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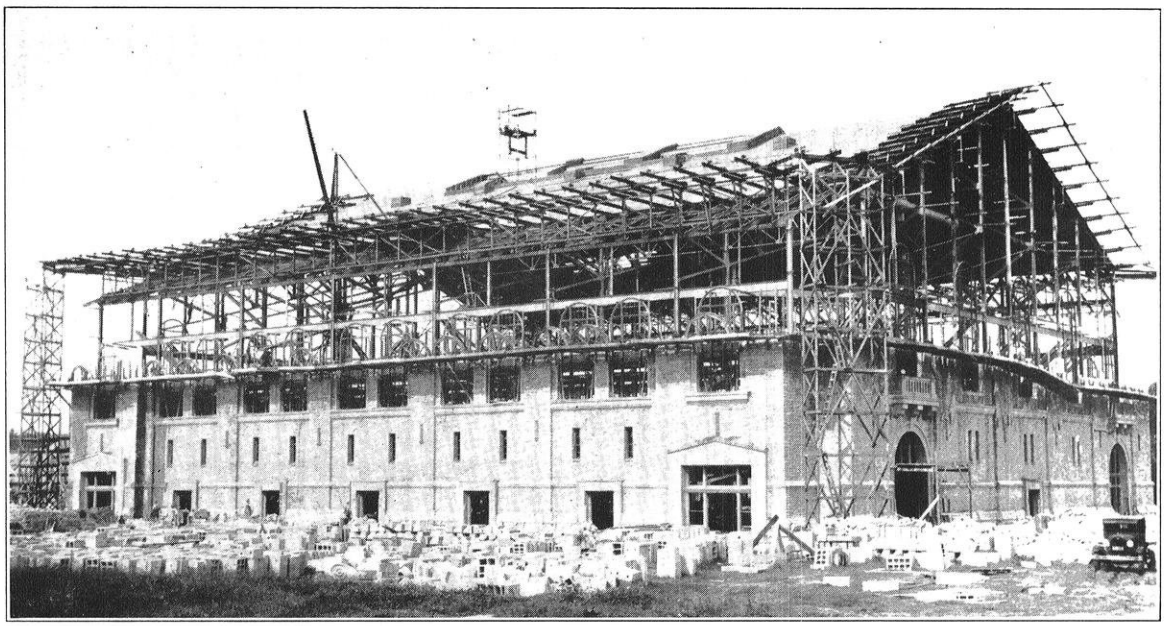
NUMBER 2

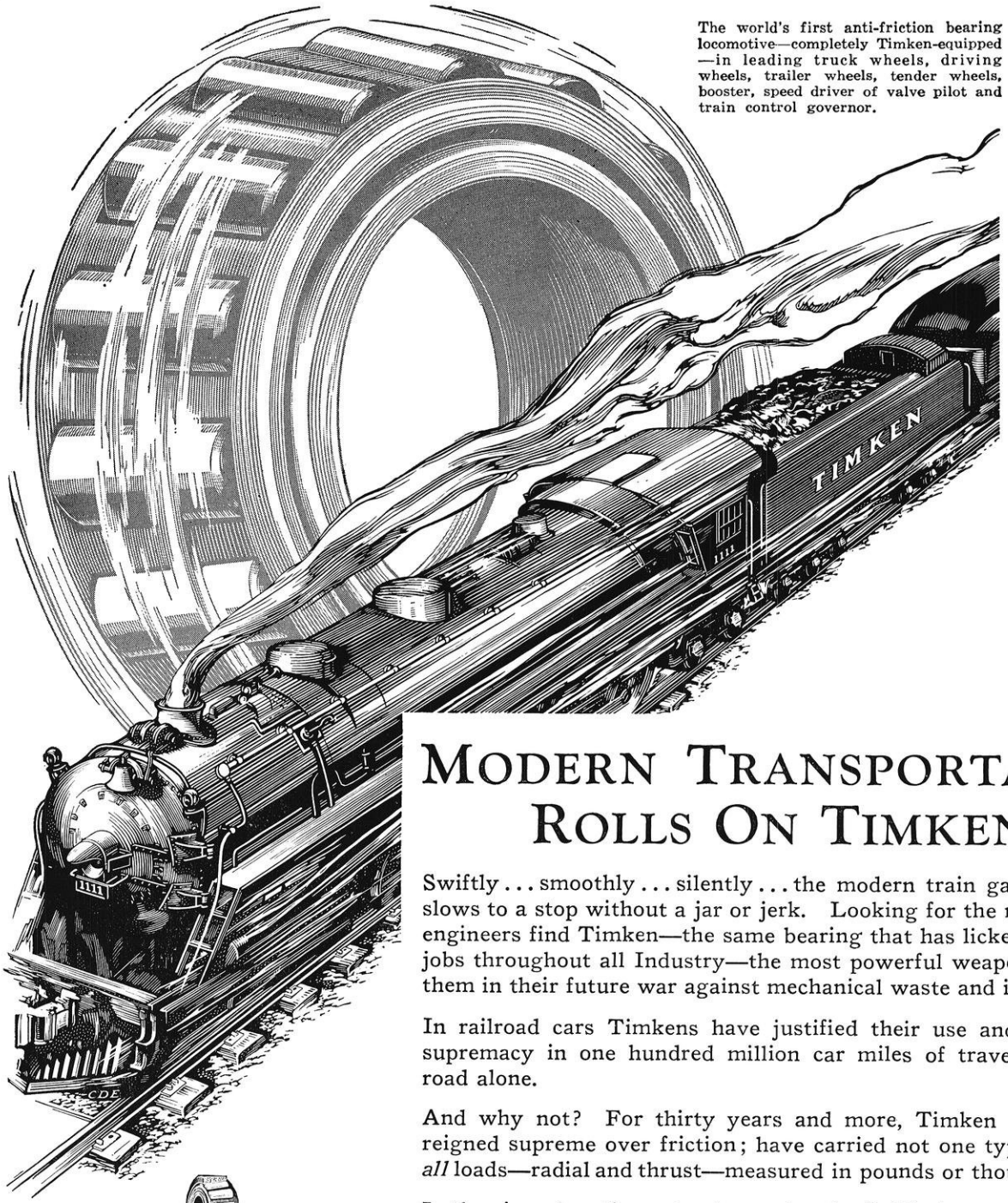


UNIVERSITY FIELD HOUSE UNDER CONSTRUCTION

NOVEMBER

MEMBER OF ENGINEERING COLLEGE MAGAZINES ASSOCIATED

1930



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The Wisconsin Engineer

VOLUME 35, NO. 2 NOVEMBER, 1930

Four Years at Wisconsin

IN the short space of a few months, barring accidents, I shall have completed the course in Electrical Engineering offered by the College of Engineering at the University. Graduation from a college means something to the farmer lads back home, who don't know very much about colleges. Their attitude can be summed up in a sentence which they so often use: "Yup, its gittin' tu be nowadays that a fella can't get nowheres without a edication!" But when I meet a man, and he tells me he is a graduate of a certain university and goes on to say how successful his football team has been lately, it doesn't mean very much to me. My four years at Wisconsin have resulted in my acquisition of an entirely new set of values. At one time I had a very mistaken notion about the purpose of a university education; and now, in the light of my college experience, I should like to set down what I think a person should receive from college, and whether or not, at the present time, he is receiving it.

I spent my early youth among working people who earned their daily bread by manual labor. My father was, and still is, a blacksmith, a trade requiring a little patience, some degree of skill, and a strong back. From my early environment, I acquired my first ideas concerning education. In the community in which I lived, the view was quite universally held that it was easier for a person to work with his head than with his hands, that in order to become eligible to this high order of head-workers, a so-called education was necessary—this education to be acquired at a college or university, preferably the latter because it sounded better, the exact difference between the two being somewhat vague. In short, an education was a means to an end, an easy road to a high-salaried position, a short-cut to success. And success was measured in terms of a yearly salary.

As a boy, I became interested in electricity and all things electrical without knowing very much about either. At various times in my electrical development, I had mended my mother's flat-iron, put a socket in the basement, wired the garage, constructed, at great expense and any amount of patience, an electric motor, and crowned my scientific achievements by probing the then little known wonders of radio-telephony. I took a more or less genuine interest in these matters just as most other boys would have done, had they had the same opportunities. After finishing high school, there were two things to do — go to work or go to college. I was always inclined to be lazy, so I came to college; I chose the short road to success. Whether I went to college or not, I was eventually going to be "something", but the college was a shorter and less tedious method of obtaining the same result. The formula was simple enough; here was the boy wonder going to college to learn all there was to learn about electricity; after graduating, he would select his company from a large field of bidders; in a short time he would revolutionize the electrical industry with a few simple inventions; and finally, as a fitting climax, be promoted to chief engineer of the General Electric Company, or President of the Westinghouse Com-

It is very seldom that articles appear anonymously in the Wisconsin Engineer; but this is a paper that is seldom written; and if written seldom finds its way into the Editor's box. The writer was an electrical engineering student who graduated three years ago.

This viewpoint is not necessarily in accordance with the editorial policy of this magazine. Far from it. Yet the truth of expression, and logical discussion are of interest to us.

Cynicism for most of us is a pose. To this student it was actually and frankly felt. Somewhere during his university life things had changed. He blamed the University. Most of us who have passed this stage of thinking realize that all this is merely the widening of our horizons. A situation which proved to be unstable for this writer in his senior year.

It is a line of thought that is sometimes found among juniors and seniors and as such certainly deserves space in this magazine.—EDITOR'S NOTE.

pany, or what not. It required little strain on a boy's imagination to picture this program. So I entered the University as a freshman in the College of Engineering.

Woodrow Wilson, in his essay 'The Spirit of Learning' says, "The college is a process of slow evolution from the schoolboy and the schoolboy's mental attitude into the man and his entirely altered view of the world." For my purposes, the statement is correct. I entered this University with the mental attitude of a fifth or sixth grade schoolboy. I came down to the University with the distinct purpose of acquiring a knowledge of one particular branch of science. At that time, I made no distinction between a professional college and a liberal college. To me, the College of Letters and Science was the place where the rich men's sons were sent to get their particular kind of an education. They had little in common with me; I came to college, they were sent. The idea of attending college for four years and not preparing one's self for some special calling, was to me a colossal waste of time. Who in all the world wanted to spend four of the best years of his life reading old English literature, learning foreign languages, and studying that mysterious and high-sounding blather called psychology? I was unable to see the light principally because I didn't want to; I was too much concerned with electricity.

