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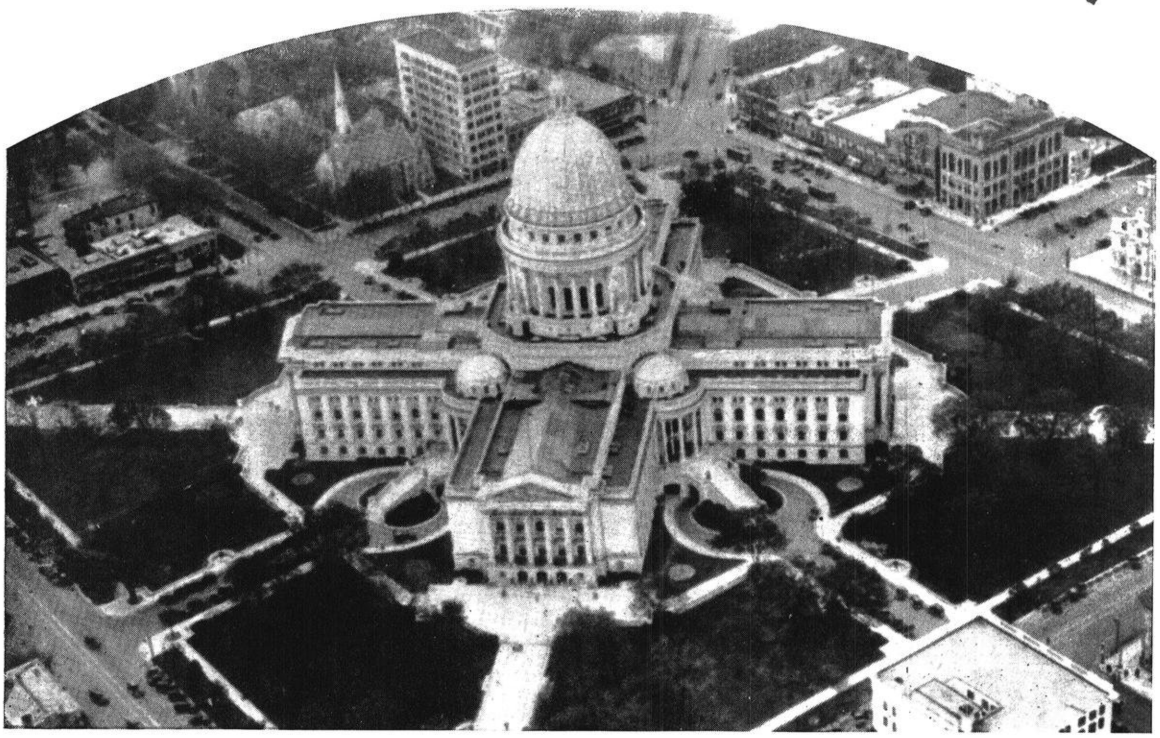
The WISCONSIN ENGINEER



THE WISCONSIN STATE CAPITOL

MEMBER of ENGINEERING COLLEGE MAGAZINES ASSOCIATED

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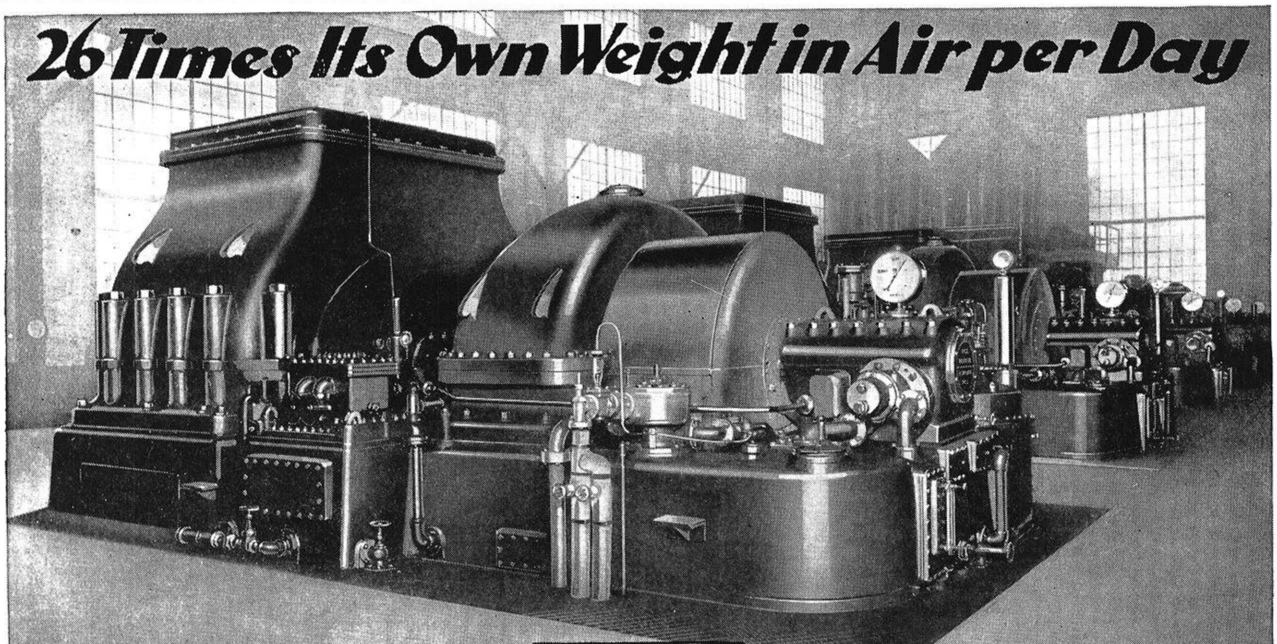
VOL. XXXIV, NO. VIII MAY, 1930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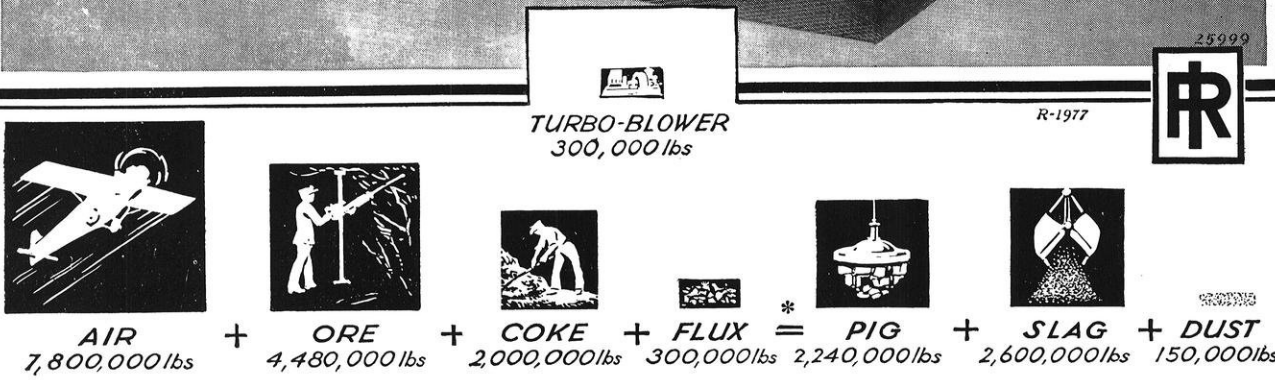
TURBO-BLOWER
300,000 lbs
R-1977
AIR 7,800,000 lbs + ORE 4,480,000 lbs + COKE 2,000,000 lbs + FLUX 300,000 lbs =* PIG 2,240,000 lbs + SLAG 2,600,000 lbs + DUST 150,000 lbs

WHAT YOUNGER COLLEGE MEN ARE DOING WITH WESTINGHOUSE

Equipping A Cathedral of Learning for the University of Pittsburgh

Nine years ago the University of Pittsburgh, then a hundred and thirty-six years old, faced an urgent need for larger quarters. To extend its restricted campus was almost out of the question, for a city had built up around it. The logical direction for expansion was into the air.

American business had long before faced the same situation, and met it with the skyscraper. But no conventional business building would satisfy here. Chancellor John Gabbert Bowman envisioned a Cathedral of Learning, an edifice that would express the essential self of the steel center of the world, a structure with more power, more spirit of achievement and reverence in it than had ever before been attempted. A great architect put his soul into the making of the plans. Leading suppliers were called on for the materials for the realization of Chancellor Bowman's dream.

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Engineer of Mechanical Design

R. A. GAUT
Pennsylvania State College, '25
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C. F. CARNEY
University of California, '26
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Westinghouse

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The WISCONSIN ENGINEER

VOLUME 34, NO. 8 MAY 1930

Some Problems *of the* Young Engineer

By RICHARD NELLER, ch'28

"LADIES and gentlemen" drawled the overstuffed afterdinner speaker (whereupon I took one last drink of water as the chairs were being turned around) "your toastmaster has asked me to address you this evening, but inasmuch as I have been very busy this week I have not had time to prepare a speech. So I hope. . . . blah blah. . . ." BZZZzzzzz. . . . As the speaker proceeded to prove his introductory statement I dozed off into the realm of blessed unconsciousness.

Richard Neller

When the clapping of hands brought me back into the world of reality an hour and a half later I recalled that my last waking thought had been that some day I would make a speech that started like this:

"Gentlemen, your toastmaster has asked me to speak to you and I thank you for the honor that you have extended to me through his invitation. If my address is unworthy of this honor it is not because I have failed to devote the time and effort to its preparation that your attention deserves. I shall talk to you for thirty minutes."

And it is with some such remark as this that I wish to preface this article. Your editor seems to be under the impression that I might have something to say about the problems of the young engineer. If you find that I haven't, that's his mistake.

I am speaking from the standpoint of a young engineer who has just weathered his first two years in the industry and is more than ever in love with his profession.

The usual criticism of the young engineer entering the industry is that he is too cocky. He overestimates his ability to cope with problems which old-timers with less technical training but considerably more practical experience have been working on for years. It is quite the orthodox thing to lecture to the seniors on the importance of forgetting that they have been to college and of entering upon their new work with the attitude of humble apprentics. But it so happens that those of us who desregard such lectures have to get the conceit knocked out of us by experience anyway, and those of us listen with an attentive ear and do profit by such advice have already become masters of our pride. So let's turn our thoughts to some of the other problems of the young engineer.

I think the average graduate from the better technical schools of the country leaves college with the following phases of his education developed to a point where they will give him a tremendous advantage over untrained competitors:

(a) the ability to study efficiently and to employ the literature as a means of reducing experimental work

(b) familiarity with the main branches of science and a working knowledge of each

(c) the ability to express thoughts clearly and to report information and opinions in such a way that others can understand them

Assuming that we all enter the industrial world with these qualities, we are confronted with the problem of mastering the following:

(1) the ability to work with men of all degrees of education and to preserve friendly relations with them.
(2) the ability to recognize problems and to determine the method of solving them.
(3) the ability to sell ideas.

I find that a practical means of approach to the first of these is to ask myself "What qualities do I dislike in others?" and then try to avoid them myself. There is no more unsound statement than the old saying 'Do not judge others by yourself'. By all means *do* judge others by yourself. When you find that you are developing a dislike for one of the men in the plant, take a moment to analyse the situation and to locate the disturbing factor. When you have done that you will have found one of the things which is to be avoided. Occasionally you may find that the dislike was based on some absurd little petty factor which you can condition yourself to overlook. In fact, this is more often than not the case; for is it not so that to have friends one must be a friend?

Perhaps the most important factor in gaining the liking of the man is to show that you are not afraid of work. This does not mean to pitch in and work in spurts, but to do an honest day's work day in and day out, not asking any special privileges or dispensations that would create a barrier of distinction.

The second quality to be developed by the young engineer in the industry is the ability to recognize problems. For four years we have problems handed to us on a silver platter and we gripe like hell if the prof. leaves out some data which is necessary for the solution. That's all well and good during the training period when we are learning the tricks of solving problems, but in the industry we must be able to recognize these problems in their countless disguises; we must go into the kitchen, even back to he soil itself, and prepare our own dish of problems. And we all get our share of 'bride's biscuits'.

An engineer in a position of responsibility has men under him to solve problems—it is up to him to hunt for a problem to solve or to analyse an existing situation so that he may divide it into solvable problems and present them clearly and concisely to the staff. Some lucky fellows are born with an eagle eye for spotting trouble and analysing it; the rest of us have to gain that insight by hard work. We must ask questions to the point where we make a nuisance of ourselves; we must be skeptical until we are in danger of getting a good poke in the nose.

The third quality, and the one which brings home the gravy, is the ability to sell our ideas. How we cuss and swear at those Steam and Gas reports! But take it like castor oil if you can't take it like orange-juice, because you need it. It's got vitamines in it. You'll have to be able to write reports, reports that are clear cut and concise, reports that make the boss say, "That boy knows his suff".

And to write such reports requires a knowledge of the English language 'as she is spoke' by technical men. A knowledge of grammar is important to the extent that ambiguity and verbosity are reduced to a minimum and that clarity and directness are at a maximum without sacrificing brevity. The little niceties of English that distinguish the cultured man from the man-on-the-street are not essential provided that the above conditions are met without them. I think it was the Octopus that printed this one:

Proprietor: Who's that knocking on the door?
Voice: It is I.
Proprietor: No school-teachers admitted.

But I am getting off on one of my pet subjects, namely a special English course for engineers to be put in place of the regular freshman English course. Before leaving this matter of report writing let me emphasize again the importance of reports in selling ideas, and let me suggest that you can improve them very often by reading them aloud before drawing the final copy.

One of the biggest problems of the young engineer is this: Shall I jump around from one company to another for a few years to build up experience, or shall I stick with one organization? There is much difference of opinion among men on this matter. I am of the old school that teaches to put all your eggs in one basket and then watch the basket. I believe in carefully selecting the company for which I'd like to work and then sticking with that company as long as they give me a fair shake. Look well at the history and consider carefully the future of the company. Ask yourself whether its financial condition is sound enough and its interests diverse enough to be able to weather rough going on the stormy sea of business. Then look into the personnel and see what progress has been made by young blood coming into the organization. All these things are good criteria by which to select the firm with which to make a connection.

Just a word about "pull", or "contact" as it is called in more refined language. In modern business there are few men who can hold their jobs on sheer pull—they must have the goods or they are replaced by men who are competent. But on the other hand, many men get their jobs through contacts. It is only natural that when there is a vacancy in a responsible position the employers will call to mind the men they know. If two men are otherwise equal, the man who is known will be given the opportunity over the man who is unknown. Why are so many of our Prom chairmen campus and football heroes? It is not because some of the more obscure men could not handle the job as well, but it is because the men in campus activities and sports are widely known. It works the same way in industry.

And now after all this advice and blarney, let's not get so befuddled that we can't see the woods for the trees. With our noses close to the trail we lose our perspective. Let's sit calmly by the wayside for a moment and let the world pass by. We see the birth of a generation and watch it struggle and tussle and fight and hustle through a

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The Mobilization *of* Industrial Organizations *for* War Service

By FRANKLIN T. MATTHIAS, c'30

BACK in the days of Frederick, Alexander, and Napoleon, warfare was a simple proposition as compared with the present time. The "Powers that be" in the army organization of those days could concentrate almost entirely on the developments of tactics, strategy, and the training of an adequate personnel, without much regard for the complicated system of supply of munitions, food, clothing and the scientific offensive machines which has necessarily been built up in the mobilization of a modern army. Armies in those days lived on the fat of the land where the fat was available, and sucered when supplies were not forthcoming in their immediate vicinity.

