

The
SHAMROCK

COLLEGE OF ENGINEERING . . . UNIVERSITY OF MISSOURI



NOVEMBER, 1936



**Predicting Osage
River Flow**



**Solvent Extraction of
Lubricating Oils**



Football Under Faurot



**New Engineering
Laboratories Building**



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Editorial

At the last meeting of the Engineers' Club this spring, an amendment to the club constitution, whereby the Shamrock staff offices were to become appointive rather than elective, was proposed and carried. Two reasons were responsible for the proposal of the amendment. One was the fact that, by careful "politicing," a person desirous of campus honors could be elected to a position of importance on the Shamrock staff regardless of his experience or past performance in Shamrock work. The other reason was the lack of continuity in the personnel of the Shamrock—a condition under which only a small percentage of a newly-elected staff had enough experience to qualify them for their positions. To eliminate such conditions a Board of Publications was appointed under the adopted amendment.

The functions of the Board are those of advice and assistance to the editorial staff in matters of general policy, in business and finance, and in the selection and preparation of material for publication. At the end of this, and of succeeding school years, the Board will appoint the Shamrock staff for the coming year, appointments being based upon recommendations given by the retiring staff. The recommendations of the retiring staff will depend wholly upon the amount and quality of work done by the candidate and upon the candidate's personal traits.

To you who are interested in attaining positions on the Shamrock staff for next year: The constitutional amendment referred to above expressly provides that the amount and quality of work done by the candidate and the personal traits displayed by him in performing his work shall be the sole criteria by which selections will be made. Now is the time to begin the favorable fulfillment of the criteria. At the September 22 meeting of the Engineers' Club, approximately fifty men signed cards, each signifying his interest in and desire for doing Shamrock work. Of that number, about a dozen men assisted in the work on this first issue. These men were probably the ones most interested, because they have given some splendid assistance to the staff. What has happened to the thirty-eight of you who remain? Your help on the next issue will be of value to us, but it will be of even greater value to you. You will realize the value of cooperation and will gain experience in writing, interviewing, searching for information, and in other things which may prove to be of inestimable worth to you in later years.

THE SHAMROCK

COLLEGE OF ENGINEERING
UNIVERSITY OF MISSOURI

NOVEMBER, 1936

Volume 4

Number 1

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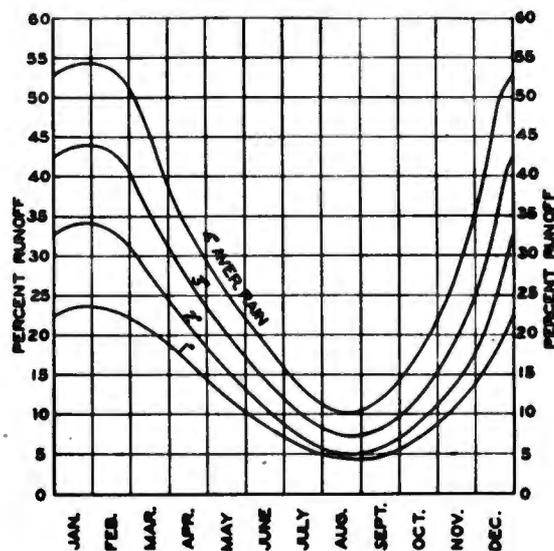
Predicting Osage River Flow

River Flow Prediction Important in Bagnell Dam Control

By G. J. Vencill

THE prediction of flows to be expected in the Osage River and its tributaries is a very important part of the operation of the Osage plant of the Union Electric Light and Power Co. This plant is located near Bagnell, Missouri, the power generated being practically all transmitted to the St. Louis area. The dam impounds a large reservoir in which waters are stored and used as needed. If water flows into the reservoir faster than it can be used the water level will rise, and when it reaches the maximum elevation, the flood gates must be opened and water passed on downstream as fast as it enters the reservoir. This excess water is lost and cannot be used for generating energy. Thus it is seen that the forecasting flow is not a theoretical problem but one of real practical importance. If it is known several days in advance that river flow will be in excess of plant capacity, water can be used from the reservoir to make more room for that coming in, thus saving water which would otherwise need to be wasted. Substantial savings are possible by careful operation.

In order to have information from which to make these predictions, the 14,000 square mile drainage area of the Osage River above the dam is divided into several subdivisions, the runoff from each of which is measured by a gaging station. Among these are the Sac River basin with a gage at Stockton, the Pomme de Terre River with a gage at Hermitage, the South Grand River with a gage at



Mr. Vencill received his B. S. in Eng. (E.E.) from the University of Missouri in 1931. He is now employed in the Hydraulic Department of the Union Electric Light and Power Co. in St. Louis.

Brownington, the Niangua River with a gage near Decaturville, and gages along the main river at Osceola, Schell City, and Trading Post. When the rivers are above a certain stage, observers at these stations report the gage reading to the engineers at the dam twice a day. There are also twenty-one stations from which rainfall reports are received, either through the United States Weather Bureau or by direct arrangements with observers.

Every morning shortly after nine o'clock an engineer in the St. Louis office telephones the St. Louis office of the Weather Bureau and receives reports of rainfall during the previous four hours and the weather forecast for the next day. At nine-thirty an engineer at the Osage plant telephones in and relays the reports of rainfall and river stages that he has received directly from the observers, and also receives the

data which the St. Louis office has. If rain has fallen the first question is, "What will the river flow into the reservoir be tomorrow, the next day, and several days after that?"

The first step in making a forecast is to determine how much the total runoff from the rain will be. As will be seen from the accompanying curves, the per cent of the rain which runs off into the streams is quite variable. It is least in the summer when the weather is hot, evaporation is high, and when vegetation absorbs large quantities of water. In the winter when the ground is frozen and there is no demand for vegetation, the per cent runoff is highest. Over a long period of years less than fourth of the water which falls in the Osage watershed flows past the dam, the remainder being lost by evaporation and transpiration. Thus we see

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Solvent Extraction of Lubricating Oils

By Richard Holsten

THERE is perhaps no industry in the world today which suffers more from radically changing methods and types of equipment than the oil refining industry. Many units and much equipment installed from five to ten years ago in oil refineries are now being removed, not because they are worn out but because they have become obsolete. New processes are constantly being developed and the old must make way for the new.

Outstanding among these new processes is the extraction of lubricating oil from crude oil through the use of selective solvents. This process has been known for only seven years and has become important commercially since 1934. Up until 1934 only eight solvent plants had been constructed, but during that year thirteen more were added having aggregate daily capacity of 30,000 barrels of finished lubricating oil.

Until recent years, the refining of lubricating oils was a more or less conventionalized process; that is, the crude stock was treated with

large quantities of sulfuric acid, then washed with caustic soda, and finally redistilled, usually under vacuum. Much oil was lost in the process. The quality of the finished oil depended almost entirely upon the type of crude oil used. Since a superior grade of crude oil was prevalent in the eastern states, the eastern oil producer received a much better price for his crude oil than the western producer, although oil was found in much greater quantities in the western states. As a consequence, the western oil companies developed the solvent process for refining lubricating oils, thereby placing the western crude on an almost equal footing with the eastern oils.

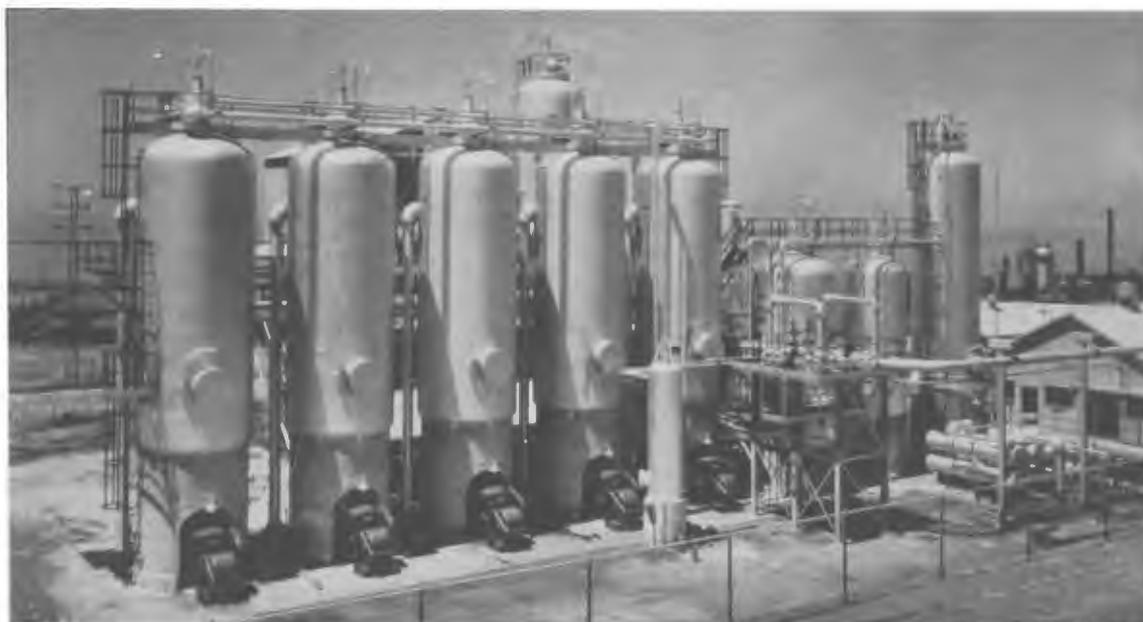
Recent radical changes in automobile designs, such as higher motor temperatures and compression ratios, more severe bearing service, and greater engine speeds, have demanded a lubricating oil of higher quality. The oil must have a higher viscosity index, higher resistance to oxidation, and lower carbon-forming tendencies. Such

an oil can be produced by the solvent process.

In order to produce the required qualities in a lubricating oil, certain undesirable compounds must be removed from the crude. Wax must be removed in order to obtain good flow characteristics at low temperatures. Asphalt is particularly undesirable because of its carbon-forming tendencies. Likewise, naphthenic compounds create a low resistance to oxidation and lower the viscosity index. These three substances are the most annoying compounds found in most crudes, although there are several others which will not be mentioned in this article. Solvent refining has proved to be the most efficient method of removing these impurities from oil.

The principle of solvent refining is very simple. A brief summary of the mechanism of the process is given in the March, 1936, issue of *The Oil and Gas Journal*. Quoting, "To a raw lubricating stock containing both paraffinic and

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Courtesy Industrial and Engineering Chemistry

Propane Plant of the Union Oil Co., at Oleum, Calif.

FOOTBALL UNDER FAUROT

By Howard Burnside

In the fall of '24 Missouri boasted one of the best football teams in the middle west. A team of hard-playing, fighting men made football history for M. U. that year. Fans of the pigskin pastime watched the Tiger eleven go through a successful season and and crown it with a post-season game on the west coast. The same ardent followers saw a wiry, well-built Tiger fullback pass, kick, and run through a glorious senior year, not realizing that this man would re-enter the football picture at Missouri University within the next decade.

Ten years later, in 1934, Don Faurot, who played that fullback position, returned to Missouri to serve the team in the capacity of head coach. During the intervening years, Mr. Faurot was not idle. He gathered nine years experience as a coach, the last four of which were at Kirksville Teachers College. For these four years, Coach Faurot had only one defeat chalked against him, and that defeat came when he was still new at the College. Under the tutelage of Don Faurot, the Kirksville teams won twenty-six games without a tie or defeat. This is indeed an enviable record for the coach and the teams.

By studying the relations between the coach and the team and reviewing the teams of a few years past, it is possible to clear up the picture of football at Missouri University and to account for the build-up of the 1936 team. In the spring of '35 the football situation at Missouri was a dismal problem. For three years box-scores had been top heavy in favor of the other teams, the moral of the team was low, and the students were rapidly losing all interest in their athletes. Don Faurot took over the duties of mentor at this low-ebb point.

The spring months saw many changes, both physical and mental, in the gradual development of the squad. The varsity and freshman players who reported for this spring practice were being introduced to a new coach and to a new system of play. In the years before, the men learned their football from Frank Carideo, former star of Notre Dame. Carideo taught the



Notre Dame system, recognized most readily by the distinctly different backfield shift. With only a few spring months in which to work, Coach Faurot was faced with the problem of teaching and familiarizing the single and double wing formations and the team shift into the line. The single or double wing formation is identified with the use of one or two backfield men to flank the line. All of the one hundred who composed the spring squad took an interest in their coach and his style of play. Their interest created a new attitude between coach and players. The squad drilled enthusiastically and became patient and determined in their work.

Many long hours were spent in signal and formation drill, one of the most grueling and monotonous exercises that active football players must go through. The spirit of the team spread through the University and by the end of the spring semester, football prospects for the fall season were hailed as the brightest in many years.

Missouri fans greeted the team last fall as the "New Deal" combination that was to raise football spirit in Tiger Town from the depths. New uniforms were purchased and the drab black jerseys of the previous years were discarded. A "New Deal" team met William Jewell College in the first game of the season and won by the lopsided score of 39-0. By defeating Colorado two weeks later, Missouri won its first major victory since the Tigers upset Oklahoma at Norman in 1931. The remaining games of the season included three ties and three defeats, a record which many students and alumni received with disappointment. The New Deal spirit was said to have been based on an overabundance of unfounded confidence. These followers failed to observe, however, that several of these six games were moral victories for a fighting Missouri team. In the game with Washington University at St. Louis, the Bears were out-gained, out-played, and defeated in every department of the game but scoring. Likewise, the Kansas U. game last Thanksgiving Day which ended in a scoreless tie was a moral victory for the Tigers. A good passing attack throughout the season kept rival teams constantly on the alert. Well executed reverse plays and tricky lateral passes worked consistently while strong defensive line play was a feature of every game. Coach Faurot substituted players liberally

(Continued on Page 12)

New Engineering Laboratories Building

By Leonard Gettinger

STUDENTS returning to Columbia this fall were quick to note the great progress that has been made in the University's construction program, the total cost of which will aggregate nearly \$1,200,000. Those who visited the campus for the first time were perhaps conscious of the fact that a great change was being made, but a full realization of the extent of the changes involved came only to those who were familiar with the campus of a year ago. Work on the library wing, Student Health Center, Educational building, Wild Life building, Home Economics building, and Walter

outlets are so arranged that class rooms may be turned into laboratories, and vice versa, with a minimum of effort, as future developments may require.

The three-story unit contains numerous classrooms, offices, research laboratories, and seminar rooms. New quarters for the engineering library have been provided on the third floor at the north end. Plans for the steel stacks have been completed and it is expected that the books will be moved to their new location during the Christmas holidays.

The one-story unit contains three main laboratories, similar in size and shape, devoted to mechanical, chemical, and electrical work. Construction throughout has been such as to furnish the utmost in convenience and to provide for future expansion as additional equipment is acquired, and as increased enrollment may demand. Each of the main laboratories is provided with a gallery on three sides, from which visitors may observe the students at work.



View of the New Building from the North

Williams Hall (the new Journalism building) is proceeding rapidly. All construction work on the new Engineering Laboratory building has been completed, and attention is being directed to the task of re-equipping the various laboratories which it houses.

This new building is located directly behind the Engineering building on the site of the old Engineering Annex, which was razed to provide room for the modern structure. It consists of a three-story unit, which is joined to the old building by connecting corridors on each floor level, and a one-story unit connected directly with the other unit on one side, and joined with the Civil Engineering laboratory on the south end. The new structure is 195 feet wide, with the three-story section 50 feet deep, and the one-story section 90 feet deep.

Modern glare-proof lighting is used throughout, and many unusual design features are incorporated in both units. Water, gas, compressed air, and electric



Looking Down on One of the Laboratories from a Gallery

The chemical engineering laboratory occupies the south end of the one-story unit, adjoining the civil engineering laboratory. Two sub-floor "rooms", each sixteen feet long, eight feet wide, and eight feet deep, near the center of the main laboratory, will provide ample space for tall equipment requiring a great deal of vertical head room. The work of moving the old equipment from its former location in the old chemistry building is well under way. Laboratory work will be resumed very shortly after the steam supply for the laboratories is installed.

(Continued on Page 13)

Opportunity and Challenge

Dean F. Ellis Johnson



F. ELLIS JOHNSON
Dean of the College of Engineering

A new college opens with all its opportunities and challenge!

Just a year ago we destroyed the old laboratory annex and began building the new Engineering Laboratories Building. Last year was a year of beginning—this year should be one of active constructive work for us all.

Now we are housed in our new Engineering Laboratories Building, and probably every student in engineering as well as every alumnus who enters this building share in pride and happiness these excellent new quarters. Probably the increased enrollment reflects in part satisfaction and confidence in the program of development in the College of Engineering of which the building is a physical evidence. The freshman class is 76.5 per cent larger than a year ago.

We have important additions to our faculty. Mr. Ralph H. Sogard, a graduate of the University of Wisconsin in mechanical engineering, with his professional degree of Mechanical Engineer from the same institution, has had several years excellent practical professional experience and comes to us as

Instructor in Mechanical Engineering.

Mr. R. B. Vaile, Jr., graduate in electrical engineering from California Institute of Technology, with his Ph.D. also from "Cal. Tech.", with five years valuable experience with the General Electric Company, comes to us from the staff of Iowa State College to be Instructor in Electrical Engineering.

Mr. J. A. Logan, graduate in civil engineering from the University of Saskatchewan, with an M.S. in Sanitary Engineering from Harvard from the consulting engineering firm now in charge of the design and construction of the new sewage disposal plant for Buffalo, New York.

We begin a new year knowing that in spite of troubled conditions throughout the country that our modern civilization requires the services of engineers. We are encouraged that the actual demand for engineers is greater than for several years.

All the foregoing outlines the opportunities of the new year.

The challenge lies in the fact that for every student and instructor the same elements will be required to make this a successful year that will be required to win him success later in the world's competition. These elements are character, charm of personality, ability to serve, and the habit of generous and effective cooperation.

The success of this year and the greatness of our College of Engineering will be determined by the way you personally meet the challenge

To character development

To growth of personal charm

To scholarship—that you may later give competent service

To unselfish participation in the worthwhile, organized activities of the College.

VAILE NEW INSTRUCTOR

At the beginning of the school year many new countenances appeared throughout the Engineering buildings. Some were merely on-lookers inspecting our new laboratories; others were freshmen lost in the rush or transfer students pretending to know their way around. Still new faces were in evidence. Among these was a young distinguished-looking gentleman, whom no one seemed to recognize. This man was none other than Professor R. B. Vaile of the E. E. department, formerly at Iowa State College. Professor Vaile, a native of Illinois, left the Corn state at an early age to become a sunny Californian, living in Pasadena and later attending the California Institute of Technology, where he received his B.S. in E.E. He received a position with General Electric soon after graduation and worked in the Schenectady, New York,



R. B. VAILE

plant for five years. Returning to California Tech, Professor Vaile received his Ph.D. in E.E. His thesis was the result of research work with a high voltage voltmeter. Since obtaining his Ph.D., he has been experimenting with high voltage meters. He spent a very interesting summer at General Electric's high voltage plant in Pittsfield, Massachusetts.

AROUND THE COLUMNS

The Baird Bells

Memorial Tower is one step nearer completion through the generous gift of Mr. Charles Baird of Kansas City, chairman of the University's board of visitors. His present, a Westminster chime of five bells and an illuminated electric clock will be ready for dedication during Homecoming celebration, Thanksgiving Day, Nov. 26.

Four bells will chime each quarter hour, an hour bell will toll each hour, and both chime and hour bell will ring at 12 o'clock noon. A full chime will sound at 8 a. m., 12 a. m., and 6 p. m. The bells will be automatically silenced during the night.

The Baird Bells were cast by the Meneelley Bell Company, Watervliet, N. Y., which also made the bell in Switzer Hall. The present bell will probably be used only to announce assemblies and special occasions, but it may be added as a part of a carillon at a later date.

Upon the hour bell will be cast the Latin quotation:

"Consono campanis reliquis de culmine turris: temporis edoceo percelerem esse fugam."

The translation of the passage is, "With the other bells I ring out the chimes from the height of the tower: I publish abroad the rushing flight of time."

Mr. Baird, donor of this greatly appreciated gift, was not present at the opening convocation when the announcement was made, but it is hoped that he will be here for the formal dedication, Nov. 26.

Stadium Parking Space

Thanks to the University and the State Highway Department, the football fans who drive out to the stadium this year will not have the hazards of dust, mud, or traffic of the past years. The parking problem and the disorderly congestion that jammed the road to the stadium has finally been remedied. When the state let contracts for the construction of a new roadway for Route K, it provided that the area between the new road, which cuts through the field west of the old road, and the old road would be leveled and graveled, so it could be used as a parking space by Tiger fans.

Under the provision that the state can add or subtract 25 per cent to or from the amount of construction to be done, the originally planned parking space has been widened so that it now extends not to the outer edge of the old roadway but right up to the fence

around the stadium. This new roadway for Route K and the parking area has been leveled off and graveled thus eliminating mud puddles and dust pockets.

The handling of traffic to the St. Louis Municipal Opera by police was studied by city officials of Columbia during the summer with the plan of applying it to the traffic at football games.

All this is going to be a tremendous improvement over conditions of the past. The increased parking facilities as well as the brighter outlook for the Tiger team will be an added incentive for the alumni to return.



Scholarship Awards to Miller and Salisbury

Our congratulations to Ed Miller, Senior Chemical, who was awarded the \$100 Missouri Engineering Alumni of Chicago prize at the September meeting of the Engineers' Club. To better understand the honor associated with the prize, let us examine the qualifications demanded of Ed; they are as follows: "The candidate must have attended the Engineering College two and one-half years, must be among the first ten in his class, and must have participated creditably in one or more distinct activities." A committee of five faculty members, appointed by the President of the University, selects the three or four men best qualified to receive the prize, sends their names, together with all necessary data and the preference of the committee for first choice, to the Scholarship Governing Board of the Missouri Engineers of Chicago, where the final selection is made.

A close second to Ed Miller was

Bill Salisbury, Senior Civil, who previously has won a number of enviable honors. Bill was chosen to receive the \$50 Rollins prize, high scholarship being the most important requisite for the award.

Surveyors Gain Practice Experience

In obtaining topographic data for an assumed railroad spur line from the M-K-T tracks to the University cattle barn just south of the golf links, one of the surveying parties (from the Routes Surveys class encountered unexpected difficulties. Their territory for the complete survey runs west a distance of about 2500 feet from Providence Road at the golf links. On their second surveying trip, the owner of the property on which they were working forcefully demanded—and obtained—evacuation of the territory by the group. The men, not to be classed as quitters, returned a week later to obtain more topographic data, but alas, they were again ejected, with forceful commands of "keep away." Diplomatic tactics on the part of Professor Rubey averted a complete breach of relations; the group is again at work, two weeks behind the rest of the class. A warning to you engineers who have had no similar experience—the trespasser has practically no rights of his own. Professor Rubey is to be commended for assigning the men in his classes to projects where they will receive the most practical and varied experiences possible.

Curator's Scholarships

The following men in the Engineering College have Curator's scholarships: James Gregory Barrett, John Miles Burnum, William Curitis Case, Milton Randolph Gaebler, Carroll M. Gordon, Kenneth Junior Holloway, Charles H. Moser, Harry Bernard Pfost, Bennie Graham Philips, Lowell B. Pickett, George Samuel Roberts, Charles LeRoy Scheuerman, and James Franklin Westcott.

Stammerjohn Wins Slide-Rule

Lambert Stammerjohn was awarded a slide-rule by the Engineers' Club at the September meeting for maintaining the highest average of any freshman engineer last year. His was virtually an E average.

ALUMNI NEWS

Attention Alumni: This section of the Shamrock is distinctively yours. It is our purpose to render you a worth-while service in keeping you informed of the whereabouts and industrial pursuits of your former classmates and friends. Surely such an objective merits your whole-hearted cooperation. If your name has not appeared in past Alumni News columns, drop us a card in order that, through these columns, we may enable your engineering brethren to know of your outcome. We will appreciate having any information concerning any alumnus with whom you may be connected.

H. L. Andrews, BS in Eng. (EE) '10, is Vice-President of General Electric Co. in New York City.

Lloyd A. Eckstrom, BS in Eng. (CE) '19, is Drawing Room Engineer for the American Bridge Co. at their Ambridge, Pennsylvania, plant.

A. H. Boyd, BS in Eng. (CE) '30, is Chairman of the Department of Engineering A. and M. College at Monticello, Arkansas.

George Delaney, BS in Eng. (EE) '17, is an electrical engineer for the Pontiac Motor Co. at Pontiac, Michigan.

Carl W. Brown, BS in Eng. (CE) '10, was recently appointed Chief Engineer of the Missouri State Highway Department. Carl joined the Department in 1918, became Assistant Chief Engineer in 1922, and served in that capacity until his recent promotion.

Samuel M. Rudder, BS in Eng. (CE) '15, was recently appointed to the position of Assistant Chief Engineer of the Missouri State Highway Department to fill the vacancy caused by the promotion of Carl W. Brown to Chief Engineer.

Ewing L. Lusk, BS in Eng. (CE) '08, is principal of the New Mexico Military Institute at Roswell, New Mexico.

Oscar H. Koch, BS in Eng. (CE) '10, is a member of the firm, Koch and Fowler, Consulting Engineers in Dallas, Texas.

Jule C. Tate, BS in Eng. (CE) '29, who has been assistant engineer with the Missouri State Highway Department at Montgomery Cit, has been recently promoted to the position of Office Engineer in the St. Joseph, Missouri, division of the department.

Frederick P. Schwart, BS in Eng. (CE) '04, is Superintendent of the U. S. Soil Conservation Camp at Hayti, Missouri.

Jiles W. Haney, BS in Eng. (ME) '13, '14, and A.M. '15, is Professor and Chairman of the Department of Mechanical Engineering at the University of Nebraska at Lincoln, Nebraska.

Glen L. Dintmick, BS in Eng. (EE) '28, is author of an article in the July issue of the "Electronic" magazine concerning recent discoveries which he has made that will improve the present method of motion picture sound reproduction systems. He is now employed by the Radio Corporation of America.

George A. Sherman, BS in Eng. (CE) '18, seems to have strayed from the fold somewhat for he is president and owner of the Sherman Hat Company in St. Louis, Mo. He is also president of the Associated Millinery Industries. George, advises, however, that he is religiously applying engineering principles in the manufacture of ladies' hats.

John W. Creasey, BS in Eng. (EE) '14, is employed by the American Telephone and Telegraph Co. in St. Louis, Mo. He is the area plant supervisor.