My college career is now drawing to a close; it will only be a few months now when the once-coveted sheepskin will be mine, but somehow I can't help but feel that those four years have not been spent to any great advantage. I will graduate from a professional college; I am supposed to know a little about the fundamentals of what that one particular branch of science, electricity, but my mental horizon has increased to such an extent that today I know less than the day I entered. The once cherished white-collar job no longer holds any appeal. My first English theme and my first set of problems in trigonometry shattered the fond belief concerning the relative ease of working with one's head and one's hands. The large electrical concerns are today literally choked with boy wonders like myself who in their youth repaired the household electrical appliances, and dreamed fond dreams of rivaling the attainments of Steinmetz, or Heaviside, or Edison, or Pupin. The prospect of being swallowed in some large industrial concern, of the long years of dull and perhaps tedious labor, of the meager salaries, of the drab life in a large city makes one wonder whether after all there are not a number of advantages in spending one's life, like my fathers have done, pounding hot iron. Sad though it may seem, such is my attitude with graduation only five months away. There is a feeling predominate in me that my college career has been a failure.

Perhaps the above conclusion is reached by a good many seniors; I am in no position to argue that point. At any rate, seniors are often typified as being cynical and sophisticated. I have before me a clipping from the Daily Cardinal of a month ago entitled 'Senior Cynicism'. Quoting the article: "In the sad half-light of evening how inane all things seem. As in the waning days of life, so also in the last year of one's university education the glistening veneer which has hid the things of life for many years sloughs off and existence stands forth in all its disgusting banality, bought at a terrible price of fierce energy and blasted hopes, yet suddenly 'cheap at half the price'. And the tired senior cast a weary glance at the pettiness which surrounds him and shapes his vocal apparatus for criptic and biting remarks, fashioned along the grim lines of an experience not yet a quarter century old." The writer of the article accounts for senior cynicism as follows: "If a goodly proportion of the cynics were frank with themselves—which is very difficult for a college senior—they would admit that a large part of their soured point of view is due to the fact that they have wasted a lot of energy on useless things through their poor planning, that they have been unable to reach goals set by a too inflated imagination, that they are at the top of the ladder now and have no one to look up to and comfort them, and are trying mightily to pacify their sense of failure. They do not realize that things do not always go the way we wish them to, that some of the dreams of youth are destined to disappointment, and that what was once will not always be." I quote this article not for its philosophy, but because it represents the opposite side of my question. Very obviously, I am a senior cynic, but I don't think my attitude was caused by a waste of energy or of inflated goals on my part.

I came to Wisconsin, as I have said before, with practically no knowledge of what I was about to do, of the work I was about to enter, or the benefits I was to derive from a college education. I entered college with an abundance of faith in the University, in the College of Engineering, in the faculty of the College, in the students, in other people, and in myself. And in the four intervening years, I have lost that faith. I realize that that is a rather broad statement, but in general terms it is true. Very clearly, something is wrong, either with myself, the institution, or both. I think a good share of the blame must necessarily fall on the institution.

It was not until I had reached the latter part of my Junior year that I caught a glimmering of what I think an education really is. Of course, education, like religion, is extremely difficult to define; it means different things to different people. For example, back in my high school days I very erronously associated the term education with colleges and universities; somehow or other I had the idea that an education was something which a person acquired by spending four years in time and some four thousand dollars in money at a college or university. That conception, I think, is quite prevalent among other than high school people. To many students, especially in professional colleges, an education consists merely in the accumulation of a vast store of technical information, I should call that a training course, not an education. If a college education is merely a training course, then I have no ground to criticise the College. I believe it possible that a student with the aid of a good memory can by diligent study accumulate an amazing store of information. But I have heard it said by a number of professors that the real purpose of a college education is to teach the student to think clearly and reason accurately. I submit that the majority of the graduates of the Engineering School have neither one of these qualities.

(Continued on page 58)

A Method for Improving Pavement Crown

By GEORGE J. HEIMERL, c'27

The crown design of various types of pavement has not been given the consideration the importance of the subject deserves. The present method of design, while formerly suitable for narrow pavements and slow speed traffic, now is largely unsuited to modern conditions of wide pavements and faster travel.

The parabolic curve has been generally used for the crown design. Although providing a curve pleasing to the eye, it has many disadvantages.

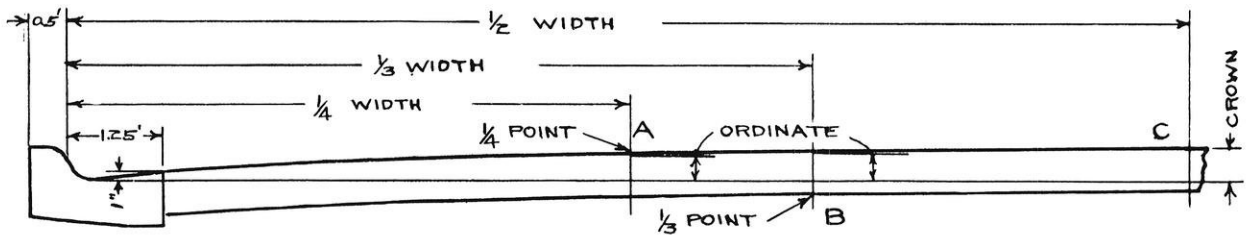
On a wide pavement, the parabolic curve results in an extremely flat surface over the middle half, and an entirely unnecessary degree of pitch to the gutter for the remaining portion. The wider the pavement, the more these disadvantages are magnified.

In order to utilize this curve, and prevent the center portion of the pavement from being too flat, high crowns must be used. As a result, approximately three-fourths of this high crown is found in the quarters near the gutters, and on our finest and widest pavements, we have the middle half of the pavement higher than the curb and a slope from the one-quarter point to the gutter of about 4 per cent.

The side pitch resulting from this high crown is a source of discomfort and even danger to vehicles. Where a pavement is warped for some special condition, or where a street is curved, a high parabolic crown is particularly objectionable.

Because of this tilt, traffic has a marked tendency to keep near the center of the pavement whenever possible, instead of remaining in the proper traffic lane. Heavy, slow-moving traffic will invariably do this when there are adverse weather conditions.

Skidding and slipping toward the gutter occur all too easily and frequently when rain, snow, and ice make travel precarious. Under extreme conditions, cars have been unable even to reach the center of the street after leaving the curb.



A typical cross section of a pavement which is not dangerous for vehicles.

It is undesirable to have a 4 per cent grade from the quarter point to the gutter. For drainage, 2 per cent or ¼ inch per foot is adequate for a smooth surfaced pavement, such as for concrete or asphalt surfacing. This, together with the street grade, will easily take the water, even if there are imperfections in the finished surface.

By reducing this unnecessary pitch on the sides, a much more comfortable riding angle together with increased safety, will be had. These advantages may be obtained by combining a straight line grade of ¼ inch per foot with parabola.

Combined System					Customary Parabola			Saving in Crown	
Pavement Width	Ord. ¼ Pt.	Ord. 1/3 Pt.	Crown ¼ Pt. Meth.	Crown 1/3 Pt. Meth.	Ord. ¼ Pt.	Ord. 1/3 Pt.	Crown	¼ Pt. Meth.	1/3 Pt. Meth.
30 ft.	2.56″	3.50″	3.50″	3.81″	3.75″	4.45″	5.00″	1.50″	1.19″
40 ft.	3.19″	4.02″	4.44″	4.85″	5.25″	6.23″	7.00″	2.56″	2.15″
50 ft.	3.81″	4.85″	5.37″	5.89″	6.56″	7.78″	8.75″	3.38″	2.86″
56 ft.	4.19″	5.35″	5.94″	6.52″	7.13″	8.45″	9.50″	3.56″	2.98″
60 ft.	4.44″	5.69″	6.31″	6.94″	7.5 ″	8.89″	10.00″	3.69″	3.06″
80 ft.	5.69″	7.35″	8.19″	9.02″	9.75″	11.56″	13.00″	4.81″	3.98″

A tabulation of the important computations and dimensions in the above design.

This straight line rise from the edge of the gutter should continue to either the one-quarter point, or the one-third point, depending on whether the pavement is to be laid in two, three, or four sections. From the one-quarter or the one-third point, use the parabolic curve on the same ¼ inch per foot basis. Making the slab joint the point of tangency simplifies the design and use of strike-offs.

A table of crowns for a concrete pavement of standard

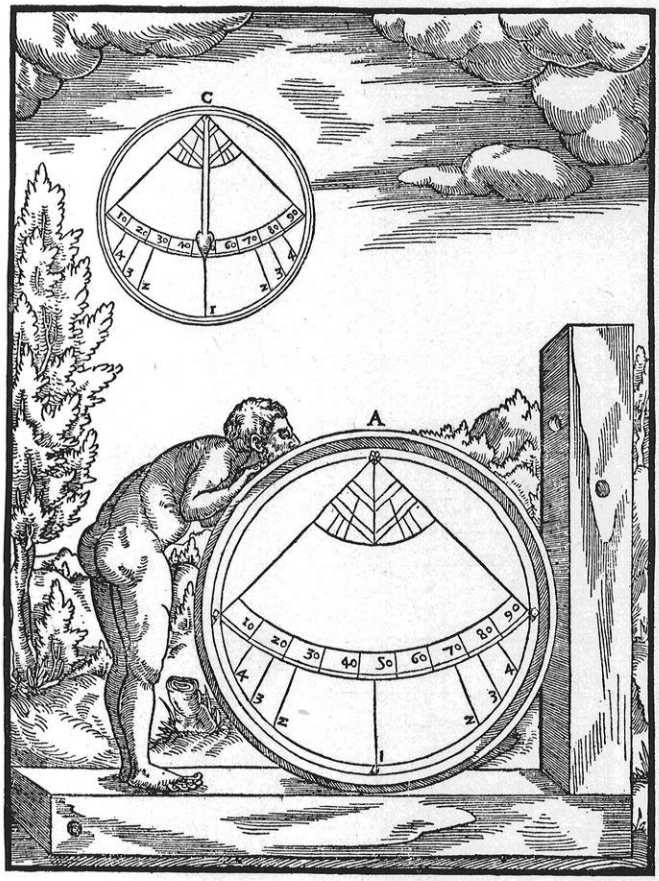
(Continued on page 55)

Ancient Surveying Instruments

JOHN R. ROBERTS, c'30

SOME two thousand years ago when Hero of Alexandria went out with his dioptra over his shoulder and his papyrus field book tucked away somewhere in a pocket of his classic robes, he proved the worth of his theories and the usefulness of his equipment, and made the beginnings of what was destined to be one of the most important and practical of the sciences. Since that time, the science of surveying has been perfected and developed in many ways, but the family resemblance between the ancient surveying instruments of Hero and our modern surveying equipment obvious.