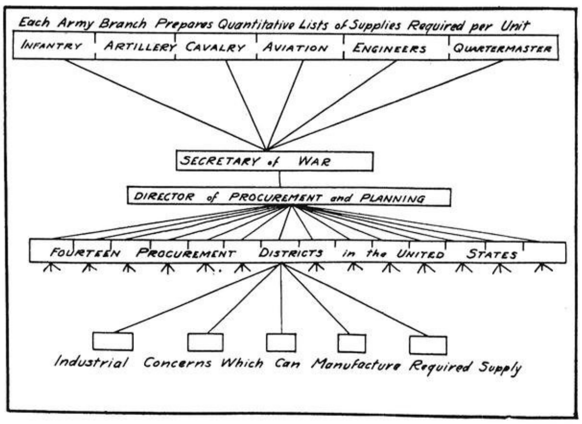


Diagram of the working organization which is being used in planning the procurement of supplies for the army in the event that a sudden major emergency does occur.

With the development of science in industrial practice and machine construction, the offensive power of armies increased due to the increased efficiency caused by the development of scientific and mechanical aids. The fighting power per man has increased proportionately with industrial progress. The armies of early days could not have hoped to resist the offensive power of a modern army even though they did outnumber them in personnel. They would have been helpless against an army using gas, machine guns, airplane bombs, high explosive artillery projectiles, and other mechanical machines which are used by present armies. Almost daily, during the world war, either one side or the other utilized some recent invention or scientific discovery to increase its offensive power. Never before in world history has such a formidable array of weapons or so elaborate a system of defense fortifications been brought into a military conflict as was done in the World War.

Practically all these new additions to military power have been brought about by the great march of industry and science. Our problem, then, in perparing for possibilities of future wars, is to provide a working plan whereby a sudden and complete utilization of our country's industrial resources by the national government, and the maintenance of such resources on an efficient and productive basis can be effected. Thus, it becomes evident that future wars will be won, not merely by the superior numbers of personnel and the superior strategy used, but more largely by the extent of the country's scientific development and the government's effective utilization of its industries. First of all in the formation of a plan for efficient wartime control of industry comes the question of what supplies will be needed and which sections of the country can best supply them. The General Staff, in cooperation with the Assistant Secretary of War, is preparing tables of organization and equipment which will furnish the basis for the determination of the initial requirements for each unit. On the basis of these tables, each branch of the army prepares quantitative lists of the necessary supply per unit and each supply branch then prepares similar lists of the articles which it can furnish. The lists thus prepared are turned over to the Secretary of War who is charged with the procurement of the necessary supply.

In order that adequate plans for such procurement may be made, it is necessary that a detailed study of the facilities of industries which may be required to produce them. This study entails a consideration of sources of material, requirements of material, rate of production, and the possible methods of increasing the rate of production in a major emergency when industrial workers are not easily available. Also, suitable substitutes for required material must be provided for if it is shown the standard supply will possibly be deficient in quantity.

The study is being carried out by a department under the control of the War Department. It is headed by a Director of Procurement and Planning and is composed of army officers detailed from all branches of the military service. The department does not directly devise plans for the procurement of such things as power, labor and transportation, but it does direct the work of the supply branches of the service in the preparation of such plans.

In order to coordinate the work, to provide smaller units with which to work and to distribute the industrial load evenly over the country, the United States has been divided into fourteen procurement districts. Each army branch is required to keep separate files for their reports on industrial conditions and required supply for each procurement district, so that, in case of an emergency, a district office can be organized immediately with all the material and data

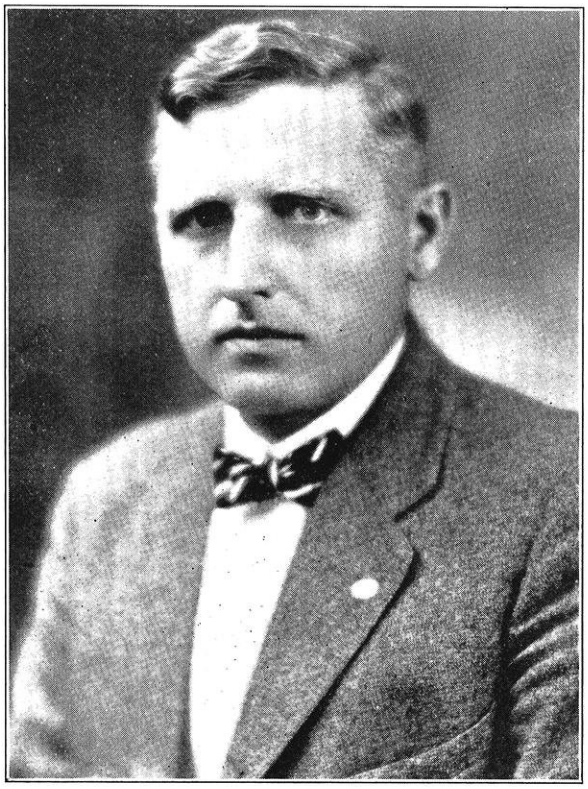
(Continued on page 310)

Patent Engineering

By O. W. Storey, ch'10

"PATENT ENGINEERING", a comparatively new title applied to a somewhat older profession, seems to have been first suggested by Robert E. Naumberg in an article in The Tech Engineering News. Excerpts of this article appeared in The Literary Digest for April 18, 1925.

Naumberg defined a patent engineer as a "person who can design a new machine in accordance with a knowledge of patent law and of existing patents, just as intelligently as a mechanical or civil engineer designs a piece of mechanism or a structure in accordance with the laws of nature. A patent engineer is no more discouraged by a legal obstacle than a mechanical engineer is by a mechanical obstacle." This definition correctly defines a hybrid profession combining a patent lawyer and an engineer but it is too narrow for the patent engineer of today who need not be primarily an engineer but may be a chemist, metallurgist, bacteriologist, etc.


Oliver W. Storey, Engineer for Burgess Laboratories

What are the duties of the patent engineer? Why shouldn't the technical advisor of a corporation or patent counsel for a corporation take over his duties? What are his qualifications? What is his future? I will endeavor to answer these questions, basing my answer primarily on my own observations and experiences.

The statement is made that a "corporation large enough to carry on research work is too large to neglect its patent protection". This statement may be further amplified to the effect that if a corporation is to have patent protection it should have the best. And I believe further that patent engineers are essential in any organization set up to obtain the best patent protection.

I assume that the corporation has competent patent counsel. How can he best keep in touch with the many activities of the corporation that have a bearing on patents? I do not believe that he should be burdened with unessential technical details and routine matters. Therefore a technical man with a knowledge of patent law (patent engineer) should be in close touch with these activities since technical ability and knowledge is required primarily. The patent engineer sifts and sorts and condenses the information he obtains and furnishes patent counsel with the technical essentials thereby allowing him to concentrate on the legal aspects.

The various research men, development engineers, foremen, superintendents, and other technical men seldom have the training which permits them to determine what is essential data foı patent purposes and therefore they should not be in direct contact with patent counsel. It is apparent that a technical man, with a thorough knowledge of the details of the company's work, and with a knowledge of patents and patent law must be the contact man. The patent technician or patent engineer must therefore keep in close touch with the details of the corporation's work. He must understand what is being done and why it is being done. Often he must help guide the work through a maze of interfering patents. This requires continual study on his part.

The patent engineer can best keep in touch with the technical details by conferring with the members of the production, research, and development departments, but he must supplement such conferences with his own independent studies to better understand what is being done and to independently check the information furnished to him. By thus keeping in close touch with the work he recognizes patentable improvements when they are made and takes the proper steps to protect them, he becomes familiar with the many details so that he can write the strongest possible patent applications, and he can advise the technical departments about the best further lines of research and development to avoid infringing prior patents and also to secure the strongest possible patent protection.

It is my experience that the patent engineer thinks in terms of breadth of invention since he unconsciously formulates patent claims as soon as he understands or thinks he understands an invention. This ability of the patent engineer and the patent attorney to see the broad applications of an invention is often surprising to the technical inventor whose vision often is limited to the narrow confines of his work. As an example, if the invention has to do with paper the patent engineer immediately thinks of the properties and constitution of paper. Since it is a fibrous material he immediately wishes to know if the invention can be applied to fibrous materials in general. Fibrous materials may suggest cotton, wool, asbestos, silk, and other fibrous materials. It also may suggest cloth, burlap, rope and other fabrics. It may suggest wood. He will want to know whether the new development can be applied to all of these materials. If it can the claims should be broad enough to cover them.

This enlarged perspective of the patent engineer is an excellent reason for not allowing the untrained man to communicate directly with patent counsel who may be familiar enough with the technical details to broaden the invention, and as a result a narrow patent of limited scope and of little value may be obtained. The broader and more valuable features may be omitted and these therefore are dedicated to the public. Many technical men have made this mistake.

After a discovery or an invention has been made the patent engineer must lay out the necessary further experimental work necessary to write a patent application. Generally he desires to know whether the invention may be broadened, what equivalent materials may be used, and the limiting percentages of materials, temperatures, etc. that may be used. He may even wish to know the underlying theory involved. This information on theory often is not necessary but usually is very helpful. However, often the patent engineer must write the application without all of the required information and then he must use his imagination and good judgment. However, he must use his imagination with care.

If the patent department functions as I have outlined it expands the viewpoint of the technical man and should prove a stimulus to him.

An important function of the patent engineer is to advise about infringement. Whenever a new process is being worked on or a new product is devised it is essential to know whether it infringes any existing valid patents. Usually the patent engineer is required to make a study of the art when the research or investigational work is started. The patent engineer is called upon to advise the technical man which avenues of approach to the solution of the problem are closed because of existing patents. He must keep in touch with the development of the solution of the problem so that he may give advice with reference to infringement from time to time. He of course must also often pass on the patentability of the new developments or discoveries at various stages of progress.

The patent engineer prepares the patent applications for the patent attorney. This is an excellent system since he is in a position to become familiar with all angles of an invention, and it is possible for him to have personal conferences at any time with the inventor and other employees who may have knowledge of the invention. Such conferences are much to be preferred over correspondence. In such a patent system patent counsel acts in an advisory capacity as the application seldom needs more than a few changes. He files the applications with the patent office and pilots the application through the patent office where his legal skill is usually required, especially if an interference is fought or the rejection of claims is appealed. The patent engineer, of course, assists him in the technical matters which arise during the prosecution of the application. Since patent counsel is skilled in court procedure he takes complete charge in infringement actions.

WIDENING THE ENGINEERING HORIZON

The coming of the patent engineer marks another advance in the field of engineering. It is another phase in the increasing importance of engineering experience and knowledge in the field of industry and business. Here is one case where engineers and lawyers work hand in hand, efficiently and well.

The widening of the engineer's sphere of activity is a continuous process from the beginnings of science to the end of civilization.

—THE EDITOR.

An important function of the patent engineer is to determine the real inventor of an invention. Often this is difficult to do though it is usually greatly simplified by his intimate contact with the work. In cases of doubt he should be able to cross-examine the various men to get at the facts preferably without making them aware that they are being cross-examined. He must carefully examine records. He must know the law relating to this point and be able to apply it, since the patent law of this country requires the actual inventor or inventors to file the patent application or an invalid patent results. Usually technically trained men are reticent about claiming an invention and it takes some time and skill to obtain all of the facts.

The patent engineer should keep in touch with competitors' products and processes to determine if these infringe any of the corporations' patents. He should be able to direct the obtaining of evidence and direct investigations required for infringement proceedings.

The patent engineer has many other duties, these varying with his training and ability and the organization of the patent department. If the patent attorney is located at the plant the duties are somewhat different than when he is located away from the plant. Some of his further duties follow.

He scans the U. S. Patent Office Gazette which issues weekly to determine what patents of interest to the corporation have issued. Copies of these should be obtained, properly indexed and brought to the attention of the interested employees. These patent specifications should be kept in bound volumes. If the corporation owns one or

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Surveying De Luxe In Venezuela

By WM. F. KACHEL, JR. c'33

WHEN the Frosh and Soph civil's are out doing their tricks with a transit on Ray Owen's farms, they think of G. Burton Hanson c'31, who is running around his own "farms" in Western Venezuela. He is locating oil bearing fields and exploring the country. On the side he claims he is picking up a little Spanish.

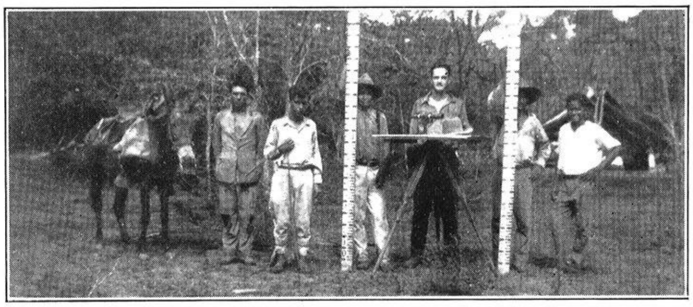
The work consists of plane table, compass, and work with the torsion balance. The latter is an instrument used in locating underground structures that might possibly bear oil. In this way the engineers give the geologists the "low down" on where to concentrate their work. The plane table work is much the same as is done in this country, except that labor is cheap and plentiful. This makes it possible to have as many as forty peons to be rodmen instead of just one as is customary in this country.

Off duty here. Government Buildings at Caracas, Capital of Venezuela

Mr. Hanson was very much surprised to find that only a few of the engineers down there knew how to operate a plane table when they first left college. His knowledge in this line (thanks to Ray Owen) helped him to be useful and get ahead in his work. Let this be an example to the poor "Sophs" who are so interested in doing their plane table areas.

When the party isn't locating oil, they are mapping the country; locating rivers, campsites, water holes, or roads; or sleeping. They always have their siestas during the middle of the day because of the heat. In this country the surveyors don't have to have heat to make them take a nap when they get tired. If you don't believe this take a look at the rodmen sleeping their stuff on the farms alongside of Bascom.

"The meals are perfect," according to all reports, even though they do come from a can. It's funny how you can enjoy Campbell's Beans and Heinz's Fifty-seven when you're far away from Uncle Sam. The cook is reported to help in making the meals enjoyable by serving pork and beans for dinner and beans and pork for supper. A change always helps a person to enjoy his food. The drinking water is reported to be very excellent. He didn't say a word about anything else worth drinking. The party



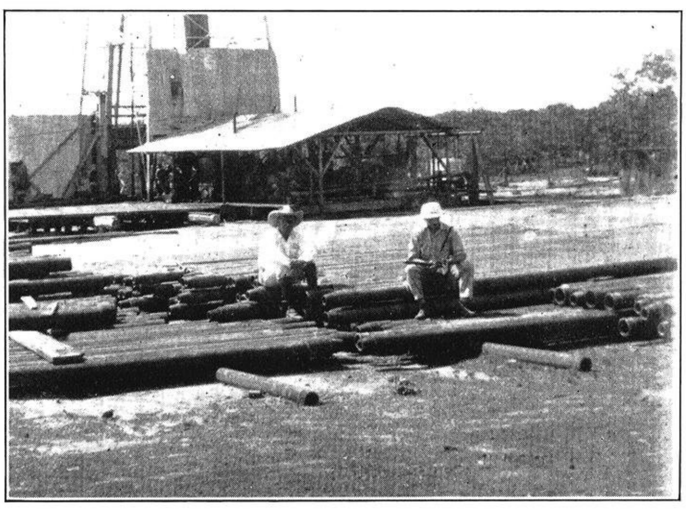
The plane table crew at a camp near the Rio Palmar. Note the metric stadia rods.

carries a portable shower with them that they use on Saturday nights. Plenty of fresh air and exercise are furnished to all members of the party free of charge. One thing the boys get that they don't want is mosquitos. They are very plentiful and affectionate. In fact often to much so.