Dwight S. Foster, BS in Eng. (EE) '16, is Engineer of Rates and Contracts for the Cities Service Gas Co. at Bartlesville, Oklahoma.

If the relative percentage of graduates placed in positions is any barometer of economic pressures, then the long-deplored "depression" may be referred to hereafter in the past tense. For there has been a greater demand for engineering graduates by industry in the past few months than for several years. The following men, grads of the class of '36, have already assumed their various duties in the industrial world for which they have long been preparing.

Joe B. Holmes (ChE) has joined the forces of the General Electric Company at Schenectady, New York.

Albert F. Pittroff (ChE) is with DuPone de Nemours Co. at Niagara Falls, New York.

Leonard Carney (ChE) has been employed by Sears-Roebuck Co. in Chicago, Illinois.

Ralph A. Elsner (CE) is with the C. A. Dieter Construction Co. at Joplin, Missouri.

Jack Terill (CE) is employed by the Missouri State Highway Department at Jefferson City, Missouri.

Carl Wilder (CE) is with the Phillips Petroleum Co. in Marshall, Texas.

Virgil H. Disney (EE) is in the employ of General Electric Co. at Bridgeport, Connecticut.

Charles W. Hall (EE) is with the Southwestern Telephone Co. in St. Louis, Missouri.

Vincent Johnson (EE) is with the Westinghouse Electric & Mfg. Co. at St. Louis Missouri.

J. W. Prewitt (EE) is in the railway sales promotion department of the Fairbanks-Morse Company in St. Louis, Missouri.

Charles Rieger (EE) is with General Electric in Detroit, Michigan.

Kenneth W. Miller, BS in Eng. (ME) '35, is assistant to the manager of the Lubrication and Industrial Department of the Shell Petroleum Corporation at St. Louis, Missouri.

William Robards (EE) is with the Minneapolis Honeywell Co. in St. Louis, Missouri.

William Sipple (EE) has a position with the A. P. Green Brick Co. at Mexico, Missouri.

Philip Watson (EE) is with General Electric at Schenectady, New York.

Noel Wightman (EE) is with Westinghouse at East Pittsburgh, Pennsylvania.

William A. Zurow (EE) is with the St. Joseph Utilities Co. at St. Joseph, Missouri.

Glenn R. Dixon (ME) is with the McKay Chevrolet Co. in Columbia, Missouri.

Joseph F. Jones (ME) is with the Purina Mills Co. at St. Louis, Missouri.

Edward Kersting (ME) is in the employ of the Carnegie Steel Company at Gary, Indiana.

Frank Minor (ME) is with the Central Missouri division of the Sinclair Refining Co.

Ray A. Rundberg (ME) is with the Proctor-Gamble Soap Co. in St. Louis, Missouri.

Donald Zuerl (ME) is with the Chance Mfg. Co. at Centralia, Missouri.

T. B. Pellmounter (ME) is continuing his engineering education at the Massachusetts Institute of Technology at Cambridge Mass.

Charles O. Huntress (ChE) is working for the Phillips Petroleum Corporation at Oklahoma City, Okla., where he is making chemical and physical tests on muds during the drilling of new wells.

David D. Moore (ChE) is employed by the Barnsdall Petroleum Co.

E. R. Begole (ChE), employed by the White Eagle Division of the Socony-Vacuum Oil Co., is engaged in soil corrosion surveys for the new pipe line to Kansas City now under construction.

C. E. Huffstetter, BS in Eng. (CE) '12, is with the U. S. Engineers Corps at Memphis, Tenn.

Wayne P. Johnson (CE) has a position with the Laclede Steel Company of St. Louis, Missouri.

George Sample (ChE) is with Proctor & Gamble Soap Co. in St. Louis, Missouri.

Bill Klingner (AE) is now junior member of the firm of McCann & Kingner, consulting engineers at Quincy, Illinois. At present, Bill is studying the effect on drainage areas which the control dams in the Missouri River will produce.

Ed Harriss (ChE) is with the Emulsion Dehydrating Co., Kilgore, Texas, which manufactures demulsifying agents for crude oil.

Robert Weimer is in the research laboratories of the Phillips Petroleum Corp. Bartlesville, Okla.

Edward Ray (ChE) is working for the Hanlon-Waters Co., Tulsa, Okla., manufacturers of control instruments and other equipment for the petroleum industry.

Reid Parker is an assistant in the Department of Chemistry and Chemical Engineering, School of Mines, Rolla, Missouri.

Paul Ogden (ME) is doing general engineering work with the Phillips Petroleum Co. of Bartlesville, Oklahoma.

Thomas P. Halley, BS in Eng. (CE) '21, is District Manager of the Southwestern Telephone Co. at St. Louis, Missouri.

PREDICTING OSAGE FLOW

(Continued from Page 4)

that in estimating the runoff from a given rain, account must be taken of the season of the year, temperature, size of the rain, and condition of vegetation and soil. By considering all these factors a fairly close result may be obtained. Knowing the rainfall at the various stations and estimating the per cent runoff from previous experience, it is a simple matter to calculate the quantity of water which will be realized from the area surrounding each station. The total for each subdivision is obtained by adding the individual totals in that area.

For forecasting river flow the "unit graph" method is used. Each subdivision of the drainage has its own characteristics of runoff which have been fairly well determined

from past records. For instance, if a certain amount of runoff is expected from a given rain on the Pomme de Terre River basin, the stage at Hermitage can be expected to reach a crest on the day following the rain and the water will be about half the total runoff. Practically all the water will have passed by the fourth or fifth day. On the South Grand River the crest at Brownington will not be reached until the fourth day after the rain and the flow will amount to only about one-fourth of the total runoff, taking six or seven days to run out. Using these known runoff characteristics, the flow to be expected at each gaging station is estimated several days in advance. Then all these estimates are combined, making allowance for the time required for the water to flow from each station to the dam. In this way an estimate of the daily flow is arrived at within a short time after the rainfall reports are received. The next morning when river stage reports are received from the various gages, they are compared with the prediction made the day before and any refinements which are indicated are made in the final estimate. It often happens that additional rains are reported the following morning and the effect of these must be added to the original estimate in order to obtain the final result.

The situation most difficult to predict because of the time element is that in which rain falls in the immediate vicinity of the dam. In this case the effect of the rain is noted on the reservoir elevation almost before the rainfall can be measured and reported. With this exception, the results of this method are fairly accurate—surprisingly so when the numerous varying factors are considered.

More detailed articles on this subject have been published by Albion Davis in the February, 1936, Bulletin of the American Meteorological Society, and by H. H. Jost, Jr., in the Union Electric Magazine for May, 1936.

ORGANIZATIONS

Engineer's Club

The Engineers Club held their first meeting September 30. President Max Vaughn introduced the officers of the club and the heads of the various Engineering societies and honor organizations; each gave a brief summary of the purpose of his organization. Professor Weinbach continued with an entertaining talk expounding the virtues of the electrical engineering field. The meeting was adjourned to the Civil Engineering Laboratory, where refreshments were served. Professor Scorah took the stand in refutation of Professor Weinbach's remarks, and upheld the mechanicals. Professor LaRue and the new electrical instructor, Mr. Vaile, were also drawn into the fray to defend their respective departments. The feud will be continued next meeting.

A. S. M. E.

The first meeting of A.S.M.E. on September 22 was a get-together meeting at which Honorary Chairman J. A. Wharton, Chairman Joe Martin, and Vice Chairman Charles Wanner gave talks.

A special meeting of A.S.M.E. was called October 2. Professor Haney of the University of Nebraska, the honored guest, told of his trip through Old Mexico and presented moving pictures of his journey.

Tau Beta Pi

Within the next two weeks, from ten to twelve members of the Senior class of the College of Engineering will be invited to wear the Bent of Tau Beta Pi. These men have earned this distinguishing honor by maintaining a high standard of academic work throughout the four years of their college career and by impressing their fellow students with their sincere interest in engineering, their honesty, their cooperative spirit, and their per-

severance in all of their activities.

To the Freshmen, Sophomores, and Juniors of the College of Engineering Tau Beta Pi extends the invitation to try for the right to wear the bent.

A. S. C. E.

October 8, the first meeting of the school year was held at Professor H. K. Rubey's apartment, with twenty members, including Professors Rubey, Larue, Moorman, and Wood, present. General plans for the future school year were discussed. Plans for encouraging freshmen and sophomores to become members of the organization were formulated. Preparations for a trip to St. Louis as guests of the St. Louis chapter of A. S. C. E. ensued. It was decided to have two meetings per month, one meeting to consist of a luncheon and a business meeting, and another to provide a time for demonstrations, illustrated talks, and other forms of entertainment. It was decided to retain the present rate of dues which is seventy-five cents per semester.

Chi Epsilon

Chi Epsilon held its first meeting of the year September 30, 1936. The new officers officiated.

The business brought up included a discussion of the policies of the chapter for the current year and consideration of a petition from the University of Mississippi for a student chapter there. It was also suggested that Chi Epsilon promote industrial tours on the part of the student chapter of A. S. C. E.

A. S. A. E.

At the first meeting of the year, Wilmo Junnilla, graduate student of the University of Minnesota, gave a talk on the advantages of Deisel power over gasoline power for farm contracting jobs. Following the talk Professor J. C. Wooley

suggested a further discussion of this question later in the year. It seems to have economic possibilities.

The club plans to hold a speech contest this year similar to the one held last year. A prize will be given to the Junior or Senior who delivers the best talk on any subject of common interest to the club.

A. I. Ch. E.

Election of officers for the American Institute of Chemical Engineers was held Thursday night in the engineering laboratories building. Officers for this year are: president, Herman Boucher; vice-president, William Farris; secretary, Howard Burnside; and treasurer, John Landfried.

FOOTBALL UNDER FAUROT

(Continued from Page 6)

throughout the season, and at times even sent in entirely new teams.

To predict the outcome of Missouri's place in the Big Six this year would be a puzzling problem because conclusions drawn from games thus far played conflict and lead to no definite answer. The annual Freshman-Varsity tilt at the beginning of the season proved neither the strength nor the weakness of the team. A week later the Tigers defeated Cape Girardeau by a 20-0 score, but this score indicates a better state of affairs than actually existed. The defensive play was fair while the offensive thrusts clicked up to standard only in the third quarter. Conclusions from this game would be that the Tigers have a fair defense and a weak offense. On the other hand the Missouri squad entered the Kansas State game a week later as the underdogs and drew a 7-7 tie. The lone Tiger score came on a long run, resulting from a well executed play, while Kansas scored in the later part of the fourth period on a short plunge. This is indicative of good team play both offensively and defensively.

THRU THE TRANSIT

By Herb Shieber

We finally had a chance to satisfy our curiosity as to just what you see when you look through a transit. One up and coming surveyor had just finished sighting on a point and called us over to check his reading. We agreed that the telescope was focused accurately. We could almost see what she was saying.

* * *

Which brings to mind the fact that since the new labs were added, we've been seeing a lot of the other sex in our sacred building. They clutter up the halls; except to get out the front door first; use the bulletin boards as mirrors; and they don't even keep to the inside rail on the steps. Are we men or are we mice? How long must we stand this disgrace? They'll be getting in our classes soon. In fact, we are informed that one has already permeated into the surveying and drawing classes. What internal fortitude she must have!

* * *

Since the barristers are offering no competition lately, it seems that the Engineering School itself has broken up into two factions, namely—the mechanicals and the electricals, with Profs. Scolah and Weinbach, respectively, as the standard bearers. Take your choice, men—if you call that a choice—and let the best side win.

* * *

And who said anything about engineers never getting rich? Just the other day we heard of an engineer who died in Colorado, leaving a fortune of \$30,000. It is true, however, that this sum was amassed only by his unceasing toil, superhuman perseverance, and remarkable ingenuity,—and the death of an uncle who left him \$29,995.

* * *

Here's one we actually overheard at the military stables. The student officer was reproaching a timid

looking soul for his fear of horses.

"What are you so afraid of?" he asked, "Falling off a horse is nothing to worry about."

"Yeah," said the meek one, "but it sure plays hell with you when you land."

* * *

And this one we wont vouch for. We weren't told this, we only heard. But someone reported what his girl friend said about us. "You can always tell an engineer," she said, "but you can't tell him much." Now, is that nice?

ENGINEERING LABORATORIES COMPLETED

(Continued from Page 7)

The mechanical laboratory occupies the center of the unit. A steel "deck" on a level with the gallery, and connected to it on one side, has been constructed near the center of the laboratory, to provide mounting space for overhead equipment. A great deal of the old equipment, which was housed in the basement of the engineering building, has been moved into the new space.

The electrical laboratory, located in the north end of the building, is being re-equipped rapidly. Much of the equipment is in place, and the work of wiring the control panel is proceeding.

The valves and piping for the laboratory steam supply are being fabricated at the factory, so that they may be installed with a minimum of labor. The first shipment has already arrived, and more are on the way. It is expected that the work of installation will be completed at such a time so that each of the laboratories will be in operation, in part at least, by December. The outlets for steam, water, and gas are arranged so that additional equipment may be readily installed without alterations or major additions to the present network.

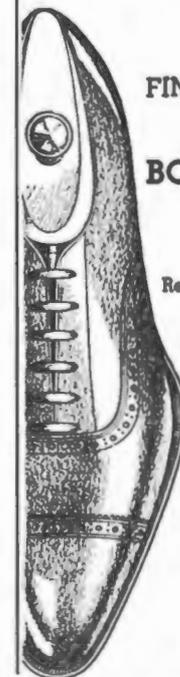
By connecting the new laboratories with the present Engineering building, the Civil Engineering laboratory, and the Mechanics Arts building, the College of Engineering now has the largest single unit on the campus, from the standpoint of ground space.

According to Dean F. Ellis Johnson, the actual per capita facilities for engineering students at the University of Missouri will be on a par with, and in many instances, excel, those of leading engineering schools of the country.

These improvements in buildings and equipment will undoubtedly be reflected in the improved quality of the work done by the students.

L. R. Liles, BS in Eng. (ChE) '28, is in the employ of the Goodrich Rubber Company in Akron, Ohio.

Leroy S. Palmer, BS in Eng. (ChE) '09, is now Professor of Biochemistry at the University of Minnesota in Minneapolis.



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SOLVENT EXTRACTING OF LUBRICATING OILS

(Continued from Page 5)

nonparaffinic compounds, a solvent known to be selective for the compounds to be rejected is added. The first increment of solvent added will dissolve in both of the compounds in accordance with the laws of solubility, but as more solvent is added, a point will be reached where two phases are formed. One phase will contain the desired components along with most of the solvent, while the other fraction will contain the components to be rejected."

A wide variety of selective solvents are now used in these extraction processes, employing usually a single solvent, but, in a few cases, two solvent phases, either completely or partially miscible. Chief among these are the following: propane, furfural, "Selecto," and sulfur dioxide. Propane, a light hydrocarbon obtained from refinery gases, is perhaps the most popular and widely used of this group. It is cheap and has excellent qualities as a selective solvent in the extraction of asphaltic and wax constituents. It is non-toxic, non-corrosive, very stable and can be used as a refrigerant for the complete removal of wax. "Selecto" is a coal tar derivative consisting of about 3 per cent cresylic acid and

the remainder phenol. It is not as cheap as propane and, therefore, is not as popular. Furfural is obtained commercially by digesting oat hulls with sulfuric acid.

The process of extraction may be carried out by three general methods. The first is single-contact extraction which considerably decreases the amount of solvent required but produces a relatively low yield of oil. The third is countercurrent extraction in which the oil and solvent flow countercurrent to each other, usually in a packed column. This method is obviously the most efficient, because it produces a greater yield of oil per amount of solvent used and it is a continuous process.

The following is a description of the propane process which is the simplest and most widely used of the solvent processes. Propane from a storage tank is mixed with the crude oil charge in the ratio of four volumes to one. The solution then enters the asphalt settlers where the asphalt, together with some dissolved propane, settles continuously by gravity. This fluid asphalt solution is drawn off from the bottom of the settlers, washed with fresh propane, and fed into the de-propanizing still. The vaporized propane is condensed and returned to the propane storage tank.

The de-asphaltized solution from the top of the asphalt settlers flows through an exhaust steam preheater to a flash chamber where sufficient propane is removed to reduce the propane to a ratio of two to one by volume. The vaporized propane is again condensed and returned to the storage tank. The solution is then water cooled to about 100 degrees Fahrenheit and pumped alternately to each of three chillers where it is chilled by self-evaporation to about -40 degrees Fahrenheit. Wax is precipitated from the solution at this temperature. The propane, acting as the refrigerant, is again condensed and returned to the storage tank. Cold propane is constantly added to the chillers to replace the vaporized propane and to keep the chilled solution ratio at two volumes of propane to one volume of oil. The chilled solution is then transferred to the filter surge tanks from where it is pumped to a series of filters. The filters remove the precipitated wax from the solution.

The dewaxed solution is then pumped into a de-propanizing still where about 95 per cent of the propane is removed at high pressure. This propane is also condensed and returned to the storage tank. The wax solution is also de-propanized in a similar manner.

The propane method is especially efficient in that very little propane is lost in the process, most of it being recovered, recondensed, and reused. Pure propane boils at about -44 degrees Fahrenheit at atmospheric pressure, making it a very simple task to separate it from the products of the process. Because of its high volatility, it makes an excellent refrigerant, thus eliminating the necessity of an artificial refrigerant.

Another interesting feature of the propane extraction process is the various types of filters used. The Shell Corporation installed a large number of continuous filters in their plant at Wood River, Illinois, recently. The filters consist essentially of rotating drums (Oliver Type) covered with filter cloth and partially immersed in the propane oil and wax mixture. A large cylindrical shell encloses the drum and acts as a pan to hold the solutions. The drum rotates at a speed of about one revolution per five minutes and with a pressure differential across the drum of about four pounds per square inch. The chilled liquid is kept at a constant level of about thirty or fifty per cent submergence. As the drum rotates, the pressure forces the liquid through the filter cloth, depositing the wax on the cloth. This wax cake then emerges into the vapor space where it is dried and finally reaches a scraper at the extreme limit of the revolution where it is removed from the cloth. The wax then drops into a screw conveyor and passes out of the filter. Suction pumps remove the oil-propane solution from the center of the drum.

Doc Scolah: "I'm dismissing class early today. Please go out quietly so as not to wake the other classes."

Prof: "Quit passing those notes."

Student in rear of class: "These aren't notes, we're playing bridge."

Prof: "Oh, pardon me!"

III. Technograph

The Congressman's wife sat up in bed, a startled look on her face. "Jim," whispered, "there's a robber in the house."

"Impossible," was her husband's sleepy reply. "In the Senate, yes, but the House, never."

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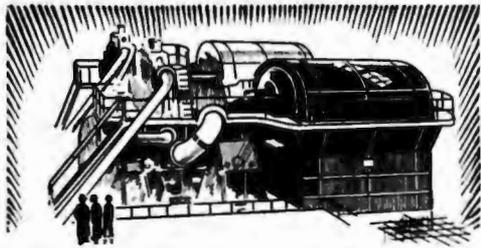
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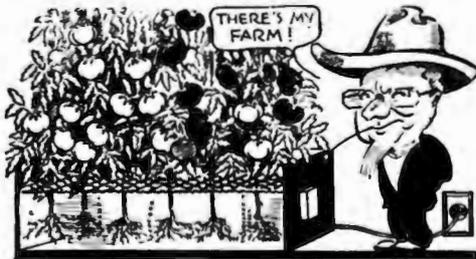
BIGGER AND BETTER TURBINES

The new 110,000-kilowatt turbine-generator, built by General Electric and recently placed in service in the River Rouge plant of the Ford Motor Company, sets several new records in turbine construction.

It is the first large unit in the world to operate at 1200 pounds pressure and at 900 Fahrenheit. Although the weight is approximately 2,000,000 pounds, it is so compact that it occupies less than a cubic foot for each kilowatt of output. Because of its extremely high efficiency, less than a pound of coal is needed to generate a kilowatt-hour of electric energy.

The new turbine is a vertical compound machine with the high-pressure turbine and generator mounted directly above the low-pressure unit. Superheated steam enters the upper unit at 12 pounds and 900 degrees. After producing 55,000 kilowatts, the steam flows directly into the low-pressure unit where it produces another 55,000 kilowatts before it is exhausted to the condenser. This is the first 1200-pound turbine in which the steam enters the low-pressure stage without reheating.

The work of designing, constructing, testing, and installing great turbines, such as this, is the accomplishment of hundreds of graduates of technical colleges and universities—men who are also graduates of the G-E Test.



ELECTRIC HEAT FOR SOILLESS GARDENS

California nurserymen are growing tomatoes, strawberries, and sweet peas in chemically treated water

heated by electricity. The method, developed by Dr. W. F. Gericke, of the University of California, has been extended to commercial installations. Tomato plants, grown in this way, produced unusually high-quality tomatoes. The yield was large, and they matured ahead of tomatoes grown in soil. Nourishment for the plants is provided by special chemicals dissolved in the water. Because the water temperature must be accurately maintained, a controllable heat source is required, and General Electric engineers have supplied heating cable and thermostats both for the experimental installation and for commercial installations which have followed.



COFFIN FELLOWSHIPS

This fall eight young men will be carrying on advanced research in seven American universities under fellowship grants from the Charles A. Coffin Foundation. The recipients and their research problems:

George E. Boyd, U. of Chicago '33. At Chicago. Study of surface energies.

Lyman R. Fink, U. of California '33. At California. Phenomena in synchronous machines. Second grant of fellowship.

Alvin H. Howell, U. of Kansas '29. At M.I.T. Insulation problems in d-c transmission.

Russell A. Nielsen, Stanford '33. At Stanford. Electron mobilities.

Richard W. Porter, U. of Kansas '34. At Yale. Transients in the monocyclic network. Second grant.

Julian S. Schwinger, Columbia '36. At Columbia. Theoretical investigations in nuclear physics.

Chauncey Starr, R.P.I. '32. At Harvard. The pressure coefficient of thermal conductivity. Second grant.

Harold G. Vogt, U. of Buffalo '31. At Harvard. The nature of the neutron.

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Missouri Secondary Road Experiments ● Eclipse Hunting in Soviet Russia
Canalization of the Upper Mississippi River

DECEMBER 1936

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O			To B ^{1.6}	Read W _h = ans.

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$$P_m = p_1 \frac{1 + \log_e R}{R}$$

C	Set indeq	Read log _e R	Set R	Indicator to p ₁
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The Engineer's Friend

Editorial

Upon entering our Engineering College, a freshman is undoubtedly amazed and perplexed at the scope of fields in which he may give vent to his energy, even though his scholastic curriculum may be largely predetermined. He may devote a majority of his time to scholastic work or he may devote a majority of it to fraternity life, with its attendant social activities, to athletics, to student leadership, to journalistic endeavors, to work, or to any of a number of other activities, each of which may possess decided values for the participant.

Sooner or later, the student may find himself engaged either in a number of activities—scholastic work included—so numerous as to dissipate his energies, or in but one or two activities, a situation in which a certain narrowness is fostered. There is a happy medium in which the activities engaged in by the student are of such number, diversity, and the relative importance that the fullest enjoyments and benefits from college life may result. The question immediately follows, how may such a happy medium be attained? Even the most brilliant student can easily be bewildered by the somewhat unorganized methods in which various non-scholastic activities are first presented to him. To whom must he turn for advice regarding these activities or does he turn to anyone for advice?

Undoubtedly, great strides have been taken in the introduction and orientation of the freshman engineer in our College. The professors as a group, even though their schedules are quite crowded, seem to be devoting increased time to the cause of the freshman. The Dean's conferences are designed to familiarize them with the life in the University, and undoubtedly are doing much good. Yet something is lacking—is it the personal touch which can result from a student-to-student relation? Orientation by group methods is undoubtedly too cold a procedure, yet the "big brother" system may create too great a reflection of the big brother's character in his protege. Surely, some scheme can be effected whereby each new student may be able to consider two or three understanding upperclassmen, as his own particular group, from whom he may seek advice on any phase of his college life.

Advisory student groups should be composed of men who rank high scholastically and who have shown, in their activities on the campus, their interest in and familiarity with activities which go to make up the fullest college life. Where may we find men better fitted for this work than in our honorary engineering fraternities?

THE SHAMROCK

COLLEGE OF ENGINEERING
UNIVERSITY OF MISSOURI

DECEMBER, 1936

Volume 4

Number 2

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Missouri Secondary Road Experiments

Earth Subgrade of Feeder Roads Is Stabilized

By F. V. REAGEL

Engineer of Materials, Missouri State Highway Department

During the past decade, large mileages of medium and high type surfaces have been constructed on the most important roads in this country, serving as a skeleton system upon which traffic can move from one population center to another without much inconvenience. With this outlet to traffic available, the natural consequence is an increasing demand for feeder roads to bring traffic to the main system and for the local or so-called farm-to-market highways.

Mileage of this type is extremely large as compared to that of the primary system and consequently funds available are considerably diluted. This situation accounts, in a large measure, for the present wave of interest in low-cost construction and soil stabilization as a particular phase of the problem.

With the inception of our highway program in Missouri, we found ourselves with a large mileage of earth roads to be improved. Expense would not permit nor immediate traffic justify the construction of high-type surfaces on secondary roads. Consequently a large mileage of traffic-bound crushed-stone and gravel roads were built to supply the demand for all-weather surfacing.

A number of trial installations of oil-mat surfacing on well-established bases provided a sample of surfacing free from the hazards and inconvenience of the floating type surfacing. When a

Mr. Reagel is a graduate of Illinois College and of the University of Illinois. He has been with the Missouri State Highway Department fourteen years and now supervises the inspection of materials and research work. He is intensely interested in the solution of research problems from the standpoint of the chemist.

considerable mileage of this new type surface was placed on relatively stable gravel surfaces as a base, however, we soon discovered that, while a gravel mat can carry traffic and remain stable as a surface if the underlying moisture is free to come up through the surface and evaporate, the same mat when blanketed with a moisture-tight surface was no longer uniformly stable. It was then necessary either to improve the base support or to add additional layers of the mat surface to provide the desired support by spreading the load over otherwise insufficient base support. The former seemed the less expensive and was therefore adopted.

Our conception of the differences between base and surface is that bases are simply additional thicknesses protected against reduction in thickness from traffic action by means of an additional layer (the surface) designed to resist the abrasive action of traffic. The protecting layers so far devised are in general more

expensive than the bases, thickness for thickness. If we are correct in our assumption that a durable water-proofed thickness of soil is of just as much value (aside from failure to resist the abrasion of traffic) as an equivalent thickness of high-type surface (again discounting beam strength) we are forced to just one conclusion—concentrate on the base and work in the direction of water-proofed bases plus relatively thin renewal cover coats as a solution to our low-cost road problem. We can get at the thin renewable surface to preserve or improve but it costs to work on the base after the top has been once placed. This is the line of reasoning on which we are basing our plan of research attack on the low cost road program.