Hero was a scholar at the University of Alexandria about 100 B. C. when it was at the zenith of its glory. A learned mathematician and philosopher, he was prolific in his writings on both subjects. The work for which we remember him in this connection, however, is his book, "Dioptra," a treatise on land surveying. This book consists of a description, with sketches, of his "dioptra," and thirty-three problems in surveying with simple solutions. This instrument was, so far as history can tell, the first and original transit or level. Even in its crudeness it resembles the modern transit in appearance and method of use.



An ancient Roman surveying level from Herbert Hoover's Translation of Agricola

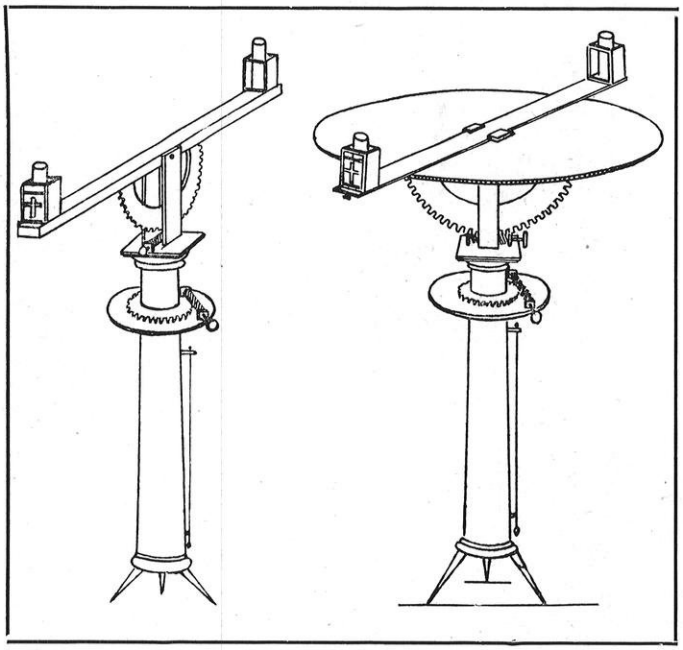
The construction of the dioptra was as follows: "The whole instrument, with the exception of a glass water level, was made of brass, and was about five feet high. The lower part or support was a hollow cylinder about three feet in length, with three sharp prongs at the bottom to hold it firmly to the ground, and a small weight was suspended by a string at one side, to show when it was vertical. On top of this support a large circular plate was fastened, always in a horizontal position when the instrument was in use. Above this was a second hollow cylinder less than a foot in length, and enveloping a spindle of the same length, which was fastened to the large circular plate. The bottom of the second cylinder was a cog-wheel, of a diameter less than that of the circular plate on which it rested, and the top, by way of ornament, was finished off like a Doric column, with a square capital on top. A long screw was fastened to the circular plate by two pins and tangent to the cog-wheel. By turning this screw all of the instrument above the circular plate could be revolved in a horizontal direction around the stationary spindle. Above the square capital were two vertical blades or standards, about a foot long, and between them, at the top, was a rule or straight-edge, six feet in length, and hung to them by a pin or journal, to allow a movement of the straight-edge in a vertical plane. Below the straight-edge, and between the standards, was a vertical semi-circle, cogged at its outer edges and turned by a long screw fastened to the square capital. On top of the straight-edge a long water level was placed, and at each end was a thin blade with a slit cut in it, through which the observer could look."

The dioptra could be used for staking out straight lines, for leveling, or for turning right angles. Hero mentions two poles which he used either as leveling rods or as pickets. One of the rods was the ancestor of the modern level rod, in that it had a movable target which was supported by a string over a pulley at the top. The target could be raised and held in place by winding the string around a spike on the rod. In lowering it, the string was loosened and the target dropped of its own weight. Hero did quite a bit of leveling, several of the problems in his book being examples of level work done with the dioptra. He also mentions in his book two other instruments: the asterisk, an instrument used prior to Hero's dioptra, and the odometer, an instrument for measuring by means of a paddle-wheel and a set of cogs, the speed of a ship through the water.

In spite of its apparent crudeness and limitations, for it could be used to measure only right angles, the dioptra was a valuable instrument to the Roman surveyors who used it for five or six centuries both as a transit and a level. All of the famous military roads and aqueducts, bridges and fortifications, of the Roman Empire were laid out and built with

the aid of the dioptra. The "groma", a simple cross-bar instrument for laying out lines at right angles, is another instrument used by the Romans. The remains of one were found in the ruins of Pompeii, and after careful study, the instrument was reconstructed.

From the time of the Roman Empire until the fifteenth or sixteenth century, there was little development of consequence in scientific work of any kind. During the latter part of the fifteenth century, trigonometry, which had been invented just before Hero's time, became something of a science, and it was at this time that one quadrant of the circle was first divided into degrees. Several years later the opposite quadrant was likewise divided to give the benefit of a second reading. It was not until about 1750 that the whole circle was graduated.



The dioptra as described by Hero. From the Journal of the Association of Engneering Societies.

The sixteenth century saw many developments in the science om mathematics and surveying, and a consequent development in surveying instruments. Gunther (1580), the English mathematician, invented the surveyor's "chain", and several scales and measuring devices. Mercator (1560), the Flemish map-maker, evolved the method of laying down the earth's surface on a plane projection. This method, called Mercator's projection, made it possible to record and map surveyor's data more effectively than before.

In 1573, Jean de Merliers, professor of mathematics in Paris, published a pamphlet entitled "L'Usage du Quarré". The "quarré" was a surveying instrument making use of simple geometric and trigonometric relations. The quarré was evidently made of wood in the form of a square. One quadrant of an arc joined two opposite corners and was divided into ninety degrees. At the apex of the quadrant, a straight-edge with a sighting slot was pivoted so that a sight could be taken along the edge of the piece and the angle read on the quadrant. The two opposite edges of the square were divided into sixty divisions each, an radii of the circle of which the pivot of the straight-edge was the center. This made it possible to compute distances and heights by means of similar triangles. The instrument was evidently intended for many uses as is shown by the variety of examples Merliers offers in his explanation, — but it is puzzling why so crude and inaccurate an instrument was produced at this time. The development of the dioptra and its modified forms, it is supposed had not yet reached a high enough stage to warrant its universal adoption.

In 1631, an important invention was made, that of the vernier. This attachment was immediately placed on the surveying instruments of the time, making it possible to obtain greater accuracy in readings.

An illustration in Dr. Louis Bell's book, "The Telescope", gives us a fair idea of the type of equipment used by astronomers in the seventh century. The picture shows a large mounted telescope through which the astronomer is peering at the heavens. The support for the instrument is about eight feet high. The elbow at the top which holds the telescope is attached to the support by a collar arrangement which permits the instrument to be revolved completely around in a horizontal circle. This elbow may be replaced by one of a different angle, and additional collars may be added to increase the height of the barrel. The barrel of the telescope is attached to a long narrow box over its entire length, and this box is in turn pivoted on the above-mentioned elbow so that the telescope and box are free to revolve in a vertical circle. The box is supported by a circular brace which is held by a hand screw in any desired position between the horizontal and the vertical. The vertical angle of the line of sight is read on a quadrant attached to the barrel of the telescope, by means of a plumb line which hangs from the apex of the quadrant. The telescope itself is about six feet in length, and is in four sections, excluding the eyepiece and front lens-piece.

It would seem that the nineteenth century ushered in the era of what we might call modern surveying instruments, in contrast to the earlier ancient surveying instruments. At any rate, the descriptions and pictures of the equipment used by engineers and surveyors about 1820 and in later years are similar in every respect to those in use today, albeit they are a bit clumsier and harder to handle. The vernier and slow motion feature, the plane-table, the tape holder, the telescopic sight, the level, the slide-rule, and other instruments which we regard as a part of modern surveying equipment, are all pictured in a treatise on surveying published in Boston in 1828, By Professor John Farrar of Harvard.

In conclusion, it is interesting to note that the profession of land surveying and the development of the equipment necessary to it, began back in the time of the Egyptians, the Medes, and the Persians, and continued on through the history of civilized peoples to its present state of perfection. Before Hero's time, investigations had been made and theories advanced, — but Hero was the first man to collect all the isolated facts and fragments then known, and with the aid of his own research on the subject. To put it to a practical use. His works as well as his instruments were taken up by the Romans, and started on their way to elaboration and development down through the ages.

A Kaleidoscope of Experiences in Summer Work

THE THINKER

By ALVIN BENESH

TWO desks away from where I worked in the drafting office, in the rear of the room, sat a quiet old gentleman who appeared to be doing very little work all day. He would come to work in the morning, arrange a book or two, seat himself comfortably, jot down a few lines on a sheet of paper, and then just sit and stare, apparently wrapped in thought. Except for writing an occasional brief note, he would be motionless for minutes at a time. Then he would putter around with a pair of triangles on some sketch for an hour or more; then go back to staring across the room.

There were some days when he would show a burst of energy. He would borrow the chief draftsman's dictaphone and dictate several letters in quick succession. The concise, clear, and unhesitating way in which he dictated the letters left no doubt that he knew his business.

During my first few days at the office I was much interested in the man but was too busy at my own work to inquire about him. After I got a little better acquainted I learned that he was a patent engineer. His was a very responsible position. He it was who had most to do with the writing of patent applications and protecting patents for the company. Deliberate and careful thinking was required in order to claim the inventions in their broadest sense, to apply for protection in matters that even the inventors would overlook. He also played a large part in litigation concerning infringements and interference. His work required thought. It was responsible work, characterized by quality rather than quantity.

CERTAIN SENIORS GIVE IMPRESSIONS GATHERED ON THE JOB

The engineering student who works during what has been humorously called the vacation period brings back to the college a new point of view that has developed out of his contact with practical affairs. His preconceived notions get many a shock; he learns to put new values upon what he knows and does not know; he discovers his place in the social scheme. If his judgment is sound, he returns a wiser and more teachable man because of his experience. We present herewith a few impressions gathered by the senior civils while "on the job."