One of the hardest jobs of the party is the moving of their equipment about from place to place. This was very difficult in the rainy season. The party often had to travel by mule and move their camp by ox-cart. Right at present they are having their tropical summer. This dries up a lot of the swamps and makes conditions much better than they usually are.

The party has a chance to get into Maracaibo occassionally. The population of this town is about 150,000 persons, or about twice the size of Madison.

The traverse work is run with compasses. Mr. Hanson states that it is surprizing how large the regional variations



A Typical Oil Set-up in Venezuela

are. For this reason he admits that he often gets rather poor closures. He doesn't have to worry about that be-

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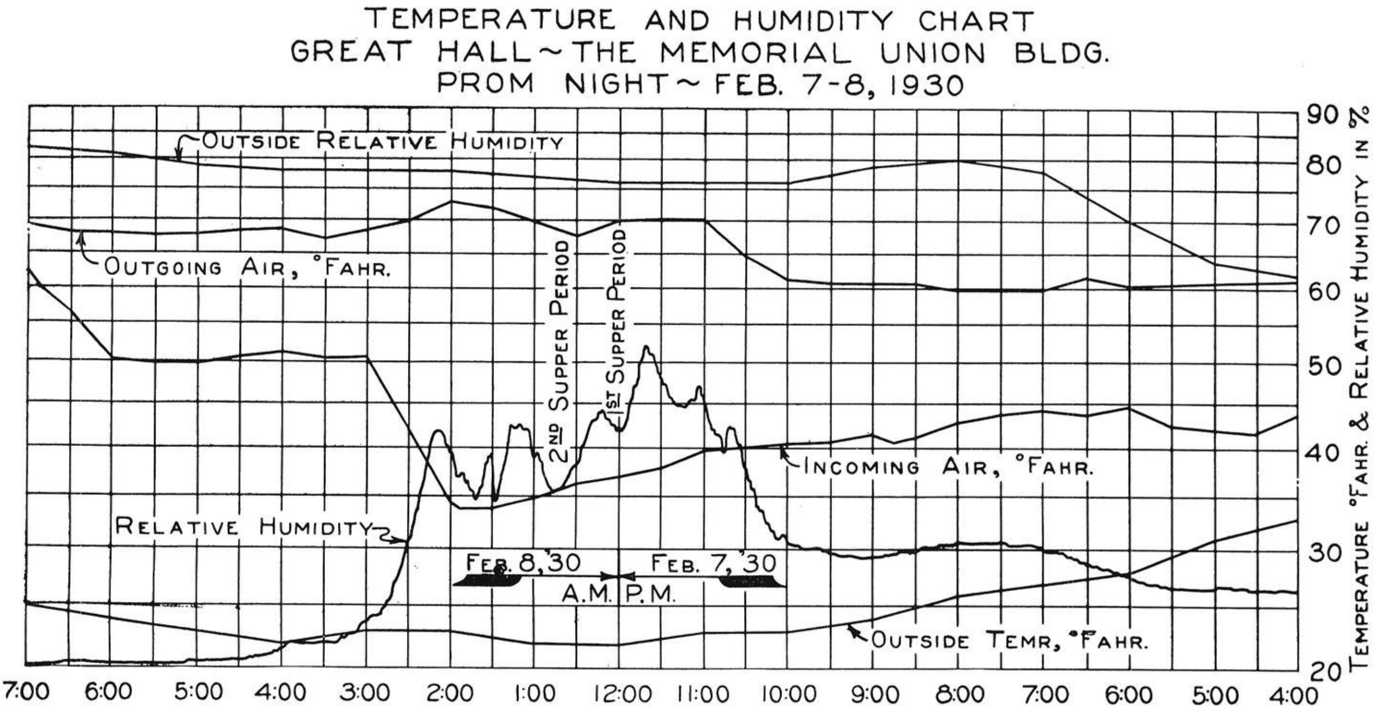
Weather Conditions In Great Hall—Memorial Union Building

By C. J. BRAATZ, m'27
Instructor, Steam and Gas Engineering

"MANUFACTURED weather makes "every day a good day" is the slogan of one of our largest manufacturers of heating, ventilating and air conditioning equipment; yet after sitting through a performance in some of our modern theatres, equipped, as they tell us, with a sea-shore atmosphere, we are prone to question the validity of the slogan. Nevertheless, the possibility of making weather to order has been, and is being demonstrated to such an extent that buildings have been constructed with all windows completely sealed and in which weather conditions are maintained constant in winter and in summer as well, independent of outside weather conditions. In office buildings, residences, and in general buildings where the floor space per occupant is relatively large, the problem of maintaining a reasonably comfortable atmosphere is not particularly difficult. However, in buildings containing rooms such as Great Hall in the Memorial Union Building, which is called upon to accommodate large crowds at intervals, abnormal conditions will arise which may not be frequent enough to justify the installation of elaborate air conditioning equipment, or even though justified may have to be omitted by virtue of limited funds.

The purpose of this article is to analyze very briefly the weather conditions that arise in Great Hall on such occasions as Junior Prom. On the night of the 1930 Prom, there was installed in Great Hall several recording thermometers and a humidity recorder by means of which a history of temperature and relative humidity conditions in the Hall was obtained. The results appear in Figure 1, together with outside weather conditions, data for which were furnished by the U. S. Weather Bureau.

It is quite common information that the temperature recorded by an ordinary dry bulb thermometer alone is but a relative indication of a person's feeling of comfort or discomfort; because from experience we know that we may have a greater feeling of warmth at a temperature of 68°F., for example, than at 72°F. if the moisture content of the air in the latter case is considerably lower than in the former. Experiments have shown* that the majority of people feel equally comfortable over quite a wide range of dry bulb temperatures providing the moisture content of the air, or in other words its relative humidity, is varied to suit the particular temperature under consideration. Combinations of temperature and relative humidity for which the same degree of comfort is experienced have been determined for various conditions of air movement and plotted as "equal comfort lines", or, as they are sometimes called, "effective temperature lines," with respect to relative humidity, and wet and dry bulb temperatures.* In still air, it was found that 97 percent of the people are most comfortable at an effective temperature of 64°, which



*1930 Guide — American Society of Heating and Ventilating Engineers.

(Continued on page 298)

Rigid Concrete Frames Used In Monterey Bridge Project

By WM. H. F. WOO, M.S. '29

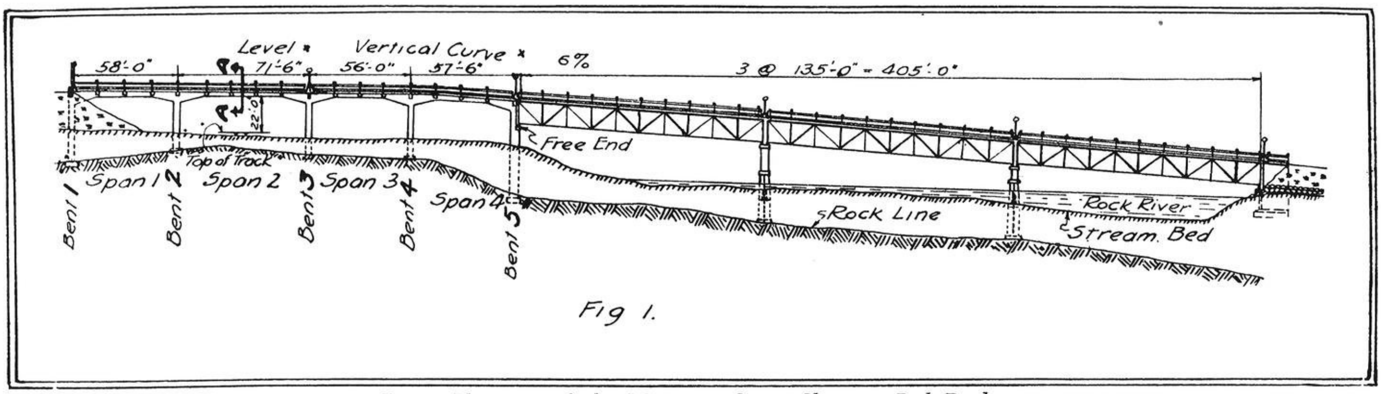
THE Monterey Bridge project, which lies on S. T. H. 13 and 26 and U. S. H. 51, in the outskirts of the city of Janesville, Wis., and is now under construction, consists of the following structures named in the order as they are arranged from north to south: (a) three 135 ft. spans of deck Warren trusses with subverticals, (b) a 4-span continuous concrete framework, and (c) a skewed plate girder bridge, the last two named structures being separated by a fill approximately 600 ft. long. The three structures are to bridge over the Rock River, the Chicago, Milwaukee, St. Paul & Pacific Ry., and the Chicago & North Western Ry. tracks respectively. Fig. 1 shows structures (a) and (b). Because of the unusual magnitude in dimensions for its type, as well as the presence of several problems which offered difficulties in the design and complication in calculations, a description of the concrete structure mentioned above will be of interest to structural engineers.

As shown in Fig. 3, the structure has a clear width of roadway of 40 feet and carries two 6 foot sidewalks. The roadway and sidewalks are supported by four frames, each frame consisting of 4 columns and 4 girders, which are so rigidly connected one with the other that the entire frame acts as a unit under loads.

Slabs only 8 inches thick

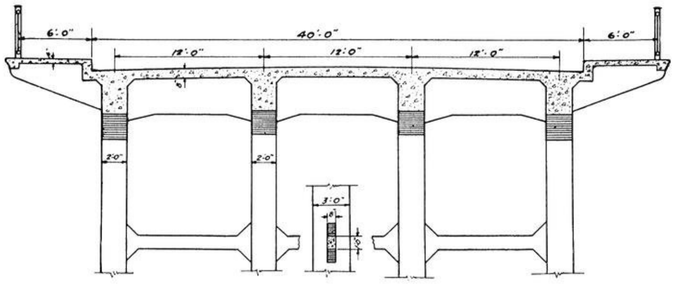
The weights of the roadway slab and the live load it is to carry are transmitted in part directly to the girders of the frames by means of the transverse reinforcement in the slab and in part indirectly, by means of the longitudinal reinforcement and transverse crossbeams, which are spaced approximately the same distance as that between the girders. As continuity exists over its supports, the slab is designed with this in view. By so doing, and with the adoption of the two-way system of reinforcement described above, it is possible to reduce the thickness of the slab to 8 inches. The primary purpose of making the slab as thin as possible is to reduce to the minimum the dead load which the girders and frames are to carry and thereby secure greater economy.

The sidewalk slab is reinforced transversely. One end of the slab rests on the coping, which in turn is supported by cantilever brackets extended from the crossbeams supporting the roadway slab. The coping is thus called upon to serve both for architectural purposes and as a beam. The depth of the brackets is uniform except at the columns where they are made deeper to give a more harmonious appearance with the haunches at the columns.



Entire Elevation of the Monterey Span, Showing Bed Rock

The frames are spaced 12 feet in order to have enough clearance between the curb and the outside face of the exterior girder for the installation of the drainage equipment and to apportion the loads approximately equally to each frame. The columns of the frames rest on the rock foundation and, due to undulating character of the latter, they are of different heights from bent to bent. At bent 5, the sudden change in elevation of the rock within the width covered by the four columns, necessitates that they be made in pairs of different heights as shown in Figure 2. The cross sections of the columns are rectangular, being 2 feet wide by 3 feet deep for all except those in bent 5. Each of the latter columns carries one end of each of the 4 trusses adjacent to it (see Fig. 1) which fact complicates the design to no small extent. The section of these columns below the truss seat was first made 2 feet wide by 5 feet deep and that above, 2 feet by 3 feet. A set of computations was made for each of the frames based on these dimensions, and results showed that the stresses in the concrete of these columns at the section immediately below the bottom of the haunches, where the maximum moments in the columns would occur, would be far in excess of the allowable limit, that about 30 per cent of the stresses would be caused by the change in temperature due to the columns being too rigid, and that, in order to reduce the stresses, the columns should be made more flexible. The depth of the columns was, therefore, reduced inches along its entire



Sec. A-A
Reinforcement not shown.

FIG. 3. *This shows the details of the floor slab with sidewalks on each side, and railings.*

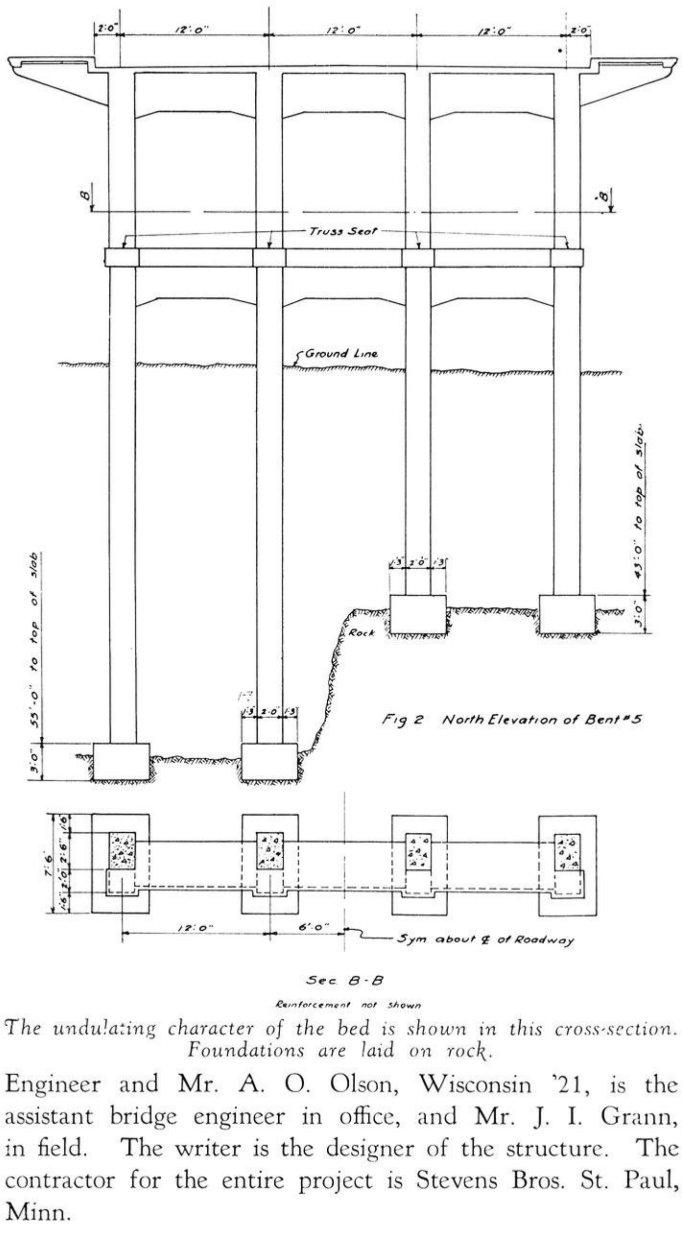
length and calculations were made, based on this revised depth. Results showed that under most unfavorable loadings the allowable stress will be exceeded but little at sections referred to above, and the revised size was adopted as final.