Considering first the bituminous angle, two different projects involving different methods of application have been used:

1—The Ingalls or subterranean method as applied to our experiments, consists essentially of scarifying the existing roadway to a depth of four or five inches, followed by the introduction of liquid bituminous material at the bottom of the scarified layer, with or without the prior or subsequent application of a small amount of water or soap solution. The equipment for application consists of a heavy frame supporting hollow curved teeth which project down to the desired depth and through which

the bituminous material from an accompanying distributor is forced by means of a pump mounted on the rear of the applicator. Following the application, the roadway is kept smooth under traffic and rolled if necessary to obtain the desired compaction. A sheep-foot roller and also multiple-wheeled rubber-tired rollers have been used to obtain such compaction.

Under compaction, the bituminous material diffuses and permeate the treated earth. This permeation tends to coat the soil particles. The permanent stability of an oil-earth mixture depends largely upon the relative affinity of the mineral surfaces included in the system for oil and water respectively. If the affinity of the mineral constitu-

will be obtained at a considerably reduced cost as compared to other types of low-cost construction in our state in areas where aggregates are not readily available.

2.—The method used in Lewis County in which the surface is scarified, the material windrowed, and the desired percentage of bituminous material added by means of a Barber-Greene plant. It is hoped that this method will give greater uniformity, better mixing and better control. The cost by this method is approximately \$4,000 per mile.

At the present time sections constructed by both methods are under service test covered with a thin bituminous armor or seal coat as a surfacing. Final conclusions regarding the service-

Portland cement in the soil to be treated in amounts determined as necessary in the laboratory from durability tests, together with the moisture for hydrating the cement and compacting the material to maximum density. On the project under way in Moniteau County the construction procedure is as follows:

The old roadbed, consisting of a worn-out gravel road, is scarified to a depth of six inches. The soil part of the scarified material is then pulverized to practically a dust. Portland cement, 12% by volume, is thoroughly mixed with the loosened clay and gravel material. After a thorough mixing, water is added by means of an ordinary asphalt distributor to bring the moisture content of the mixed materials to around



LEFT—The bituminous injector placing bituminous material at the bottom of the scarified roadway.

RIGHT—The sheepfoot roller; the tracks give an idea of the manner in which it compacts the subgrade.



ents for oil is greater than for water, then the oil will be preferentially absorbed by the soil, preventing a detrimental reaction with water, whereas, if the opposite preference is shown, an unstable system toward moisture will be formed. (Chemical studies now under way in cooperation with the Bureau of Public Roads and the University of Missouri give promise of preference prediction and possibly preference control.) It is apparent in our opinion that the final result is a base and not a surface but it is hoped that the base obtained, at a cost of approximately \$2500 per mile, will require only a light-armor-coat as a surface. The resulting combination, if successful,

ability of this type of construction cannot as yet be drawn but preliminary indications are favorable. The mixing method, at present, shows more uniform distribution of treating agent as was hoped, although at a somewhat higher cost of manipulation.

At the present time, on Route 5, Moniteau County, we are constructing an experimental section in which Portland cement is employed to stabilize the soil of the existing roadbed. This method has been employed previously in South Carolina in 1935 and in South Carolina, Illinois, and Wisconsin in 1936.

The method consists essentially of intimately incorporating

21% by weight. After continued mixing produces a uniform water distribution, the soil is compacted from the bottom up with a sheep-foot roller. After this compaction, a motor patrol blade is used to smooth out the marks of the roller and to dress the surface to the proper crown. The final passage of the sheep-foot roller is followed up by a flat-wheeled roller, smoothing the roadway to its final finish. Immediately after the final rolling, the surface is covered with wet straw. Following a curing period

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Canalization of the Upper Mississippi

By CLIFFORD E. PEHL
Associate Engineer, U. S. Engineers Corps

The Engineers Corps of the U. S. Army since 1930 have been making rapid progress in the actual construction of a series of locks and dams on the Mississippi River which will create a nine-foot channel between St. Louis and the Twin Cities. 26 dams with navigation locks will make a series of flat pools to insure navigation during low-water periods. Actual work at each lock-and-dam site has begun and completion of the entire project in 1939 is anticipated. Three dams had been constructed prior to 1930—one at Keokuk, Ia., and one at Minneapolis, both by private interests, and one at Hastings, Minn., by the Engineers Corps. About 1930, the entire project was planned and work started on Lock-and-Dam No. 15, at Rock Island, Ill. Lock-and-Dam No. 4 was begun shortly afterwards. With availability of federal relief funds, P.W.A. and W.P.A. construction projects started along the entire upper river. The last two projects to get under way were Lock No. 24 at Clarksville, Mo. and Lock No. 25 at Cap Au Gris, Mo., just east of Winfield, Mo., and 30 miles northwest of St. Louis.

Lock No. 25, which should be complete in January 1937, has typical overall dimensions, clearances and method of operation. The size of the lock chamber is 110 feet wide by 600 feet clear length. The land wall (near Missouri side), including the two guide walls, is 1992 feet long. The general section of the land wall is stepped from a base width of 27 feet. A 14-foot diameter tunnel is inside. The intermediate wall, opposite the land wall, consists of two vertical faces, 30 feet apart; the wall has been stepped on the inside near the top for economy;

the open section will be filled with sand, topped with loam, and seed-with grass. An auxiliary lock, 110 feet wide by 350 feet clear length, is being constructed next to the main lock to take care of future increased traffic on the river; until needed, it will function as a part of the dam.

The lift at Lock No. 25 will be 15 feet when the pools are at normal elevation. Filling or emptying the lock chamber will be effected in $7\frac{1}{2}$ minutes through

Mr. Pehl is the resident engineer in charge of the Lock-and-dam project near Winfield, Mo. A graduate of Kansas City Junior College, he has been engaged in work on the upper Mississippi River project for five years—four in the office of the division engineer in charge of the entire project, and one year with the engineer in charge of the St. Louis district.

the action of gravity; water will enter or leave the chamber through two 14-foot diameter culverts, one in each lock wall. Tainter valves are located near the end of each culvert, where the culvert section is changed to a square section, $12\frac{1}{2}$ feet by $12\frac{1}{2}$ feet. The valves are opened by means of a hoisting drum and wire-rope cables, operated by an electric motor. Since electric operation is used, the motors must be kept above the elevation of the highest water stage at which the locks must operate.

The mitering-type lock gates, which close at about a 20-degree angle, each weigh approximately seventy tons, are $61\frac{1}{2}$ feet long, and are 27 feet high at the upper end of the main lock and 35 feet high at the lower end. The total weight of each gate is sup-

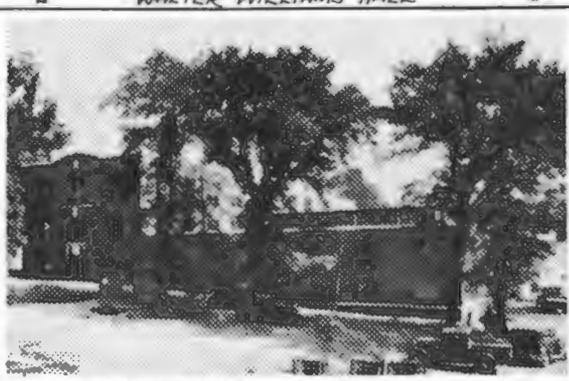
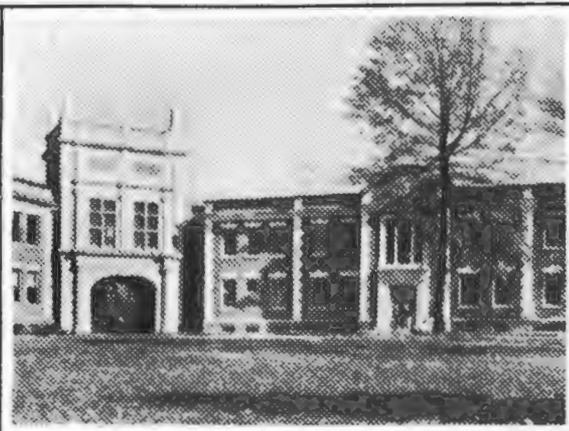
ported by the pintle, a perfect nickel-steel hemisphere, 15 inches in diameter. Horizontal pull is taken by a pin at the top of the gate and above the pintle; the pin is connected to gate anchors embedded in the locked wall. The gate, when opened, swings into a recess in the lock wall, allowing free passage of boats. Motivating power is furnished by an electric motor through a train of reduction gears, ratio 3245 to 1, to a strut arm connected to the sector gear and attached to the top girder of the gates.

When completed, the lock will contain 94,000 cubic yards of concrete, 510 tons of reinforcing steel, and 432 tons of structural steel in the gates. The piling foundation of the lock required about 11,000 timber piles, 28 to 43 feet long; 1760 tons of steel piling are required for permanent cutoff walls to prevent seepage and undermining.

The dam, a typical one, will be of the moving-gate type. Construction work has not started at this site. The dam will be so constructed that the gates can be lifted clear of the highest flood on record by at least five feet, thus offering a minimum obstruction to flood waters. The movable section of the dam will probably consist of 14 Tainter gates, each 60 feet long and 25 feet deep, and three roller gates, each 100 feet long and 25 feet deep. Each gate has its individual hoist and, due to its tremendous weight, movement is very slow, the rate of the roller gates being 9 inches per minute.

Connecting to the movable-gate section will be an overflow spillway with crest at upper pool elevation. During normal opera-

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PRACTICE TEACHING BUILDING

WALTER WILLIAMS HALL

WEST WING OF LIBRARY BUILDING

ENGINEERING LABORATORY

WILDLIFE CONSERVATION LABORATORY

STUDENT HEALTH CENTER BUILDING

NEW UNIVERSITY BUILDINGS DEDICATED

The six new University buildings shown above, costing approximately one and one-half million dollars, were dedicated Saturday, November 21st. Senator Frank M. McDavid of Springfield, president of the Board of Curators, presided at the dedicatory exercises. Prominent speakers were Gov. Guy B. Park, an alumnus of the University; Mr. Tom K. Smith, president of the American Bankers' Association, also an alumnus of the University; Mr. E. H. Foley, Jr., head of the Legal Department of the Federal Emergency Administration; and Dr. Frederick A. Middlebush, president of the University.

The Student Health building will be three stories high and the basement will be given over to X-ray and therapeutic equipment for both diagnosis and treatment. The first floor of the building will house clinical facilities for the out-patient department of the University Student Health Service. The second floor of the building will be a contagion ward, and the third floor will be given over to the State Crippled Children Service.

Walter Williams Hall, named in honor of the late Walter Williams, founder and dean of the first school of Journalism, and former president of

the University, will practically double the space now available for the School of Journalism. It will house photo-engraving and typographical laboratories, classrooms, library, and also office space for both the faculty and the Columbia Missourian.

The largest of the new buildings is the Practice Teaching building of the School of Education which is 256 feet long and 110 feet deep. It will serve the purpose of three buildings by housing the University Elementary School, the University Junior High School, and the University Senior High School. This building is completely modern throughout, providing facilities for approximately three hundred students and will serve as a model school building both from the standpoint of structure and of equipment. An unusual feature in the building is the individual unit heating plants in each room. There will be playground space on the roof. It will also house administrative offices for the School of Education.

The Engineering Laboratory building is in two units, one three stories high, 195 feet wide and 50 feet deep, and the other a one story unit, 195 feet wide and 90 feet deep. The one story unit is divided into three laboratory rooms for mechanical, chemical, and electrical engineering. The three story unit is given over to classrooms, office, and research laboratory facilities.

The Wildlife Laboratory building is the first structure of its kind to be erected in the middle west, and will house laboratory and research facilities for the botany and zoology departments. One of the unusual features of this building will be the equipment to maintain a constant year round temperature in all the laboratory rooms and especially in the aquarium rooms.

The new wing on the General Library building, 186 feet long and 54 feet deep, will practically double the stack capacity of the present University library. Considerable space in the new wing will be given over to the reserve reading room and a scientific library room. There will be space for 120 cubicles or carrels to be used by graduates doing research work.

In addition to the erection of new buildings, considerable work has been done in the repair of some of the service facilities of the University and a number of buildings have been renovated. Major repairs have been made to the electric distribution system, some of the water mains, and other services. Ten major buildings have been renovated. These repairs will tend to improve the educational efficiency of the University.

ECLIPSE HUNTING in Soviet Russia

By HARNER SELVIDGE

One day last November, I was sitting in my office leisurely contemplating a nice research problem when my boss, Prof. Mimno, walked in and casually asked, "Do you know where Ak-Bulak is?" I said that I didn't. "Well, you had better find out, because you are probably going to spend several months there this summer," he informed me and walked out, leaving me enveloped in a geographical and emotional fog which didn't completely clear up until I actually sailed from New York on April 8, 1936, with a ticket which read: "Ak-Bulak: via London, Copenhagen, Helsinki, Leningrad, Moscow, and Orenburg."

Ak-Bulak is a little village in Kazakstan, USSR, and lies about 200 miles north of the Caspian Sea, and 100 miles south of the city of Orenburg, which can be found on most maps. Ak-Bulak lay on the center line of the band of totality of an eclipse of the sun, which was visible on June 19, 1936. This strip of darkness stretched from Greece clear across the desolate steppes of Siberia, losing itself in the Pacific Ocean just north of Japan. To Ak-Bulak went the Harvard University-Massachusetts Institute of Technology eclipse expedition of which I was a member.

First I would like to explain briefly why I, a radio engineer, went on an eclipse expedition. The problem of the transmission of radio waves involves what is sometimes called the Kennelly-Heaviside layers, or more generally, the region known as the Ionosphere. This is a region in the upper atmosphere where exist ionized layers which reflect and absorb radio waves. It is these layers which make our long-distance short-wave transmission possible. The ionization is large-

Mr. Selvidge attended the University of Missouri three years, and obtained his B.S. and M.A. at Massachusetts Institute of Technology in the cooperative course offered by the school and A. T. & T. Co. He is now an instructor at Harvard and is engaged in research work. This article is the first of a series of three.



The Author in Russian Garb

ly caused by the ultra-violet light from the sun, and when this is cut off suddenly, as during an eclipse, it offers a very unusual chance for us to study the changes which take place and thus further our knowledge of the physics of the upper atmosphere. Our laboratory has been a pioneer in this kind of work, having made measurements during the eclipse of 1932, which was visible in New England. It was convenient, therefore, to combine a radio expedition to Ak-Bulak with one from the Harvard Astronomical Observatory which was going to make spectrograph studies of the corona of the sun during the eclipse.

It was necessary for us to sail from New York more than two months before the eclipse date to allow time for setting up the equipment at the camp. This left us roughly four months in which to invent, construct, and test the radio apparatus. The apparatus was finished in time, but the testing was rather limited, and it was only by working day and night, holidays included, that the equipment was ready in time. I should say that the business of getting ready was by far harder than any other part of the expedition work. For the Ionosphere measurements, the radio party took three transmitters, four receivers, and four automatic photographic recorders. In addition, we had two transmitters and receivers for communication work. These were commercial products loaned to the expedition for this purpose. The Russian Academy of Sciences published a pamphlet describing the eclipse sites; it stated that there was 220-volt 50-cycle alternating current available at the town of Ak-Bulak. The apparatus was made to operate at this voltage. It was necessary, of course, to have with us a very large supply of spare parts in case of failure of any part of our equipment. For instance, we took three of every vacuum tube required, as well as spare transformers, condensers, recorder motors, etc. In addition, there were innumerable quantities of other supplies, such as bedding, soap, tools, films, lanterns, and a very important item, canned fruit. The latter was to be used in case the Russian food proved too tough for our delicate constitutions. The radio equipment was shipped in 37 crates, and weighed about five tons. The as-

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SPORTS

By HOWARD BURNSIDE, Ch.E. '39

FOOTBALL

One thing prevented Missouri from gaining a Big Six title in football this year, and that one thing was the supremacy of a strong Nebraska team. The Faurot crew passed and plunged from a 1935 tie for fifth place to a second place rating in this year's competition. After matching Kansas State with a 7-7 tie at the beginning of the season, the Tigers journeyed to Lincoln, Neb., and received a 20-0 drubbing from the Cornhuskers. Rather than label the Tigers as poor ball toters, due credit must be given the Nebraska team for having one of the best offensive and defensive outfits in the country. Beyond a doubt Nebraska deserved their Big Six Championship, and beyond a doubt the Tigers deserved their second place berth, ranking ahead of Kansas State, Oklahoma U., Iowa State, and Kansas U.

Matching smart football with a hard style of play, the Missouri team went far beyond the predictions of pre-season dopesters. Losing only to the powerful Michigan State and Nebraska teams this year, the Tigers climbed into the list of potential champions for the first time in many years. Outstanding this year was the strong line play of the Missouri team which repelled opposing thrusts as readily as it opened holes for the Tiger backs. Nelson and Peiper, Missouri's ace ends, were particularly strong on the defense. "Tiny" Rau and Huston Betty, all Big Six center, were outstanding and consistent both offensively and defensively throughout the season.

The offensive work of the team was hampered greatly by jittery

ball handling, and not infrequently was the ball fumbled at crucial moments. However this can be overlooked in considering the performances of Missouri's galaxy of backfield stars. Captain Al Londe, playing a fast season at half, was paced run for run by Jack Frye, Missouri's outstanding triple threat man. The long yardage sprints of Heinie Mahley, Mizzou's "Galloping Gazelle," thrilled football fans every Saturday afternoon. Pete Ewing, a new varsity man from the sophomore ranks, Art Murray, and Harry Mason played good football throughout the Tiger schedule. However, one noticeable weakness of even the best combination of backs that could be put on the field was the inability to defend during an aerial attack.

Next year we may look forward to even greater achievements by a team that will be the leading challenger for Nebraska's Big Six crown. An abundance of junior and senior material will be ready to start the football season, while there will undoubtedly be new sophomores contending for regular varsity berths. Four men—Jack Frye, Al Londe, "Chink" Henderson, and Vernon Castle—will graduate. These men started the Thanksgiving Day game, their last game for Missouri, and turned in performances that emphasized the fact Missouri would lose a wealth of material. Spring practice will, as it usually does, bring forth several baby Tigers from the freshman ranks who may be depended upon for part of the Bengal's growl in 1937. We feel that the 1936 season has been a successful one and that we can look forward to a rosy future.

TRACK

An opportune spot presents itself so that we may review the fall sports that are somewhat neglected while football is in the limelight. Fall track consists of indoor work on the distance runs, the two-mile team being the big feature of the season. The team's regular practice in the field house was chiefly responsible for Missouri's second place in the two-mile event at the Big Six meet held in Manhattan, Kansas, November 21.

Rex Kirkham is captain of the team for the current year.

POLO

The polo season was not very successful. Haunted by the bad luck jinx, the team lost their games as regularly as the football team won tilts. One rather funny incident occurred in the Oklahoma game when a horse ridden by an Oklahoma man kicked a goal that proved to be the margin of victory for the Sooners in a 7-6 game. The major causality of the year came when "Ike" Sheiber broke his leg.

BASKETBALL

Coach George Edwards is not very optimistic about the basketball team this year, but we hope that he has an inferiority complex about his teams. The squad has been cut several times, and the remaining men are working out every afternoon in the field house. The daily practices include short scrimmages with the freshman team. There will be six returning lettermen, including "Chink" Henderson who will not be eligible for the second semester. The team will be bolstered somewhat by the services of new sophomores, the standouts being Brookfield, Brown, Nord, and Van Hooser.

OUR REVISED CURRICULA

DEAN F. ELLIS JOHNSON

Our completely revised curricula in the College of Engineering as shown in the present catalog do not mark merely changing whims of the faculty. It is perhaps true that occasionally changes in University requirements are somewhat similar to rearranging the furniture in a home but the changes in our curricula are of a much more serious character and represent an effort to care for the recognized growth and changes in the fields of engineering for which it is our business to prepare men.

With the advancement of scientific knowledge produced by research and the application of the results of these researches to the uses of mankind, the demand upon the technical training of engineers has become greater yearly. Yet the time in which to train men has remained at four years. Thorough training in mathematics and fundamental science has become no less important, but, if possible, even more essential than ever. The time required for this training obviously cannot be reduced. The extension of each professional field to handle modern developments, however, requires a longer sequence of technical training if the men leaving the engineering colleges are to be even intelligently conversant with the newer applications in their field. Thus throughout the engineering colleges of America there is a growing feeling that technical training in engineering is about to burst the bounds of four years and demand a longer time as does both law and medicine.

Beside the pressing requirements of scientific and purely technical training, another important factor plays a part in or-

ganizing well-planned curricula in engineering. To be most useful to modern society, with its dependence upon applied science, and to win the most reward for himself and his family, the engineer must now have a much broader training than ever before. To properly manage the businesses founded upon the engineer's work, which have now grown to such great magnitude, the engineer himself should be trained in the fundamentals of law and business organization. If he is to handle the important labor and personnel problems connected with his ventures he should have at least basic training in sociology and psychology. Even to handle the more technical phases, particularly in some fields, the engineer should now be prepared in subjects that some years ago would have been considered quite apart from engineering. For example—a well-trained sanitary engineer in these modern days should know much more of chemistry, bacteriology, and hygiene than in the past.

Our completely revised curricula in engineering at the University of Missouri represent a long studied and careful attempt to approach as nearly as possible a solution to all these demands while still clinging to the time limitation of four years. Some sacrifices have necessarily been made; yet it is believed that the required fundamental training has been preserved while at the same time reference to each of the curricula will show that a lengthened sequence to two and one-half or three years has been created in each of the professional fields as designated by the title of each curriculum.

A longer and detailed discussion of the changes is probably

unnecessary. Two of the changes most readily noticed are the removal of the old time shop courses from the freshman year and the lengthening of an important elective sequence to run throughout the junior and senior years. In place of the old shop courses more modern and intensely more technical work in manufacturing processes is inserted later than the freshman year. The elective sequence is designed to offer as much opportunity as possible for the student who desires to prepare himself for either the management of business or the management of personnel. Or, if he chooses to enter some professional field that requires special auxiliary study, he may have opportunity for this study. There will be also the occasional man gifted by nature and especially interested in entering advanced field of research and development who can use this elective opportunity to strengthen his grounding in advanced mathematics and in chemistry and physics.

An intelligent student in our College of Engineering should first canvass the facts earlier stated above and become entirely conscious and aware of the pressures bearing upon him as one entering the profession of engineering. He should study himself to prepare to meet the situation. He should choose if possible the field of his special interest. He should plan to use the curriculum provided to serve his individual purpose, which means securing the best advice possible concerning the use of his elective opportunities.

If our College of Engineering is to be a really distinguished college of engineering it should be marked by the peculiarly intelligent attitude of our students toward their own preparation for their life work and by the understanding cooperation of a competent faculty.

AROUND THE COLUMNS

Inspection Trip

Twenty-five senior students and professors, members of the local chapter of A.S.C.E., met members of the Rolla chapter at Winfield, Mo. Here, Mr. Pehl, chief construction engineer at the flood-control dam near Winfield, one of a chain extending up and down the Mississippi River, took the combined group on an inspection trip of the locks, which will be the first completed unit at this site. The groups then motored to St. Louis, where they were guests, together with the Washington U. chapter, of the senior society of St. Louis at its annual dinner and meeting at the Statler Hotel. The civils look upon this trip as the outstanding one of the school year.

The hydro-electric plant of the Union Electric Power and Light Co., at the Lake of the Ozarks near Bagnell, Mo., and the municipal water-supply plant at Jefferson City, Mo., were the principal points of interest observed by the Hydraulic Engineering Class on an all-day inspection trip, November 9, 1936. Accompanied by Professor T. J. Rodhouse, the class spent three hours inspecting the power plant and dam at Bagnell under the guidance of Mr. Raymond Weldy, an operating engineer. On the return trip, the group stopped at Jefferson City, where the city engineer took the men through the pumping station and the purification plant of the water supply system.

Through the courtesy of Mr. Harrison Brown of the A. P. Green Fire Brick Company, the student branch of the A.S.M.E. sponsored an interesting and informative inspection trip to one of the nation's foremost refractory plants, the A. P. Green Fire Brick Company of Mexico, Mo., November 10.

Plant Superintendent Mr. George Sullivan and Master Mechanic Mr. H. O. Wood acted as guides for the trip. They pointed out the manufacturing process employed in converting the raw material into the finished product. The large steel conveyor belt used to elevate the raw ore from the receiving dump to the storage bins, the brick presses, the tunnel kilns, the dryers, the pattern and machine shops, and the research laboratory, constituted some of the interesting highlights of the trip.

Twenty-six students, accompanied by Prof. J. R. Wharton, made the trip. Judging from the enthusiastic com-

ments of these men, the visit to the Green plant should be made an annual affair.

Columns Guarded

Thanks to the vigilance of the members of the Engineers' Club, under the able direction of Lorenzo Banks, the Columns were still intact after the Washington game. Visitors to the campus on the following Sunday morning were greeted by the familiar sight of the six sturdy sentinels, entirely unharmed. The vigilance was redoubled during Homecoming, lest some reckless Jayhawk or Jayhawkers throw caution to the winds and attempt to disfigure the famous landmarks.

We don't wish to convey the impression that our visitors could not be trusted, but, like Patrick Henry, we have no way of judging the future but by the past, and an attack upon the Columns was not exactly unheard of in previous years.



Enrollment

The question as to which department has the largest representation in the College of Engineering has finally been settled. After much jockeying for position by the civils, chemicals, and mechanicals, due to late registrations and subsequent withdrawals, the mechanicals emerged victorious, followed at a safe distance by the civils, whose lead over the chemicals was none too generous.

The final tabulation released by the Dean's office, gives the numerical strength of each department as follows: Mechanical, 94; Civil, 89; Chemical, 87; Electrical, 79; and Agricultural, 15. The boys with the White Campus affiliations knew all along that their claim to fame lay not in superior numbers. Of course, being able to attend both Barnwarmin' and St. Pat's Ball has its advantages.

Engineers' Club

The Engineers' Club has been getting its various activities under way. Orlan Johnson was elected Publicity Manager and Lorenzo Banks was appointed chairman of the Attendance and Discipline Committee. Prof. Sogard gave the club a brief talk on the boiler explosion at the power plant in Moberly and gave reasons for the failure of the boiler. The club voted to have a dance and negotiations are now being made with the student council for cooperation with them in putting on a dance on December 12.