ON BOTH SIDES OF THE FENCE

By F. P. ERICHSEN

There will always be two sides to the fence in the contracting game: the office side and the field side. It has been my good fortune to know something about both sides. After two years in the office of a contracting firm, I had six months of field experience. The marked difference between the viewpoint of the office and the way the job actually is done impressed me greatly. It was particularly noticeable on a job with which I was associated from its embryonic stage to its completion.

After having worked on the job in the office from its inception until it became a contract in our hands, I was jumped to the other side of the fence in the capacity of a timekeeper. It was then I learned the difference between working out a job on paper and actually doing the work in the field. I was thoroughly familiar with the specifications and was much surprised at the contrast between the way the work was done and what the specifications called for. The inspector passed many things that I would have questioned. He was an experienced man and recognized what was important and what was not. This enabled him to pass certain infractions of the specifications. By this leniency the job was expedited, the contractor and the inspector were not constantly bucking one another, and the job was entirely satisfactory when completed.

NOT FIRED

By WALTER E. MCDONALD

"Such a mistake may get by in school, but in practical work you would have received a good calling down and perhaps have lost your job." How many times have we been told this during our days at the university? So many, in fact, that I believed it and was about to look for my coat and hat after the following incident had occurred.

I was working in a highway office. A set of plans was being rushed to completion for an approaching letting of contract. Plans, cross-sections, and the title sheet were scattered about on a large drafting table, and mixed with them was a roll of cross-section paper. I needed a piece of this roll and passed the shears through it as I had done many times before, but on this unforgetable occasion I also cut the title sheet beneath to the extent of seven or eight inches. For a moment I was dazed. The thought of the long and tedious labor which the damaged sheet represented rushed through my mind together with the realization that the plans were to be sent away that same day. I expected to be fired; the only question was: Would I be thrown out immediately or permitted to finish out the week? I told the chief of the accident. He replied in words I could hardly believe: "Hell! That was too bad." Not another sign of anger did he show. I was as stunned as if I had been fired, but it was a pleasant thing to learn that outside of school accidents may happen without costing one's position.

THEY DESIGNED BY GUESS

By LESTER W. BARTSCH

After I had completed two years of my college course, I became dissatisfied with education and decided, as many

Frazer, Art, c'28, has been recently promoted to Assistant Engineer of the United States Geological Survey at St. Paul. He is working on the nine foot channel for the upper Mississippi River.

Grant Eugene L., c'17, ce'28, until recently professor of industrial engineering at Montana State College, is now associate professor of civil engineering at Stanford University. He will teach engineering economics and engineering applications of accounting and statistics. Professor Grant has just published a new book, "Principles of Engineering Economy," which is reviewed in another column in this issue of the WISCONSIN ENGINEER.

Hardy, A. A., ex c'27, is working on preliminary design and layout for the Prairie Pipe Line Company at the offices of that company at Tulsa, Oklahoma. He is married but has no children. **Paul Fell** c'28 is with the same company in the inventory department.

Hasler, H. J., c'17, is an electrical contractor in Gary, Indiana. He is married and has a boy of six. He stopped in the Engineering Building a couple of weeks ago.

Kessler, L. H., c'22, Professor of Hydraulic Engineering, is on leave of absence to build a water works, and sewage disposal plant at Williams Bay, Wisconsin. The cost is expected to run around $300,000.

O'Connor, W. D., m'22, was a campus visitor on July 11, 1930. He is connected with the patent department of the Westinghouse Electric & Mfg. Co. at East Pittsburg, Pa.

Paine, Paul M., c'14, gives his address as Box 196, Kenosha, Wis. Since graduation he has been engaged in a variety of work including engagements with the Illinois and the Minnesota highway departments, with the Forest Products laboratory at Madison, with Clayton County, Iowa, as county engineer, and with city and municipal engineers.

Parsons, W. J., c'26, is with the U. S. G. S. at Helena, Montana. He is working on flood control along the upper Missouri River. He is married but has no children.

Oettmeier, Arnold G., c'27, is job engineer under **E. M. Barnes,** c'22, on a large filtration plant construction for Erie, Pa. He is working for Engstrom & Wynn of Wheeling, W. Va.

Richtmann, William M., m'25, former business manager of the "Wisconsin Engineer" and instructor in steam and gas at Wisconsin, is to be married this fall to Marion Van Dusen of Prentice, Wis. Mr. Richtmann is now with the Barber-Coleman Co. of Rockford, Ill.

Robb, Carroll E., c'24, who was with the National Safety Council for several years after graduation, in October, 1929, joined the staff of the Associated Factory Mutual Fire Insurance Companies at 111 W. Washington St., Chicago. He is engaged in making periodic inspections of fire protective systems in a territory extending from Denver to Detroit and Winnipeg to El Paso. He lives at 301 S. Kenilworth, Oak Park, Ill., and has two boys, John, 5, and David, 1½ years old. Robb was in Madison and visited the college on October 10.

Ruf, Harold W., c'28, was married at Green Bay on June 19 to Margaret D. Atkinson, daughter of Mrs. Reginald Graham Atkinson of London, England, and a graduate of Wisconsin. Mr. Ruf will be instructor in hydraulics at Wisconsin.

Smith, Bernard F., c'25, Address: 1224 E. Pacific Street, Appleton, Wisconsin.

Smith, Prof. Leonard S., c'90, ce'95, for many years professor of highway engineering and city planning at Wisconsin, writes from California under date of Oct. 9 as follows: "I am to give an illustrated talk to the Los Angeles chapter of A. S. C. E. on the 16th; subject, "Replanning of Tokio and Yokohoma."

Stiles, Dwight H., c'20, is on the staff of the Associated Factory Mutual Fire Insurance Companies at 111 W. Washington St., Chicago. He joined the staff in October, 1929, at the same time that Carroll Robb, c'24 joined it. He has a son, Allen, who is 1½ years old. His home is in Riverdale, Ill.

Ward, Gerald C., c'29, former editor of the "Wisconsin Engineer" and instructor in railway engineering last year, was married on June 19 to Sarah Augusta Hardy of Spencer, Idaho. The bride is a 1928 graduate of Wisconsin. They motored to New York City where Mr. Ward was to begin a connection with the McGraw-Hill Book Company. After a summer in the big city, they started West again about the middle of September for a swing around the college circuit.

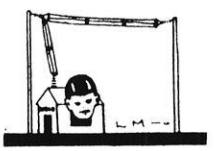
Wehrle, Otto, c'29, MS'30, is in the U. S. Engineer Office at Milwaukee.

Weider, Carl, formerly a professor at Wisconsin, is chief engineer of the Prairie Pipe Line Company at Independence, Oklahoma.

Zervas, Walter C., c'22, was in Madison for Homecoming and reported that he is manager of the Electrical League of Milwaukee, an organization of all branches of the electrical industry engaged in promotion and market development work. He has two children, one four years and one six months old.

ELECTRICALS

Chrysler, Maurice A., e'30, is a student radio engineer with the R.C.A. Victor Company at Camden, N. J. He says he would be glad to hear from his former acquaintances. Address: 534 Penn St., Camden.



Fairweather, Burton A., e'28, is still in toll developmentwork with the A. T. & T. He also is on a radio program circuit. Address: 463 West St., New York City.

Guillemin, E. A., e'22 is an instructor in Electrical Engineering at Massachusett's Institute of Technology. He was married on May 29, 1929 to Mary L. Moran. Address: 41 Woodlawn Ave., Wellesley Hills, Mass.

Hall, W. H., e'29, is an inspector for the British Columbia Electric Railway Company. He is situated at Ruskin, B. C. He says engineering is not as active a field up in Canada as it is down in the states. He is working on a hydro-electric plant on the Stove River, and likes the work very much.

Koerner, Edwin Otto, e'23, was admitted to practice before the Wisconsin Supreme Court on August 4, 1930. After graduation in 1923, Mr. Koerner went to the Western Electric Co. but a year later became an examiner of the U. S. Patent Office. While in Washington he studied Law at night school and was admitted to the Bar of the District of Columbia. He is now in the patent department of the Allis-Chalmers Company at Milwaukee.

Machael, Russell L., e'30, is a cadet engineer for the Indiana Electric Corporation.

Onstrud, Lawrence J., e'30, likes his work on the test floor of the Westinghouse Electric plant very much. His address is: 1439½ Elm St., Wilkinsburg, Pa.

Rusch, Hugo, L., e'23, is Supervisor of Performance Report Section at the Headquarters Office of the Johns-Manville Corporation.

Schuchardt, R. F., e'97, E.E. '11, has been appointed to serve on a committee to determine who shall be included in the new "Who's Who in Engineering". Mr. Schuchardt is

(Continued on page 56)

Editorials

UNIVERSITY OFFERS ADDITIONAL COURSES IN AERONAUTICS

Students taking mechanical engineering at the University of Wisconsin now have the opportunity of specializing in aeronautical engineering under provisions that have gone into effect this fall. Eight courses, totaling seventeen credit-hours, have been listed in the new bulletin of the College of Engineering. They include: aerodynamics, airplane stress analysis, design of airplane parts, propeller theory, welding, airplane engines, aeronautical meteorology and airplane engine testing. Students wishing to take the option in aeronautics will take these special courses in place of some of the courses usually required of the mechanical engineers. They will of course, be required to take the fundamental courses required of all engineering students, and will be graduated as mechancial engineers. Students in courses other than mechanical engineering also will be able to elect these aeronautical subjects.

The question of whether or not to follow the lead of certain other engineering schools and establish a complete course in Aeronautical Engineering was carefully considered by the faculty of the college last spring. A survey of the field that might absorb graduates in aeronautics did not offer justification for any greater specialization than that now being offered under the aernautical option. Professor Raymond J. Roark, who has general supervision of the new option, spent part of last summer in visiting various factories and laboratories to get first-hand information as to the wisdom of encouraging students to specialize in aeronautical engineering.

"It is clearly the belief of the engineers interviewed," reports Professor Roark, "that the best preparation is one that involves a thorough grounding in the fundamentals of mechanicts and stress analysis, rather than more superfisial instruction in subjects specifically aeronautical in nature. This was the well-considered and strongly-held conviction of several men, each of whom occupies a position in the industry that lends weight to his view." The following excerpt from a letter is representative of their ideas:

"The type of training which we prefer is that of a sound fundamental training in structural engineering — something which is generally given in civil engineering courses. Where aeronautical work is taken we prefer that it be taken as a post-graduate course. Practically every university in the country appears to me to give too little attention to drilling in fundamentals and rushes the students into specialized courses for which they will have no use when they leave school. We feel that having the students conduct analyses on airplane structures is not nearly so valuable as having them spend the equivalent time on the fundamental mechanics behind it. A man with proper grounding can very easily be trained in the method of airplane analysis once he has joined some engineering force."