The depth of the girders in span 2 of the interior frames, the span length of which is 71 feet 6 inches, is 2 feet 7 inches measured from the bottom of the slab. At the center of this span, it is reinforced with fourteen 1¼ inch square bars to take care of the maximum positive moment of 11,500,000 inch pounds. The positive moment in the girders of other spans being much less, they are made shallower and are not as heavily reinforced. All girders are 2 feet wide, giving enough room between the seven lines of reinforcement for the concrete to run through. Haunches are provided at the ends of the girders to reduce the stresses there caused by the high negative moments and shears. The deepest haunches, measuring 4 feet 1 inches exist at the ends of the girders in span 2 and are called upon to carry a maximum negative moment of 18,500,000 inch pounds and a shear of 135,000 pounds for each. The reinforcement in each of these haunches consists of fourteen 1¼ inch square bars at the top, six 1¼ inch square bars at the bottom and ½ inch square rectangular stirrups spaced 4½ inches on centers. For architectural reasons, haunches of the exterior frames are made of uniform depth, as are the girders.

In calculating the stresses in the frames due to different kinds of loads, the following assumptions were made: (1) the columns are fixed at the bottom, (2) the joints of the frames are rigidly connected, and (3) the foundation is unyielding. The sections are so divided and balanced that it will require one day's work for a medium sized concrete plant to pour two sections. Proceeding in this manner, all concrete will be in place in five days. It is expected that on account of the presence of the complicated reinforcement, any attempt to pour the concrete in a hurried manner is sure to yield unsatisfactory or fatal results. Only through good workmenship and rigid inspection, can expected results be obtained.

The structure is designed in accordance with the standard bridge specifications of the Wisconsin Highway Commission and is able to carry, on the roadway, two 12½-ton trucks plus impact, or a uniform load of 113 to 126 lb. per sq. ft plus impact, and, on the sidewalks, 72 to 76 lb. per sq. ft. without impact. Concrete will be of designed mix and for beams its allowable stress is 800 lb. per sq. in. between supports and 900 lb. above supports. The structure contains 855.8 cu. yds. of concrete and 250,100 lb. of reinforcement, which is about 2.3% the volume of concrete. Compared to other types of concrete highway bridges, this percentage is high, which fact is accounted for by two reasons: high allowable stress in concrete and the presence of moments of different signs at almost every section of the structure. Based on the unit price submitted by the successful bidder, the structure, complete with fixtures, costs only $172 per ft. of the structure and, therefore, is very economical.

The plans for the entire project were prepared in the bridge departmnt of the Wisconsin Highway Commission of which Mr. C. H. Kirch, Wisconsin '12, is the bridge



Sec. B-B
Reinforcement not shown

The undulating character of the bed is shown in this cross-section. Foundations are laid on rock.

Engineer and Mr. A. O. Olson, Wisconsin '21, is the assistant bridge engineer in office, and Mr. J. I. Grann, in field. The writer is the designer of the structure. The contractor for the entire project is Stevens Bros. St. Paul, Minn.

Editorials

IMPOSSIBLE A recent article in the Engineering News Record discussed the activity and interest which may in a few years terminate in a tunnel underneath the English Channel. The greatness of the project, the dangers involved, the risks to be run are overwhelming. It is easy to say that the feat is impossible.

A parallel case is the Boulder Dam development. To imagine a dam twice as high as the state capital building is very difficult for even an experienced engineer. The tremendous size of the reservoir makes it very simple for the reader to shake his head and pronounce the whole thing a wild dream.

But look back a few years. Back before the days of the Panama Canal, before the days of the Eiffel Tower, or the Eads Bridge, when construction was a hazardous and tedious operation because of ignorance of material performance and lack of the highly developed machinery which is typical of this day. Those engineering accomplishments and others which seem so everyday and tame to us were once laughed at, and classified as wild dreams by the people of that period. But engineers overcame the fear and lack of confidence of the financial supporters and those wild dreams took actual form.

If those projects were possible to the engineers of that period, such feats as the Boulder Dam and the tunnel below the English Channel ought to be well within the range of man's ability today. It would be unusual for the American race at least, to rest on the laurels of the past, and indulge in the oriental habit of ancestor worship. In fact when we consider the improved machinery, the knowledge of construction materials, we wonder if Napoleon were not right in stating that nothing is impossible.

POLITICIANS Glenn Frank has predicted that the politician will soon be missing in our government positions. Instead there will be men of technical training or training in economic fields, men capable to legislate.

The politician used to be character who knew very little about what he represented. He was a good public speaker and could develop contacts with men. He usually had good judgment. In former times it was almost unnecessary for him to know anything else. The country was not technically developed. Road-building, transportation, public utilities either existed on a very small scale or did not exist at all. The politician's mind was big enough for his position.

But now with the rapidly developing technical sides to the state and commonwealth, the old type of politician is entirely incapable to carry out his office. It is very hard for a man without a working knowledge of engineering, to use good judgment on engineering subjects. And engineer subjects are getting to be more prevalent every day. Questions of sewage disposal, water supply, street paving must be settled by a technical employee of the government.

President Hoover is an unusual example of a technical man in the politicians chair. His vocation is almost unique among the presidents of the United States. With the changing of our country, we may expect that government offices will be more and more occupied by technically trained men.

SUMMER WORK Have you got a summer job yet? Are you going to run a gun, carry a rod, wheel a concrete buggy or lean against a shovel; or are you spending your summer in a hammock getting lots of rest?

From the general consensus of opinion, summer jobs are going to be scarce this year. Nevertheless they should be sought after. The summer time presents an unusual opportunity to get something which the college cannot give—practical experience, along with some dough that always comes in handy.

For those that cannot get work, there are always courses to be taken in the extension division of the university. In this way a few credits may be checked off a lighter course which will allow more outside work may be planned for the following year. The summer school in the college of engineering provides an extensive curriculum.

TO THOSE WHO GRADUATE

Graduation is rapidly approaching. For some it is the veritable commencement of their life's work, and they look forward to it. For others it marks the termination of four years more or less pleasantly spent in the classroom.

The undergraduates will scarcely notice a change. Vacation will bring temporary jobs, summer camp, or pleasurable pastime. In fact, the big void left by the seniors is not effective until September. At that time it comes suddenly as a shock, and we realize that we have lost something, that the buildings, equipment, or professors cannot supply—the fellowship of those who have left to start their careers.

We are impatient to be out there with you, earning a living, and accomplishing things. The years in between seem to be long and without gain. Some will lose interest and not come back to finish their course. The rest will return to write experiments, to cram for exams, to spend their time on problems that are only thrown in the waste paper basket.

Nevertheless we shall miss you. We would like to be out of school with you in the "big rackett". The associations which are strong at Wisconsin may continue. And finally we wish you the best of success. To you Good Luck!

COMING TO WISCONSIN?

The *Wisconsin Engineer* sends a few hundred copies of its last issue to the high schools of the state, where eventually it is read by those who are interested in the university.

Much of the information that high school graduate receives concerning the various institutions of higher learning, is obtained from students who have returned from that college. The information is naturally biased and it depends entirely upon the individual character of the informer whether or not the particular institution is recommended or not recommended. Those that have done poor work are naturally discontented with the school. Those that have done well will usually support it.

The Wisconsin Engineer is naturally a biased source of information when it comes to discussing the University of Wisconsin and especially the College of Engineering. We will not, therefore put forth the argument that we like the school, because we like, or because the fellows are good fellows. We will try to refer you to facts which are apparent and which will not be denied by a student of another institution who knows about Wisconsin.

First, there is the faculty. It is a large body of outstanding men. Nearly every one of them has been successful in practicing the line of engineering that he is teaching. Many of them continue there consulting work even while they are acting as professors in the College of Engineering. They are employed in this consulting capacity by the leading investment houses, mining interests, chemical concerns, and other business. Take a copy of the catalogue, mark the names of all the associate professors, assistant professors, and full professors, and ask any outstanding engineer about them. You will find them remarkably well known in the field which they represent.

A large number of the text books used in the curriculum are written by the professors themselves. An education derived under the tutelage of successful men is a stable and beneficial education.

Secondly, we would like to point out the equipment which is available to students in the engineering school. With the completion of the new mechanical engineering building next year the college will be more than able to take care of the increasing number of entrants each year. The new wing to the general chemistry building, the adequate facilities for study in the physics building, and the material which is available to those in the higher courses are factors wll worth considering in chosing an alma mater. The location of the engineering school on Lake Mendota is undisputably the finest college location possible. Many students come to Madison in the summer time because of its similarity to a pleasure resort: The location of the engineering school adjacent to the other colleges in the university is important. Engineers in choosing their electives may select the best that is given, in finance, history, languages or art.

For the last point we would recommend the extensive alumni list composed of all of those who have graduated from this institution. An alumni directory will show repeatedly the words, chief, president, vice president, manager, editor superintendent, foreman and other names which are applied to leaders. The success of Wisconsin graduates is an item which cannot be denied and which should occupy your consideration. We hope you will be with us next year.

ALPHA TAU SIGMA

Alpha Tau Sigma, the engineering journalism fraternity, announces that a contest will be open next year for students who wish to show their ability with the pen. A slide rule will be given as a first prize, second and third prizes will consist of some smaller gift such as a good set of triangles.

The unusual development and approach to the subject will be given more weight than the technical side of the article. A full account of the contest with the rules will appear in the October issue of the Wisconsin Engineer.

CURRICULUM CHANGES

While the great curriculum changes affecting the whole university are being discussed, two minor changes affecting only this college are already definitely promised for next year. Freshman English for engineers is to be put upon an experimental basis in deference to a general feeling that the course as it has been conducted in the past does not meet the needs of engineering students as fully as it might. A number of the engineering sections will be handled by instructors who will have considerable freedom in planning and conducting the work. These instructors will be permitted to try out various theories and suggestions. Out of this experiment should come, in due time, definite ideas of just what to teach and how to teach in a course of English for engineers. Engineering students, as a rule, appreciate the need for facility in speech and writing. Their special needs in this field deserve consideration. This attempt to discover what their needs are should receive the sympathetic co-operation of every one in this college.

The second change affects the civil engineers only. The course in Railway Location, which has been given in the first semester of the junior year, will be given in the first semester of the sophomore year at the same time as Railway Curves, changing places with Descriptive Geometry. This change will have two desirable results: First, it will make it possible for civils to take their summer camp work at the end of the sophomore year and so have the summer following their junior year free for work. They can get better jobs at the end of their junior year than at the end of their sophomore year. Second, it will make it possible for a civil to take R.O.T.C. without having to postpone graduation. Up to now, the R.O.T.C. man took summer camp at the end of his junior year and the R.O.T.C. camp at the end of his Senior year.

IN APPRECIATION

The staff of the *Wisconsin Engineer* takes this opportunity to thank the students, faculty and alumni for their support in furnishing us with articles and information during the past year. Our magazine is a student publication and is possible only by the continued support of students and faculty. We owe our present success to our university friends.

Alumni Notes

Successful Wisconsin Engineers

H. Henry Magdsick

By ROBERT L. VAN HAGAN, c'32

Henry Herbert Magdsick, who was installed as president of the Illuminating Engineering Society last October, was born in Van Dyne, Wisconsin, January 18, 1888, and was graduated from the Burlington, Wisconsin High School in 1904.

While at the university, Mr. Magdsick acquired an interest in electric lighting from Prof. Edward Bennett, and wrote his thesis on "Effective Illumination". Then, unlike most of the graduates, he proceeded to follow up his thesis subject and has devoted more than nineteen years to the study of electric lighting and its applications. Upon graduation from the university in 1910, he became associated with the National Electric Lamp Association and has continued to serve with that company since. For the past ten years he has been director of commercial engineering, with particular interest in the more specialized applications of electric lighting.

In 1914 Mr. Magdsick gained wide recognition in illuminating circles when he designed the floodlighting installation on the Woolworth Tower, one of the first floodlighting jobs to be applied to a big building. In 1916 he designed and supervised the floodlighting of the Statue of Liberty.

Mr. Magdsick and his associates have made many fundamental studies of lighting which have greatly affected its application in several fields. The depressible beam system of automobile headlighting is an outgrowth of one of these fundamental studies, that of road lighting requirements of automobiles. This system is now standard on practically all American-made cars. Electric signs have been similarly affected by a study of Mr. Magdsick's, that of the legibility of luminous patterns. The fact that his interest in

H. Henry Magdsick

electric display lighting has not waned is evidenced by his applique unit system" of light ornamentation for building exteriors, which has been recently placed on the market by several manufacturers. He has written numerous papers and technical bulletins dealing with lighting in various phases and for many types of service.

When the First International Lighting Mission came to America in January, 1923, Magdsick was placed in charge, and with its termination he accompanied several of the members to Europe to assist in the organization of the first European lighting centers at London and Paris.

He has from time to time been active in committees of the National Electric Light Association, in the lighting division of the Society of Automotive Engineers, as chairman of the legislative committee of the Automotive Lighting Association, as a member of the executive committee of the electrical advertising section of the Society for Electrical Development, and in the Illuminating Engineering Society. In the latter, his more important positions have been on the war service committee, on which he devoted particular attention to night flying, the motor vehicle lighting committee, and the papers committee, of which he was chairman from 1926 to 1928. During the past year he served as vice-president of the society.

While he was in school, Mr. Magdsick was an active member of the old U. W. Engineers' Club, a member of the university Y. M. C. A., and was elected to membership in Tau Beta Pi.

He married Miss Rachel Davis of Cleveland, Ohio and they have a boy of nine.

This concludes this year's series of articles describing some of our successful alumni. It is especially gratifying and stimulating to the student staff to be able to present such eminent men in engineering as we have presented during the past year. We look to our successful alumni with pride and with the hope that of our number there may be some who will occupy similar positions of respect and responsibility in our profession. This series will be continued next year.

MECHANICALS

Clark, H. L., m'26, is now located at Antofagasta, Chile.

Campbell, Claude W., m'22, is with the Automatic Washer Company at Newton, Iowa. His official position is that of Factory Manager.

Hanson Earl, 'm22, is now developing engineer in Iceland.

Mollerus, Fred J., m'24, is with the International Machinery Company at Antofagasta, Chile. His address is in care of the above company. He has recently annexed a wife from Schenectady and tells us he is getting along very happily.

Glenn, Truman G., m'22, has been appointed assistant district engineer of the central district of the General Electric Company, Schenectady.

MINERS

Hahn, Emilie (Mickey), min'26, has recently published a book, SEDUCTIO AD ABSURDUM; The Principles and Practice of Seduction, from the press of Brewer and Warren, which is reviewed at some length in the **St. Louis Post-Dispatch** of March 21. The review, which is favorable, closes thus: "Engineeress Hahn, having collected, winnowed, classified, and synthesized a vast body of data on the subject, has employed the case method in presenting her scientific conclusions. Nineteen distinct and we are assured, successful experiments are described in detail; and if a funnier book—or essentially a saner one— has been produced on the subject during these rectic years, this writer wants to read it. Though the cleansing laughter that is in it rises ever from the ragged edge of printability no one with a moderate sense of humor is likely to take offense."