General

There's no lack of activity on the engineers' side of the campus lately. Workmen are busy installing machinery and other equipment in the new laboratories building. The library will probably be moved to its new quarters in the new annex during the Christmas vacation. Mrs. Hurty, the capable custodian of the books, was proudly displaying the new home of her beloved books to the visiting alumni during Homecoming.

Also much in evidence around the Columns lately are the surveying classes, working hard in order to finish their field work before bad weather is encountered.

St. Pat's Board is beginning to function in earnest, and, judging from their interest and activity, we'll have quite a celebration this year. Charles Owings, Chairman of the Board, has some excellent ideas up his sleeve, and he'll explain some of them in our next issue.

Here's one item that literally deserves the heading. About two weeks ago, workmen were observed mounting the Columns by means of tall ladders, removing chips which were loosened from the cornices by weathering. It is presumed that this was done for the protection of returning alumni who exercised their prerogative of walking upon the sacred sod on the top mound and sitting on the base of the Columns.

Alumni returning for the Homecoming celebration were greeted by the welcome sight of new buildings—those already completed and those still under construction. Of particular interest to the returning engineers was the new Engineering Laboratories Annex. It was their unanimous opinion that the College of Engineering is at last coming into its own.

ORGANIZATIONS

A. S. C. E.

At the regular meeting of A. S. C. E. on Oct. 22, Dr. Branson of the geology department gave an illustrated talk concerning his visit to Mexico last summer.

A dinner meeting was held on Nov. 5 at Harris' Cafe. The attendance, refreshment, and program committees, appointed temporarily earlier in the semester, were appointed permanently by the president, John Jonas.

Members of the senior class attended a banquet and instructional tour sponsored by the St. Louis branch of the A. S. C. E. on Nov. 14.

In lieu of the regular meeting for Nov. 19, the members made an inspection trip to Tipton, Missouri to view an experiment in base stabilization by the Missouri State Highway Department.

A. I. Ch. E.

The increase in the number of chemical engineering students has been reflected in the increased interest in A. I. Ch. E. this semester. At several of the meetings, short talks have been given by members on subjects related to chemistry. On Dec. 10, a motion picture film of the Du Pont Laboratories will be shown. The film is of a non-technical nature, and visitors will be welcome.

Plans are being made by the chapter for the rating of members according to various traits of personality, in order to assist them in overcoming any deficiencies. The basic idea is to have each man in the organization rated by ten other men on the basis of personal appearance, habits, industry, etc., thus giving the individual his standing among his fellow students.

Tau Beta Pi

Again the honor of membership is extended to a number of men in the College of Engineering. On Tuesday, November 3, the following men were initiated: Ralph F. Schmidt, C. E. Wright, City; Marvin H. Carl, Ch.E., Mount Vernon; Ben F. Hillebrandt, E.E., Kansas City; Preston T. Sumner, E.E., Sedalia; Harold L. Pearlstein, Ch.E., St. Louis; Leonard A. Gettinger, M.E., Festus; Frank M. Cortel-you, C.E., Kansas City; Thomas H. Rubey, CE., Columbia; Robert C. Garrett, Ch.E., St. Louis; Thomas O. Thompson, M.E., Wellsville.

The initiation was held in the Engineering Building, and the initiation banquet was held immediately following the ceremonies at Gaebler's. Prof. R. L. Scoria acted as toastmaster. The speakers were Prof. W. L. Bradshaw of the Political Science Department, who spoke on "Interpreting Election Returns," and Dean F. Ellis Johnson of our own college, who spoke on "The Meaning of Tau Beta Pi To Its Members."

At some time in the near future, a smoker will be held, at which time the new members will each present a paper.

A. S. M. E.

ASME held its regular meeting on Tuesday, November 4, for the purpose of rating all mechanical engineering students who were interested in the project. The rating charts which provided the basis of the ratings were supplied by the Dean's office. The system employed permitted the rating of each man present by 10 others and gave each man present the privilege of rating 10 others in attendance at the meeting.

"Strictly confidential" was the keynote of the entire meeting.

The consensus of opinion was that very definite benefits could be obtained from such a rating, but that perhaps a more accurate system could be found.

At the conclusion of the meeting, it was decided that another rating later in the school year would be helpful as a means of comparison.

Pi Tau Sigma

Missouri Epsilon chapter of Pi Tau Sigma held its fall election last month. Those chosen for membership were: Bradley Douglas and Clifford Holt, seniors, and Eugene Burnett, Herbert Baugh, and Robert Geauque, juniors. Formal initiation for these men will be held December 8.

Prof. J. R. Wharton was chosen as faculty adviser to succeed Prof. E. S. Gray, who is now at Purdue University on a fellowship.

Thomas Thompson and Leonard Gettinger attended the national convention of Pi Tau Sigma at Austin, Texas, November 20 and 21. Mr. Gray, national vice-president of the fraternity, also attended, and sends his greetings to all his friends in the College of Engineering.

A. S. A. E.

At the meeting on Nov. 10, it was decided to make the hotdog stand an annual project during Farmers' Week, in view of its signal success this fall. After the business meeting, two films were shown, one concerning western life and the other illustrating the development of transportation.

A seminar meeting is held on the Tuesday night that the society does not meet. The seminar group consists of five graduate students, five senior students, and Profs. Jones and Wooley.

Chi Epsilon

Chi Epsilon announced the pledging of the following students in civil engineering: Ralph Schmidt, senior, and C. Kenneth Shepherd, H. P. Wheeler, and H. Wilke, juniors. Jack Coates, senior, will also be initiated at a meeting on December 17.

Chi Epsilon is sending a delegate to the national convention of the fraternity at Purdue University on December 19, 20, and 21. Plans are being made for an inspection trip to St. Louis to replace the annual banquet this semester.

A. I. E. E.

On Saturday, October 24, Charles Owings, Robert Bickel, and J. J. Trebilcote, together with Dean Johnson and Professor Lanier, attended a meeting of the Kansas City section of A. I. E. E. Mr. McClutcheon, national president of the Institute, addressed the meeting.

The convention of the Southwest District was held at Dallas, Texas, on October 26 and 27. The University of Missouri was represented by Charles Owings, J. J. Trebilcote, Dean Johnson, and Professors Weinbach and Vaile.

At the regular meeting of the local student branch on November 24, Charles Owings presented a paper on "The Photo-Electric Cell."

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in
Photography*

RANKING ENGINEERS

Following is a list of the junior and senior engineers who rank high in scholastic work. These men all have rankings of 250 or better, based on reports complete to this year.

Juniors

1. Landfried, John E., ChE 344
2. Mull, Cleo, ChE325
3. Johnson, Robert F., ME.322
4. Klein, George F., ChE321
5. Rood, Joe, ChE320
6. Romberg, Bill, ChE314
7. Farris, William W., ChE 306
8. Fingerhood, Carl, ChE276
9. Baugh, Herbert H., ME ..269
10. Burnett, Eugene, ME269
11. Campbell, John A., EE267
12. Wilke, Harvey, CE267
13. Geauque, Robert, ME264
14. Westover, Paul, EE263
15. Boucher, Herman, ChE262
16. Savanosky, Julius, ChE ..259
17. Wheeler, H. P., CE254
18. Hessler, Ulrich S., CE253

Seniors

1. Schmidt, Ralph, CE330
2. Salisbury, W. P., CE319
3. Miller, Ernest E., ChE314
4. Carl, Marvin, ChE309
5. Rau, Carl, ChE302
6. Hillebrandt, Ben F., EE 301
7. Owings, Chas. E., EE290
8. Pearlstein, Harold, ChE ..289
9. Gettinger, Leonard, ME 293
10. Cortelyou, Frank, CE281
11. Rubey, Tom H., CE275
12. Thompson, T. O., ME270
13. Garrett, Robert E., ChE ..267
14. Kolde, Robert F., EE264
15. Sumner, Preston T., EE ..264
16. Fish, Clarence A., EE260
17. Beattie, Norval, CE256
18. Bretscher, Erwin, CE254
19. Holt, Clifford, ME251
20. Jeffries, W. G., EE250

He: "I'm a little stiff from bowling."

She: "Where did you say you were from?"

CANALIZATION OF THE MISSISSIPPI RIVER

(Continued from Page 6)

tion conditions, the pool will be maintained at low-water flows. As the discharge of the river increases, more water will be passed through the gates until the discharge of the river has reached a point where the upper pool and lower pool have reached the same elevation at the dam. At this stage, all the gates will have been lifted clear of the river and will be raised as much further as necessary, depending on the size of the flood. Should the flood exceed the upper pool stage, which is quite possible, the overflow spillway will automatically come into use, providing more discharge area for the river.

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ALUMNI NEWS

Robert V. Aycock, BS in Eng. (ME) '10, is President of the Vaughn Investment Co. at Kansas City, Missouri.

Kenneth W. Miller, BS in Eng. (ME) '35, is Assistant to the Manager of Lubrication for the Shell Petroleum Co. at St. Louis, Mo.

T. M. Roberts, BS in Eng. (EE) '24, is an engineer in the Research Department of the Union Electric Light & Power Co. in St. Louis, Mo.

Albert R. Waters, BS in Eng. (CE) '12, is Vice-President of the Carter-Waters Corp. in Kansas City, Missouri. He has a son, Albert Waters, Jr., enrolled at M. U. this year.

Logan H. Keller, BS in Eng. (EE) '12, owns the L. H. Keller Electrical Equipment Co. at Kansas City, Missouri.

Erskine S. Longfellow, BS in Eng. (ChE) '21, is an instructor in Chemistry at the Junior College of Kansas City, Missouri.

Thomas B. Ellis, BS in Eng. (EE) '14, is with the General Electric Co. in Chicago, Ill. His son, Thomas B. Ellis, Jr., is a Sophomore in the College of Engineering this fall.

Earl F. Beckett, BS in Eng. (EE) '09, has fallen from grace and is a probation and parole officer with the U. S. Department of Justice in Kansas City, Mo.

Henry C. Westover, BS in Eng. (CE) '04, is Heating and Ventilating Engineer for the Los Angeles Board of Education. His home is in Glendale, Calif.

Lawrence G. Weiser, BS in Eng. (ME) '30, is a salesman for the Westinghouse Manufacturing Co. He has recently been transferred from the Dayton, Ohio, to the Louisville, Ky., office.

Leo Brandenburger, BS in Eng. (EE) '03, is Branch Manager of the Wagner Electric Corp. at Salt Lake City, Utah.

Charles O. Huntress, BS in Eng. (ChE) '36, visited the college November 9 and 10. Since graduation he has been employed in the Production Division of the Phillips Petroleum Co. and at present is located in Oklahoma City. While here, Mr. Huntress gave a very interesting talk to the Petroleum Technology class on the production of petroleum.

Melvin P. Hatcher, B.S. in Eng. (CE) '20, has been with the Burns & McDonnell Engineering Co. of Kansas City, Mo., since graduation.

Maynard D. Mize, BS in Eng. (ChE) '20, is Chemist in the Research Laboratory of the Wallace & Tierman Co. in Belleville, New Jersey. He is Treasurer of the American Association of Cereal Chemists.

J. Rody Anderson, BS in Eng. (ME) '32, is employed in the Commercial Engineering Department of the Southwestern Bell Telephone Company in St. Louis, Missouri.

Russell W. Thomas, BS in Eng. (ChE) '28, is now Metallurgist for the Armco International Corporation in Middletown, Ohio.

Eugene F. Gaebler, BS in Eng. (CE) '17, is Office Engineer for the Pacific Fruit Express Co. in San Francisco, Calif.

Roy A. Middleton, BS in Eng. (EE) '25, has recently been transferred from the Kansas City, Mo., branch of the American Telegraph & Telephone Co. to their Dallas, Texas, branch.

Edward E. Wall, BS in Eng. (CE) '84, is Director of Public Utilities of St. Louis, Mo.

Clarence S. Jarvis, BS in Eng. (CE) '08, is a Hydraulic Engineer with the U. S. Department of Agriculture in Washington, D. C.

Fred G. Beckman, BS in Eng. (EE) '13, is a contractor in Muskogee, Okla. He specializes in drilling and cleaning oil wells.

L. J. Schrenk, BS in Eng. (ME) '06, is General Superintendent of the Public Lighting Commission of Detroit, Mich.

S. J. Callahan, BS in Eng. (CE) '14, is Supervising Engineer of the new City Hall Building of Kansas City, Missouri. He is in the employ of the Kansas City Department of Public Works.

Ira G. Walborn, BS in Eng. (EE) '06, is Power Sales Engineer for the Pennsylvania Power and Light Co. at Hazelton, Penn. He has a son and daughter enrolled in the College of Arts and Science at M. U. this semester.

E. R. Dinkle, BS in Eng. (CE) '06, is President of the Union Engineering and Construction Co. at Avalon, Penn.

William L. Sapper, BS in Eng. (CE) '30, is Assistant Engineer with the U. S. Engineers at Providence, R. I.

R. H. Pinkley, BS in Eng. (EE) '99, is Vice-President in charge of transportation of the Milwaukee Electric Railway and Light Company in Milwaukee, Wisconsin.

James T. Orton, BS in Eng. (EE) '25, is employed in the Plant Engineering Department of the Southwestern Bell Telephone Company in St. Louis, Mo.

Joseph H. Brooking, BS in Eng. (CE) '07, is with the List Construction Co. of Kansas City, Mo.

ENGINEERING BRIEFS

Cast Iron Capitol

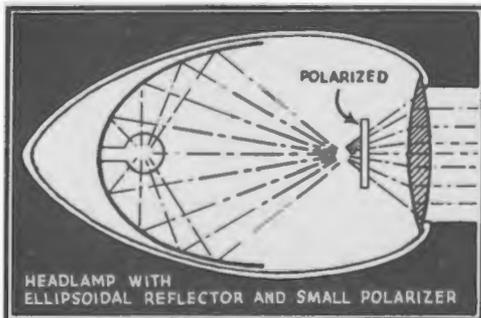
The dome of the Capitol of the United States is made completely of cast iron.

The dome is constructed on a skeleton framework which consists of 36 cast iron ribs. The inner and outer domes are each constructed of cast iron plates. The total weight, ribs, plate, and cast iron ornaments, amounts to a total of 8,878,743 pounds, according to the official records.

The present dome, which is the second to have adorned the existing capitol building was completed in 1865, nine years after its construction was begun. It stands today, a monument to cast iron construction.

Polarized Lamps

As a means of preventing glare in night driving, a system of polarized lighting has been proposed by L. W. Chubb of Westinghouse research laboratories. The set-up of the motor car headlight is shown in the accompanying illustration. When viewed from a polarized screen similar to that used in the headlamp, the glare from approaching headlights completely disappears



Courtesy Popular Mechanics

while the driver obtains the maximum illumination of road and nearby objects.

In order for this system for the prevention of glare to be effective, all cars must be equipped with the polarized headlights and polarized viewing screens

for the driver. Present headlamp units could be easily adapted to the use of this system. The only changes necessary would be the insertion of larger light bulbs and the insertion of the polarization screens.

1937 Autos

Primary attention has been given, in the 1937 motor cars, to economy and safety. Comfort and ease of the passengers and the driver have also been given places of importance.

Chrysler engineers have designed the instrument panels of their cars so as to eliminate all projections that might injure occupants of the car in case of an accident. The light switches and ignition key have been recessed in small tunnels in the panel. Manual controls are at the lower edge of the panel and are controlled by a finger-tip hooked into a notch. Door handles, inside and out, are curved so that they will not catch clothing or flesh.

The center of gravity has again been lowered, this time without that annoying transmission tunnel which was raised above the floor-boards. The most popular method used to accomplish this is the use of hypoid gearing, which is a design half-way between a worm gear and the conventional pinion. This gearing of the differential lowers the transmission throughout its entire length. The other method is to use a two piece propeller shaft, as is done in Oldsmobile and Pontiac this year.

Ford has brought out two motors and one body this year. The new 60 H.P. V-8 motor is the type that has been used on the European continent for the last year. Its chief advantage is its fuel economy and lower tax rating. Ford bodies, this year, join

the ranks of the all-steel (including top) bodies.

New springing and new shock absorbers on a number of new cars add materially to the riding comfort. Interior appointments have followed the general trend in styling and are constantly being improved. The general lines of the cars have a trend toward smooth-flowing, graceful lines.

Melting a Tower

The three million pound east tower of the "Skyride" of the Chicago Century of Progress was felled by melting two of the legs. 1,500 pounds of thermite, fired by electricity, generated a temperature of more than five thousand degrees, melting the ten-foot sections almost immediately.

The West

Horace Greely might well say today, "Go west, Engineers, go west." The Boulder Dam power and irrigation project provides cheap power and water to a vast area. The All-American Canal, from the Colorado River through the Imperial Valley, is under construction. The Los Angeles Metropolitan Aqueduct, costing 220 million dollars, will augment the power and water supply for a population of some twenty million. Los Angeles and Long Beach are spending seven million dollars on a breakwater. San Diego is developing a two-million dollar harbor. The Golden Gate bridge at San Francisco cost 77,200,000 dollars. The Grand Coulee power and reclamation project on the Columbia River has been started. Many more millions are being spent on highways through the Western States.—What next, Engineers?

A glass office building is to be erected soon in New York City. It will be five stories high, of fire-proof construction, with exterior walls consisting of great screens of glass construction units framed in Indiana limestone.

MISSOURI SECONDARY ROAD EXPERIMENTS

(Continued from Page 5)

from about 8 to 10 days the straw is removed and the mixture sets up to a hard, firm, smooth surface. One full day is required to scarify and pulverize a 700-foot section of roadbed, and another full day is then spent adding the cement, supplying water, mixing, compacting and finishing.

This test section of two miles and the other test sections in the other states referred to above have not been under the action of weather and traffic a sufficient length of time to prove the merits of this method of stabilizing. It is purely an experimental section and its worth can only be demonstrated by its behavior under service. However, we are encouraged by indications that, in special localities, treatment of soils by this method may have appreciable merit and possibility.

If the results of soil stabilization methods of constructing bases is entirely successful, it is believed that present costs of low and medium type roads can be considerably reduced. The tendency should then be toward the more rational design of stable, permanent bases plus thin renewable cover coats rather than the use of excessive thicknesses of surfacing such as are now necessary.

Other sections of the United States and some foreign countries are watching these tests with a view to adoption if successful and consideration is being given to utilization of the theory in connection with the improvement of aviation landing fields and public play grounds.

Success expert: "What's your name?"

Greek Client: "Gus Poppopopulos."

Success expert: "Get a job selling motorcycles."

COMMENT

We overheard a member of one of the E. M. A. classes say that he wished Profs. Lanier and Weinbach would follow Stephen Leacock's suggestion on writing technical books. Here is Mr. Leacock's suggestion:

"I have realized that all our technical books are written and presented in too dry a fashion. They don't make the most of themselves. Very often the situation implied is intensely sensational, and if set out after the fashion of an up-to-date newspaper, would be wonderfully effective.

Here, for example, you have Granville writing in a perfectly prosaic way all in small type such an item as the following:

'A perpendicular is let fall on a line BC so as to bisect it at the point C, etc., etc.'

just as if it were the most ordinary occurrence in the world. Every newspaper man will see at once that it ought to be set up thus:

AWFUL CATASTROPHE

Perpendicular Falls Headlong On A Given Point

THE LINE AT C SAID TO BE COMPLETELY BIASECTED

President of the Line Makes Statement
etc., etc.

Jim Trebilcote, senior electrical, amazed the Communications class one Saturday morning with a slide rule answer, worked out to the eighth place. After the second occurrence of this remarkable phenomena, his results were checked; all three were correct to the fifth place. Accurate tallies have been kept of the answers that Jim finds, and in nearly seventy-five per cent of the cases he has been correct to the fifth or sixth place. The rest of the class are now complaining that Prof. Weinbach expects them to do likewise.

The Engineers Club need not worry about obtaining a competent solo cornetist to accompany the group on its annual Serenade this spring. Prof. Moorman of the Civil department held the solo cornet chair in Illinois U.'s great band while a student at the school. He also has played in the pit in legitimate theaters and has played on the Orpheum circuit.

To all you Mechanicals who are encountering scholastic difficulties—go and ask Prof. Selvidge to prevail on "Tommy Ticklebritches" to give you aid; he'll understand and it'll do you a lot of good.

Rumor has it that Prof. La-rue's prize election joke carries as much of a wallop now as it did prior to the election. Ask him about it.

Rock Salt mixed with clay or other material and rolled to a firm surface is a very useful paving material on lightly travelled highways. The compound packs itself into a concrete-like and crystallized surface, resulting in a non-skid highway. Construction of an eighteen-foot road is estimated at approximately 450 dollars per mile.



THRU THE TRANSIT

By Herb Shieber

I suppose that we all must at one time or another taste the drops of bitter disillusionment. To think that after all these years of hero worship, I now find that he too is of common clay. Ah! the utter catastrophe of it all! Throughout the years Prof. Westfall has made his name famous as the foremost of all the writing - on - the - blackboard - while - sitting - facing - the - class - ers, and now has come that day of reckoning. To the total shock of everyone, the unbelievable happened. Misjudging the distance, the distinguished professor shoved backwards a bit too far, and the chair went over the edge, depositing its contents on the floor. My hero has fallen.

We have been hearing a lot lately about being a little bit better than the next fellow in order to get along. But—my gosh—a guy has to be a contortionist to even get by. First he has to keep his back to the wall and his ear to the ground. Then he must put his shoulder to the wheel and his nose to the grindstone. Finally he's gotta keep a level head, a stiff upper lip, and both feet on the ground.—and his nose clean.

And we too are of the opinion that there is something fishy go-

ing on with Trebilcott's eighth place slide rule reading. To us that darn slide rule corresponds exactly to the Chinese's description of a street car, "No pushee, no pullee; all same go like hellee."

It happened in surveying class last week. My partner had to leave town in the middle of class (so he said) and there I was stuck without a rodman in the middle of a traverse. Swallowing my pride, I approached an innocent bystander to inveigle him into holding the rod for a stadia shot. I asked him if he knew anything about surveying. He replied, "Naw, I never even looked through a transom."

We see where an organization in Wisconsin is erecting a statue in memory of Paul Bunyan. Well, if some tall story telling is any requisite for a memorial statue, we can already see Dr. Betz posing for the sculptors. He tells one about receiving a paper on which a student was to simplify the expression $\sin x/\cos x$. The apt scholar not only divided out the x 's, but also saw the common factor s and eliminated it too, obtaining the ingenious answer "in/co."

ECLIPSE HUNTING IN SOVIET RUSSIA

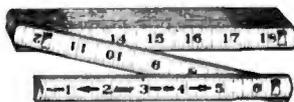
(Continued from page 8)

tronomical party had 40 cases weighing about 10 tons. The construction of all these boxes was a good-sized job in itself.

At the time of the eclipse, the members of the expedition totaled 23. Of this number, nine sailed on April 8, and the rest arrived at the camp site shortly before the eclipse. Those of us who sailed first spent a week in England, and then took a boat to Helsinki, Finland, by way of Copenhagen. The freight accompanied us to England, and then was put aboard a Soviet boat to go direct to Leningrad. In order to make sure that no boxes were lost, we were on hand every time the cargo was loaded or unloaded, and checked each box on the list. We spent one day in Helsinki, and then took the night train to Leningrad. In the morning we crossed the bridge across the stream that marked the border of Finland and the USSR. In its exact center stood a Finnish and a Soviet border guard, shoulder to shoulder. There is little love lost between the Finns and the Russians, and the Red side of the river was well protected by barbed wire. The train rolled slowly under a big red welcoming arch, and we all looked eagerly forward to our first experiences in the land of the Bolsheviks.

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Portrait of a Man Falling off the Wagon.

"I had 12 bottles of whiskey in my cellar and my wife told me to empty the contents of each bottle down the sink, or else. So I said I would and proceeded with the unpleasant task.

I withdrew the cork from the first bottle and poured the contents down the sink, with the exception of one glass, which I drank. I extracted the cork from the second bottle and did likewise, with the exception of one glass, which I drank.

I then withdrew the cork from the bottle and emptied the good old booze down the sink, except a glass, which I drank. I pulled the cork from the fourth sink, and poured the bottle down the glass, which I drank.

I pulled the bottle from the cork of the next and drank one sink out of it, and poured the rest down the glass. I pulled the sink out of the next glass, and poured the cork down the bottle. I pulled the next cork out of my throat and drank the glass. Then I corked the sink with the glass, bottled and drank the pour.

When I had everything emptied, I steadied the house with one hand, counted the bottles and corks and glass with the other, which were 29. To be sure, I counted them when they came by again and I had 74. As the house came by I counted them again and finally I had all the houses and bottles and corks and glasses counted, except one house and one bottle, which I drank."

—Colorado Mines Magazine

Doctor: "What you need is a little sun."

Coed: "Oh, Doctor!"

"Another combination shot," said the co-ed as she leaned too far over the billiard table.

Small Boy: "Say, mister, let me have six of those diapers."

Clerk: "Here you are, sonny. That will be ninety cents for the diapers, and nine mills for the tax."

Small Boy: "The hell with the tacks. Me brudder uses safety pins."

—Penn State Frosh

Movie Actress: "I'll endorse your cigarette for no less than \$50,000."

Cigarette Magnate: "I'll see you inhale first."

Frosh: "What kind of oil do you use in your car, Bill?"

Soph: "Well, I usually start out by telling them I'm lonely."

Teacher: "If I were flogged, what would that be?"

Class: "That would be corporal punishment."

Teacher: "But if I were beheaded, what would that be?"

Class, in unison: "Oh, that would be capital!"

Diner: "Do you serve crabs here?"

Waiter: "We serve anyone. Sit down."

Woman (phoning the desk clerk): "There's a rat in my room."

Hotel Clerk: "Make him come down and register."

Rastus: "Say, Sambo, what time in yore life does you think yo' wuz scared de worst?"

Sambo: "Once when ah wuz calling on a married gal an' her husband come in an' caught me. Boy, wuz ah scared!"

Rastus: "How are yo' suah dat was de worstest yo' evah bin scared?"

Sambo: "Cause her husband turned to dat wife ob his an' he say, 'Mandy, what's dis white man doin' here?'"

FORT PECK DAM

Fort Peck Dam, the world's greatest earth dam, scheduled for completion in 1939, is unique in a number of ways. The embankment is unequaled in size, being nearly five times larger than that for the Gutum Dam in Panama. Four hydraulic pipe line dredges are being used, handling over 3,000,000 cubic yards of dirt a month; a record was set in October, 1935, when 3,613,000 were moved. By careful planning, work proceeds throughout the winter months with almost no interruptions. By the use of steam tunnels located under sand and aggregate piles and heated enclosures to cover the freshly-poured structures, it was possible to place concrete when the temperature was seventeen degrees below zero.