There is a general agreement that the field of aeronautical engineering is at present overcrowded, according to Professor Roark. It appears that the field is strictly limited. It seems difficult to find, either in the record and present status of commercial aviation or in the history of the somewhat comparable automobile industry, grounds for believing that aeronautical engineering will ever offer professional opportunity to any great number of men of average ability. It would seem, rather, to hold attractive possibilities for a small number of graduates possessed of unusual scientific ability, originality, and decided interest in the field of aviation.

The decision of the College of Engineering to offer training in aeronautical engineering as an option in the course in mechanical engineering is believed to be in accord with the judgment of those familiar with conditions in the industry.

GAS ON THE STOMACH

"This is an age of science," says President Frank, "but not a scientific age." Verification of his statement comes to us in apress dispatch from the oil fields of Nebraska telling of an "oil Wizard" who is able to detect underground oil supplies by the effect they have on his stomach, In the presence of oil, he develops nausea. Not only can he detect the presence of oil by this simple means, according to the veracious reporter, but he can also predict the output of a proposed well. This pool will yield 200 barrels daily," he says, or, "about 500 barrels here." Apparently the degree of nausea varies. We cannot but be curious as to the results if he should chance to find himself in the presence of a real rip-snorter of a gusher. The moral of this tale to the engineer is that he must realize that this is NOT a scientific age; that human beings are credulous and crave miracles, and will often follow the quack with more enthusiasm than they will follow the scientist. Making scientific thinkers of the mass of the population will require many generations. In the meantime, the engineer must accept the situation philosophically and adjust his methods to the conditions. There is a natural tendency to be impatient with apparent stupidity. Such tendency must be curbed.

SOME COMMENTS ON TRAFFIC CONTROL

It is almost a fifty-fifty chance that the installation of stop-and-go lights will result in an increase in the accident rate, according to a study that is being made by the National Safety Council. Of the 341 installations that were studied forty per cent resulted in an increase in the number of accidents.

(Continued on page 55)

EDITORIALS

(Continued from page 46)

In an article in *Public Safety* for October, Earl J. Reeder, traffic engineer for the Council, discusses in detail one of the installations that increased accidents. The signal was installed in November after 26 accidents had occurred since the preceding January 1. During the corresponding period following installation a number of accidents occurred. Mr. Reeder comments: "A collision diagram study should have discouraged the installation of a signal for the solution of this particular accident problem. * * * Less than 20 per cent of the accidents could have been affected by any ordinary signal installation." Accidents increased 135 per cent at this intersection following the installation, although they increased only 10 per cent for the city as a whole.

These facts will come as a shock to a good many people. The moral seems plain enough: We cannot go on assuming that the stop-and-go light is a panacea for traffic difficulties. A bad intersection should be studied by someone who is qualified to determine what should be done. City fathers will have to revise their ideas upon this point; it is not safe to go on the assumption that "A signal may help; at least it can do no harm."

* * * *

Students of traffice control can do some laboratory work on University Avenue now that the Fathers have seen fit to install massive concrete blocks on that erstwhile fine thoroughfare. This installation seems to be based upon a new principle in street traffic control; namely, that the safety of one class of traffic may be secured at the expense of serious danger to another class. For the sake of protecting pedestrians, automobile traffic is being subjected to a very serious hazard. Already there have been enough car crashes against these concrete blocks to prove that they are extremely dangerous.

Streets are called "arteries of traffic". It would seem natural that the streets should be as free from obstructions as possible if they are to carry their maximum traffic. Instead of following that sensible principle, our City Fathers are filling this thoroughfare, the most important in the city, with obstructions that have decreased its capacity mightily.

It can be predicted with certainty that these concrete blocks will be removed before long. The sad part is that they will probably be followed by something equally asinine.

Engineering may be defined as the application of the principles of science to the development of natural resources, the design and erection of structures, the construction and operation of machines and ways of transportaiton and communication, and the devising and controlling of physical and chemical processes of manufacture, especially those involving the use of machinery. Many of the simpler types of structures, operatoins, and processes require little or no scientific knowledge, but only the exercise of common sense and the skill and ingenuity acquired in practice. This is not the field of the engineer, but rather that of the skilled workman or artisan, and training for such work is obtained by practical experience rather than by theoretical study.

GRANT, c'17, WRITES BOOK ON ENGINEERING ECONOMICS

Reviewed by LESLIE F. VAN HAGAN

Professor of Railway Engineering, University of Wisconsin

PRINCIPLES OF ENGINEERING ECONOMY: By Eugene L. Grant, Professor of Industrial Engineering, Montana State College. The Ronald Press New York. Cloth 6x9 in.; pp. 387. $3.75

PROFESSOR Eugene Grant, nephew of former president Birge and a graduate of the course in civil engineering at the University of Wisconsin, has given the teachers of engineering economics an ably prepared text book for their work. I venture to predict that it will be well received.

The book is suitable for a course that supplements the usual course in elementary economic principles; it devotes itself to the practical application of economic prinicples to specific engineering problems. Teachers of engineering are beginning to realize that this practical application can be taught most effectively in special courses and under teachers who are engineers. The book meets the needs of the instructors and students in such courses.

Prof. Grant, c'17

About half of the book is devoted to "The Arithmetic of Engineering Economy," one-quarter to "Fact Finding in Economy Studies," and one-quarter to "Background for Economy Studies." The arithmetic is presented about as attractively as such material will permti, but it still remains arithmetic. Parts 2 and 3 give the author his real opportunity and he has made them very interesting and valuable. His style is direct, clear, and cinvincing. A student should find these two parts easy reading and much to his liking.

Scattered throughout the book are illustrative problems that command admiration. They have been gathered from such varied fields of engineering that a student or a teacher of what ever course should be able to find plenty of illustrative material in his own particular field. The problems are stated so that they simulate fairly well the type of thing that the engineer will meet in his practice.

The author's common sense shows all through the book. He is careful to keep before the student those factors over and above arithmetic that infuence decisions in economic problems.

The time is about ripe for a flood of text books in this field. Professor Grant has set a very high standard for those who will undoubtedly attempt to follow him.

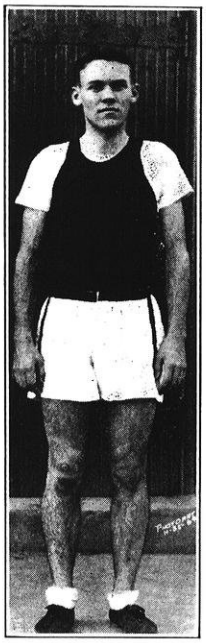
The coming of engineering economic texts is a movement to equip the engineer with something more than a technical education. Engineers in contracting are more inclined towards business than design. An education in which economics and especially engineering economics is given will equip technical men for contracting fields. Besides this, the consulting engineer, the engineering executive, and the city engineer now find in print, those elements of economics which formerly they had to analyze for themselves.

Campus Notes

AYRES CHOSEN AS ASSISTANT PROFESSOR OF ELECTRICAL ENGINEERING

E. D. Ayres, who has been associated with the firm of Jackson & Moreland, Engineers, of Boston for the last six years, has been appointed Assistant Professor of Electrical Engineering to teach power distribution and central station courses at the University.

Mr. Ayres has had a broad experience in the field in which he is teaching. Jackson & Moreland as a firm during these six years have done much pioneering work in the field of system interconnection and system stability for such public utilities as The Edison Electric Illuminating Company of Boston, The New York Edison Company, The Philadelphia Electric Company, and The New England Power Association, and a great deal of industrial work for such firms as The Standard Oil Company and Illinois Glass Company. Mr. Ayres has been intimately associated with considerable of this work in a responsible capacity. He has also been connected with the recent engineering work of Jackson & Moreland in their Cascade Tunnel Electrification for the Great Northern and the Hoboken Terminal Electrification for the Delaware, Lackawanna and Western Railroad.



Cortright, c'31

ENGINEERS COVER GROUND AS CROSS-COUNTRY RUNNERS

It is surprising to note how many engineers are active in athletics at Wisconsin. An inspection of the roster of practically all of the varsity sports shows a good percentage of engineer names along with those of other colleges of the university. This percentage is especially large on the cross-country list, for about half of the varsity cross-country men are engineers. They seem to do quite a good job of the running besides, as the record of the team indicates. Wisconsin placed second in the Western Conference, or Big Ten, last year, and promises to do as well, or better, in cross-country this year.

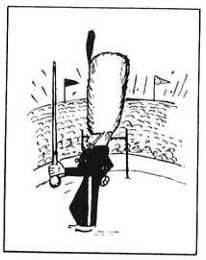
Coach Tom Jones says of the men: "Engineers generally make good cross-country men; they are not afraid of work, they like an outdoor life, and the sport is well adapted to their schedule, as the practice generally does not take more than an hour daily. The cross-country team is made up mostly of engineers every season".

To classify the team still further, the civils have by far the largest majority of runners, as in football they have more men than any of the other classes of engineers. It is hard to tell whether the civils like the outdoor life, or whether the miles of levelling and such over the surrounding country make them better fitted for the sport. At any rate, they have the edge on the other classes of engineers.

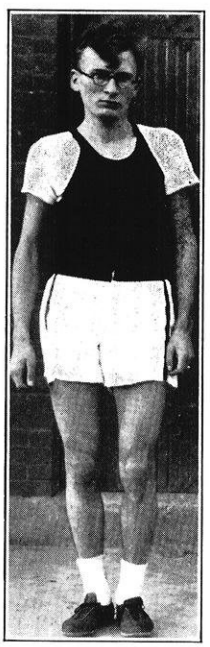
One of the chief personages among the "thinlies", as *The Daily Cardinal* chooses to call the runners, is Harry M. Cortright, a junior civil. He comes from Sandwich, Illinois. Just what connection the name of the town has to do with his ability as a runner will be left to the punsters. John F. Wohlgemuth is another transit operator who distinguishes himself on the turf and cinders. He is a senior, comes from Milwaukee, and has thrown dirt in the face of many a rival runner. Harry Dever and Leonard Angoli are two more junior civils who uphold the school's reputation in this sport. Dever is from Beloit, and Angoli claims Milwaukee as a home town. Louis Berg was on the squad last year, but is unable to be out for cross-country this season. He will be out for indoor track, however. He is also a junior civil. Winston Bone is a sophomore chemical engineer living in Madison who should do some good work in the next few years. John Gillette is a sophomore mining engineer on the squad. He, too, is a resident of Madison.

