges sign their names, it's no forgery. The signature shows true wave shapes and phase relations. And, best of all, the PM-13 is permanently connected in the circuit and runs by itself.

Incidentally, Claude Hathaway, a U. of Colorado graduate in 1927, is largely responsible for this new development.

THERMOCOUPLE TAVERN

We take you now to our new indoor weather laboratory.

General Electric has "commandeered" this ten-room house in Schenectady and dedicated it to improving the air we breathe. Two G-E engineers —Elliott Harrington, Beloit College, '16, and Leon Mears, U. of Minnesota, '30, live there and conduct tests. Air conditioning (temperature control, humidity regulation, air cleansing, air circulation) flourishes. There is automatic oil heating; there are extensive air ducts in the walls, in the floors; room coolers; combination units to deliver air either heated or cooled; filtering, humidifying, and circulating devices. Air currents can be produced—vertical or horizontal. To help summer cooling, a ventilator exhausts air from the attic. With thermocouples located in nearly a hundred places, temperature readings are taken at one point by means of a telephone-relay system.

This residence was one of the proving grounds for the G-E oil furnace. Now it develops design principles for air-conditioning equipment.