The four concrete-lined diversion tunnels each have a finished diameter of 24 feet, 8 inches and average 6316 feet in length.

A spillway three miles east of the dam is designed to discharge 250,000 cubic feet of water per second into the Missouri River nine miles below the dam.

The primary purpose of the Fort Peck Dam is the maintaining of an 8 to 9-foot navigable channel in the Missouri River throughout the navigable season. The dam will also serve as a flood control and irrigation project, and penstocks are included for a future hydroelectric plant.

A Roman aqueduct built during the reign of Pontius Pilate still supplies spring water from outside Bethlehem into reservoirs in the mosque of Omar sanctuary.

To reduce the cost of maintaining tracks and replacing worn rails, railway engineers are now joining the ends of the rails by a process called thermite-welding.

ENGINEERS!

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G-E Campus News

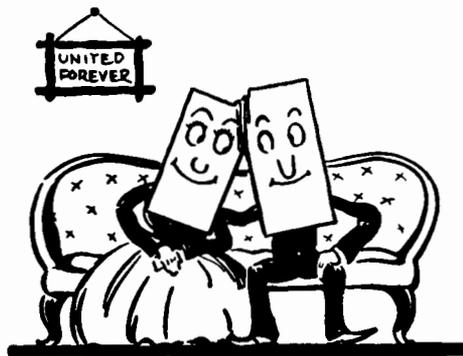


NUMBER 7000

JUST as if timed to take part in the 25th birthday celebration of the General Electric shops in Erie, Pa., Locomotive Number 7000 recently bowed its way out of its shed and took a brilliant turn on the test track.

The first of Number 7000's predecessors was begun in Erie in 1911, or just 25 years after electrical manufacture had commenced in Schenectady. Since that time locomotives weighing from 1½ to 300 tons have been turned out to improve haulage electrically. This range includes types for every sort of service—straight electric with trolley pole or third-rail shoe, battery types, internal-combustion engines, and combinations of different designs.

The Erie plant is notable for its contributions to practically every phase of modern electric transportation. The electrification of terminals and railroads has been accomplished largely with Erie equipment. Many of the new high-speed trains, which have aroused so much interest in rail travel, and many urban transit vehicles, such as street cars, trackless trolley coaches, and diesel-electric buses, likewise use Erie equipment.



FIFTY YEARS OF WELDED BLISS

TWO pieces of metal were joined in "weldlock" fifty years ago. That was in 1886, when Professor Elihu Thomson, one of America's greatest

pioneers in the field of electrical science and co-founder of the General Electric Company, invented resistance welding—fusing metals by placing them in contact and passing an electric current through them.

To mark the golden anniversary and to honor the man who officiated at the "ceremony," the Detroit Section of the American Welding Society dedicated a recent program to Professor Thomson's invention.

The years have seen resistance welding develop from its purely experimental stage into a process of metal fabrication that is wide in application. Metal radio and industrial tubes and parts, automobile bodies, the high-strength aluminum alloys used in aircraft, farm implements, the new lightweight railway equipment—all are fabricated by resistance welding.



SUNSHINE IN MANHATTAN

AT last there is sunshine—sunshine for those who spend so much of their hurried lives in the shadows of Manhattan's financial district. For in his new downtown recreation and health center—largest of its kind in the world—Artie McGovern, famous trainer and physical director, has equipped both the hot room and gymnasium with ultraviolet sunlamps.

Installed by General Electric engineers in the form of 26 ceiling units—probably the largest installation ever made in a single location—they not only afford health-giving artificial sunshine but are the sole means of illuminating the two rooms.

This installation marks another step forward in the field of lighting. The development of better lamps to sell at greatly reduced prices, the campaign for safety on the highway by means of improved highway lighting, the "Better Light—Better Sight" movement for the protection of eyesight, and the search for methods to improve general health have all been given strong impetus through the efforts of the General Electric Company.

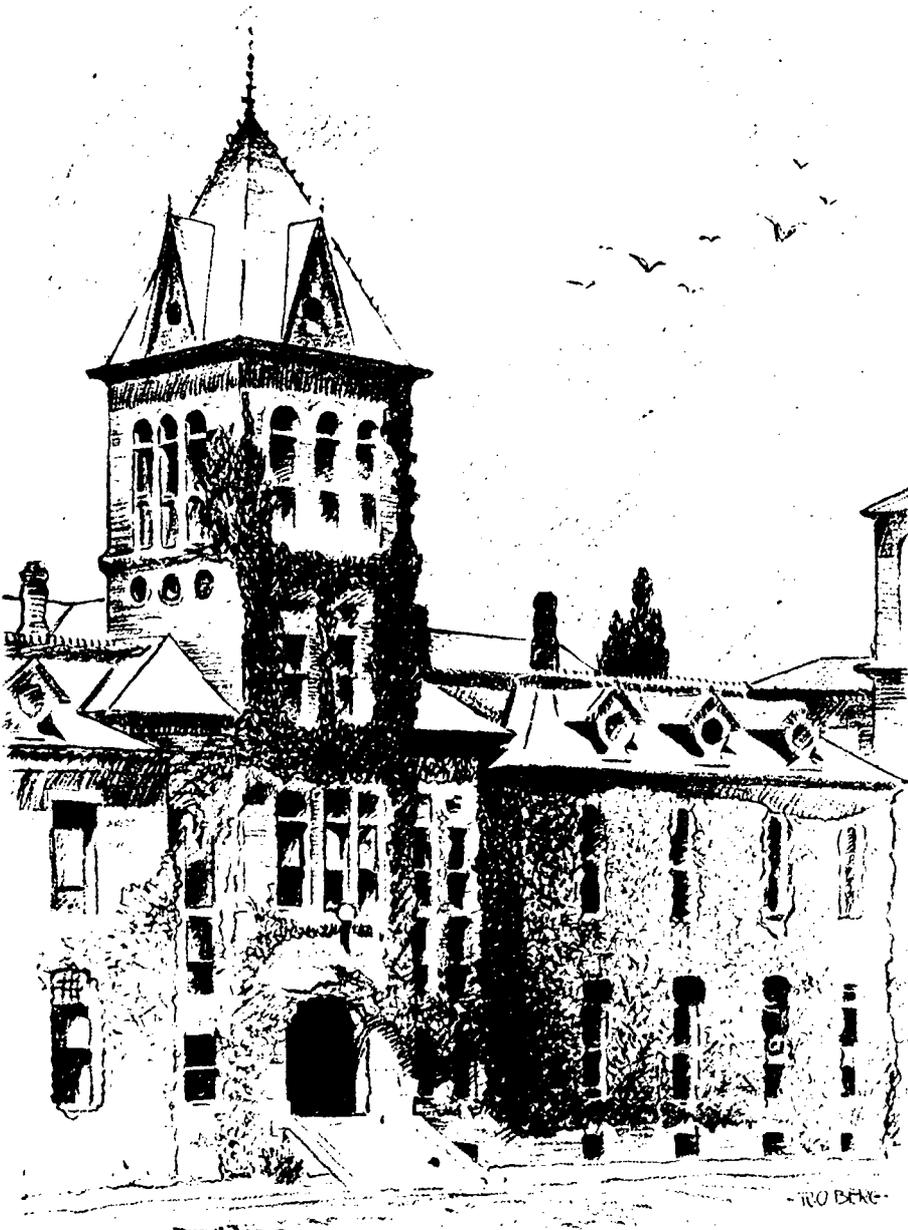
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St. Pat's
CELEBRATION
March 17-18-19-20



Engineering
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St. Pat's
FORMAL BALL
March 20

FEBRUARY, 1937

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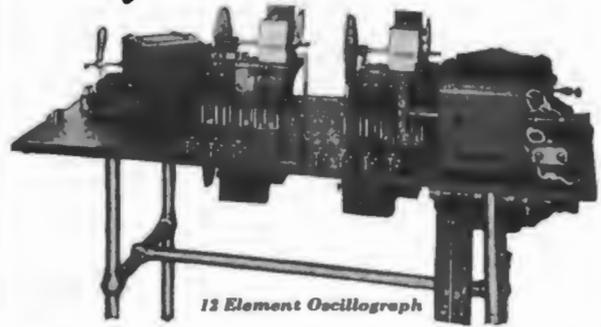
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ALUMNI...

In a little over four weeks you alumni will begin the annual trek back to Columbia to celebrate the day of our patron saint, St. Patrick. The celebration will begin, as usual, with the barbeque and serenade the night of March 17. From this beginning, activities will continue until March 20, culminating in the St. Pat's Ball Saturday night March 20.

We at the Engineering college are in the midst of preparations for staging one of our best celebrations in several years. It will be better for several reasons. To begin with, we will, during St. Pat's week, hold housewarming for our new Engineering Laboratories Building. Its ample floor space, together with space available in the Civil Engineering Laboratories, will be utilized for the presentation of numerous large scale stunts and exhibitions by the five departmental divisions of the student body. Then, too, we have a definite prestige to uphold. Since the St. Pat's celebrations originated at Missouri, many eyes will be on us during this occasion. It is our duty to conduct our festivities on as large a scale and in the most interesting manner possible.

The president of the club has left school to go to work; a new president will have been elected by the time this issue appears. The St. Pat's organization has been just a little slow in forming. These facts have reduced the time for actual preparation. However, we are now in full stride, and will guarantee you a celebration that you will enjoy.

THE SHAMROCK

COLLEGE OF ENGINEERING
UNIVERSITY OF MISSOURI

FEBRUARY, 1937

Volume 4

Number 3

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THE SHAMROCK

Volume 4

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Transportation Difficulties of World's Longest Pipeline

By MORRIS RABINOW

UNDOUBTEDLY, one of the world's most gigantic transport accomplishments was achieved during the construction of the world record pipeline from Iraq to the Mediterranean. Almost every means of conveyance was used during construction operations. The pipes were carried by land, sea and even air. Ship, railroad, tractor, truck, cableway and derrick all joined to facilitate the conveyance of the 12-inch steel tubes and materials to their destination. After being shipped from their European origin, the pipes were conveyed by ship across the Mediterranean, through the Suez Canal, down the Red Sea, up the Persian Gulf to Basra Iraq. They were taken on special railroad cars, then on tractors across the sandy desert and stored at various stations along the line. Derricks loaded them on huge trucks

Mr. Morris Rabinow graduated from the University of Missouri in 1932 with a B.S. in E.E. After graduation he took a job with The Iraq Petroleum Company. With the completion of this pipeline Mr. Rabinow opened an Electrical business of his own in Palestine Jerusalem, where he is occupied at the present time.

where they were taken and stored on the east bank of the Euphrates River. An immense cableway carried the pipes across the river. Again motor vehicles were used to carry the pipes to their destination. Other pipes were taken by a different route because of the great difficulty in passing an extremely rocky part of the desert. For this purpose Scammel (English) trucks were used to carry their loads across the lava

country, these being the only vehicles in the world capable of negotiating this abnormal surface.

Let us now summarize the natural difficulties confronting the engineers in conveying over 100,000 tons of pipes for thousands of miles. Very few railways existed so that rails had to be laid and special cars built to convey the materials in Iraq. Later, it was learned that vehicular transport was much more economical than transport by rail, but the railway and cars had to be completed in accordance with the contract. The desert surface was found to be hard in some places but very soft and sandy in others so that huge tractors with their trailers equipped with caterpillar treads were resorted to. Sandstorms would hold up traffic and transport for days at a stretch causing delay and inconvenience. The motor vehicles gave much trouble because of the severe conditions under which they were operated. There were no roads to guide the drivers so that night driving was difficult. Frequently the drivers lost their way. Trouble on the desert was frequent because the vehicles were driven by inexperienced men recruited from small villages, and we can appreciate their difficulty when they had to leave their vehicles at night to repair them and to keep an eye open for wild beasts, snakes and scorpions which were found to abound in exuberant profusion. During the rainy season traffic



Fig. 1. Aero-car used to supply parts.

was held up completely for weeks at a time.

Each difficulty will be explicated upon. The tractors were stationed and serviced at Baiji, Iraq. These 65 horsepower monsters solved the problem of transport across sandy country. Each had two trailers. Caterpillar treads had to be used on the tractor as well as on the trailers because of the soft earth. This, however, rendered transport slow and expensive. Nevertheless, it was much cheaper than the construction of a railroad and special cars to carry pipes. Fortunately, the contract was made for the construction of a rather short line, otherwise, the loss would have been greater than it had been on the above mentioned line.

Sandstorms were very annoying. Work had to be held up for days at a stretch and traffic proceeded very slowly. In fact, at times traffic had to stop completely since one couldn't see more than a few feet ahead. A few words will be said about the nature of a sandstorm. Dust particles become charged electrically. They repel all particles near them since the charge is the same sign. For this reason they may remain in the air for several days. An aerial caught enough electricity during one of these storms to give repeated 1/2-inch sparks to earth. Tornadoes, although frequent, gave less trouble than sandstorms because of their short duration.

The upkeep of nearly one thousand vehicles was very (expensive) high. This was partly due to the severe conditions of operation. There were no paved roads, or to be more exact, no roads at all. The desert surface played havoc with springs in particular. Each passenger car carried one or two spare ones. The chassis on almost every make of car broke, but, the Scammell suffered most in this respect. Electrical troubles were abnormally frequent. The reasons for these



Fig. 2. One of the Scammell trucks used in crossing rocky country.

were many. The intense desert heat and the cold night air, the intense vibration and "hard going," the inexperienced drivers and many adverse conditions contributed to these troubles.

The aero-car in Fig. 1 was used to supply electrical spare parts to the various stations. If any major electrical repairs were needed at any place the aero-car and its men remained to complete the repair. In addition, advice was given where the local repairmen were inexperienced. This was necessary because more harm was done by curious inexperienced electricians than on the road perhaps. The huge trucks and their complicated electrical systems were new to almost everyone and all were interested in seeing the strange units dismantled. This was especially true of voltage regulators. The expensive storage batteries needed every possible protection against abuse. Voltage regulators helped by preventing the batteries from being overcharged. As the batteries came up to charge the regulators automatically reduced the charging current. After, the drivers seeing the ammeter showed only a few amperes charge, would meddle with the generator or regulator to bring it up to the high charging rate they were accustomed to having. We then sealed all the units.

Voltage regulators on White trucks frequently burned-out. The relay coil was found to be the weak spot in these. The writer then used an external relay in connection with the burned-out unit where the regulator winding remained intact and got very satisfactory results. This had to be done because spare regulators had not yet arrived. The Marmon-Herrington regulators never burned because they were of sturdy construction and wound with enameled wire which was more suitable for the desert temperatures than cotton covered wire. Their points sometimes stuck due to arcing caused by dust working between them. More than once this caused a complete burn-out of the entire wiring as well as the generator. The Bosch regulators on some English trucks worked well, but, the field resistances used in conjunction with these regulators gave trouble. Besides, spares were lacking so the problem was to eliminate these altogether if possible. The generators used had only two brushes. A third brush was fitted to them for the field and the generator acted as an ordinary three brush generator without any regulator. The only difference was that the third brush was immovable. Its position was determined by running

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ECLIPSE HUNTING in Soviet Russia

CONTINUED FROM DECEMBER ISSUE

By HARNER SELVIDGE

A FEW HUNDRED yards from the border we stopped at the customs station and got off our train, steeling ourselves for the ordeal to come. Many questions raced thru our minds. Would we be able to take all our cameras and films in? Would they find that we had more cigarettes than the rumored limit? What about three suitcases full of radio tubes, surely unusual objects for tourists to be carrying? Fortunately all our fears were groundless. A letter was shown to the chief customs officer which cleared all the apparatus. Our cameras and field glasses were listed on our passports and we were required to show that we still had them when we left the country. A careful inventory of all our money was taken as it is illegal to take any Russian money out of the country, or even more foreign currency than you take in. This restriction is also the case in Germany and Poland on account of the unusual financial condition that exists in these countries. In fact, one member of our expedition arrived late because he was arrested in Poland for failing to declare his money at the border. Luckily he spoke German and man-

aged to explain that he did not break the law intentionally. He was shortly released, but spent an uncomfortable day. We had no such difficulties in Russia.

I was the goat at the Russian customs inspection. After one of the inspectors finished with one of my bags he shut it up suddenly and mashed my only tube of shaving cream all over the inside and outside of my bag. In the other bag he found a couple of Colliers and Saturday Evening Posts which I had been carefully hoarding to read in Ak-Bulak. He decided they would have to be held, but after a protest he lost interest and I finally got them back. All of our books and papers were carefully scrutinized, page by page, by the inspectors, most of whom spoke no English at all.

After a few hours we were off to Leningrad, a couple of hours distant. There we were met by Dr. Gerasimovic, director of the Poulkova Observatory at Leningrad, and a world-renowned astronomer. At one time he was at Harvard University Observatory and had spent several years in America. He was the head of the Soviet Academy of Science's Eclipse Committee, and



The Author in Russian Garb.

had charge of all the arrangements for the visiting scientific expedition. In Leningrad we learned that we had had an unexpected piece of good luck. We found that he had arranged that all of our boxes of freight could be brought into the country without any customs inspection. This was an entirely unprecedented concession and saved us many days time. Dr. Gerasimovic then told us that he had arranged for us to have seats in the reviewing stand in Leningrad for the May Day parade to be held that week. We then went to our hotel, the Astoria, and found very luxurious accommodations, with the hotel restaurant serving remarkably fine meals. In fact most of the party agreed that they were the best meals they had eaten anywhere.

On May first we were aroused early and after a hurried breakfast we started out for the square through which the parade was to pass. Our parade tickets and passports were minutely scrutin-



Map of Russia showing path of total Eclipse.

(Continued on Page 11)

Modifications In Steel Analysis

A SURVEY of the types of steel used by almost every important industry—automotive, aviation, railroad, ship, construction, mining, petroleum, chemical, food—indicates that chromium steels are more widely used than ever before. The tendency is to use more chromium steels for heat-resistant and corrosion-resistant applications and for added strength in structural applications. Certain modifications of analysis, such as new gradations of chromium content and suitable additions of other elements, are making many of the chromium steels more valuable, more economical, and more widely applicable.

Modifications of the widely used 4 to 6 per cent chromium steels that have been chronicled in recent technical publications or displayed in engineering exhibits include a molybdenum-bearing 9 per cent chromium steel suitable for severe service in petroleum refineries and power plants. For high-pressure service, where resistance to shock and the decarburizing effect of hydrogen at high temperature is required, good results are obtained with 1.50 to 2.75 per cent chromium and the addition of molybdenum and vanadium. An-

Fig. 2. Specimens showing effect of nitrogen addition on grain size of 20 per cent chromium steel. Left, with Nitrogen. Right, without Nitrogen.



other modification is a columbium-bearing 2 per cent chromium steel. The 4 to 6 per cent chromium steels themselves have been modified and improved by additions of columbium or titanium. The creep strengths of 4 to 6 per cent chromium steels containing tungsten or molybdenum, which are used for condensers and tubing in oil cracking, are improved when columbium is added.

The addition of columbium or titanium is responsible for much of the improvement in the properties of many of the chromium-nickel and straight chromium steels, and is the most successful answer research has yet given to

certain exacting demands of industry. The prime function of columbium is to control the carbide constituents of chromium steels. There have long existed many possible applications in which plain chromium steel would have proved exceedingly useful had its air-hardening characteristics been modified or eliminated. Columbium is very effective in overcoming or modifying the air-hardening properties of these steels, including those of the high-chromium stainless type. In the past year columbium-bearing steels have aroused much interest and favorable comment, especially among those who are interested in products fabricated by welding.

Columbium is used in 18-8 chromium-nickel stainless steel welding rods, and either columbium or titanium in the stainless base metal to inhibit any tendency toward intergranular corrosion that might otherwise be present in or near welds. The amount of columbium added is determined by the carbon content of the steel and by the temperature at which it is to be used. With correct amounts of columbium in these steels it is not necessary to anneal structures

(Continued on Page 12)



Fig. 1. The Sea Bird. A welded Stainless steel Amphibian fully equipped but weighing only 2,285 lbs.

THE ENGINEER'S CLUB

By DEAN F. ELLIS JOHNSON

Our Engineers Club provides such interesting opportunities that the organization should be a challenge to every alert and ambitious student. There are those who take much satisfaction in the history of the Club's activities and in its accomplishments in the past. Such satisfaction should not be denied. It is the forward look, however, with its interesting possibilities that we wish to consider just now.

Each one of the professional engineering societies fulfils a definite need but is necessarily limited in its scope. The Engineers Club as the organized student body has as its broad field the interests of all engineers. All those larger undertakings that are obviously beyond the scope of any departmental society are its proper field. Such undertakings as maintaining on a worthy level the tradition of St. Pat's, as promoting an All-Engineer's Ball, or an All-Engineer's Banquet, or a successful management of Open House of all laboratories are unquestionably its proper business. These activities lend interest and

esprit de corps to student life. In their successful and proper management is laid the foundation for important standards which unquestionably will be reflected later in the professional life of the men involved. It is therefore a most important thing when the Engineers Club determines the basis of eligibility upon which it elects its officers and the standards by which it measures their conduct of the responsibility placed upon them. Not alone is the reputation of the entire engineering student body involved in its conduct of its public affairs but also involved to a degree not often realized is the future reputation of engineering as a profession. The unity and unselfishness of interest necessary for the successful prosecution of Engineers Club activities is a splendid preparation in college for that necessary unity of undertaking among engineers in professional life later that is so essential if engineering as a profession is to claim not only the respect of its public but the rewards and the larger opportunities that fundamentally engi-

neering deserves as a major servant of our civilization.

Beside all these larger implications of Engineers Club activities, the importance and challenge of this organization to the individual must not be overlooked. The individual engineering student during his college life has no richer opportunity in any of his associations to train himself for leadership than in the Engineers Club. The man who endeavors to work happily and effectively with fellows from all other branches of engineering in making a success of the Club's undertaking has before him an opportunity to develop judgment in dealing with large numbers of men of diverse interest as well as in exercising that delicate thoughtfulness and tact that is so necessary if he is later to work successfully with other individuals. It is to be hoped as an important contribution to the growing worth of our College of Engineering that each succeeding class will take a more active and a more intelligent interest in the Engineers Club and meet the important challenges it offers to both the student body as a whole and to the individual man.

ST. PAT CELEBRATION . . . Chairman St. Pat's Board, Chas. Owings

Saint Pat! Of what do you think when you hear that name? Do you think first of a famous Irish Churchman? Do you first think of the one who drove the snakes from Ireland. No! You think of the Engineers and the Saint we claim as our Patron.

For thirty-four years since the discovery of his guardian care, in 1903, we have successfully celebrated his birth and proclaimed our affection for him. Types of celebrations have varied from year to year, but always we have succeeded in broadcasting the idea that we are proud to claim him. This year we hold our thirty-fifth celebration. It's our job,

yours and ours, to see that the celebration is a success.

We've never failed the old fellow and we don't intend to start now. We are going to make the 1937 celebration as large as it is in our power to make it for St. Pat will be shown, for the first time, his new Engineering Laboratories. We plan to give him such a display of Laboratory stunts, both old ones and new ones, that he'll still be talking about them when he returns in 1938. It will of course be possible for the townspeople as well as the students of the University to attend these demonstrations.

In addition to the stunts using

all the facilities of our new Laboratories, we will continue to hold the greater number of the customary events of the week.

The barbecue and subsequent music will continue as usual except that the meat is expected to be even choicer "hoof" than ever before and the music will be closer to the quality of the Choral Choir than last year.

At the Alumni Luncheon "Old meets New" for it is here that returning alums and we who are still "fixtures" are mixed together and given a chance to become acquainted. This luncheon has become a very desirable part of our

(Continued on Page 14)

ORGANIZATIONS

CHI EPSILON

At the meeting of Jan. 15, Jack Coates, our official representative to the national convention at Purdue University, presented an account of the convention procedure. His presentation of our pledge project, that of making a stadiaboard paddle, met with popular approval. Writeups of the senior members of the local chapter, together with a picture of each, are being prepared for the next issue of *The Transit*, official publication of the national organization.

PI TAU SIGMA

At the formal initiation on Dec. 10, the following men were initiated into Pi Tau Sigma: Herbert Baugh, Eugene Burnette, Bradley Douglas, Robert Geauque, and Clifford Holt. Following the initiation ceremony, a banquet was held at Gaebler's, at which each of the new members presented a short paper. Prof. J. R. Wharton acted as toastmaster.

It is planned to renew the practice, inaugurated several years ago, of alternating business meetings with informal luncheon meetings, at which a talk is given by men outside the field of engineering. It is felt that such contacts help broaden the engineer's rather technical outlook.

TAU BETA PI

At the last meeting of Tau Beta Pi held during the first part of December, the new initiates presented papers before the careful judging of the old members. R. C. Garrett won first place with a paper on "This Chaotic World."

New members are to be chosen from the upper one-eighth of the junior class. Outside activity as well as scholastic average will enter in their decisions for these new men.

A. S. C. E.

A. S. C. E. held its first meeting following the Christmas holidays on Jan. 14 with a luncheon at Harris' Cafe. Following the dinner Prof. R. L. Scoriah, of the M. E. department, gave an illustrated lecture on "Night Radiations in the Sky," and discussed along with the visible auroras, a comparatively recent discovery of the existence, and effects on the naked eye, of invisible radiations.

A special meeting was called Feb. 10, in honor of Mr. Goetz, Mr. Ax, and Mr. Dierking of the Portland Cement association. The group attended a luncheon at Harris' Cafe after which they convened at the Engineering Auditorium where Mr. Goetz delivered an illustrated lecture on the use of Reinforced Concrete in modern structures.

A. S. C. E. will have their next regular meeting on Thursday evening, Feb. 25, the place yet to be decided. Plans are being formulated to show motion pictures of present structural activities of recent projects. The pictures will be furnished through the courtesy of the American Institute of Steel Construction.

A. S. M. E.

The members of the Missouri Student Branch of A. S. M. E. held their regular election of officers for the second semester on January 26. The following officers were elected: T. O. Thompson, Chairman; B. C. Douglas, Vice-chairman; J. J. Hill, Secretary-treasurer. The following committees have been appointed: B. Flowers, Membership; J. Louis Crum, Jr., Inspection Trips; B. C. Douglas, Meetings and Papers; B. K. Flanery, Publicity.