ZIBELL HEADS THE BAND

Without the band, the football games would lose a good deal of their color, for Wisconsin has a wonderful band. The appearance, music, and complicated formations attest this fact. One of the hardest jobs in connection with the band is that of drum major. He must strut around with a cocky tiring step, throw his baton over the goal posts and catch it without fail, drill the band boys for their exhibition between halves, and carry a two-ton ermine hat besides.



Only an engineer could get away with all this successfully. He is Jerome W. Zibell, civil senior, of Waterloo. He hasn't misspelled any words, on the gridiron at least, this season, catches the baton every time he makes a tricky throw in the air, and in general handles the 140 members of the band very well. Zibell won out against several other contestants for the positoin in tryouts held last year. With his two assistants he designs all the formations, and drills the band into doing them correctly, all of which is quite a job.



Wohlgemuth, c'31

The band will make a trip to Evanston to show the Purple rooters what a real band looks like.

Engineering Review

NEW METHOD OF CAR WASHING REDUCES MAINTENANCE

A new method of car washing, developed and perfected for its own use by an eastern railroad, presents a new idea in a very practical and usable manner. In the past the cleaning of railway cars presented an expensive and tedious problem and many new methods of washing have been proposed and adopted by various railway companies. Of them all the new method of washing seems to be the best.

The cost of washing a car by the old method averages five and one-half dollars a car, that is requiring the labor of eleven men at fifty cents an hour for an hour each car. The new method permits the washing of one hundred cars during an eight hour day, employs five men and reduces the average cost per car to twenty cents apiece. When hundreds of cars have to be cleaned this saving represents a small fortune.

The apparatus used consists of two independent sections. One section uses water as its cleaning agent while the other uses oxalic acid. The first part of the apparatus is a vertical, wall-like structure, built on a foundation at the side of the track. It has three revolving brushes vertical to the sides of the car. The second section is also built on a foundation parallel to the track and has a series of horizontal brushes placed which operate with a reciprocating movement. Each brush revolves with a velocity of three hundred revolutions per minute. The water is sprayed with high pressure and brushed at the same time. The method is highly efficient and does fully as well the job done by manual labor.

SPECIAL ALLOYS IN THE MACHINE-SHOPS TODAY

The machine-designer, in order to capably answer problems arising from the use of special alloys in the machine shops, turn to the metallurgist for his answer. The increase in popularity and variety of the newer metals demands of the machine-designer, today, fuller knowledge of the characteristics of each alloy, especially in the machining of it in the shops.

The machine-tool engineer has sought to incorporate flexibility of design and increased rigidity in coping with the more stringent demands upon the tools,—increased range and number of feed and speed combinations result directly in increased power. Though these developments are apparently logical steps in the metal-working industry, they are none the less brought out sooner by the problems of machining the newer metals,—special alloys.

POWER FROM THE GULF STREAM

The newspapers of September 9 announced that Prof. Georges Claude, French scientist, had succeeded in launching and sinking a large tube that will constitute a part of an installation designed to utilize the heat energy of the Gulf Stream. The tube was installed at Matanzas, Cuba. This was Prof. Georges' third attempt to install the tube, two other tubes having been destroyed at a loss of $1,000,000.

The system proposed by Claude and Boucherot proposes to generate power from the sea by "boiling" the warm surface water in a vacuum produced by means of the cold water from the deep levels. The steam so generated is to be used in a very low pressure turbo generator operating a d.c. motor at 5000 r.p.m. Such a turbine has been built and subjected to tests, which gave satisfactory results. An experimental plant on the banks of the River Meuse in Belgium indicated that the proposal is based upon sound energy considerations. The economic feasibility of the project remains to be proven.

BOOM TIMES FOR PIPE LINES

The practicability of transporting certain commodities by pipe line seems to be thoroughly established if the present activity in constructing such lines can be taken as a criterion. A recent survey by the Union Trust Company of Cleveland shows that there are now 80,000 miles of lines transporting natural gas alone. The investment in these lines is reputed to be $2,000,000,000 or about the same as an equal length of concrete highway. In addition there are many thousand miles of oil lines. It has even been proposed to transport coal by piping it. The location, construction, and operation of pipe lines is demanding the services of civil engineers in considerable numbers. One gas company has, at the present time, seven or eight locating parties in the field. About $250,000,000 will be spent for new lines in 1930.

MAKING NATURAL GAS AVAILABLE

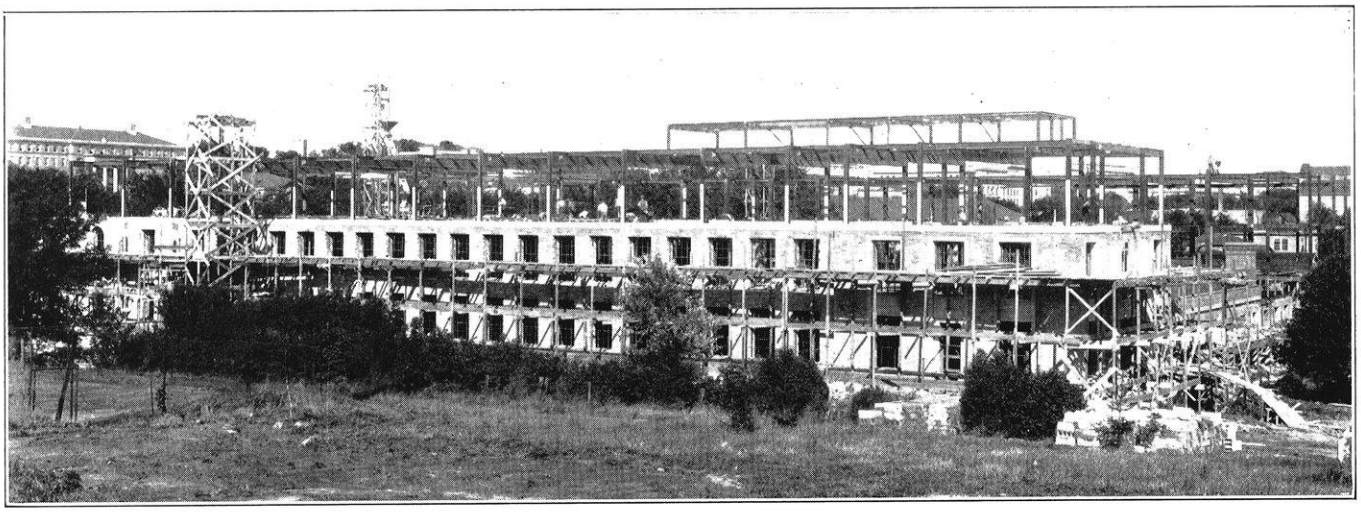
Natural gas, of which there are abundant known supplies, is being made available over a wide range of country thanks to the development of pipe line transportation. The range has increased from 250 miles in 1927 to 450 miles at the present time, with a promise of 1000-mile distribution in the near future. Among the long distance projects under consideration are: a line from Texas to Chicago, one from California to Washington, and one from California to Montana.

RECENT DEVELOPMENTS IN BOULDER DAM CONTROVERSY

The United States Supreme Court, Oct. 13, approved the State of Arizona's long-threatened suit to challenge the legality of the act creating Boulder Dam, when a bill of complaints, containing disputes against six other Colorado Basin States and the Sec. of the Int., was permitted to be filed. The defendants were allowed until January 5, 1931, to file their replies. Until the replies are filed it is a matter of question as to whether or not an injunction can be issued. While six other states are objects of the complaint the chief charge is meant entirely for the Secretary of Interior. The states seem to be drawn into the controversy merely as an ends to obtain immediate action in the Supreme court as an action between states. If they had not been drawn in the fight, Arizona would have to begin the court action in the State courts.

Arizona contends, in their complaint,

that their state rights had been violated and they demand a permanent injunction against the construction of the dam. They also say it is unconstitutional and their claim is supported by five reasons. It also said that by the authority of the Secretary of the Interior to sell electric power it deprived the state of its right to collect taxes from other people who desire to use Arizona's natural resources. The act authorizes the projects which seem to make ample provision for the States of Arizona and Nevada's returns from the Boulder Dam. It is believed that both states benefit far more than if allowed to be operated by private power development.



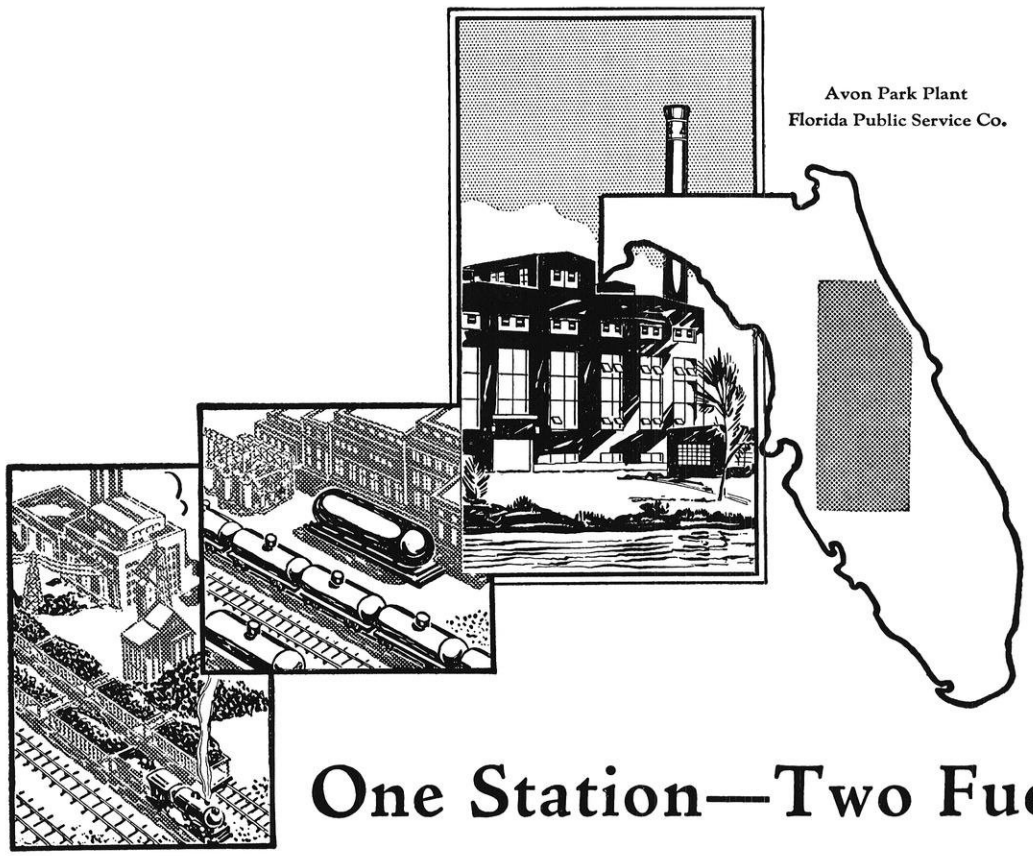
The Mechanical Engineering building as it appeared under construction in September.