"MICKEY" HAHN

Hymer, H. G., min'20, is superinendent of the Wabigon Mine for the Hanna Ore Mining Company of Buhl, Minnesota.

Stengl, R. J., min'13, address: Box 501 Baxter Springs, Kansas.

CIVILS

Armstrong, Alva, c'30, gives his address as 242 North Fifth Street, Allentown, Pa. He is working for the government on Topographic and Hydographic surveying.

Best, Byron G., ex-min'13, writes in a letter to Professor Van Hagan," Going back a little farther with these reminiscences, I have often laughed about the bawling out you gave me in your short railroad course. I was chief of party that day, and found Doug Corner, who was instrument man, with the transit so badly cramped that it looked as if a stillson wrench would be necessary. 'For Pete's sake, Bugs, straighten out this damn thing for me. If Van ever catches me with this he'll kick me out of class.' I took the transit and was working at it when you came along. Boy! What a lecture! 'Any blinkety blank fool who would treat an instrument this way ought to have his blinkety blank tail kicked so blinkety blank hard that . . . . . .' well, you know what it's like. You loosened the leveling screws and gave the instrument back to me, and I took it. We were all so flabbergasted that none of us could say a word until you had disappeared down the line, and then, 'Baby, hasn't that boy some control of the English language.'

"This reminds me of a similar incident that happened some years later. Harold Davidson and I were about to go out on a job and I discovered that one of the gang had left my instrument in much the same shape in which you found Doug's. I started to tell the world in no uncertain terms what I thought of such a stunt, and was getting along pretty well, when I remembered that Harold was a quiet fellow, very well mannered and even tempered, and, to our knowledge at least, did not indulge in such violent expressions. Well, I felt quite ashamed of myself for making such an outburst, and flushed up and stopped. Harold was over in one corner of the room, struggling with a pair of dirty, iron-ore-impregnated overalls. He perched on one leg, looked over at me and drawled, 'Go ahead, Bugs. Don't stop on my account. I feel the same way about it, but I don't know how to say so.' "

Bringham, Robert H., c'28, with the U. S. G. S. at Washington, is in the section of Reports in the Washington office. Address: 1950 L. Street N. E., Washington, D. C.

Hall, William H., c'29, who was working as a carpenter for the six months following graduation, is now inspector for the British Columbia Electric Railway Company of Ruskin, B. C. He writes, "The B. C. E. R. are constructing a hydro-electric plant here at Ruskin on the Stove River. My work is to see that the contractor places the concrete properly so that a good job will be obtained, and to help the carpenter foreman with the plans if necessary. There are four inspectors on the job; two for each shift. One designs the mixes while the other watches the placing." Address: 605 20th Avenue West, Calgary, Alberta, Canada.

Kulp, John H., c'29, former staff member of the Wisconsin Engineer, has been temporarily transferred into Trunk and Toll Engineering Department of the Michigan Bell Telephone Company. Address: 2266 Hurlbut Avenue, Detroit, Michigan.

Landwehr, Waldemar J., c'25, address: 310 N. Blount Street, Madison, Wisconsin.

Linder, Clement P., c'25, gives his address as 1746 K Street, N. W., Washington, D. C.

McMullen, Ralph E., c'27, is chief of party on a power line survey between Condit and Yakima, Washington. His temporary address is: Colburn Hotel, White Salmon, Wash. He writes: "I have charge of about 22 miles of survey and have under me nine men, 2 in the level party and 7 in the transit party. The country through which we are running our survey is mountainous, in the Mt. Hood-Mt. Adams area. It is timbered with fir up to 48-in. in diameter. The north slopes are usually covered with fir and the south slopes with oak.

"I was furnished with an aerial photograph of the area, on which was projected the alignment, which served as a guide for the staked route. This was my first experience in the use of aerial maps but has proven an interesting as well as instructive experience.

"I have also found that slope chaining (which by the way I do not feel is stressed enough at Wisconsin) can produce some very speedy and accurate surveys. In a few cases have found it necessary to triangulate across canyons to insure accurate chaining. In on ecase we chained in intermediate points to the canyon floor and up the canyon slope with but 0.14 foot error for the course.

"One level circuit is run with rod readings to 0.001 foot. We use a brass bench mark plate similar to the U. S. G. S. plates and are setting our benches with the idea that they

(Continued on page 298)

Engineering Review

ANTI-KNOCK VALUES IN GASOLINE TESTS

A study of gasolines with respect to their anti-knock qualities, necessitated by the use of higher compression engines in both the automobile and aviation industries, is being conducted at the University of Wisconsin by Grover C. Wilson, assistant professor in steam and gas engineering.

"Because of the tendency of present commercial gasolines to detonate or knock at these higher compression ratios," says Prof. Wilson, "the problem has become an important one, and many laboratories throughout the country are conducting experiments."

A variable compression engine, directly connected to a 15 horse-power dynamometer, has been installed at the university. It has several outstanding differences from the ordinary engine, including an electric oil heater to save time in warming up, a variable compression head by means of which the cylinder wall and head may be raised or lowered, and a double-bowl carburetor for facility in changing from one fuel to another.

A special apparatus, the standard knock mechanism, is included, by means of which a knock is produced by purely mechanical means, the intensity of which is adjustable. The mechanism is so designed that the same intensity may be exactly reproduced at any time, in that way furnishing a fixed or standard knock which is heard by means of a stethoscope attachment.

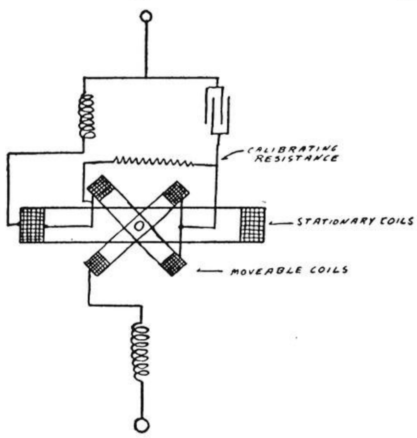
For comparing the knocks of different fuels used in the engine, it is equipped with a diaphragm in the cylinder head wall by means of which the detonation knock is passed to the stethoscope. The procedure in comparing fuels is to adjust the compression ratio for each different fuel until the knock produced by it equals in intensity the standard knock.

NEW INDICATING FREQUENCY METER DEVELOPED

A new frequency meter of the indicating type has been developed. The design of this meter permits the production of instruments having a scale range of plus or minus 2 cycles for 60 cycle work, with operating torques at least equal to those in corresponding voltmeters, and with a remarkable freedom from temperature or voltage error effects.

The earlier forms of frequency meters operating on the ratio principle used a divided electrical circuit, one branch being wound as non-inductively as possible, while the other side was made purposely as inductive as possible. As the frequency varied, the ratio between the currents in the divided circuit varied, and this allowed the instrument to be calibrated in terms of frequency.

The scale range of from 25% below to 25% above normal frequency was about the limit for such instruments making most of the scale range



practically useless on modern systems, the frequency of which is maintained within close limits. The necessity for accurate indications within a narrow range of frequency only, led to the development of resonant circuits for the ratio type instruments, preferably using the dynamometer form of construction.

The frequency meter about to be described is the latest development along this line and the design permits the production of instruments having a scale range of plus or minus 2 cycles for 60 cycle work, with operating torques at least equal to those used in corresponding voltmeters, and a remarkable freedom from temperature or voltage error effects.

The instruments differ from the usual reasonance type of ratio instruments in that a single resonant circuit of the parallel type is employed, which results in a very low volt-ampere burden. The figure shows the internal connections. The circuit design is such that the change of resistance of the reactors and coils due to temperature variations produces no effect whatever. The indication depends only on the values of inductive and capacitative reactance. Thus the temperature effect is so small that it can hardly be measured. The use of a special type of condenser is partly responsible for this performance.

The ranges obtainable are from 54 to 66 cycles or from 58 to 62 cycles for use on 60 cycle systems. The narrow range scales are supplied for use on inter-connected systems and applied principally to power or lead dispatching.

Since such an instrument is responsive to changes of .01 cycles, frequency changes due to the load can be readily observed. The instrument is more accurate than the usual means available for calibrating. It therefore follows that where several instruments are required for load dispatching purposes at different points of a system, it is preferable to have all these instruments calibrated together, so as to eliminate the effects of individual observation errors in the original calibration.

BOULDER DAM HEIGHT INCREASE ADVISED BY BOARD

The Colorado Board of engineers, after two years of study on the Boulder Dam project, have decided that an increase of 25 ft. in height of the crest of the Boulder Dam would be necessary. The chief cause of the change was the insistance of residents of the lower valley for safety measures capable of taking care of a great flood, such as the one experienced in 1884. In the present plans the dam would be topped by such a flood but under the change there would be room to spare. In its report to Sec. Wilbur, the board emphasized the fact that the approval of the increase in height was based only as a factor of flood control and the additional power developed was not necessary. The board also advised the building of a model dam to test the results of their study of the stresses on the dam.

POWER RESOURCES REPORT OF WASHINGTON RIVERS RELEASED

A manuscript report on the power resources of Hall Creek and Sanpoil and Nespelem Rivers, Washington, has just been released by the Interior Department. It was prepared by L. L. Bryan, hydraulic engineer of the Geological Survey, and is open to public inspection at the office of the Geological Survey in Washington, D. C., and at the district office at 406 Federal Building, Tacoma, Wash. The streams mentioned drain a large portion of the Colville Indian Reservation, in eastern Washington, and flow into Columbia River. No water power is being developed on them at present, but the potential power at eight proposed sites is 3,300 horsepower for 90 per cent of the time and 6,600 horsepower for 50 per cent of the time. With regulation by storing 150,000 acre-feet in a proposed reservoir on Sanpoil River the potential power of the streams would be increased to 12,900 horsepower for 90 per cent of the time and 13,900 horsepower for 50 per cent of the time.

ELECTRIC EYE USED TO DETECT ESCAPING PRISONERS

When a model of a prisoner creeping up a model prison wall came within the range of vision of an "electric eye" a revolver trained on the prisoner was fired and a bell on the prison wall sounded a general alarm. In addition this device might have turned on a system of flood lights and set off a battery of machine guns or even a barrage of tear gas. The protective field available seems unlimited, it is only necessary to select the severity of the method to be used.

This was the first demonstration of how science may thus stop the ever-frequent prison breaks. This use of the "Electric eye" is only one of its many possible applications. The mechanism involved for the prison demonstration was relatively simple. At one end parallel to the prison wall and near the top a small and scarcely noticeable beam of light shined steadily into the "electric eye" which was mounted at the other end. When deisrable an invisible beam of ultra violet light may be employed. Any interruption to this beam though ever so slight causes the desired sequence of events to occur with lightning like rapidity. The interruption of light causes the flow of current through the "electric eye" to cease. The impulse thus created, amplified through a grid glow tube, operates the relays. These in turn pull the trigger of the revolver and set off the electric bell or whatever other devices have been installed.

DO YOU KNOW THAT

In 1929, a total of 385 railroad grade crossings were eliminated on the Federal-aid highway system?

Forty-eight crossings were eliminated by the construction of grade—separating bridges carrying the highway over or under the railroad; and 337 by relocation of the highway to avoid the railroad. Since 1919, the records of the bureau of Public Roads of the U. S. Department of agriculture show, a total of 4,676 grade crossings have been weeded out of the system—995 by grade separation and 3,681 by relocation.

SECRETARY OF AGRICULTURE APPORTIONS MONEY AMONG THE STATES

The secretary of agriculture Arthur M. Hyde, apportioned among the 48 states and Hawaii the sum of $48,750,000 of the additional $50,000,000 authorized by the bill signed by President Hoover on April 4, which also authorized the appropriation of $125,000,000 for each of the fiscal years 1932 and 1933.

Wisconsin allocation of the additional $50,000,000 is $1,232,780.

GASOLINE TAX INCOME SHOWS INCREASE DURING THE 1929 YEAR

The 48 states and the District of Columbia collected $431,636,454 in taxes on the sale of 13,400,180,062 gallons of motor fuel in 1929.

This includes a 12-month collection in 46 states and the District of Columbia, a 5-month collection in Illinois, and the collection of 8 months in New York. Illinois and New York were the last states to adopt this method for part payment of the highway bill. The pioneer states—Oregon, Colorado, North Dakota and New Mexico—led the way in 1919. Now all the others have followed, but the tax did not become effective in New York until May 1 and in Illinois until August 1.

The average fee per gallon was 3.22 cents as against 3 cents in 1928. In the course of the year 20 States increased the rate of taxation either one or two cents. The highest tax per gallon was six cents; the lowest two cents. At the close of the year, three States had a six-cent tax; eight a five-cent tax; 19 a four-cent tax; one, Utah, a three and one-half-cent tax; 10 a three-cent tax; and seven States and the District of Columbia a two-cent tax.

The net number of gallons taxed and used by motor vehicles in Wisconsin for last year was recorded as 374,251,957. This places us as number 11 on the list of all the States.

FIRST CONSTRUCTION CENSUS UNDERTAKEN BY GOVERNMENT

The first census of the construction Industry ever undertaken by the United States Government is now under way as a part of the 1930 decennial census? It is being taken at the urgent request of the contracting group of that industry, as, for many years, leaders in the industry have realized the necessity of obtaining omre complete and accurate statistics of their business in order to promote efficiency in the conduct of the construction industry. While in the past they hvae been largely forced to use estimates and general assumptions, it is now expected that essential facts will be available for this purpose as a result of the census. It will be particularly pertinent information at this time when President Hoover is emphasizing the importance of Public Works construction as well as private construction, as "the balnce wheel of American Industry," in securing and maintaining general prosperity throughout the Nation. The figures obtained will also furnish the basis for further statistical research of even a more intensive nature.

Campus Notes

PROFESSOR ALVIN MEYERS
1872—1930

Professor Alvin Meyers, for the past ten years a member of the Department of Electrical Engineering, failed to recover from the shock of a major operation at the Methodist Hospital in Madison, his death occurring April 23.

Professor Meyers was born October 5, 1872, on the farm of his father, Isaac Meyers, at Verona, Wisconsin. His boyhood was spent on the farm and his early education was obtained at the country schools. He fitted himself for teaching in the public schools by attending Stoughton Academy. After teaching for some years, his interest in the subjects of physics and chemistry led him to enroll in the electrical engineering course at the University of Wisconsin, from which he graduated in 1901. He was more mature than his classmates and, in recognition of his strong influence among them and of his outstanding scholastic work, he was elected to membership in the honorary engineering fraternity Tau Beta Pi.

Throughout his life Professor Meyers has been a lover of the great outdoors. This led him after graduation to go west to enter the employ of the Telluride Power Company, the organization responsible for the pioneer hydro-electric developments in the mountains of Colorado and Utah. In the hydro-electric surveys, the construction of transmission lines, and pipe lines and power plants he was in his natural element. His joy in, and his appreciation of good clean-cut workmanship, his human interest in the welfare of his associates, his integrity and his ability as an engineer and an organizer led to his rapid advancement. During his years in the West he served as Superintendent of Construction on a number of important hydro-electric and steam-electric plants and transmission lines in Utah, Idaho, Montana, Washington, Oregon, and Texas.

Throughout this period, his work was characterized by the interest he took in the development of the young men assisting him. In this manner he kept alive his early interest in teaching and was led in 1920 to leave the construction field and to join the Staff of the Department of Electrical Engineering at Wisconsin to teach courses dealing with the distribution of electric power and the properties and applications of electric machinery.