At the meeting of January 12, J. Louis Crum, Jr., presented a paper on air-conditioning, illustrated with slides distributed by The American Radiator Co.

A motion picture distributed by The Babcock-Wilcox Co., on Steam was presented at the meeting of February 9. Mr. F. C. Brandt, manager of the St. Louis division of Babcock-Wilcox Co., was a guest of the organization at that time.

A. I. Ch. E.

On January 6th the members of A. I. Ch. E. gathered at Blackmore's studio to be photographed for the *Savitar*. The group included fifty members of the organization and Dr. Lorah, sponsor. During the final examination week and the two preceding, preparatory weeks, there was no activity among the Chemical Engineers, all of whom were dusting off the last pages of their text books. The next meeting will be held February 11th in the Engineering Lab.

The Physical as compared to the Chemical Characteristics of Clay was the subject of a talk given by Dr. C. E. Marshall, visiting professor from the University of Leeds, England, to the student branch of A. I. Ch. E., on Feb. 11. Doctor Marshall explained the lattice structures of the molecules of Aluminum, silicon, oxygen and potassium, which make up most of our clays.

A. I. E. E.

The usual rush of final week temporarily shunted the activities of the A. I. E. E., but normal operating conditions will be resumed Feb. 16 when a paper entitled "Airport Lighting" will be presented by Jim Trebilcote. A film, "The Magic of Communications" will be shown in conjunction with this paper.

Plans for this semester's activities include the presentation of a film at each meeting. Several outside speakers have arranged to present papers at a banquet the date of which will be announced later.

WORLD'S LONGEST PIPELINE

(Continued from Page 5)

the two-brush generator on a test bench and attaching the field to a carbon brush and holding this on the commutator in different positions until the maximum charge was obtained. A resistance, whose value was determined by experiment, was placed in the field for a fine adjustment of charging current. This worked so well that all the generators were equipped with a third brush and the regulators dispensed with. This simplified the wiring and gave much less trouble.

The intense vibration the vehicles were subject to caused many short circuits. The wires near sharp metal edges often became abraded due to continual vibration and caused trouble. The continuous day and night driving caused the generators to burn. The desert air, which the temperature would reach 170°F. in the sun, prevented a proper dissipation of heat. The huge engines of the heavy trucks generated an enormous amount of heat and because the generators were placed close to these powerful engines they worked at such a high temperature that there was deterioration of the insulation. These electrical units were not designed for tropical, but form temperate climates. At intervals the armatures were re-wound even if there actually did not exist a defect for it was

known the insulation would cause trouble periodically.

The cold night air caused hard starting because the heavy oil stiffened. This caused the many battery troubles we had. To obviate this strain on the batteries the writer suggested using a welding machine for starting. These were found in every station. They were capable of delivering up to 600 amperes at 40 volts. There was a large drop in the long leads due to the heavy current, impressing about 25 volts across the starter. This was double the rated voltage, but proved very satisfactory. (Any automobile starter will take double the voltage it is rated at with no harmful results).

Each vehicle was equipped with extra oil, water and petrol tanks for their long desert trips. This proved a big expense because nearly a thousand vehicles had to be so equipped.

The cost of operating small trucks was found to be much higher per ton-mile than the larger ones. As an experiment a Mormon-Herrington truck was bought for \$40,000. This massive vehicle with its trailers weighed 43,000 pounds and could carry forty tons. A factory representative came out with it because it was too complicated for ordinary repairmen to attempt repairing. His advice was very much needed. Once a tooth broke off from one of the gears in the transmission. He cautioned against welding on material as, if this should break it would ruin all the good gears. Instead he advised loading it to half its capacity. When no ill effects were noticed it was loaded as usual until a new gear came. The upkeep of this truck was so low per ton-mile that three similar ones were ordered. Fig. 1 shows a Mormon unloaded. The maximum speed was governed a 28 miles per hour. From a crawl to maximum speed the vehicle had twelve forward and three reverse shifts. It had

thirty tires, ten of which were on the truck and were supplied with power from the huge 190-hp. engine.

In contrast to these vehicles Scammel trucks, shown in Fig. 2 could carry only eight tons. However, the lava country made it very difficult for a greater load to be carried. The country for fifty miles around an extinct volcano estimated unsurpassable until a road was constructed over the bad stretch. Rocks from the size of a bean to a cubic yard in volume covered the surrounding earth and made the land black with lava. This is shown in Fig. 2. These heavy trucks did not use the road for long because the loose stones flew in all directions when a truck went over the road. Because of their excellent performance one was chosen to carry the last pipe to complete the gap where two gangs met thus ending the construction of the 1,179-mile pipeline. A British flag was carried by this Scammel for the occasion.

During the winter months travel across the desert was impossible for weeks at a stretch. The soft earth would allow a vehicle to sink hub-deep in it after a heavy rain. Chains were of little value in such cases.

Almost all drivers carried arms while crossing the desert. This was not so much for wild beasts as for savage Bedouin. Even Arabs feared to travel alone on the desert. Drivers had to be careful not to lose their way. They were guided by the telephone line that ran the entire length of the pipeline. This line was erected before any other construction so as to maintain vital telephone and telegraphic communications. It was constructed in the record time of eight months. About 29,000 poles, 25 to the mile, were used and each marked with its exact distance from the starting point at the oilfields in Kirkuk.

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Columbia, Missouri

A great cableway and ferry were used to transport materials and men across the Euphrates River. The cableway carried most of the material as it did the work quicker. It consisted of two piers erected 1,800 feet apart and each being 140 feet high. It solved a big problem economically. The river, 1,500 feet wide in winter, proved very shallow for a heavy boat and a bridge would have been costly. Maintenance of the cableway was not very great. Every week an engineer went to the top cable to measure its diameter for wear and recommend when a new cable was needed.

The ferry used was a light one. It was propelled by the action of the flowing water. The front was attached to a pulley which ran along a main cable stretched between both banks. To a cable was fastened a pulley free to roll along the main cable. The other end of the cable was on the ferry. If the ferry had to travel eastward the cable and its pulley were placed on the west side of the boat and the end of the boat was pulled until the ferry was at the proper angle to the current with the stern to the west. This was a very clever idea but it took too long for the ferry to cross from one bank to the other.

In the autumn of 1934 the \$50,000,000 pipeline was completed and King Ghazi of Iraq, in the American fashion, pushed a button and oil started flowing to the Mediterranean Sea. Thus was finished one of the greatest engineering jobs of modern times. A year later, during the month of October, 1935, the vast amount of 347,000 tons of crude oil were sent to the Mediterranean.

During the riots of 1936 the pipeline was damaged by rifle fire repeatedly. Plans are under way for the construction of another line of bullet proof steel.

ECLIPSE HUNTING

(Continued from Page 6)

ized no less than twelve times during our three-block walk to the stand. The parade started at ten o'clock, and we were treated to the sight of two million people parading past a handful of officials and guests who did not total two hundred. When we arrived, the square was full of soldiers, and the ceremonies started with military formalities, which included the taking of the oath of allegiance and the singing of the Internationale. Then the army passed in review. For two hours they marched by in a magnificent display of every conceivable kind of armament. First there were the foot soldiers. These included infantry, frontier guards, militia (police), and aviation auxiliaries. Then came the cavalry and artillery units with an enormous variety of guns of all sizes. These were followed by mobile units including armored cars. There were also trucks filled with "flying infantry," each man with a parachute on his back and carrying a light machine gun. Then came all sorts of tanks. There were very fast light tanks, amphibians, tanks with flame throwers and big mobile fortresses mounting large guns. We saw several hundred tanks, there being several dozen of each type. As the last of the tanks entered the square, the first of the airplanes roared overhead. There were about three hundred planes, starting with the big bombers and transport ships, and ending with three extremely fast pursuit planes with dived down at the square and then roared by so fast the eye could scarcely follow them. It was rumored that they were powered with the latest type of American made motors.

After the army passed, the parade of the Proletariat began. Until five o'clock in the afternoon the square was packed with moving paraders who entered from three streets on one side and

went out on the other side after passing the reviewing stand about two hundred abreast. They were organized in groups, such as trade unions, sports clubs, army reservists, factory groups, and other organizations. They carried all sorts and kinds of banners, placards, floats, flags, and huge pictures of the various government leaders. The parade was closed by a band of 3000 pieces which marched by in close formation. Fortunately we had seats throughout the nine-hour session, but many in the reviewing stand stood the whole time. It was uncanny the precision which which the whole affair was managed, as there were no waits or hitches and everything went off as scheduled. Of course they have plenty of practice, with several such parades each year.

After a few days of sightseeing in Leningrad, we took the train overnight to Moscow. There we spent a few more days making final arrangements for our journey. We had time for some sightseeing here, including a visit to Lenin's tomb. We then left for Ak-Bulak in a private car attached to the end of the regular train. Our car had a kitchen, several sleeping compartments, a small office, and a large living room

GIVE CRESTED GIFTS

WE HAVE A COMPLETE
STOCK OF CRESTS



Buchroeder's

ECLIPSE HUNTING

(Continued from Page 11)

which served double duty as a dining room. The nine of us had a cook, a steward, a waiter, a conductor and a porter to do our bidding. It was planned that we would live in the car while we were in Ak-Bulak.

When we arrived in Ak-Bulak we were greeted by the head of the local soviet (mayor) and other local officials and our car was put on a siding. You will recall that all our apparatus was built to operate on 220-volts, 50-cycle AC, the Soviet government having reported this power as being available in Ak-Bulak. So as soon as we arrived we went on a tour of the local generating stations. We were first surprised to learn that the power was turned on when it got dark, and went off at about 2 A.M. Then imagine our complete dismay when we found that there was not a single alternator in town. There was only 220 **direct current**, and not a single piece of our apparatus could run of DC! !

(Editor's note:—How the power problem was solved and the story of the eclipse will be told in the **concluding** installment next month.)

STEEL ANALYSIS

(Continued from Page 7)

fabricated by welding in so far as obtaining freedom from intergranular corrosion is concerned.

Among the important modifications of the straight chromium, oxidation-resistant steels, is a heat-treatable alloy containing 16 per cent chromium and 1 per cent nickel. This corrosion-resistant alloy is heat-treated after fabrication and is used in airplane construction.

The soaring "Sea Bird," the first non-experimental all chromium-nickel stainless-steel airplane, symbolizes the outstanding posi-

tion of alloy steels in a year of unabated metallurgical progress. The railroads, with their streamlined trains of stainless and low-alloy structural steels, have already gained a prominent position among the users of high strength steels. Furthermore, predictions are that the automotive industry, always an important user of alloy steels, will use 50 per cent more chromium-nickel stainless steel in 1937 than the already substantial amount consumed in 1936.

The analyses of many heat-resistant steels containing 20 to 35 per cent chromium have also been modified. A new alloy containing 35 per cent chromium and 7 per cent aluminum has recently been announced as suitable for continuous service at 2,300 deg. F.

Another important modification of the high-chromium steels with which steelmakers and foundrymen are becoming familiar is the addition of nitrogen to improve the grain structure. Steel castings containing over 20 per cent chromium have been in use for many years in applications where resistance to corrosion, to high temperatures, and to excessive wear is desirable. Such castings have shown a tendency toward the formation of a large grain structure and toward grain growth when held at a high temperature for very long periods. The addition of nitrogen to such alloys has the effect not only of reducing the tendency to grain growth at high temperatures, but also of refining the grain. This results in a marked increase in the ultimate strength, yield point, elongation, and reduction of area. The nitrogen is added in the proportion of approximately one part of nitrogen to 120 parts of chromium. It is introduced in the form of high-nitrogen ferrochrome.

Nitrogen is added to chromium steel ingots as well as to castings, and imparts a fine grain to the metal. The fine grain makes the alloy tough, ductile and more adaptable to deep drawing operations. Nitrogen-bearing high-chromium steel therefore appears to have valuable potentialities for manufacturers desiring a high quality corrosion-resistant seamless tubing.

While the tubes of nitrogen and columbium in chromium steels are still being tried out in many industries with view to wider application, the utilization of many new modifications of chromium steel is already very extensive. The older types of chromium steels are also being used to an increasing extent. The automotive industry requires even more than aviation and the railroads; but all these industries are using increasing amounts. Collector rings, exhaust manifolds, pump shafts, valves piston rings, and water jackets of chromium steel are used in automotive, aviation, and power plant engines and generators. Steam power plants have superheaters made of 18-8 chromium-nickel and other high-chromium steels. A Bessler steam engine with stainless steel coils has been used in a train and has been made light enough for use in airplanes. Architects are employing chromium-nickel stainless steel more extensively than ever for building trim. Kitchen installations and furniture of this metal are becoming more popular for residences.

The wider application of chromium steels, a greater variety of commercial ranges of chromium content, and modifications to include nitrogen, columbium, titanium, molybdenum, aluminum, nickel, or tungsten, depending upon the application, are very definite trends.

ALUMNI NEWS

Since the first of the year, Mr. Donald Stanberry, B.S. in Eng. (ChE) 1935, has been at the Jersey City, N.J., plant of the Colgate-Palmolive-Peet, Co., to which he was transferred from Kansas City.

Ed Donnelly, (ME) '35 is with Frick Co., Waynesboro, Penn.

James Gilbert, BS in ChE '33, is now employed by Shell Petroleum Co.

Carl D. Muench, BS in Eng. (ME) '25, is Sales Engineer for the York Ice Machinery Corp., Des Moines, Iowa.

Carl E. Baumbarten, BS in Eng. (ChE) '21, is Chemical Engineer for the Aluminum Ore Co., in East St. Louis, Illinois.

Louis H. Winkler, BS in Eng. (ME) '07, is Metallurgical Engineer for The Bethlehem Steel Co. in Bethlehem, Penn.

Frank W. Capp, BS in Eng. (CE) '09, is employed in the Structural and Technical Bureau of the Portland Cement Ass'n, Chicago, Ill.

Frank H. Adams, BS in Eng. (CE) '08, is now Vice-President and General Manager of the Surface Combustion Co. in Toledo, Ohio.

C. C. Cornelius, BS in Eng. (EE) '17, is Superintendent of the overhead systems of the Kansas City Power & Light Co. in Kansas City, Missouri.

Thomas P. Halley, BS in Eng. (CE) '21, is District Manager of the St. Louis, Missouri branch of the Southwestern Bell Telephone Co.

C. E. Huffstetter, BS in Eng. (CE) '12, is with the U. S. Corps of Engineers at Memphis, Tenn.

C. E. Schooley, BS in Eng. (ChE) '21, is an instructor in Chemistry at the Junior College of Kansas City, Missouri.

L. N. VanHook, BS in Eng. (EE) '10, is Assistant Superintendent of Power for the St. Louis, Missouri Public Service Company.

Paul A. Blackwell, BS in Eng. (CE) '00, is Chief Engineer for the Virginia Bridge Co., in Roanoke, Va.

Abe Detweiler, BS in Eng. (ME) '31, is with the U. S. Dept. of Agriculture at Washington, Mo.

Warren H. Moore, BS in Eng. (EE) '20, visited the University last August. He is employed by the Century Electric Co. at the Cleveland, Ohio, office.

Truman E. Witt, BS in Eng. (EE) '22, is employed in the Omaha offices of the Century Electric Co. Until recently he has been located in the St. Louis division.

L. A., Schlueter, BS in Eng. (ME) '27, is Ass't Gen'l Supt. of the Tar and Chemical Division of the Koppers Co. in Pittsburgh, Pennsylvania.

Fred Kennedy, BS in Eng. (ME) '11, visited the University last August. His home is in Muskegon, Michigan.

Erskine S. Longfellow, BS in Eng. (ChE) '21, is now a chemistry instructor at the Junior College of Kansas City, Missouri.

James L. Baker, BS in Eng. (CE) '32, is with the Texas Highway Department in Houston, Tex.

Frank W. Capp, BS in Eng. (CE) '09, '12, is employed in the Structural and Technical Bureau of the Portland Cement Association in Chicago, Illinois.

Carl E. Baumgarten, BS in Eng. (ChE) '21, is doing chemical engineering work for the Aluminum Ore Co. at East St. Louis, Illinois.

Logan H. Keller, BS in Eng. (EE) '12, is owner of the L. H. Keller Electrical Equipment Co. in Kansas City, Missouri.

George D. Oliver, BS in Eng. (EE) '16, is manager of the Mountain States Power Co. at Riverton, Wyoming.

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... BLARNEY ...

A wealthy client insured her wardrobe while traveling in Europe. Upon reaching Paris she found an article missing and immediately cabled her broker in New York: "Gown lifted in Paris." Her broker replied, after due deliberation: "What do you think our policy covers?"

—Mad Engineer

Engineers' Whiskey Test

Connect 20,000 volts across a pint. If the current jumps it, the product is poor.

If the current causes a precipitation of lye, arsenic, iron slag, and alum, the whiskey is fair.

If the liquor chases the current back to the generator, you've got good whiskey.

—Pelican

Mixed

Judge: "Are you certain that the defendant was drunk?"

Officer: "Absolutely, sir."

Judge: "Why are you so sure? Could you have been mistaken?"

Officer: "Well, I saw him put a penny into the telephone box, then look up at the clock on the City Hall and moan: 'My gosh, I've lost fourteen pounds!'"

—Kablegram

"Does your boy friend have ambitions?"

"Mercy, yes, ever since he's been knee-high."

FREE!

We will shave the beard that
wins the kiss.

TIGER

BARBER SHOP

The Guest's Choice

Hotel Clerk: "Inside or outside room, sir?"

Guest: "Inside, I guess; it looks like rain."

Schoepel (translating a passage in German): "I fell to the ground, humble, alas, and clasped her by the knee—and that's as far as I got, professor."

Ill. Tech

The nurse entered the professor's room and said softly, "It's a boy, sir."

The professor looked up from his desk. "Well," he said, "what does he want?"

Mary had a little skirt,
And it was very tight.

Who gives a damn
For Mary's lamb,
With Mary's calves in sight.

Slight of Ham

A big buck Indian had just ordered a ham sandwich at a drug counter and was peering between the slices of bread when he turned and said to the waiter, "Ugh, you slice 'em ham?"

The waiter replied, "Yes, I sliced the ham."

"Ugh," grunted the Indian. "You damn near miss 'em."

—Nebraska Awgwan

She "Do you think you're Santa Claus?"

He: "No, why?"

She: "Then leave my stockings alone."

—C.C.N.Y. Mercury

He: "Do you know how bad the drought is in the Midwest?"

She: "No. How bad is it?"

He: "It's so bad that the trees are going to the dogs."

—Cornell Widow

The bright young pupil looked long and thoughtfully at the second examination question, which read: "State the number of tons of coal shipped out of the United States in any given year." Then his brow cleared and he wrote: "1492—none."

—Utah Humbug

ST. PAT (Con'd from Page 8)

program and will by no means be neglected this year.

Through our Friday night All-School Dance at Rothwell Gym we give every one an opportunity to dance to the music that on Saturday night we reserve for Engineers alone. We are not yet ready to announce the name of the orchestra, but we are sure it will meet with your approval.

St. Pat will arrive during the week and will be on hand to knight all of his loyal followers. All Engineers will, of course, greet St. Pat by the official salutation, the Kow-Tow. We expect the Blarney Stone to return as usual which is, and really should be, one of the most revered events of the entire celebration. It is through this ceremony that those are recorded who have really shown themselves willing to give time and effort for the benefit of the Engineers club.

We ask your assistance. We want you to learn to speak of "our" celebration and not to get the habit of referring to it as "theirs." If you are an undergraduate help us by working, by passing your ideas on to the committees who may put them to use, and by giving us your full support at all times. If you are an alumni keep in touch with us, be present during the celebration and, let us have your suggestions, new or old. If you are a faculty member you may aid us by giving us suggestions, and by really attempting to cooperate with us in our undertaking for the celebration. Lets really make it "Our" celebration.

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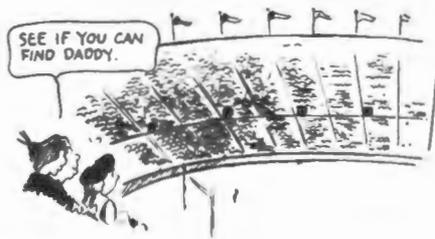


LOSE A NEEDLE?

Not a needle in a haystack, but perhaps a needle in a rug. During the manufacture of rugs, needles may become broken and embedded in the finished product. Former methods of inspection were tedious and time-wasting, but a new magnetic device indicates the exact location of the steel fragment.

This iron detector, developed in the General Engineering Laboratory of the General Electric Company, consists of a test coil, a motor-generator set, and an amplifier. The rug is passed through the magnetic field twice in directions at right angles. The presence of a broken needle causes a distortion in the magnetic field and consequently an unbalanced voltage in the secondary coil. This unbalance is amplified, and the relays cause signal lights to glow.

Detectors of similar principle have previously been developed for such uses as detecting scrap iron in sugar cane and in scrap cellophane. The General Engineering Laboratory is constantly receiving problems from industrial concerns and is developing equipment or giving suggestions to solve these problems.



MICROANALYSIS

Two millionths of a gram of material present in a 25-cubic-centimeter sample is almost as inconspicuous as one man in a group composed of the combined populations of New York City, Chicago, and Detroit gathered in one huge stadium, yet the phototube and the recently developed spectrophotometer can accurately determine such microscopic quantities. This detector has been commercially developed in the laboratories of the General Electric Company from the original design by Professor A. C. Hardy of M. I. T.

In medical science, the spectrophotometer should prove very useful. The presence and amount of almost any element which will form a colored compound when combined with some reagent can be determined. In the industrial field, paints have been studied and the effects of heat, light, ultraviolet radiation, humidity, and surface greases have been measured. This has proved a reliable guide to purchase of these materials.

The spectrophotometer is admirably adapted to the study of problems involving colored substances. Its scope extends far beyond chemistry, physics, or industry. In fact, it is in the biological sciences that the instrument will probably find its most important applications.



BY A NOSE

A century ago there was a race between a horse and a locomotive. No such race will be necessary to determine the supremacy of the steam-electric locomotive being built for the Union Pacific Railroad by the General Electric Company. This new unit will get its first trial run on the test tracks at the Erie, Pa., Works early this year.

This new passenger unit will carry a steam-turbine electric generating plant to feed power to the traction motors. The turbine will exhaust through condensers, using the same water over and over with small additions to make up for leakage. A new, highly efficient type of steam boiler has been built, and heavy fuel oil similar to that used in present-day locomotives will be used.

The new unit will be a double-cab locomotive, streamlined, practically smokeless, and provided with power equipment for air-conditioning the trailing passenger cars. It is rated at 5000 horse-power and is capable of hauling 1000-ton trains at a speed of 110 miles an hour. The efficient fuel consumption will allow runs of hundreds of miles at top speed without a stop.

The many desirable constructional features of the modern high-speed electric locomotive will be incorporated in the design as a result of General Electric's many years of experience in building and equipping electric locomotives.

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ST. PAT'S NUMBER

KNIGHTS OF ST. PATRICK 1937

Summa Cum Laude

*Frederick W. Green
Charles T. McGinley*

Magna Cum Laude

*Lennie P. Johnston
Two to be named*

Cum Laude

Five to be announced

Knights

*Hugh Gratsch
Charles Owings
Ralph Schmidt
Charles Carl
T. O. Thompson
Bradley Douglas
M. T. Rahiya
John Jonas
Leonard Gettinger
M. Albertson Riddle
B. D. Simon
J. K. Harper
Carl Fingerhood
J. Louis Crum
Joe Romberg
Kenneth Shepherd
Bayles Flanery
Al Messina
Carl Rau
P. T. Sumner
Robert Bickel
Paul Pulliam
Ben Hillebrandt
Tom Rubey
James Trebilcott
William Salisbury
William Jeffries*

MARCH 1937



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Editorial

This is the time of the year when all eyes are focused on the College of Engineering and especially on the Engineers Club, because we are now in the midst of the celebration of which the Missouri Engineer was the originator. At this time, all of us who are in the College of Engineering experience, to a certain degree, a surge of pride in our colorful traditions.

The Engineers Club is the basic organization in the Engineering College concerned with the St. Pat's celebration. However, the celebration in reality is only a division of the primary function of the Club, that of promoting closer contact between members and developing the spirit of group action.

At the present time, the membership of the Club, supposedly composed of the entire student body, is really only 60% representative of the student body insofar as Club dues paid to date are concerned. Very few men are financially unable to pay the Club dues, which are among the lowest to be found at any Engineering school.

Just what is wrong? Don't we Engineers have enough time to spare an hour and a half every two weeks, so that we might attend Club meetings and become interested in its activities? Aren't the advantages of being a Club member stressed enough to freshmen? Do we feel no professional pride and no sense of obligation in our chosen field of Engineering?

One of the questions asked by a non-payer of dues, when broached on the subject of payment, is "Will I get my money's worth out of the celebration?" Immediately the dues-seller lapses into a bargain-basement-salesman's attitude to convince the non-payer that the celebration will bring him, through the barbeque, banquet and Ball, a value equal to that of his dues. However, should it be necessary to present such an argument? Certainly not. The main advantage in being a member of the Club lies in channels other than that of the celebration, although it is a beneficial and interesting Club activity.

The solution to the situation lies in the education of all Engineers to the value they receive from participation in Club affairs. Since the Engineers Club is, in its entirety, a student club, it is the duty of us student members to see that the true spirit and purpose of the organization is realized and appreciated.

THE SHAMROCK

COLLEGE OF ENGINEERING
UNIVERSITY OF MISSOURI

MARCH, 1937

Volume 4

Number 4

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THE SHAMROCK

Volume 4

MARCH, 1937

No. 4

St. Pat's Celebration 1937

By CHARLES OWINGS, Chairman, St. Pat's Board

THE 35th annual St. Pat's celebration of the Engineers Club will soon be in full swing. One of the most colorful and traditional activities on the campus, the celebration this year will undoubtedly rank among the best in a number of years. Revival of laboratory demonstrations and exhibits and the first appearance of an all-honorary luncheon will be new features in this year's program. A complete program will be found on pages 12 and 13.

Following the precedent established in former years, Burrall Bible Class, through its leader, Mr. Paul Weaver, invited the Engineers to attend the Class services Sunday, March 14. The Engineers responded in a body, meeting first at the Engineering Building and then proceeding to the Bible Class, where each man was presented with an identifying symbol in the form of a green carnation.