SUBWAY CONSTRUCTION IN NEW YORK

Subway construction in the modern era of machine working has developed a new and interesting aspect in the many details demanding new methods of working.

In 1900-1904 subway work was of the type demanding nearly 100% manual labor, except for the drilling and blasting work. The second system of subways attempted by New York was begun in 1914 and continued thru to 1918. The methods of construction changed but slightly between these periods and nothing of spectacular development in the line of new machinery and tools was announced.

During the current year and several years previous new subways have been in process of construction in New York City. The methods of construction are far different from those employed in years previous. Work was facilitated by huge clam shells and power shovels working on street level depositing their load in motor trucks of five yard capacity, the trucks carting the dirt much easier and with less required space than former methods of hauling. In addition to the difficulties of cave-ins from silt, quicksand, loose dirt and rock which made lining and reenforcement of the walls of the subway all very necessary, the experience of the modern engineer in the underpinning of structures was greatly in demand. Huge buildings and over-street-structures required reenforcement until the operations of building the subway were finished. The under-street conduits were carried by street-decking apparatus. Elevated railways also demanded their share of the underpinning structure. Due to the water conditions encountered in the process of building a great deal of study was required to select a suitable plan for drainage. A system was finally adopted by which the use of sump and ditches accomplished the objective in demand. Underwater was encountered in a great number of places in the city. Different soils demanded different treatment and a greatly varied water drainage system was the result. The modern subway proceeds with a great deal less danger and with far greater speed due only to the advanced tools and greater engineering skill in coping with obstinate difficulties.



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METHODS OF CROWN IMPROVEMENTS

(Continued from page 39)

widths, and a typical gutter section, is given. This gutter section has a rise of 1 inch from the low point to the outer edge, a distance of 1.25 feet. Values of ordinates, from the pavement surface to a straight line drawn from the low point of the gutter, are shown for the one-quarter point, one-third point, and center. For comparative purposes, a column of ordinarily used crowns is also given.

The crowns figured on the one-quarter point basis differ little from those for the third-point basis. Either makes a satisfactory basis for design. It should be noted that the difference between the above crowns and the ordinary parabolic crown is approximately the amount saved on the side quarters of the parabola, and while cutting down the side pitch by about one-half, the pavement still has a slope satisfactory for drainage. The combined system suggested results in a minimum crown which need not be reduced for steeper grades; uniformity of crown for a given width is a distinct advantage.

The parabolic curve should be modified in some such manner as indicated above if crown design is to be improved. There is no logical reason for adhering so closely to a curve which is unsuitable in many respects.

Scientists now tell us that some of the coal that we now use was thousands of years in formation; the older the coal, they say, the better it is. Which only goes to prove that there is no fuel like an old fuel.

ALUMNI NOTES

(Contnued from page 45)

with the Commonwealth Electric Company of Chicago, Ill., as chief electrical engineer.

Wegner, Ernest, e'29, has turned traitor on the engineers and is now studying patent law at night school.

Westphal, Leslie C., e'30, is in the engineering department of the Chicago Transformer Company. He writes: "I enjoy the work very much although I do not care much about the city."

Whittemore, Herbert L., m'03, ME'10, chief of the section of engineering mechanics at the Bureau of Standards, has been appointed to the federal Building Code Committee by Secretary of Commerce Lamont, according to Washington dispatches of August 28. The committee was organized in 1921 by Herbert Hoover, then Secretary of Commerce. It consists of seven architects and engineers. Mr. Whittemore was instructor at the University of Illinois, Columbia University, and the University of Oklahoma before becoming connected with the Bureau of Standards.

Wolfe, Harry C., e'26, Address: 955 S. Braddock Ave., Pittsburgh, Pa.

MECHANICALS

Caldwell, Earl L., m'24, former staff member of the Wisconsin Engineer, is in the sales department of the Johns-Manville Corp., 18th and Michigan, Chicago. Caldwell married Mary Ball, Wis. '24.

Davis, Elmer L., m'27, Address: 1310 Farwell Ave., Milwaukee, Wisconsin.

Dewey, Filliam V., m'30, is working for a master's degree at the Penn State University at State College, Pa. His address is: University Club, State College, Pa.
University Club, State College, Pa.

Douglas, James Eugene, m'30, is a student engineer for the Vilter Manufacturing Company at Milwaukee, Wisconsin.

Ferguson, Phil M., ms'24, is associate professor of civil engineering at the University of Texas at Austin.

Gerlach, Harold W., m'30, is doing experimental research on Diesel engines for the Fairbanks-Morse Company at Beloit, Wisconsin.

Zaumeyer, R. J., ch'29, has been promoted to the position of engineer of the Lakeside Mill of the Kimberly-Clark Corporation, Neenah, Wisconsin.

Mueller, John R., m'30 has just returned from Canada, where he spent the entire summer fishing and canoeing. He says he got some good movies of wild game and saw some beautiful country. Now he intends to try to get a job.

Schefe, F. K., m'30, is with the American Sheet and Tin Plate Company at Gary, Indiana.

CHEMICALS

N. K. Demmon, ch'29, has discontinued his employment with the Thermotomic Carbon Company, Monroe, Louisiana, and is now engineer for the National Carbon Company, Cleveland, Ohio.

Kinney, Harold J., ch'30, is one of the increasing number of engineers who turn traitor to all they learned in college and take up patent law. He is employed by Pennie, Davis, Marvin, and Edwards, a New York law firm. Address: 1836 Lamont St. N. W., Washington, D. C.

Leon Monfried, ch'29, is chemist for the city of Milwaukee at the Sewage Disposal Station.

Ross, George H., ch'27, is employed by the DuPont Cellophane Company, Buffalo, New York.

Schutt, John W., ch'30, is a cadet engineer with the Seaboard By-Product Coke Co. at Kearney, New Jersef.

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Zimmerman, Gordon B., ch'31, was married last July 5 to Miss Mary Kyes at Oshkosh, Wisconsin.

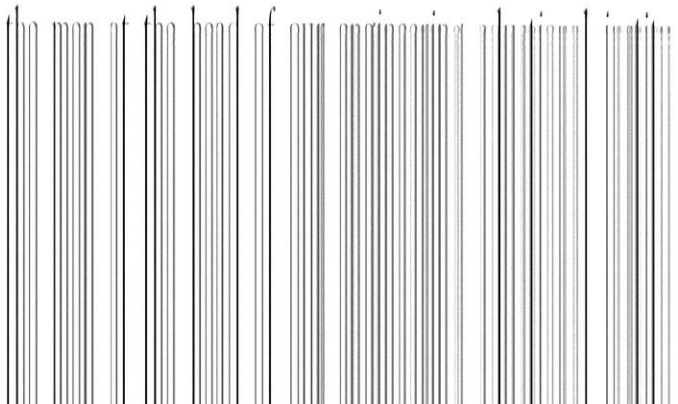
MINERS

Turneaure, F. Stuart, min'27, son of Dean Turneaure, has returned from Bolivia where he was geologist for the Patine Mines. He will take graduate work at Harvard this year. His wife and three year old daughter, Donna, have accompanied him East.

FOUR YEARS AT WISCONSIN

(Continued from page 38)

There is apparently a great deal of controversy among the engineering educators of the country as to whether or not the engineering colleges are functioning as they should. Current professional literature regularly devotes considerable space to the ever growing problem of engineering education. There is great argument on all sides, with specialization versus non-specialization, technical courses versus non-technical courses, and functional education versus non-functional education. Some eductors, supposed authorities, argue one way, others, equally able, argue another. The point is that even



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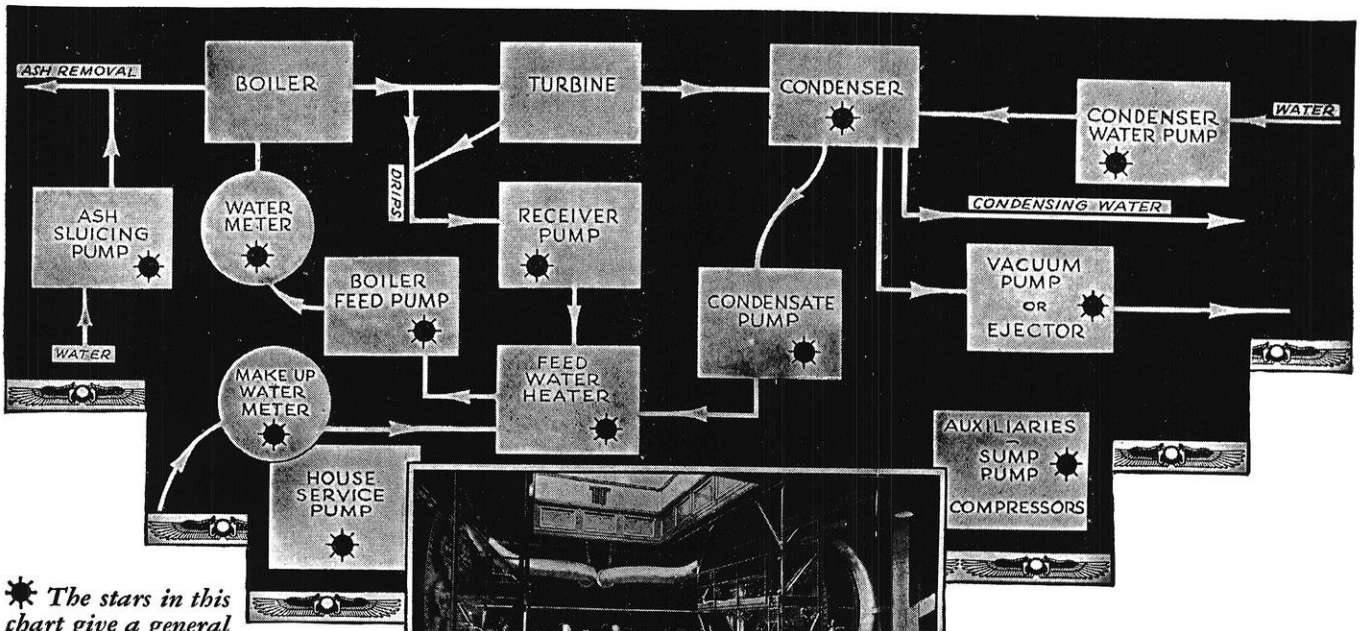
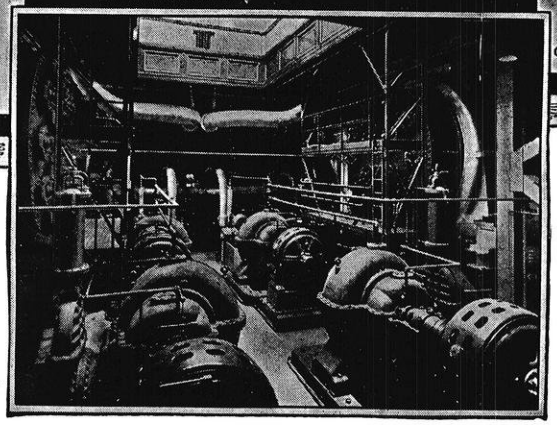


The stars in this chart give a general indication of the points in the turbo-electric plant where Worthington equipment can be installed to help insure reliable and economical operation.