In his associations at the University, Professor Meyers's directness and simplicity of manner, his unaffectedness, and his sympathy and understanding endeared him to his colleagues. Especially did these personal qualities find a ready response in the hearts of his students.

His deep and lifelong interest in the field of education, his natural ability, his straightforward way of presenting his ideas, and his genuine concern for the welfare of all those who came under his direction, made him an inspiring teacher and an able counsellor.

MATTHIAS HEADS Y. M. C. A.

Franklin Matthias, well known as a senior civil, T. E.. instructor, and former editor of the *Wisconsin Engineer,* seems to be getting famous about the campus lately. His name and picture recently appeared in the *Daily Cardinal* as a member of the Military Ball Committee, and a few days later he crashed the head lines as president of the university Y. M. C. A. He was selected for the post by an official nominating committee, and met no opposition in the election.

ETA KAPPA NU BANQUET

On Tuesday evening, May 6, Eta Kappa Nu, honorary electrical engineering fraternity, granted the privilege of wearing its key to five new members. The banquet was held at the University Club. The new initiates to the Theta Chapter are Edward C. Brandt, Hugh L. Hemmingway, Elmer C. Ilker, John Lloyd Jones, and Dale H. Nelson.

Stewart L. Johnston acted as toastmaster. The initiates were welcomed into the group with a speech by J. G. Van Vleet. John Lloyd Jones responded for the initiates, after which their essays were read. Prof. Edward Bennett, head of the electrical engineering department, delivered an address to the chapter, closing the program.

PROF. J. W. MEAD LECTURES TO A. S. C. E.

Professor Warren J. Mead (not "Danny") of the geology department entertained the members of the student section of the American Society of Civil Engineers on April 2 with a description of his trip through the Boulder Canyon, and accompanied his talk with mtoion pictures of the region of the Boulder Dam site.

A student speech program was also put on in addition to professor Mead's talk. A number of the students presented four-minute speeches on various subjects, and received constructive criticism from their fellow civil engineers in the audience.

TAU BETA PI INITIATES

The Alpha Chapter of Tau Beta Pi of Wisconsin, at a banquet on April 29 at the Park Hotel, initiated the following engineers: Alexander Cowie, John T. Drow, Gordon L. Fredenhall, John L. Innes, John Lloyd Jones, Walter F. Karsten, Asgar F. Langlykke, Arnold F. Meyer, Norbert Stekler, Carlyle J. Steinke, William J. Teare, Andrew G. Woodford, and Frank C. Ladwig.

Professor R. S. McCaffery acting as toastmaster, presented first the president of the chapter, who welcomed the new members. A. F. Meyer, as spokesman for the initiates, responded. The main address was presented by Walter C. Buetow. This is the second Tau Beta Pi initiation this school year, as the group initiates semi-annually.

CHI EPSILON INITIATES

Another important initiation occuring recently was that of Chi Epsilon, honorary civil engineering fraternity. Their banquet was held in the Old Madison West room of the Memorial Union on Tuesday, May 6. The address was given by Prof. L. F. Van Hagan after the dinner. Gerald

(Continued on page 296)

Side Shots

The modern girl is sure a live wire, —in fact, she carries practically no insulation.

"Had a date with Helen last night!"

"A little!"

AND WE POOR STUDENTS—

Don't know as we've told you, but it so happened last semester that Bob Homewood included his answers to a Hydraulics exam with the rest of the bluebooks, and when he was recording the grades he found that he had given himself a 43.

MY DEAR!

"After digging down five feet", wrote Francis Euclide in describing the Chicago caisson method, "the walls are lagged with boards held in place with WHOOPS!"

Judge: Why did you strike your wife?

Defendant: Well, your honor, she's been studing how to develop a magnetic personality, and yesterday she walked past me when I had a hammer in my hand.

—*Exchange.*

A soldier asked for exemption from church parade on the grounds that he was an agnostic.

"Don't you believe in the ten commandments?" asked an officer.

"Not one of them."

"Don't you believe in the observation of the sabbath?"

"No."

"Good. You are just the man I have been looking for to scrub the barracks."

SAD POME

Many a man before his day
Has gone to his sarcophagus,
For pouring booze, reputed good,
Down his dry esophagus.

Gradually feminine gender is becoming nuder.

P. A. D. NOTICE!

When your heels hit hard,
And your head feels queer,
And your thoughts rise up
Like froth on beer;
When your knees are weak,
And your voice is strong,
And you laugh like a chump
At some fool song,
You're drunk, Old Man, your drunk!

She: "Do you think you could learn to love me?"

Other chump: "Well, I passed Calculus."

The reason for a stag: No doe.

Pete Hermansen, since taking hydraulics 10, has found that bacteria multiply by dividing.

A certain East Indian, who took great pride in his mastery of the English language, sent the following note to inform his employer that his mother had died: "Regret to announce that the hand that rocked the cradle has kicked the bucket."

Found on a Co-ed's slicker: As we show, so shall ye peep.

Mich. Technic.

"Please!"

"No!"

"Oh! Please do."

"Positively, no."

"Please, just this time."

"I said, No!"

"Aw, Ma all the boys are going barefoot now!"

The Scotch banker, on hearing that someone was going to take his offer of $5,000 to the man who swam the the Atlantic, added that he must swim the distance under water.

Height of dumbness: Man who thinks Oxford bags are English co-eds.

"Mamma, Mamma, Papa iss kilt!"

"Ikey, vot are you sayink?"

"Hiram choost said de hosses had et up de fodder!"

—*Penn Triangle.*

It is said that cannibals like their women half baked, whereas college men prefer theirs stewed.

In an Ad the Oil Company advertised: Under proper conditions a quart of gasoline will move an automobile four miles. Improperly used in the home, it will move two fire trucks, two ambulances, and two hearses about the same distance.

DEFINITIONS

A college student—one who can tell time by the amount his socks have slipped.

Pessimist—the chap who looks both ways before crossing the street.

Pedestrian—a girl who won't neck.

Hair tonic—liquor reputed to grow hair on one's chest.

We have with us a young man who calls his girl grapefruit, because every time he squeezes her, he gets hit in the eye.

If you don't like these jokes,
And their dryness makes you groan,
Just stroll around occasionally,
With some good ones of your own.

She was:

Only a telephone girl, but she severed my connections with the university.

Only an engineers daughter, but she put me on the wrong track.

Only a redcoats daughter, but she knew Howe.

"A woman can make a monkey out of a man in five minutes."

"Yeah, but think of those five minutes!"

CAMPUS NOTES

(Continued from page 292)

"Jerry" C. Ward, instructor in railway engineering was toastmaster, and Franklin T. Matthias, senior and T. E. instructor, gave the president's address of welcome to the initiates, which was responded to by Theodore H. Perry on behalf of the new members.

Those who are displaying the new keys on their watch chains are: Lester W. Bartsch, Donald C. Bangs, Clarence W. Buending, John L. Innes, Leo F. Kosak, Theodore H. Perry, and Richard E. Wolff.

FRESHMAN ENGLISH COURSE TO BE REVISED—CIVILS TO TAKE DIFFERENT SCHEDULE

A committee has been appointed to study the problem of freshman English for engineers. At the present time the engineers take the same course as the letters and science students. The committee consists of Prof. L. F. Van Hagan, the chairman, Phof. Edward Bennett, and Prof. Frank Dawson.

The criticism of the present system is that too much attention is paid to the classical side of English rather than to that which would be most useful to the engineer in his work. No plans have been made as yet, but Prof. Van Hagan favors separation of the course from the L. and S. course, with the establishment of an experimental course for engineers, the instructors being a part of the engineering faculty rather than the regular English department. Various methods and arrangements of courses would be tested to determine the type of instruction best suited to the needs of the average engineering student. The present course, according to Prof. Van Hagan, is almost identical to that used thirty years ago, and the necessity of a change is felt.

Another proposed change will be placed under consideration. This change involves the shifting of the schedule to allow the civil engineering students to include three non-technical credits per semester in their course throughout the four years. This would mean the shifting of the railway engineering course from the junior year to the sophomore year, descriptive geometry would be given in the junior rather than the sophomore year, and the annual six weeks' trip to Devil's Lake would be made in the summer after the sophomore year.

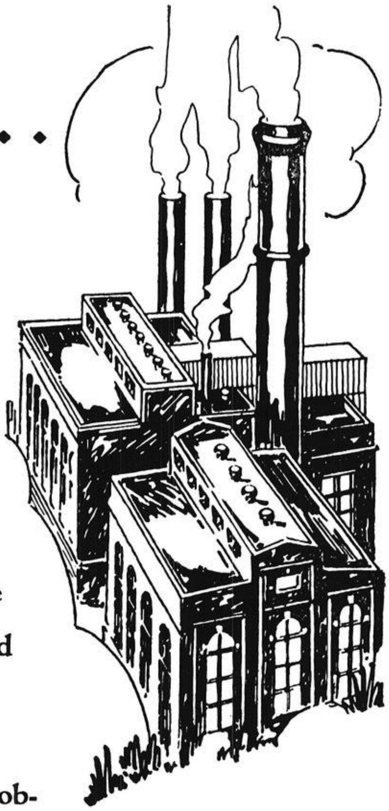
KING BECOMES WATERTOWN CITY ENGINEER

A real job awaits Ben King, CE 4, when he returns to Watertown after graduating, when he will step into a two-thousand-a-year job as City Engineer of Watertown, Wis. A small campaign card with his picture on it seems to have brought results, for he won out against a Marquette University man by a margin of some 68 votes. Congratulations, Benny!

ENGINEERING FACULTY RESEARCH CONFERENCE HELD

Over 50 members of the engineering faculty met at the Univesity club April 22 for the second annual research conference and smoker. These meetings are held for the purpose of allowing the faculty to hear reports on the different research projects on the engineering campus. The committee for the occasion consisted of of Professors Bennett, Dawson, Elliott, Larson, Kowalke, McCaffery, and J. B. Kommers, the chairman.

"Cut production costs,"....



demanded the owners. Barstow engineers designed and built a new power house, and were among the first to use powdered coal..... the plant is still one of the most efficient in the United States, all factors considered—including interest on investment.

"It must be an economical building," said the company officials. Barstow engineers planned economically for present and future needs.

Transportation in Florida swamps was a problem. Barstow experts knew that only oxen's cloven hoofs could find a foothold in the mire. Ox teams speed construction.

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ALUMNI NOTES

(Continued from page 289)

will later be of service to the government in mapping the area.

"An idea of the country may be had from the profile data on our first line. We climbed from 250 feet above sea level to about 1400 feet in about one mile, then dropped about 800 feet in the next half mile."

Piltz, Russel J., c'26, address: In care of Bennett Allison Company, 1111 Harney Street, Omaha, Nebraska.

WEATHER CONDITIONS IN GREAT HALL — MEMORIAL UNION BUILDING

(Continued from page 283)

on the dry bulb temperature scale, includes the range between 64° and 72°. For a dry bulb temperature of 68°, this corresponds to a relative humidity of about 40 percent.

Under normal conditions of operation, the problem of maintaining a condition of comfort in most buildings is not so much one of supplying sufficient heat, (assuming of course, a properly designed heating plant of ample capacity) but rather one of maintaining the air in a condition such that the heat supplied will be the most effective. Ordinarily this will require the evaporation of a considerable amount of moisture in the average building, because when the cold outside air, that replaces the warm inside air from one to three times each hour by infiltration, undergoes a temperature change from —10° to 70° for example, its relative humidity is reduced to such an extent that we very often live in an atmosphere that is as dry as the air over the Sahara Desert.

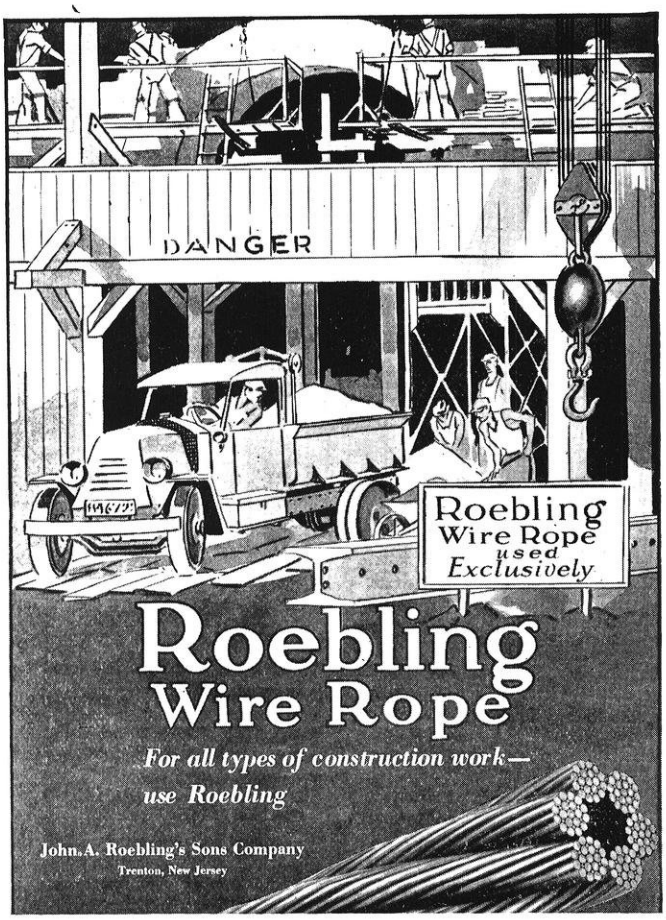
This is accounted for by the fact that while the evaporation of snow and ice (or should we say sublimation) on a cold day takes place very slowly, the amount of moisture required to saturate the cold air is comparatively small and hence its *relative* humidity may be very high, as indicated by Figure 1. When this air is heated to 70°, its capacity for moisture, or its absolute humidity, is very appreciably increased, and therefore its relative humidity will be very much less than it was initially. For example, air at 0°F. and a relative humidity of 80%, when heated to 68°F. will have a relative humidity of only about 5%.

In Great Hall, however, on such occasions as the Junior Prom and the Military Ball, the effect of the crowd on inside weather conditions alters the situation to such an extent that instead of the air being too dry, it may be too damp for comfort.

Two conditions arise as a result of the crowd, both of which tend toward their discomfort. Research work carried out by Mr. F. C. Houghten* indicates that an average individual normally clothed and at rest gives off about 400 B.T.U. (heat units) per hour, while one at work will produce between 550 and 600 B.T.U. per hour by radiation, convection, evaporation and exhalation.

Also, the total amount of heat produced by an individual for a given degree of activeness remains practically constant although the amount produced by any one of the foregoing mehods varies. That is to say, in order to carry away this constant amount of heat produced by the body, Nature

*Director, Research Laboratory, American Society of Heating and Ventilating Engineers.



has evidently equipped us with a temperature control system by means of which she endeavors to keep the body temperature constant by maintaining equilibrium between the heat produced and the heat dissipated, by variations in the rate of evaporation, radication and convection. For example, as the temperature of the air approaches that of the body, the heat dissipated by radiation and convection decreases, while to counteract this condition more perspiration is made available, resulting in greater evaporation. Similarly, a low relative humidity is conducive to a high rate of evaporation. Hence it is apparent that conditions may arise, such as a combination of high dry bulb temperature and high relative humidity, for which Nature's control system ceases to function properly, and we experience the familiar muggy feeling.