The actual activities of the celebration proper will begin Thursday, March 18, with the first opening of the laboratory exhibits. The laboratory presentation will supplant the Field House exhibition of former years and will act in the role of house-warmer for the new \$160,000 Laboratories Building. The new laboratories, together with the Civil Engineering laboratories, provide over 30,000 square feet of floor space for mechanical,

agriculture, civil, electrical, and chemical engineering displays. A lack of steam will handicap the mechanical display, but the other displays will not suffer from such limitations. Among the attractions listed are eggs fried on ice, Rube Goldbergian mechanical movements, moving pictures, amateur photography, glass blowing, materials testing, working models of machinery, liquid air experiments, and hundreds of others. Exhibits are loaned by the Missouri State Highway Department and a number of private companies.

Immediately after the close of the laboratory exhibits, all Engineers will assemble at Rollins spring for the well-known and long-anticipated barbecue. Faculty members and alumni are cordially invited to join in the festivities. John Jonas, chairman of the barbecue committee, has promised some of the best meat ever, and will furnish several kinds of drinks. If any Engineer does not approve of Jonas' choice of drinks, well——. Last year, due to inclement weather, the barbecue was held in the Civil labs. Although everyone enjoyed that barbecue, we feel that the open spaces form a better setting for this portion of the Engineers' celebration.

Sometime during the course of the barbecue, the winner of the beard contest will be announced.

The contest, open only to seniors, began Sunday morning, March 14. The winner will be selected on the basis of length of the beard and the profusion of growth. He shall receive his just reward the night of the All-School Dance.

Immediately following the barbecue, all physically able men will embark on that choice means of self-expression, the customary, almost classic, serenade of sorority houses and dormitories. This will be no ordinary serenade. To somewhat soften the barbaric harmonies of former years, the Engineers have been practicing songs at Engineering Club meetings for some time. A picked orchestra of seven pieces will be on hand to guide any struggling or straggling voices along the proper channels of vocal effort.

The celebrants of the preceding evening will arise sometime before 9:00 A.M. Friday morning to take part in a more serious phase of the week's activities. At 9:00, in the Engineering Auditorium, faculty members, alumni, and students will gather to listen to speeches by prominent men. Bob Garrett, chairman of the banquet committee, has made a number of contacts and the chief speakers for the occasion will soon be announced.

Immediately following the convocation, members of Tau Beta

Pi, Pi Tau Sigma, Eta Kappa Nu, and Chi Epsilon will meet with guests for what will be the first all-honoraries banquet. Since the banquet will be a relatively short one, no speaker has been engaged. However, new pledges of each of the organizations will be announced and will be presented. The alumni members of any of the various fraternities are invited and urged to attend.

At one o'clock, March 19, the Engineers Club will be the guest of Mr. Rex Barrett at a special performance of "Penrod and Sam" at the Uptown theater. We take this means of expressing thanks to Mr. Barrett.

It was first thought that St. Patrick would arrive in a blimp. Later information has dispelled this rumor and the means by which St. Pat will arrive and appear are not definitely known. Partially due to the fact, the usual parade will be dispensed with. However, St. Pat will surely appear near the Engineering Building at about 7:00 o'clock and will immediately conduct the knighting ceremony. A platform will be erected just south of the Engineering building. On it will rest the revered and cherished Blarney Stone and on it the loyal and true followers of St. Patrick will be knighted. A loud speaker will make it possible for everyone to hear the ceremony. The Pershing Rifles will escort St. Pat to the platform, and the University Cadet Band will furnish the music for the occasion. The following degrees will be conferred: Knight of St. Patrick, Summa cum Laude; Knight of St. Patrick, Magna cum Laude; Knight of St. Patrick, cum Laude, and Knight of St. Patrick.

Following the knighting ceremony, the demonstrations and exhibitions will continue in the Engineering Laboratories.

An open-house in the Dean's office from 9:00 till 12:00 Saturday morning, March 20, will provide a place in which newly-arriving alumni and other visitors may assemble, met each other, and talk with students and faculty members. The gathering will be a very informal occasion.

At noon, the alumni-faculty-student banquet will be held in one of the Columbia churches. The banquet constitutes an important place on the week's program because it is the occasion for more or less spontaneous

One of the new laboratories which will be used for the Engineers Exhibition.



speeches and another congenial get-together session.

Following the banquet, the alumni association will hold a meeting in Room 234, Engineering Laboratories Building, to elect officers for the coming year and to transact other business. After the alumni meeting, the University of Missouri College of Engineering Foundation will hold a business session. The Foundation is a most important organization in that it is composed of men who are quite interested in the future development of the College of Engineering.

The formal St. Pat's Ball will begin at 9:00 p.m., March 20.

Herman Drake and his orchestra will furnish the music. The coronation of the Queen of the Ball by St. Patrick will occur after the fourth dance. A special edition of *The Shamrock*, in which a picture of the queen will be featured, will be distributed at the end of the sixth dance. At 12:00 p.m., the 35th St. Pat's celebration will officially close.

A number of organizations, both local and national, are co-operating to make the celebra-

tion, and especially the exhibit, the best possible. Among those to whom we express our appreciation for their aid are the following:

Boone County Lumber Company, See's Blacksmith Shop, The Drug Shop, Roberts and Green Hardware Company, Patton's Repair Shop, Phillips and Company, Parker Furniture Company, Allton Automobile Company, McKay Chevrolet Company, Paullus Maytag Company, General Radio Company, Westinghouse Manufacturing Company, American Institute of Steel Construction, and the Missouri State Highway Department.

Knights of St. Patrick . . .

Summa Cum Laude

Charles T. McGinley

Charles T. McGinley was born in Kansas City, Missouri, December 28, 1882. He attended the grade school and high school there and later graduated from St. Mary's College.

From 1904 to 1911 he was employed in the engineering department of the Metropolitan Street Railway at Kansas City in various positions from field survey work to assistant chief engineer. From 1911 to 1914 he was employed as a construction engineer for the Kansas City Southern Railway, Bonner Springs Interurban Electric Railway, and as contractor's engineer. Later he was employed by the City Engineer's office in Kansas City and Jackson County, Missouri, in both field and office capacities, and then returned to the reorganized Kansas City Railways as Ways and Structure Engineer for the Board of Control.

When the Federal Aid Highway System was started in 1919, realizing the growing importance of highway development, Mr. McGinley became associated with the U. S. Bureau of Public Roads as highway engineer in the district office at Omaha, Nebraska, operating in Kansas, Nebraska and Missouri. Since 1920 he has been located in Missouri and took an active part in the location and construction of the entire highway system of Missouri. Last year, when the Highway Planning Projects were inaugurated, he was placed in charge of the Bureau of Public Roads activities as Bureau Manager to plan the future highways of Missouri, on which work he is now engaged.

He was married in 1907, is a resident of Columbia, Missouri, and has three children. His elder son, Charles T. McGinley, B.S. in Eng. '29, C.E. '33, became a Knight of St. Patrick in 1929.

Frederick W. Green

Mr. Frederick W. Green was born at Rock Island, Illinois, April 30, 1887. After graduating from a four-year Latin course at the Rock Island High School, he went to Chicago, where his father desired him to study law at Northwestern University. His interests were in engineering and instead of studying law he entered the employ of a railroad contracting firm (Naugle, Holcomb & Company) in 1894. Between that date and 1901, he filled various subordinate positions in the Construction and Operating Departments of the Chicago & Alton, Kansas City Suburban Belt, Fitchburg and Great Northern Railroads, and at the same time studied nights, under C. D. Randall and J. B. Beecher, higher mathematics, physics, engineering, drawing and other subjects. In 1901 he was appointed Trainmaster for the Great Northern Railroad at Sioux City, Iowa; in 1904, Superintendent Missouri Pacific Railroad at Little Rock, Arkansas; in 1906, General Superintendent and in 1911, General Manager of the Louisiana & Arkansas Railway at Stamps, Arkansas; in 1916, Assistant to President of the St. Louis Southwestern Railway Company.

Mr. Green was commissioned Captain, Combat Section, Engineer Officers' Reserve Corps, November 1916; called into

active service at Ft. Riley, Kansas, May 5, 1917; assigned to Twelfth Engineers, May 18, 1917; with Third British Army, August 18 to November 20, 1917; then appointed Superintendent Army Transport Service at Brest, France; promoted to Major, May 1, 1918; transferred to St. Nazaire, France, as Superintendent Army Transport Service, July 1, 1918; promoted Lieutenant Colonel, October 1, 1918, as General Superintendent Transport Service, Grand Division No. 1, in command of 179 officers and 9,200 enlisted men. Honorably discharged from Army, March 13, 1919; awarded Distinguished Service Medal by General Pershing, and Officer of the Legion of Honor of France by the French Republic.

He returned to railway service as Assistant to President of the St. Louis Southwestern Railway, March 20, 1919; elected Vice-President of the St. Louis Southwestern Railway Lines, July 15, 1919, and continued in that rank until the present time.

Mr. Green has done some original research work on Economics of Railway Location; Testing of Locomotive Fuels; the use of Nomo Graphic Formulae in determining the cost of stopping and starting trains.

He is a Fellow, American Academy for the Advancement of Science; member, American Society of Civil Engineers; American Society of Mechanical Engineers; American Institute of Mining and Metallurgical Engineers; Western Society of Engineers; Society of American Military Engineers; Engineers Club of St. Louis, and Circle,

(Continued on Page 14)

Origin of St. Pat's Celebration

THE FIRST St. Pat's celebration was held in the spring of 1903 after the following resolution had been drawn up by Leo Brandenberger, then a senior engineer:

"Whereas, in the ranks of the engineering department there are many of noble birth and Irish blood, and

"Whereas, the ancestors of many of our illustrious students came from Erin's Isle, and

"Whereas, St. Patrick was an Engineer,

"Therefore, be it resolved, that the engineering department take a holiday and attend the morning prayer in a body."

As a result of the resolution, a number of Engineers attended morning prayer services on St. Patrick's day and later walked about town singing Irish songs, accompanied by a band.

The year 1905 might be classed as the beginning year of the St. Pat's celebration as it is known today. That year, committees were appointed to plan and direct the celebration. St. Pat was represented and the first Kow-Tow

was held on the Quadrangle. The campus stunt idea had its inception when an Engineer's banner was flown from a wire stretched from the Engineers' Building to Academic Hall. The Blarney Stone made its first appearance at this celebration.

In 1906, St. Pat arrived in an airplane, and conducted his knighting ceremony in much the same manner as in 1905. However, in 1906, the activities of the year were recorded in the first Shamrock, which was issued the 17th day of March.

The movement started in 1905 soon spread to other campuses. In 1907, a Rolla representative visited Columbia and since that time Rolla has been conducting a St. Pat's celebration. In 1909, University of Iowa and Iowa State College began commemorating St. Pat's Day. Arkansas joined the group in 1913 and was followed by the University of Oklahoma in 1914. University of Tennessee held its first celebration in 1919.

In 1919-1920, a National Guard of St. Patrick was organized at

a convention in Columbia in which eleven schools from seven states participated. A knight's pin was adopted and a constitution and by-laws was drawn up. The second National Convention of the Guard of St. Patrick met at Iowa State College in 1921 at which the following schools were represented: Iowa State College, University of Arkansas, University of Oklahoma, University of Minnesota, University of Tennessee, Oklahoma A. & M., Missouri School of Mines and University of Missouri. This organization has since ceased to function.

Although the National Guard of St. Patrick is no longer active, the popularity of the celebration has grown until it now embraces a majority of the Engineering schools in the country. To the Missouri Engineers goes the credit for the founding of a great celebration and it is the recognized duty of each Missouri Engineer to do his part in perpetuating the spirit and magnitude of the observance of St. Pat's Day.

The Blarney Stone

The Blarney Stone forms the basis for the most colorful St. Pat's tradition on the Engineers' campus.

The stone was first uncovered in 1905 by workmen engaged in excavating for the old Engineering Annex, which has since been replaced by the Engineering Laboratories Building. The stone, 18 inches by 30 inches, was partially covered with queer figures; no one was able to decipher the message supposedly contained in the figures. However,

a young engineer, his mind fresh with memories of the St. Pat's Day observances of the preceding two years, decided that the figures meant "Erin go Braugh," which in turn was translated into "St. Patrick was an Engineer."

The Blarney Stone in some way disappeared soon after its discovery and no one seemed to know what happened to it. However, a message was received by officials of the celebration that year. In the message was explained the manner in which the

stone could be secured. It was secured and all aspiring Knights of St. Patrick that year kissed the stone as an indication of their allegiance to their patron saint.

Yearly, from 1905 up to the present, the Blarney Stone forms the central theme of the knighting ceremony. Every year, as in 1905, the St. Pat's Board receives a message telling them how they may secure the traditional stone. The resting-place of the stone between ceremonies is certainly a

(Continued on Page 20)

Candidates for Queen of St. Pat's Ball

By HOWARD BURNSIDE

During the weeks of preparation for the annual visit of St. Patrick, the greatest task of the sons of Erin is to select from the fairest maidens on the campus a Queen of the Engineers to rule over them until their patron saint again returns. The candidates for the honor of being Queen of the Engineers are selectively chosen, and, in an assembled meeting, the aspirants for the throne are introduced to the engineers. By secret ballot the technical gentlemen choose their queen, whose identity is unknown until the night of St. Pat's Ball, when the revered saint, in a simple ceremony, crowns the fair lady "Queen of the Engineers."

This year the queen will be selected from as impressive a group of lovely ladies as has ever graced the halls of the building with the Shamrock. These girls, fifteen in all, were twice invited to visit meetings of the engineers. At these meetings group photographs of the candidates were taken with the new laboratories as settings.

Not quite as much significance is attached to the title "Candidate" as to that of "Queen," but one could appropriately say that from these queens will be chosen a candidate. Alphabetically speaking, Helen Bode tops the list of nominees. Miss Bode, a native of Kansas City, is a member of Gamma Phi Beta sorority and is enrolled in the school of Arts and Science. Apparently Kansas City is being glorified by the engineers in their quest of the fairest of fair, for Barbara Brink and Mary Jane Stevenson also

make themselves at home in that city. Barbara Brink, a dark haired Kappa Kappa Gamma, is a student in the Arts and Science school, as is Miss Stevenson, Independent, whose blond hair halos her sparkling eyes.

Miss Ruth Caldwell and Miss Martha Percival, as candidates for the queenship, also represent the Independent Women. The maiden from Crystal City with the dark brown hair is known in the Arts and Science School as Miss Ruth Marie Caldwell. Mary Percival is representative of St. Louis' fair lasses. Her personality is enhanced by her shyness and her quiet manner. Virginia Coulter is an "out-stater" from the vicinity of the Windy City. Winnetka, Illinois, is her home town. Virginia is five feet four inches tall, has gray eyes and dark hair, and is a favorite among her Kappa Alpha Theta sorority sisters. Anna Margaret Griffin of the Alpha Phi sorority fills her nomination for the throne very well. She hails from Mexico, Missouri, and is studying in the School of Agriculture.

To this group of lovely candidates is added Jane Deutman, Alpha Delta Pi, with the twinkling round eyes. Miss Deutman lives in University City, is a "five-foot-fiver," and has long, dark brown, wavy hair. An ever present smile makes her pleasing personality even more charming. Gladys Kruse, another maiden from St. Louis, is a member of Phi Mu sorority. She crowns her queenliness with light blond hair, and spends her spare time thinking of ways to make her studies in the Education School less burdensome.

Miss Helen Williams, an Alpha Gamma Delta, brought her brown locks all the way from Nebraska City, Nebraska. Miss Williams came to the University to study newspaper work and is enrolled in the School of Journalism. Barbara White comes to Columbia from St. Joe, and resides in our fair town at the Alpha Chi Omega sorority. Barbara has brown hair and eyes and keeps one interested in the fair sex with her witty conversation. Shirley Rose Suits is a student in the School of Education from Bartlesville, Oklahoma. This Chi Omega contrasts her black hair with very blue eyes. Virginia Wolk, a Delta Delta Delta damsel, is a student in Arts and Science. She is five feet-five inches tall and has blond hair and gray eyes. Virginia is a St. Louisian and has a keen sense of humor.

Miss Jean Lindsay, of Pi Beta Phi sorority, is one of the tallest

The Queen's Attendants

Will be named in this space
in the Special Ball
Edition

The Queen's picture will
appear opposite this page in
a special insert

of the candidates and tops her length with flowing golden locks. Tulsa, Oklahoma, claims Miss Lindsay as one of its daughters. Jean is a pleasant girl to talk to and can hold her own while talking on any subject. Brown wavy hair, brown eyes, and a sweet face describe Delta Gamma Juanita Maire from Linn, Missouri. If shyness is indicative of a truly pleasing girl, Miss Maire has many admiring friends.

Evidently the engineers have a taste not only for perfection in modes of living, but in beauty as well, if one is to ascertain by this year's candidates for St. Pat's queen. Every engineer looks eagerly forward to the night of the Ball, for each is hoping that the girl of his choice will be announced. Excitement reaches a high pitch, especially so this year as the engineers have fifteen candidates from whom the reigning beauty is to be selected. However the choice results, the sons of Erin will certainly have a very lovely queen.

The Adventures of Abner

By A. Non Emus

(Being a fable involving faculty, seniors and others of more or less importance around the Missouri realm of St. Pat).

Once upon a time there was a merry Miller named Abner who dwelt in a pretty little Vaile in a Wood. Being hungry for Fish one morning, he said to Lorah, his wife, "I'm going down to the Banks of the stream and see what I can catch."

Now Lorah talked baby talk so she said, "I would like the Fish but I can't stand it when you Hurty the Beattie by putting it on the Hook."

"Phooey," said Abner, the Miller, and left for the stream. On arriving he felt warm, so he took off two Coates, tearing the Selvidge on one. Soon he was Kolde and had to put them back on, even though they had that Wooley feeling. Then he had a strike.

"Ah," said Abner, "Scorah one for me. I will catch him if I have to Pulliam all over the place; once I get Holt of him, I will have him."

Just then the Miller heard a noise behind him and there stood the game Wharton, who said, "Where's your license, Ab? If you ain't got it, you will La Rue it very much. You didn't have one last Summer. I think it was mighty Rau of you."

"Now, now, Lee," said the Miller, "I haven't a license but I did Park a jug up on the Banks. Have some wine?"

Said the game Wharton, "Wein? Bach where I came from we drank only Loganberry juice. If I drink your wine, I might Pull a Nier blunder and let you go. The last time my nose got as red as a Rubey. However, did you say it was up on the Banks?"

(Continued on Page 21)

The Candidates



Top Row—Left to Right: Lindsay, Suits, Stevenson, Griffin, Percival, Caldwell, Wolk.

Bottom Row: Coulter, Bode, Williams, Maire, Deutman, Brink, Kruse, White

Engineering Briefs



Courtesy Railway Age

A new loading machine, designed to handle ice or snow at 10-20 cu. yd. per minute, gathers materials at the entrance to a conveyor and delivers it straight to the rear or at an angle of 45 degrees on either side of the truck mounting. The conveyor contains a patented, articulated section and a universal chain so the conveyor section to the rear of the operator's cab can be swung to either side. Forward speed during loading varies from 0 to 2½ m.p.h. Free speed is approximately 16 m.p.h. at an engine speed of 1000 r.p.m. There are two intermediate speeds and a reverse.



Courtesy Industrial Equipment News

Germany is in the process of constructing a system of double roadways totaling over 4,000 miles in length. The system will connect all important industrial cities and all strategic border points. The road-building program was launched to combat unemployment, aid industrial output, encourage use of the automobile, and facilitate troop movements. On the main arteries cities are by-passed, railroad crossings are eliminated, intersecting highways are separated, and no speed limit is given. The road-building project calls for constructing within 5 years 4,350 miles of main highways at a cost of \$1,000,000,000. The total amount spent in the year 1934-1935 was \$200,000,000.

The standard widths of the Reichsautobahn, two views of which are shown below, to outside of shoulders is 78.7 ft. Two reinforced concrete slabs 24.6 ft. wide are separated by a space of 16.4 ft. This space is used for a bicycle path, for parking area, and is partially planted in shrubs and grass. Outside each slab is a sidewalk for pedestrians and a shoulder. Average cross-country roads are designed to be about 6 or 7 miles apart.



Courtesy Civil Engineering



Courtesy Civil Engineering



Above is shown the immense size of the All-American canal, which is cut through the sands of the desert located between the Colorado River and the Imperial Valley. The water will be carried from the Imperial dam on the Colorado River eighty miles to the irrigation system of the Imperial Valley.

Courtesy Engineering News-Record



Courtesy Engineering News-Record

During the recent great Ohio River and Mississippi River flood, the fight waged to prevent complete inundation of Cairo, Illinois, by the flood waters attracted wide interest. The Ohio-side levees, the real danger points, are of earth-filled cellular concrete wall construction back of the previously existing concrete seawall.

Atop this 60-foot seawall, a three foot mudbox bulkhead was constructed and filled by January 27, using 2,500 men along the 10,000 foot wall, to hold back the rapidly rising Ohio River. The figure shows the method by which the mudbox cap was constructed. Shiplap was nailed inside 2"x4" stakes, which had been driven two feet into the crown of the levee back of the concrete cap. Opposite stakes were wired together. Bulk clay was then tamped into the open box.



Courtesy Industrial Equipment News

A De La Virgne Diesel engine, main and auxiliary generators, engine radiators, cooling fans, and traction-motor blower are all mounted on a common sub-base for accurate alignment in this new 200,000 lbs., 26 ft. wheelbase, Baldwin switching locomotive. A cork-rubber pad is placed between base and underframe to counteract rail shock. The engine is rated at 660 brake h.p. at 600 r.p.m.

The light-weight, stainless steel, sleeper trailer bus shown below was built for the Nairn Transport Company, Ltd., for use in the Syrian desert between Bagdad and Damascus. It has a capacity of 14 passengers and is completely air conditioned. The bus, designed by the Edward G. Budd Manufacturing Company, is powered by a 150 horsepower Deisel engine.



Courtesy Railway Age

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Bill Farris..... Vice-president

Silas Sides..... Business Manager

T. O. Thompson..... Treasurer

Joe Rood..... Secretary



CHARLES OWINGS, Chairman,
St. Pat's Board

ST. PAT CALENDAR

- March 14: 9:00 a. m.—attendance roll Bible
- March 14: 9:00 a. m.—beginning
- March 17: 7:30 p. m.—Engineers
- March 18: 7:00 p. m.—opening of meeting L Engineering
- March 18: 10:30 p. m.—annual ba of board
- March 18: 10:30 p. m.—serenade
- March 19: 9:00 a. m.—convocation Jesse Hall
- March 19: 12:00 a. m.—all-honorat
- March 19: 1:00 p. m.—attendance ulty at a Uptown T
- March 19: 7:00 p. m.—arrival of Stone, kni participate and by Pe
- March 19: 7:30 p. m.—continuanc
- March 19: 9:00 p. m.—all-school man Drak at Hotel J
- March 20: 9:00 a. m.—open-house
- March 20: 12:00 a. m.—alumni-stu
- March 20: 3:00 p. m.—alumni me
- March 20: 5:00 p. m.—meeting of
- March 20: 9:00 p. m.—formal St. orchestra; Ball; distri rock.
- March 20: 12:00 p. m.—official clos

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Laboratories.

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it.

priority houses and girls' dormitories.

students, alumni, and faculty in
auditorium.

banquet.

Engineers Club, alumni, and fac-
ulty of "Penrod and Sam" at the
e.

Patrick, appearance of Blarney
ceremony, and Kow-Tow—all
by the University Cadet Band
and Rifles.

Engineers Exhibition.

in Rothwell Gymnasium; Her-
man's 12-piece orchestra, featured
on, St. Louis.

Dean's office.

Faculty banquet.

Engineering Foundation.

Ball, Herman Drake and his
presentation of the Queen of St. Pat's
and a special edition of the Sham-

celebration.

Celebration Committees

Dance.....	Charles Briggs
Dance Decorations....	Erwin Bretscher
Gen'l Decorations.....	Gentry Philpott
Electrical Lab.....	James Trebilcote
Mechanical Lab.....	Leonard Gettinger
Chemical Lab.....	Edward Fawks
Civil Lab.....	Jack Coates
Agricultural Lab.....	Joe Parks
Publicity.....	Ralph Schmidt
Banquet.....	Robert Garrett
Contest.....	Louis McLean
Program.....	Bertrand Flowers
Barbeque.....	John Jonas
Discipline.....	Lorenzo Banks
St. Pat's Time.....	Robert Bickel
Serenade.....	Hugh Gratsch
Queen.....	Bill Farris
Finance.....	T. O. Thompson
Protection.....	James Harper
Reception.....	Louis Crum
Campus Stunt.....	Jack Baker
Responsibility.....	Silas Sides
Knighting Ceremony.....	Bob Rolsky



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Mr. John Logan, newly-appointed professor of Sanitary Engineering in the College of Engineering. Mr. Logan comes to the University of Missouri direct from Chicago, where he worked as a designer for the firm of Greeley & Hansen, Hydraulic and Sanitary Consulting Engineers.

Born in Yorkton, Saskatchewan, Mr. Logan obtained his preparatory education in Yorkton and received his A.B. from the University of Saskatchewan in 1929. For two years he was associated with the highway department of the province of Saskatchewan as resident engineer.

He resigned his position with the highway department in 1931

to reenter the University of Saskatchewan. In 1934, he received a B.S. in Civil Engineering. Mr. Logan was the only Canadian to receive the Gordon McKay scholarship to Harvard in 1934; in 1935, he obtained a M.S. in Sanitary Engineering from Harvard. He was an instructor in Sanitary Engineering at Iowa State College, 1935-1936, and resigned his position to accept work with Greeley & Hansen.

While at Saskatchewan University, Mr. Logan was captain of both the hockey and the football teams, and received a major award due to his participation in football, hockey, water polo, and basketball. This award corresponds to eight service letters in our school.

A Canadian citizen, Mr. Logan has taken out papers preparatory to becoming an American citizen.

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KNIGHTS OF ST. PATRICK

(Continued from Page 6)

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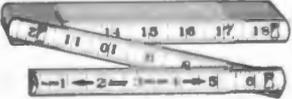
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AROUND THE COLUMNS

VAILE HONORED

Professor R. B. Vaile of the Department of Electrical Engineering was recently presented the John Dunlap Memorial Award by the Iowa Engineering Society. The award, a gold key, was given Professor Vaile at the annual meeting of the society, held in Des Moines, Wednesday, March 3. The award was given in recognition of the best paper presented to the society at its annual meeting in 1936. Professor Vaile's paper was written on the subject, "A High Voltage Electrostatic Belt Generator." It was published in the October, 1936, issue of the **Journal of the Iowa Engineering Society**.