A representative Worthington installation . . . two 42,000 sq. ft. surface condensers with centrifugal circulating pumps and other auxiliaries, at the Avon, Ohio, station of the Cleveland Electric Illuminating Company. Recent tests showed that the vacuum maintained in these condensers is among the highest on record.

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To both of these questions I answer a very emphatic "no". A high school lad, for example, might be interested in electricity and think he ought to take the Electrical Engineering Course when he enters the University, but he knows practically nothing about anything, let alone have any intelligent reason for wanting to take the Electrical Engineering course. Of course, there is a good bit of chance in it; he may happen to like it and he may not, but the mere fact that he is interested in electricity is not going to make him take an interest in the course. The point is that the average student on entering the College of Engineering doesn't know for sure whether he will ultimately be interested in any one of the many branches ofengineering. The Engineering faculties find themselves in a very peculiar position; they are confronted with the problem of admitting large numbers of would-be engineers, and of giving to each a course of study adapted to his own particular needs, when neither he nor the faculty know what those needs are. I will even go so far as to claim that a student after two or three years in an engineering college cannot be expected to know into what branch of engineering work he will ultimately go. After all, I think the real criticism of Engineering colleges in not what courses they offer, not in whether the courses are too technical or too highly specialized; in the end, I don't think it's going to make a great deal of difference whether a man took Electrical or Civil Engineering, or any other kind of engineering, while in college. The value of a college education, is appears to me ,lies not in a wise selection of courses, but in the contacts which the student makes with his associates and his instructors, with men who are actually doing worth-while things in a worth-while way.

As I look back over my four years at the University, I am at once struck by the fact that no one event, or person, or thing seems to stand apart from the commonplace routine of college life; I see only a haze of faces, class-rooms, lectures, books, and formulas — long and tedious formulas, their derivations and remembering, formulas in mathematics, physics, mechanics, electrical courses; the whole four years seems to have been spent in an endless substitution in formulas. There are formulas for this for that, for the other; everything was formulas. Of course, I realize that this conclusion is a bit superficial, but it typifies, better than anything I can think of, my impression of the Electrical Engineering Course.

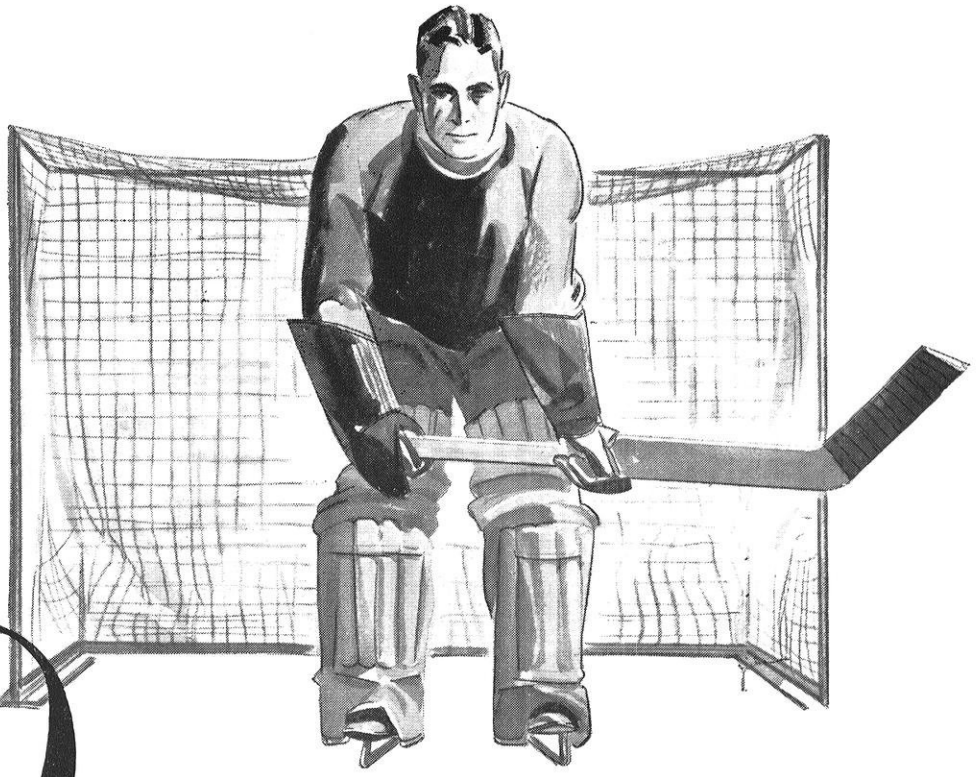
One of the things which I think every student who takes his college work seriously should possess is an intimate acquaintance with at least one of the faculty members; a man to whom the student can take his troubles and difficulties, a man whom the student can work with as well as work under, a man who can understand the student and sympathize with him, who can meet the student on common ground and just 'talk things over'. Under our present system such an acquaintance is obviously a practical impossibility. The first two years of the student's college life are spent under more or less incompetent instructors who may be interested in teaching, may be interested in their research work, or may even be solely interested in their monthly checks. During my four years at the University, I have suffered each of these three types. It is not until his last year and a half that the

student comes into any semblance of contact with real worthwhile men in his chosen profession. But the professors are burdened with departmental duties, with executive duties with the correcting of an endless number of reports, of problems, and of written work, and with long tabulations of grades and grade-points. And with the increasing enrollment of late years, the faculties of our engineering colleges and other colleges as well—have reduced a 'college education' to a process, and grind out graduates with the machine-like precision of an automobile factory — so many subjects, so many reports, so many topics, so many grade-points, and then the diploma. The modern so-called college education, I say, is today a fixed process. What are the results? I believe the following to be true: the average graduate of an engineering college today, has only the slightest inkling and the vaguest conception of what he is even supposed to know. He cannot think logically or clearly; he cannot adequately express, either in words or on paper, such ideas as he does occasionally get. He can appreciate neither literature nor music; of art he knows absolutely nothing; he has not even the slightest idea of what is going on in the world about him; and yet, simply because he has satisfied the faculty by the completion of so many courses, because he has acquired so many credits and so many grade points, he is arrayed in an ill-fitting gown and an equally absurd headdress, and with all the solemnity of a religious ceremony, his four years or agony are finally rewarded, and he has the the degree Bachelor of Science conferred upon him.

In answer to the above, one might very well ask, "but is not a thorough technical training all that is required of a good engineer; and cannot a good engineer fulfill his function in life without an appreciation of literature, or music, or art?" I should say 'no', both for the engineer's sake and the sake of society. I do not mean by this that the engineering student should take a number of courses in the appreciation of art, but I do think that the fact should be impressed upon him that there are other things going on in this world besides alternating current and transient electrical phenomena.

It may possibly be that students can be taught to think by herding them into class-rooms and throwing formulas at them; it may be that it is his college course that makes the engineer; but I feel that the value of a college education lies in the close association with the worth-while men of the institution. Dr. Max Mason, President of the University of Chicago, in an address a few days ago before the convention of the Association of American Colleges, said in closing, "Let your students be hewers of wood and drawers of water to some great teacher who has a great problem on his hands—and who will share that problem. Establish for them contacts with greatness—not with routine."

Four years ago I entered the University with the intention of making engineering my life work. Today, I stand on the threshold of that work, bewildered and uncertain. I don't know whether I have chosen the wrong profession; I don't think I have; but the significant thing is that while at Wisconsin, nothing has happened to stimulate or encourage my interest in engineering work; there has been nothing that inspired me; nothing but formulas, the substitution in an endless number of formulas.



ON GUARD!

Out in mid-rink, flying skates cut the glassy surface of the ice into powder amid the clatter of sticks and the hoarse, inarticulate cries of human beings in combat. Back and forth goes the puck, now dexterously propelled down the side-lines by a fleet forward, now shuttled rapidly to and fro amid a tangled mass of sticks and legs. Yet fast as it moves, it never eludes the watchful eyes of the two heavily-armored huskies who tend the goals. On guard, ready to thwart disaster with stick, skates, or any part of his body, the good "goalie's" work is ever vital, and often spectacular.

In a large organization like Westinghouse, there is need for a number of such expert "goal tenders." Occupying positions in the Accounting, Legal and Contract Departments, they carry on quietly their important work of guarding the resources, patent situations, and contractual relationships of the company. And among them may be found many younger college men, like those whose pictures appear on this page, who have found in this work an opportunity to secure recognition and worthwhile reward.

S. F. HENDERSON
Armour Institute of Technology, 1926
Contract Administration

E. H. HORNBARGER
Virginia Polytechnic Institute, 1921
Contract Administration

G. C. SALTZMAN
Carnegie Institute of Technology, 1923
Patent Department

W. F. SWEZEY
University of Kansas, 1923
Patent Department

Among the important pieces of electrical work handled by Westinghouse in recent years may be mentioned the following:

Cascade Tunnel Electrification, Great Northern Railway; Network Protector Installation, Chrysler Bldg., New York; Hydro-Electric Generating Equipment, Coolidge Dam, Arizona.

Westinghouse

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