There may be some difference of opinion as to whether or not dancing under the crowded conditions of a Prom or Military Ball comes under the category of work, but in the absence of data relative to what a normal strait-jacketed male and his girl-friend *can* do to the tune of "Turn on the Heat", it seems reasonable to assume 550 B.T.U. per hour as an average figure for the evening.

On the basis of the number of tickets sold and given away, it is estimated that the attendance at the 1930 Prom was about 750 couples. Assuming that two-thirds of these were in Great Hall, for the first dance at least, (this allows a space 3½ feet square for each couple) would mean that the dancers alone were the equivalent of a heating plant having a capacity of 550,000 B.T.U. per hour, which, for the temperature conditions that prevailed on the night of February 7-8, is approximately three times the amount of heat required to maintain the hall at a temperature comfortable for dancing, say 65°F., assuming the proper relative humidity. And had it been an extremely cold night, twenty degrees below zero let us say, the dancers would still have developed 48% more than the required amount of heat. Hence the problem of keeping the dancers comfortably warm, even in extreme weather, is one of cooling rather than one of heating.

In addition to substituting for the heating plant of the building, the crowd also acts as a humidifier, which, *to a certain extent* is desirable for reasons already mentioned. However, if the amount and condition of the air entering the building is not such as to provide for carrying away the moisture dissipated by the crowd before the relative humidity becomes too high, conditions of comfort are still further aggravated. Hence, to counteract the tendency of the dancers to overheat and over-humidify the air in the Hall, air must be supplied at a lower temperature or in larger amounts, or the condition met by combinations of the two methods. To prevent the relative humidity from becoming too high, larger amounts of air must be depended upon in the absence of dehumidifying equipment.

The heating and humidifying effect of the dancers is clearly shown by the accompanying chart. The inside relative humidity curve indicates that the Grand March started about 9:45 at which time the relative humidity began to climb slowly for about twenty minutes, then to drop off momentarily during the picture taking ceremony, which was

followed by a very decided rise during the first dance. From here on each of the following dances has a decided hump of its own on the relative humidity curve. Note also that while the temperature of the incoming air gradually decreased throughout the entire evening, the temperature of the air leaving the Hall rose from about 61° to 70° during the first dance and remained practically constant for the remainder of the evening. Inasmuch as the average relative humidity between 10:00 p. m. and 2 a. m. was about 40%, the chart woud imply that you should have been reasonably comfortable at the 1930 Prom, except perhaps during a short period near mid-night when the relative humidity rose to about 53%.

In the Great Hall, fresh air is supplied through grilles in the dome of the ceiling, after passing through heating coils, if necessary, and is exhausted through grilles in the south wall benches. Obviously, as long as the temperature of the outside air is sufficiently low, air can be supplied at a temperature such that in falling from the dome to the breathing line, it will be tempered to a value conducive to comfort. To calculate the temperature at which fresh air must be supplied in order to carry away the excess heat developed by dancers, the following regulationship can be used:

(1) $$H = \frac{Q \times 60 \times (T_2 - T_1)}{55}$$

where H = Excess B.T.U. per hour = 362,000 B.T.U.
Q = Cubic feet of air supplied per minute = 12,300
T_1 = Temperature of incoming air.
T_2 = Final Temperature = 65°F.
55 = Number of cubic feet of air that can be raised in temperature 1°F. by the addition of one B.T.U.

(2) Or $$T_1 = T_2 - \frac{55\ H}{Q \times 60} = 38°F.$$

The actual average values of T_1 and T_2 for the night of April 7-8 from Figure 1, was 37°F. and 67°F. respectively

Let us assume now that the outside temperature was 40°F. instead of 22°F. The heat supplied by the dancers is still 550,000 B.T.U. per hour but the heat loss from the building is reduced to the extent that the excess heat to be carried away is now 441,000 B.T.U. instead of 362,000 B.T.U. per hour. Solving again for T_1 from equation (2):

$$T_1 = 65 - \frac{12{,}300 \times 60}{55 \times 441{,}000} = 32°F.$$

which means that to maintain an inside temperature of 65°F. would necessitate the installation of some sort of cooling system, or increasing the supply of air, Q, from 12,300 C.F.M. to 16,200 C.F.M. obtained by solving for Q in equation (1)

60 × (65 — 40)

$$Q = \frac{55 \times 441{,}000}{60 \times (65 - 40)} = 16{,}200$$

It is true that opening the windows on such occasions will relieve conditions for dancing, but with the outside temperature at 40°F., such a procedure is hardly advisable from the standpoint of uncomfortable drafts for those who

sit along the walls during rest periods. Starchy foods have also been suggested as a means of keeping a stiff upper lip when the air becomes oppressive.

Experimental data are also available* by means of which the approximate condition of the air with respect to relative humidity could also be predetermined for the purpose of designing air conditioning equipment, but for the purpose of this article the actual average amount of moisture evaporated by the dancers per hour can be readily calculated from the information given on Figure 1, and knowing the amount of air suppied to the Hall per unit time by the fan system.

From a psychrometric chart, (see A.S.H. & V.E. Guide) it is found that the moisture content of air at 22°F. and a relative humidity of 77%, (using average values for the night of February 7-8) is 12 grains per pound, while at 67°F. and a relative humidity of 41% the moisture content is 47 grains per pound. Hence with the fan system supplying 12,300 C.F.M., the average rate of moisture evaporation by the crowd must have been about 276 pounds or 33 gallons per hour. Near mid-night, at which time Figure 1 indicates the crowd was at its best, the rate of evaporation went up to about 43 gallons per hour. Figure 1 also clearly shows that there were five dances, each about a half hour in length, following the Grand March which apparently started about 9:30 p. m. with 500 couples on the floor, the latter figure would mean an evaporation of about one fifth of a pint or 0.2 of a pound per capita per dance; or a loss in weight by evaporation, for the entire evening, of one pound per person, statistics from the Rathskeller to the contrary, notwithstanding.

*1930 Guide. A. S. H. & V. E. P. 100.

SURVEYING DE LUXE IN VENEZUELA

(Continued from page 282)

cause some of the frosh civils get some pretty large closures on their compass traverses right here at Wisconsin.

The largest grievance of the party is the lack of organization. Mr. Hanson tells us that the Engineering Department and the Geophysical Department have absolutely no cooperation. A large amount of time is wasted by one department doing work that the other has just completed.

On the whole Mr. Hanson is enjoying his work in Venezuela very much. He thinks Wisconsin has a very fine course in surveying. This should cheer up the poor fellows who still work on the University's farms.

PATENT ENGINEERING

(Continued from page 281)

more trade-marks he scans the list of proposed new marks in the Gazette to determine whether any of these conflict with those owned by the corporation so that opposition proceedings may be instituted promptly. He likewise scans the list of patent suits both filed and decided so that he will be posted on litigation involving patents in which the corporation is interested.

The patent engineer should read the published decisions in patent and trade-mark matters in both the Gazette and

U. S. Daily so that he may be well informed on the trend of patent law. Often he finds decisions which may be used directly to good advantage in the prosecution of patent applications. A "pat" decision for the case in hand is very desirable.

The patent engineer should scan the new patents in the Canadian and British Official Journals. Often patents are issued in Canada and Great Britain to inventors before corresponding patents are issued in the United States, especially at the present time since the United States Patent Office is so far behind in its work. It is comparatively easy to obtain patents in these two countries so that they issue at an early date after filing and these patents therefore constitute an advance notice of what probably has been filed in the United States Patent Office and the patent engineer may act accordingly. It also may be desirable to keep in touch with the patents issued in other countries.

The patent engineer should be in charge of the note books kept by the various employees of the corporation and especially those of the research men. He sees that they are kept properly, that they may be used in patent actions as interferences and litigation.

In patent office interferences and patent suits the patent engineer prepares the technical side of the case for the patent attorney. He helps obtain and prepare exhibits, he may interview and prepare witnesses and is the attorney's right hand man during the taking of testimony, preparing of briefs, etc. He must know all the technical phases of the matter in litigation. It is desirable to know the commercial phases when infringement damages are considered.

He may be called on to write license agreements. He should know the technical details involved in the license so that he may advise patent counsel.

The patent engineer directs the marking of the products of the corporation with the proper patent numerbs. He also supervises the proper marking of registered trademarks and copyrighted labels.

A corporation may receive many suggestions about alleged new ideas from people not in its employ. It also may have patents offered to it. The patent engineer usually passes on these or refers them to the proper person for further study since he is familiar with all phases of the corporation' business.

The patent engineer should supervise employees' contracts. This is a matter which has to be handled carefully.

A patent engineer must have the proper technical training. He must have enough knowledge of patent procedure and patent law so that he may advise the technical staff about ordinary patent matters and so that he may write patent claims and specifications. This knowledge may be gained by experience in a patent department or patent attorney's office by a technical man. Above all he must have common sense and tact and be able to gain the confidence of the other employees, as he must often have their cooperation. He must have the confidence of the employees so that they will freely accept his advice and decisions in patent matters. As an example, occasionally an employee believes another one is erroneously credited with an in-

vention. The patent engineer must have the confidence of the employees involved so that they will accept his decision after he makes an investigation of such cases. He must have initiative and imagination combined with a legal mind. Details are all-important and he must have the patience not to avoid them. Since he has all of the confidential technical information with reference to the corporation's processes and products at his disposal, he must be trustworthy. He must be able to write good English and express himself clearly. A reading knowledge of German and French is desirable but usually not necessary. He must keep in touch with the literature relating to the corporation's work.

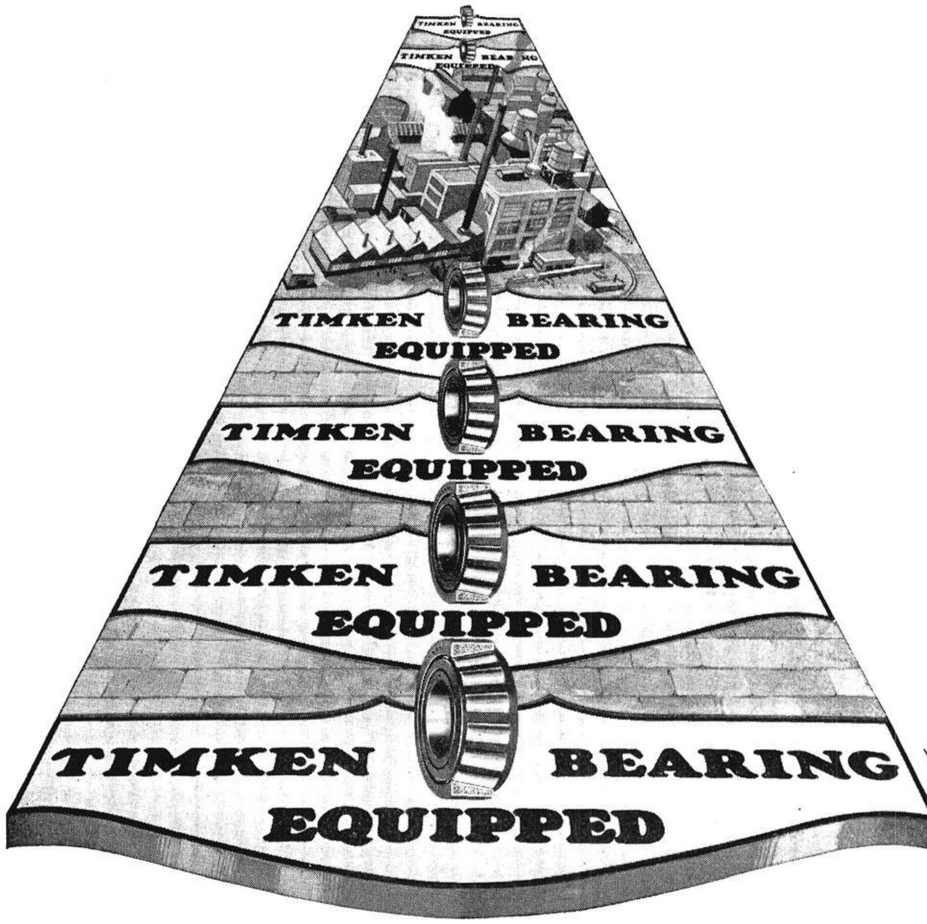
In my opinion a patent engineer has as many and probably more opportunities than technical men in other lines. He may make himself highly valuable to the corporation as a patent engineer. He may become a patent attorney by passing the bar examinations. Because he is in touch with all phases of the corporation's activities and since it often is necessary to direct investigational work he may demonstrate that he is well fitted to become director of development or research. If he has any abiliy as an executive or as a negotiator, there usually are opportunities to demonstrate these abilities from time to time.

At the present time there is a considerable call for patent engineers if the advertisements in the technical press are any criterion. It is a most interesting field. Success in this profession depends, as in others, largely upon ability to observe, ability to get along with other men, and upon common sense. The novice, such as a technical graduate, usually does not know whether he has a "legal mind" until he has tried it out. The first year of the novice in a patent department may be difficult because he is entering an entirely new field. During that year his net worth to the corporation usually is close to zero. At the end of that time he should know whether he still wishes to become a patent engineer. Even if he does not continue, I believe the experience will be of much value to him. Instead of entering the patent department of a corporation directly the technical graduate may first spend a year or two in the technical departments. A year or two in the patent office at Washington is helpful. I do not believe that it matters which course is pursued because in the end the ability of the individual governs his future. It is a matter of acquiring both the technical and patent knowledge as it relates to the corporation's business and that requires a certain amount of effort regardless of the method which is used.

PROBLEMS OF THE YOUNG ENGINEER

(Continued from page 278)

sordid four-score years at best and then buried with the rest. Life is too short to spend 90% of it in the mere mechanics of keeping alive. So even though you are sold on this Happy Hunting Ground idea take time out to play. Dream of the past, plan for the future, but live in the present.



Paving the Way to Profits

This is the direct route to profit; the road that takes the friction-load off power; the way to longer life for machinery; a short cut to saving in lubrication . . . the way that modern industry takes to leave Waste in the dust of days that are done.

Industry is on the right track, and to today's student engineers will be entrusted the future responsibility for keeping it there . . . by throwing out machines that are bound to self-destruction—bringing in machines that have within them the elements of self-preservation . . . Timken tapered construction, Timken *POSITIVELY ALIGNED ROLLS* and Timken-made steel, these exclusive carriers of all loads, whether radial, thrust, or both.

Industry is Paving the Way to Profits when it selects "Timken Bearing Equipped" in designing and buying machinery of all kinds *wherever wheels and shafts turn.*

THE TIMKEN ROLLER BEARING CO., CANTON, OHIO

TIMKEN *Tapered Roller* **BEARINGS**

THE MOBILIZATION OF INDUSTRIAL ORGANIZATIONS FOR WAR SERVICE

(Continued from page 279)

pertaining to the district easily available. The details of each district management and organization is provided for in the branch unit pans. In times of peace, each district does not maintain a central office, but several districts are consolidated into one office.

Method of Devising Plans for Supply

For the preliminary data from which plans are devised, specifications for any specific item are prepared by the supply branch responsible for it and the specifications checked by the Assistant Secretary of War. Plants and factories which will provide that particular item are then allocated to the branch whose duty it is to supply that item in proportion to their needs. Furthermore, the items to be produced are apportioned by the supply branches to the districts and individual producers so as to equalize the load on each producer with regard to available power, labor, possible new facilities, transportation, fuel and like necessities.

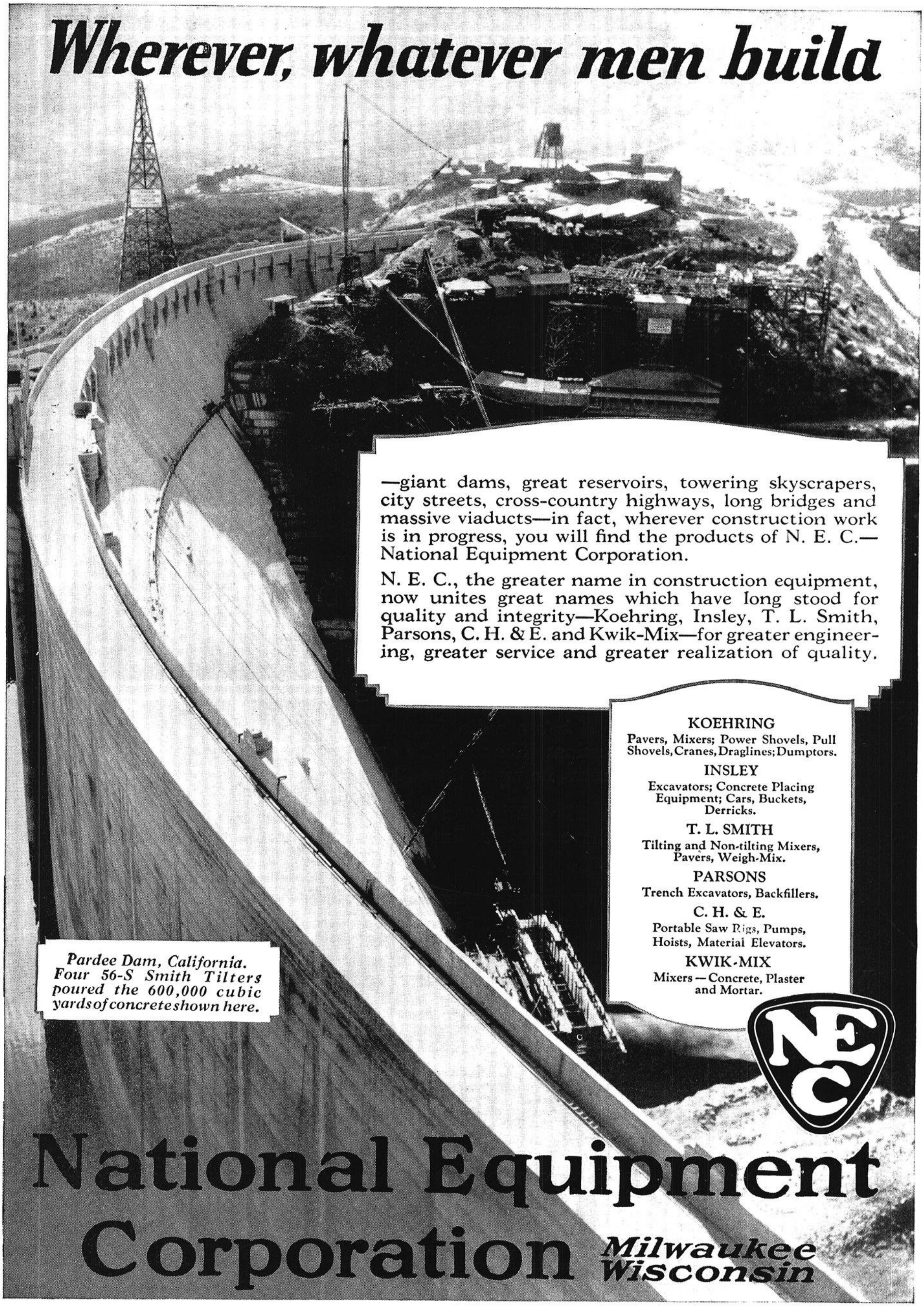
As soon as plans have been completed for the procurement of any item, the specific procurement plan for that item is submitted by the chief of the supply branch to the office of the Assistant Secretary of War. Thereafter it is revised and reviewed to keep it up-to-date and usable at any specified time upon short notice.

In all of these plans, the War Department does not figure in the actual managing of the industries unless absolutely necessary. Plants will be operated as far as is practicable with as little governmental supervision as possible and very few governmental restrictions will be placed on the actual supervision of construction, as little, in fact, as is compatible with high efficiency and output.

The Cooperation of Business in the Military Scheme

With the realization that war is a complex business problem as well as a problem in tactics and strategy, the War Department is endeavoring to acquire the cooperation of business and industry in the formulation of war plans. Business is ready and willing to cooperate. Therefore; instead of merely the Army and Navy as offensive and defensive powers, we have, in fact the Army, the Navy and Business.

All of the departments of planning and procurement are constantly in touch with civilian leaders. Direct cooperation has been secured from more than six hundred civilians, many of whom are nationally prominent in the business and engineering world. In addition to these contacts, arrangements have been made and contracts signed to apply in emergencies with more than ten thousand industrial plants in the various industrial districts. In addition to these, help is being furnished in the study of the problem of business organization of an army, especially as it concerns an adequate and rapid supply, by technical publications, educational institutes and various professional societies. With all this backing, it is certain that, should a major emergency arise, our country will be able to meet the issue squarely and efficiently, without the excessive waste of supplies which characterized our army in the last great World War.


Wherever, whatever men build
—giant dams, great reservoirs, towering skyscrapers, city streets, cross-country highways, long bridges and massive viaducts—in fact, wherever construction work is in progress, you will find the products of N. E. C.—National Equipment Corporation.
N. E. C., the greater name in construction equipment, now unites great names which have long stood for quality and integrity—Koehring, Insley, T. L. Smith, Parsons, C. H. & E. and Kwik-Mix—for greater engineering, greater service and greater realization of quality.
KOEHRING
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T. L. SMITH
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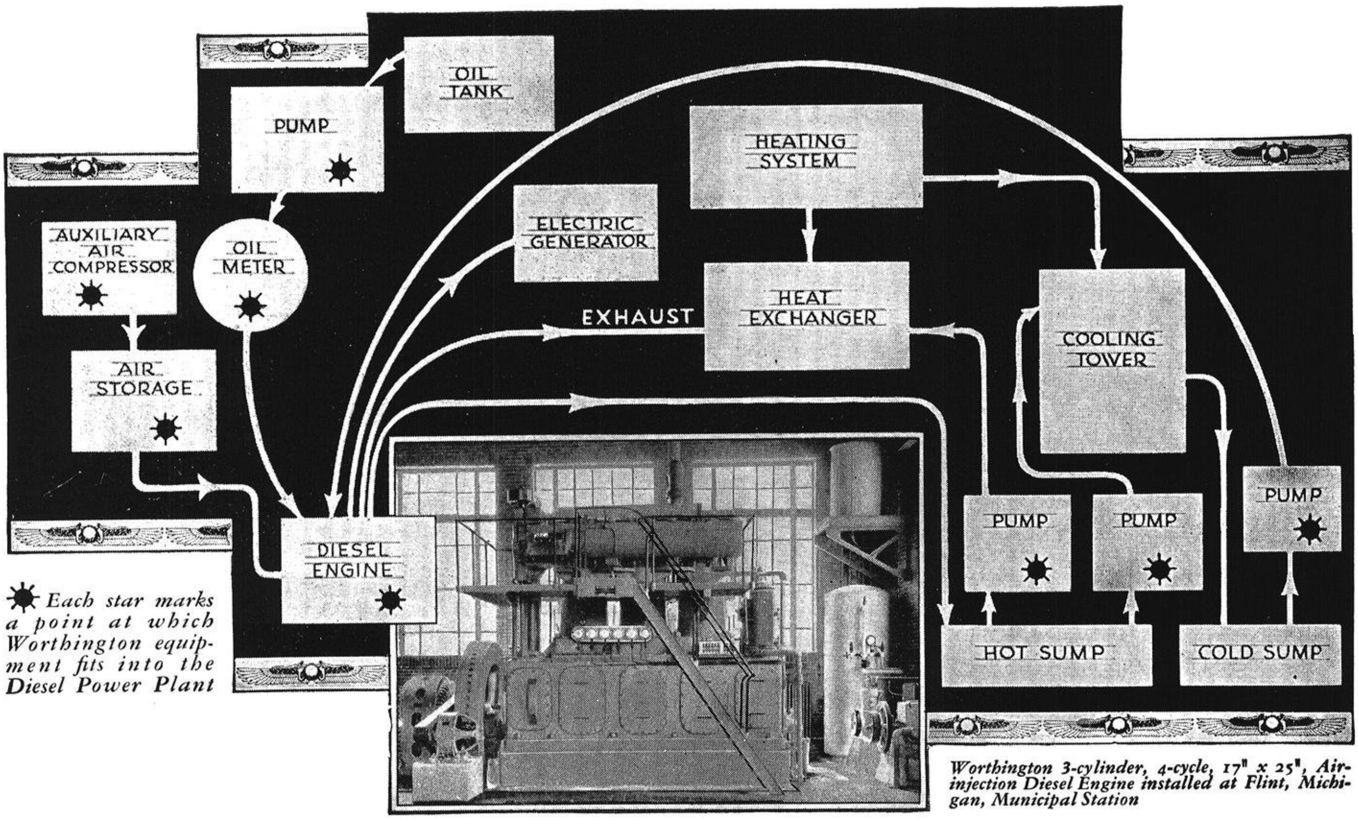
PARSONS
Trench Excavators, Backfillers.
C. H. & E.
Portable Saw Rigs, Pumps, Hoists, Material Elevators.
KWIK-MIX
Mixers — Concrete, Plaster and Mortar.
Pardee Dam, California. Four 56-S Smith Tilters poured the 600,000 cubic yards of concrete shown here.
NEC
National Equipment Corporation
Milwaukee Wisconsin



✱ *Each star marks a point at which Worthington equipment fits into the Diesel Power Plant*

Worthington 3-cylinder, 4-cycle, 17" x 25", Air-injection Diesel Engine installed at Flint, Michigan, Municipal Station

Flint wanted dependable lighting

. . . and got it

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In Flint, Michigan . . . city of automobile manufacture . . . they have to relax. But they are wide awake on the subject of lighting.

They wanted dependable low-cost power for their lighting system, and they got it . . . with a modern Worthington 3-cylinder 4-cycle Diesel Engine direct-connected to an a. c. generator.

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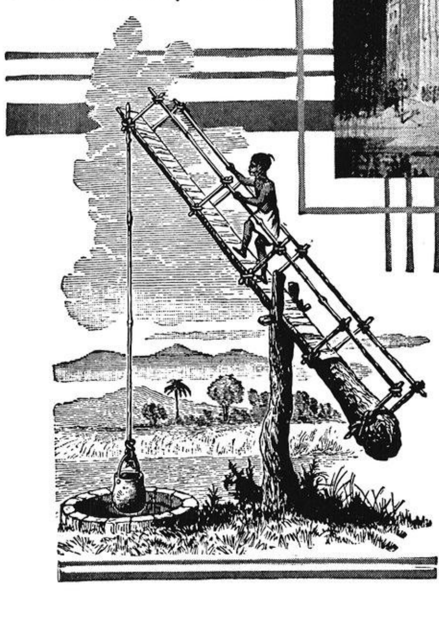
One of the early phases of Vertical Transportation.



Russ Building, San Francisco, Cal. Geo. H. Kelham, Architect
Equipped with Otis Signal Control Elevators

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San Francisco has grown into a great metropolis since 1871, when its first elevator was installed in a photograph gallery on Montgomery Street . . . Otis Elevators have been an important factor in this expansion because the development of the modern city of tall buildings was made possible by the safe, high-speed elevator . . . The world's first *safe* elevator was an "Otis."

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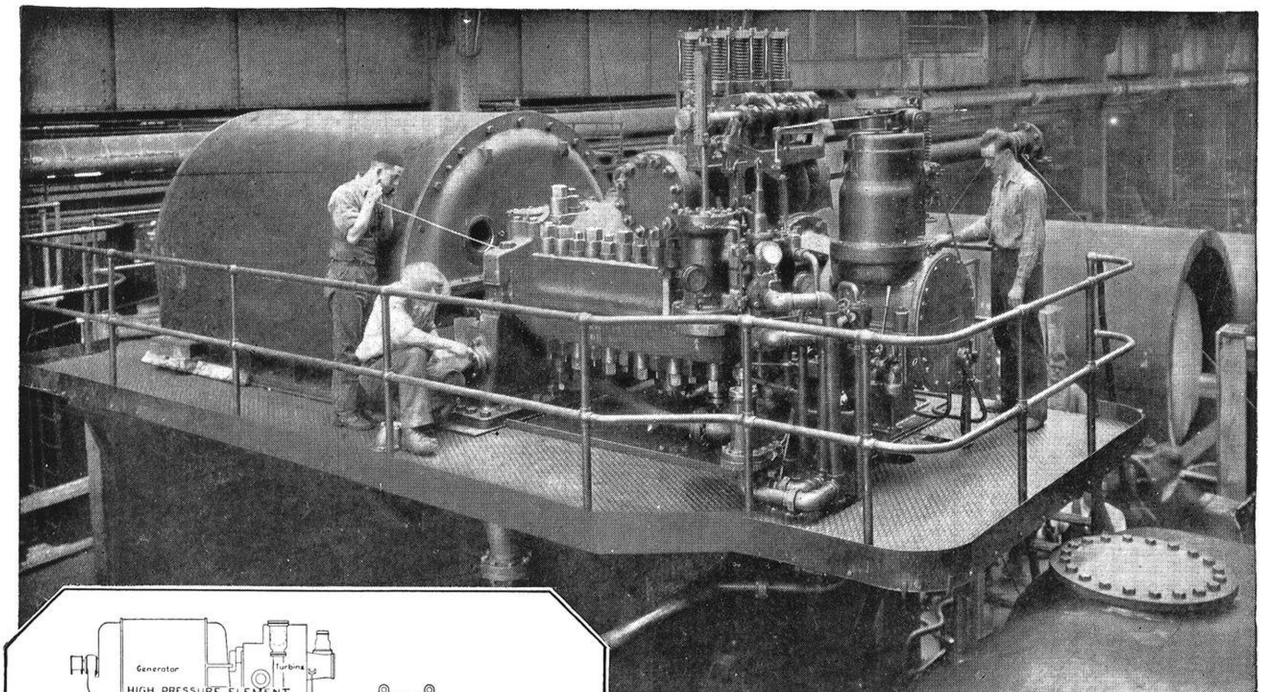
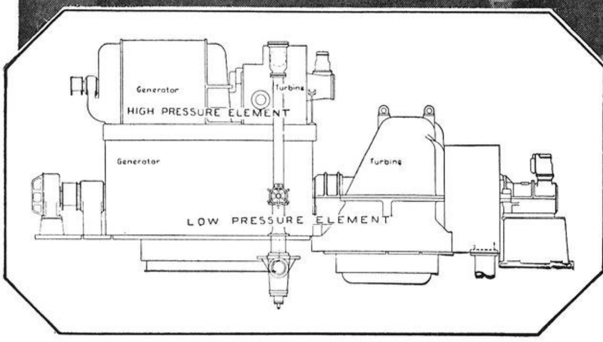
OFFICES THROUGHOUT THE WORLD





Elevation of the G-E vertical compound turbine-generator

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