The apparatus described in the paper is, at the present time, under construction in the laboratories of the Iowa State College at Ames. The machine has not yet been tested and Professor Vaile plans to return to Ames during the Easter holidays to inspect the work.

WE WONDER

Quite a number of our engineering students were wondering last Wednesday, when the queen was being elected, whether one of our trusted judges wasn't being swayed out of his impartial stand. It seems that Professor Scolah was seen quite consistently around some of the candidates, who couldn't be blamed for trying to sway his impartiality. Some of the Engineers were wondering whether the fifteen candidates had fifteen escorts or just one.

ALUMNI MEETINGS

Pre-St. Pa.'s meetings of alumni were held in Chicago, St. Louis, Kansas City, and Jefferson City recently. The meetings were for the purpose of discussing St. Pat's plans and activities. The College of Engineering was represented in St. Louis, Tuesday, March 9, by Dean F. Ellis Johnson, Lennie Johnston, president of the Engineers Club, and Bob Garrett. Prof. Harry Rubey represented the School at the Jefferson City meeting, Saturday, March 13. No representatives were sent to the Chicago and Kansas City meetings.

A MECHANICAL?

It has been rumored lately through the halls of the Engineering Building that a certain Electrical Engineer deserted for the ranks of the Mechanicals in the middle of his senior year. The story runs something like this:

At the recent joint meeting of the A.I.E.E. and the A.S.M.E., this certain Electrical, Pulliam by name, asked the lecturer, a certain Mr. Lankford of the Century Electrical Company, to explain to him the difference between a single-phase and a split-phase motor. Mr. Lankford was about to answer the question when Professor Weinbach informed all and sundry, "He's a Mechanical," referring to subject of our little story.



SENIOR INTERVIEWS

The conference room next to Dean Johnson's office has been in use quite a number of times during the past few weeks. Representatives of the following companies have been here to interview senior engineers: Empire District Electric Company, Gulf Oil Corporation, Texaco Company, Union Electric Light and Power Company, A. P. Green Fire Brick Company, General Electric Company, Bailey Meter Company, and Southwestern Bell Telephone Company. Representatives of Proctor and Gamble are expected in the near future.

In addition to those companies which have sent representatives to Columbia, there are quite a number of companies that have written requesting interviews with men in other cities.

CAMPUS STUNTS

The main campus stunt this year will be one of the most unique and appropriate stunts in the history of the celebration. Jack Baker and his crew of workers are putting the finishing touches to a monstrous 87-foot snake. The head will be 10 feet tall, 8 feet wide, and about 12 feet long. The body of the snake, consisting of 7-foot sections joined in such a way that the entire snake will be quite flexible, averages 8 feet in height and 5 feet in width. Over a timber and wire framework will be stretched cloth painted a bright Emerald Isle green. The snake will wriggle along the campus, motive power to be supplied by an Engineer stationed in each section.

Also included under the caption of campus stunts will be two giant replicas of Engineers' buttons of past years, one to be placed on each side of the columns. Ernest Pelky is hard at work making the replicas.

The final campus stunt will let everyone know just who is responsible for the celebration. The word **ENGINEERS**, spelled with 3-foot letters, will be suspended from wires stretched from the Engineering Building to Switzler Hall.

BURNSIDE REPEATS

Howard Burnside, sophomore Chemical engineer, was announced as the winner of the button contest this year. The prize-winning design was a cartoon of an engineer charming a snake for St. Patrick by playing an instrument which carried out the idea of the four departments. The prize awarded for the accepted button design was a refund of the winner's Engineers Club dues. Burnside was also the winner of the contest last year.

ALPHA CHI SIGMA

At a recent meeting, Alpha Chi Gamma pledged three new members. The men pledged were Bill Henders, Chapin Stevens, and John Dobsen. Alpha Chi Sigma is a national honorary chemical fraternity.

ORGANIZATIONS

A. S. C. E.

Because of the activities in preparation for St. Pat's celebration the A. S. C. E. did not have their last scheduled meeting.

The members of A. S. C. E. have been working with Jack Coates, the chairman of the Civil Engineering exhibit committee for St. Pat's Week and vice-president of A.S.C.E. Jack has made several trips to Jefferson City accompanied by members of the Society to make arrangements for a display from the testing and experimenting laboratories of the State Highway Department. Several steel and aircraft manufacturing companies have been asked to submit displays illustrating structural design.

A. S. C. E. will have their next regular meeting on Thursday evening, April 8, the place yet to be decided. Plans are being made to show motion pictures on structural engineering on recent projects. The pictures will be furnished by the American Institute of Steel Construction.

A. S. M. E.

At the regular meeting of Feb. 23, Mr. R. H. Sogard, of the Mechanical Engineering Department, addressed the club in an informal talk on his experiences while employed in the Lakeside Station at Milwaukee, Wis.

A joint meeting with A.I.E.E. was held on March 2, at which time Mr. W. R. Langford of Century Electric Co., St. Louis, discussed motors for air conditioning installations. The meeting

was preceded by a joint dinner of the two organizations at Harris' Cafe.

Mr. Eugene Burnett, a recent Missouri graduate and now with The York Machinery Corp., of York, Pa., talked on his experiences in the York Training School on air conditioning at the meeting of March 9. Other business included the announcement of papers to be presented at the annual A.S.M.E. District Meeting in Kansas City on April 9 and 10. Mr. T. O. Thompson and Mr. B. Flowers are the delegates and speakers for the Missouri Branch. Mr. J. Louis Crum, in charge of inspection trips, announced tentative plans for a trip to St. Louis on March 25 and 26. All Mechanicals interested in these two events are urged to sign up immediately.

Chi Epsilon

At a meeting on Feb. 18, members of Chi Epsilon decided to attend the dinner sponsored by the members of all the honorary engineering professional fraternities, to be held March 19.

It is planned that the members will make an inspection trip in the early spring to some new engineering project. The possibility of having a farewell party at the end of the school year was discussed but no definite plans were made.

A.I.E.E.

A joint meeting of A.I.E.E. and A.S.M.E. was held March 2. The meeting was in the form of a banquet at which Mr. Langford of

the Century Electric Co., St. Louis, Mo., spoke on "The Induction Motor and Its Adaptability to Air-Conditioning." The talk was very interesting and was well attended.

Mr. G. Waters, Chief Engineer of the Wagner Electric Company, has consented to speak before the organization in the near future.

A.S.A.E.

At a meeting of the Ag. Engineers on February 23 a program committee consisting of Norman Teeter and Charles Timm were appointed by President Park to help with plans for St. Pat's Week.

Films were run by the Minneapolis Moline Power Co., showing the operation and manufacture of Minneapolis Moline Tractors and other farm equipment.

At the March 9 meeting, a committee consisting of Bob Snyder and J. S. McKibben was appointed to keep a record of club activities. A trophy will be given by the Farm Equipment Institute to the student branch of A.S.A.E. which has the best list of club activities.

Two talks were given members of the club. Webb Clark spoke on the artificial drying of hay, and Bill McCreery discussed the possibilities of wind electric plants on Missouri farms.

A. I. Ch. E.

At the regular meeting of the A.I.Ch.E. on March 11, plans were completed for the Chemical Engineering laboratory stunts. Ed Fawks, who has charge of the

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project, promised the best showing of recent years and the best of all the departments this year. Virtually every member of A.I. Ch.E. has a project for which he is responsible. From all indications, the Chemicals will have a show more than worth the price of admission to the entire exhibition.

Plans were completed for the annual inspection trip to the St. Louis industrial district, where juniors and seniors will see the application of the Chemical Engineering principles they have studied in school. The students, accompanied by Dr. Lorah, will attend a banquet Tuesday night given by the professional A.I. Ch.E. chapter of St. Louis and by Chemical Engineering students from Washington University. Plants to be visited Tuesday, Wednesday and Thursday include those of Proctor and Gamble, Shell Petroleum, Mallinkrodt, Owens-Illinois Glass Works, and Monsanto Chemical Works.

The next meeting, April 8th, will be a dinner meeting at Harris' at 6:15 p.m. President Boucher has promised to obtain a very good speaker for the occasion.

Eta Kappa Nu

During the first part of December the following men were initiated into Eta Kappa Nu: Paul Westover, Eldred Bowen, and John Campbell. The new initiates presented papers at a banquet held at Harris' Cafe.

At the last meeting held the first of March officers were elected to fill vacancies: Eldred Bowen, vice-president; John Campbell, secretary, and Paul Westover, bridge correspondent.

Tau Beta Pi

The following men were pledged to Tau Beta Pi, February 23: R. E. Lanfried, C. E. Mull, E. F.

(Continued on Page 22)

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• • • ALUMNI NEWS • • •

J. M. Salmon, BS in Eng. (CE) '02, is Bridge Engineer for the Louisville & Nashville Railway Company in Louisville, Kentucky.

R. F. Tickle, BS in Eng. (EE) '14, is President of the Adjustable Joist and Forms Company in Minneapolis, Minnesota.

J. H. Cooper, BS in Eng. (EE) '29, is Welding Engineer on the Lynn River Works for General Electric Company at Marblehead, Massachusetts. He received his MS in EE from the Union College at Schenectady, New York.

Elmer F. Edwards, BS in Eng. (ME) '20, is now Sales Manager for the York Ice Machinery Company at their St. Louis, Missouri, branch.

David H. Cunningham, BS in Eng. (EE) '27, is with the R.C.A. Manufacturing Company in Camden, New Jersey.

Thomas D. Cunningham, BS in Eng. (EE) '26, is also with RCA at Camden, New Jersey.

P. C. McManama, BS in Eng. (CE) '32, is Ass't Engineer with the U. S. Biological Survey in Minot, North Dakota.

Paul Doll, BS in Eng. (Ag. E) '36, MA in '37, has recently been appointed assistant county agent in Clay county. He left Columbia for his new work at the end of the fall semester.

Maurice M. Burley, BS in Eng. (CE) '25, is with the Investment Bankers on valuation of public securities issues in New York City.

Ralph Ricketts, BS in Eng. (Ag.E) '37, has accepted a position as engineering aide with the Bureau of Agricultural Engineering. He will be stationed at Cape Girardeau, Missouri, to work on rehabilitation and maintenance work in drainage in that section.

Jose Cervantes, BS in Eng. (CE) '36, sailed for Yucatan, Mexico, this month. He is in the employ of the Shell Oil Company there.

Leonard Carney, BS in Eng. (CE) '36, is employed in the Merchandise Development Department of Sears, Roebuck & Company in Chicago, Illinois.

Ted Harper, BS in Eng. (Ag. E) '37, has accepted a position with the Bureau of Agricultural Engineering as engineering aide. He is to be stationed at New Canton, Illinois, and will be engaged in supervising maintenance on the drainage district there.

Robert Beasley, BS in Eng. (Ag.E) '36, has been located at Hayti, Missouri, on drainage work since June. He now has the rating of Junior Agricultural Engineer and has been offered work in the Bureau of Agricultural Engineering at Washington, D. C.

Ralph J. Denton, BS in Eng. (CE) '33, is representing the A. P. Green Firebrick Company of Mexico, Missouri, in the East.

James F. Geary, BS in Eng. (CE) '11, is a Consulting Mining Engineer and General Manager of the Caribou Gold Mining Company at Salt Lake City. He is also Director of the California Bar Gold Dredging Syndicate.

Arthur B. Hitchcock, BS in Eng. (Ch.E) '31, is supervising work in plant operation for the National Lead Company, of New Jersey.

Jesse J. Booth, BS in Eng. (EE) '10, is Ass't Maintenance Engineer for the Carnegie Steel Corporation in Duquesne, Pennsylvania.

Donald C. Adams, BS in Eng. (EE) '31, is employed with the Alcohol Tax Unit, Bureau of Internal Revenue, Aurora, Indiana.

John A. Craig, BS in Eng. (Ch.E) '30, is Chief Chemist for the Skelly Oil Company at Lyman, Oklahoma.

Lloyd J. Burress, BS in Eng. (ME) '11, is Ass't General Superintendent of the Carnegie Steel Company in Gary, Indiana.

Gordon B. Short, BS in Eng. (EE) '36, has been in the employ of the Westinghouse Electric & Manufacturing Company in St. Louis, Missouri, since graduation. We understand that he is to march to the halter—we mean—the altar this coming June. Congratulations, Gordon.

Vincent O. Johnson, BS in Eng. (EE) has also been in the employ of Westinghouse in St. Louis since graduation. He was married last November and, seemingly, set a precedent.

John W. Baldwin, BS in Eng. (ME) '19, is Chief Engineer of the Power Plant of the Ohio Boxboard Company at Rittman, Ohio.

(Continued on Page 21)



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ENGINEERS!

Now is the time to stock up on those much needed reference books.

The Missouri Store

THE BLARNEY STONE

(Continued from Page 7)

mystery to the members of the Board as well as it is to all Engineering students. Kissing the stone has become one of the most emotional parts of the knighting ceremony. Last year, the stone reacted unfavorably with the lips of the kisses, causing a decidedly burning sensation. No one knows what the stone holds in store for the knights-to-be this year.



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DRAKE TO PLAY FOR BALL

For both the All-School dance and the St. Pat's ball, the Engineers Club has secured Herman Drake and his popular 12-piece orchestra. Drake, who started playing the piano at the age of 11, is regarded as one of the outstanding dance pianists in the middlewest. He plays the piano during all dance numbers. A microphone will be installed in the piano in order that the fine technique and original style of Drake's playing may be fully appreciated by the dancers. Two additional microphones are placed so that the full band may be easily heard. Knowing Drake's ability as a pianist, one does not wonder that the style of dance music presented by the orchestra is closely akin to that of Shep Fields and of Eddie Duchin.

Featured among the vocalists are Ann Marlowe, Wynn Farrell, Gene Babbitt, and Ralph Tieman. A violin section is one feature of Drake's orchestra. Paul Stallman, one of the violinists, was a student of the University in 1930-1933, at which time he studied in the Fine Arts School and played in the University Orchestra. He then studied in Chicago and played in the Chicago Civic Orchestra. Before joining Drake's band, he taught music in the St. Louis schools.

Advice to the Chemistry Professor

Suppose for instants you are a chemistry perfesser and one of yer pupils is Butch Swonson which is the star player on yer skools team and 2 days before the big game you give a ekasaminatschun and Butch dont answer no questions. Yer problem is whether to anser the questions for Butch or not let him play on the team which will lose sure. The anser is don't flunk Butch on account of even if Butch didn't play football he cootnt answer the questions and even if he did anser them they wootnt do him no good because Butchs fort is to play football and make the all-American and then go into motion pitchers and become a lover.

If you anser the questions for him your skool will win the game and 4 yrs later wen you visit Hollywood Butch will show you around.

But if you don't let Butch play in the game yer skool will lose, the coach will get fired, the team wont get to go to the Rose Bowl game, the morgage on the stadium will come due with no money to pay for it and then the skool will drop the chemistry dept. to make up the football defisit.

DINE

and

DANCE

at

DIXIE CAFE

11 So. 8th

THE ADVENTURE OF ABNER

(Continued from Page 8)

"That's where I **Satter**, **Lee**. Right behind the **Middle bush**. It's all I have. **So gard** it well. By the way, what makes you so bowlegged? Have the **Ricketts** as a baby?"

"That's your **Riddle**," said the game **Wharton**. "I see your jug. Usually I drink from a **Pearlstein**, but this time I will **Phillip McCann**."

"Well, go easy," said the **Miller**. "Last time I had some, I looked at the front **Wahlin** my house and I says, '**Lorah**, the **Wallis** falling over,' and **Lorah** says, 'Abner, if you don't go **West** fall down and break your neck, it won't be your fault. And I says, '**Lorah**, I'm glad I'm not a **Moorman** with two wives. Anyway, it's all **Dun**, can the noise." That's the way I have of **Getting** goat."

Then the game **Wharton** said, "Shall we place some **Betz** on the size of that **Fish**? I hate to take **Sides** and **Ewin(g)** most of the time anyway. But you aren't so **Smarr(t)**."

"Neither are you, you **Simon Legree**," said the **Miller**. "Even if you can **Scan land** as a surveyor. Besides you have been **Owings** me some money for a long time, so you can't put me in the **Briggs**."

"Listen to thet **Thur man**," said **Lee**. "I don't **Wanner** to, anyway. Have you a sandwich, even one with **Pepper** on it?"

"Not even a **Crum**. I **Doug las** night for worms to **Hall** down here today. You're always harping on food, you **Harper**."

"You're empty in the **Garret**," said the game **Wharton**. "Put your rod in the **Rodhouse** and let's go out in the **Wood** and pick some **Flowers**."

ALUMNI NEWS

Malcom E. Wells, BS in Eng. (ChE) '33, ChE '34, is now in the Technical Department of the Sinclair Oil Company refinery at Hammond, Indiana. Mr. Wells handles the research and efficiency investigations on most technical problems except those pertaining to waste disposal. His new home address is 5022 Magorin Avenue, East Chicago, Indiana.

Charles O. Huntress, BS in Eng. (ChE) '36, has been transferred and is now assistant to the Oklahoma City District Treater of the Phillips Petroleum Corporation, who is in charge of treating the 300 wells in the district.

Erston Poor, senior chemical engineer, is working in the analytical and research laboratories of the Mallinkrodt Chemical Works, St. Louis, Missouri.

Joseph J. Koenig, BS in Eng. (ChE) '32, is now with Thomas Gaylord and Company in St. Louis, Missouri.

George Sample, BS in Eng. (ChE) '36, is with the research division of the Shell Petroleum Corporation at Wood River, Illinois.

J. W. Prewitt, BS in Eng. (EE) '36, is Sales Engineer in Railroad Dept. for Fairbanks, Morse & Company in St. Louis, Missouri.

Fred P. Hutchison, BS in Eng. (ME) '16, is with the Western Electric Company at Kearney, New Jersey.

C. W. Hall, BS in Eng. (EE) '36, is with the Bell Telephone Company in St. Louis, Missouri.

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JACK'S SHACK
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The
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HOTEL

a

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Blarney . . .

A certain prominent collegian attending our Homecoming game sat down on the bleachers.

"Whose game?" he asked.

A shy young "home-eck" sitting next to him looked up hopefully.

"I am," she cooed.

Maxie: "Do you like beer in a mug, girlie?"

Blondie: "That all depends on how he acts when he's got beer in him."

Bill: "And when I kissed her, there was the odor of tobacco on her lips."

Jim: "You don't object to your girl smoking, do you?"

Bill: "No, but she doesn't smoke."

"The sedan," he says, "was parked at the side of the road, and as I drew near I could hear noises of a struggle within. I could hear a rustle, probably of silk, and the muffled panting of a man. The body of the car swayed slightly to and fro. I heard a curse, and then, again, the muffled panting. I crept softly around to the side, looked into the window, and saw—A man trying to fold a road map the same as it had been."

Tounge twister: A skunk sat on a stump. The skunk thunk the stump stunk and the stump thunk the skunk stunk.

Greatly agitated, a woman carrying an infant dashed into a drugstore.

"My baby has swallowed a bullet," she cried, "What shall I do?"

"Give him some castor oil," replied the clerk, calmly, "but be sure you don't point him at anyone."

Priscilla: "You used to wear corsets. Why did you give them up?"

Prunella: "Oh, I had a couple of complaints."

House Mother: "Young man, we turn the lights off at 10:30."

Freshman: "Oh, boy! That'll be keen."

Professor (in chemistry class): "What can you tell me about nitrates?"

Co-ed: "Well-er-um-og, yes! They're a lot cheaper than day rates."

Professor (to mother of freshman): "Your son has a great thirst for knowledge. Where does he get it?"

Mother: "He gets the knowledge from me and the thirst from his father."

Active: "Who laid the table for breakfast this morning?"

Pledge: "I did, all but the eggs."

"Say, you got a nerve!" cried the dentist to his drill when the patient dived out of the window.

"Willie," asked the teacher, "what was it that Sir Walter Raleigh said when he placed his cloak on the muddy road for beautiful Queen Elizabeth to walk on?"

Will, the ultra-modern, gazed around the class room in dismay, then, taking a long chance, answered, "Step on it, kid."

Bud: "Is this candy pure?"

Clerk: "As pure as the girl of your dreams."

Bud: "Give me a package of gum."

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TAU BETA PI

(Continued from Page 17)

Kline, J. E. Rood, B. J. Romberg, W. W. Farris, J. G. Coates, and Ed Miller. Immediately after the Easter holidays the men will be initiated into the organization, the initiation banquet to be held at Gaebler's Inn.

A number of smokers are being planned for the remainder of the semester. At these smokers, papers will be present by student members and talks will be given by faculty members.

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G-E *Campus News*



ICE WATER

New electric drinking-water coolers introduced by General Electric have replaced the antiquated ice-cooled type on several prominent Midwestern railroads. This is another step in the modernization program being carried on by railroads to increase passenger traffic.

The new coolers are designed to overcome many disadvantages of the ice-cooled units. With foot operation of the self-contained units, only one hand need be used to get a drink. Cleanliness is promoted because of the absence of ice-filling operations, and the expense for maintenance and service is reduced to a minimum.

The water is automatically maintained at a healthful and refreshing temperature through thermostatic control. Coolers are designed either as self-contained units or as separate cooling and refrigerant condensing units for remote installations in the car.



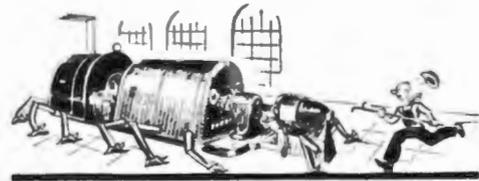
AS VACUUM TUBES GREW UP

As the vacuum tubes grew, they found their style cramped because metal could be sealed to glass only in thin strips. Research took up the problem, and it is now possible to fabricate glass and metal together, in any size or shape, very much as two metals are fabricated.

In a successful glass-to-metal seal, the temperature coefficients of expansion of the glass and the metal must agree exactly over a wide range of temperature. Painstaking investigation—much of

it in the General Electric Research Laboratory, at Schenectady—developed new alloys and new glasses, which could be used for this application.

The first application of this new knowledge has been in metal radio tubes, now standard in almost all radio receivers. Power thyratrons, switches, capacitor bushings—all these follow along the new trail. We cannot predict how far this new technique will go, but the possibilities are numerous and inviting.



TURBINE STEEL CREEPS

If the wrong kind of steels were used in turbine construction, the machine would not go creeping across the floor with the operator in hot pursuit, but the results might be even more disastrous.

Part of the increase in efficiency that has come about in the power-generating field in the last few years has been due to increased steam temperatures and pressures. As a result, the modern turbine shell runs, almost literally, red hot. This shell must withstand pressures such as exist half a mile down in the ocean and must keep a 20-ton rotor spinning perfectly in line. Heat softens metal, just as it softens candy, and permits it to stretch. This stretch, however, must be kept to the merest creep—about one part in 1000, if the changes are uniform.

In the Schenectady Works turbine shop, automatic electric furnaces hold samples of turbine steel at the temperature which will occur in the turbine. Gauges, which indicate changes of one part in a million, measure the creep as the pieces are exposed to heat for years at a time. From these tests, the best steel is selected.

It has been largely due to this research carried on by General Electric that the temperature and pressure of steam used in power generation have been raised to unexpected highs in the last few years.

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COLLEGE OF ENGINEERING
UNIVERSITY OF MISSOURI

MAY, 1937

Volume 4

Number 5

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THE SHAMROCK

Volume 4

MAY, 1937

Number 5

ECLIPSE HUNTING in Soviet Russia

PART III

BY HARNER SELVIDGE

It was a rather sorry sight to see our group of radio engineers standing around the railroad yards that brisk May morning at Ak-Baluk. We had come over 7000 miles to make measurements during the eclipse and then found that, contrary to published reports, there was no alternating current available in the town to run the radio apparatus. One of the prize photographs of the expedition shows the members of the radio party standing around talking to the interpreter with the saddest sort of looks on their faces. The picture has been entitled 'What? No AC?!' It is more realistic if you read the title in a loud voice rising gradually to a scream of anguish at the end. The embarrassed authorities got busy, and in a couple of days they had located an old converter in a nearby town, and we decided that we would try to use it. There was a big 50 horsepower diesel engine with a ten-foot fly wheel in Ak-Bulak which was used to run the machinery in the local grain mill. We used it to drive our converter, connected as a self-excited alternator. The grain mill was shut down for the duration of our stay so we had exclusive use of the diesel. We were a month late getting started, however, because we had to wait for new brushholders for the alternator; the diesel had to be overhauled and new bearings put in; the transmission wire (we requested copper and got aluminum) was late in arriving; and then we had to string our transmission line ourselves. We had

fortunately allowed for some delays, so we were started taking measurements about three weeks before the eclipse. The radio transmitters were set up at the grain mill, and the receivers and recorders were located in a baggage car on the siding with our private car, about three-quarters of a mile away.

For some time before the eclipse the Soviet government had been studying the weather conditions and had found out that the region near Ak-Bulak offered the best chance for good weather at that time of year, and this was the reason our expedition picked this spot. However, while the astronomical observers had to have clear weather for their work, the radio measurements could be made in any kind of weather. In addition to our group, Ak-Bulak was the location of the principal Soviet astronomical expedition. All told, there were about thirty expeditions located at various points along the path of totality across the USSR. Seven of them were from foreign countries. The Soviet expedition at Ak-Bulak was under the personal supervision of Dr. Gerasimovic.

The site of the astronomical camp was on a hill about eight miles out of town, near the exact center of the band of totality. The country was semi-desert, with a sandy soil with little vegetation except along the banks of some small streams. There were no trees except some carefully cultivated ones. The country was rather flat and somewhat resembled our western plains. The houses in Ak-Bulak were

largely made of mud bricks, with thick mud roofs and usually surrounded by a low mud wall. The population was alleged to be 9000, two-thirds being Russian and the rest Kazaks. The latter are the original inhabitants of this territory, and are very Mongolian in appearance. Their language is quite different from the Russian, and throughout the Kazak Republic this language is used, the Soviet government being anxious to have all racial minorities keep their own languages. In Ak-Bulak there were Kazak schools in which Russian was taught only as we teach foreign languages. There were very few horses in this part of the country, the beasts of burden being camels and oxen. The former were of both the one and the two-humped variety, and there were about as many of them as there were oxen.

The week preceding the eclipse was marked by a streak of very bad weather, with clouds obscuring the sky most of the time. It was 'very unusual', according to the natives. The morning of the eclipse dawned with a cloudy sky, and the gloom was as thick at the astronomical camp as it had been in the radio party when they found there was no AC. However, just before the eclipse the clouds broke, and those of us who were not too busy with apparatus saw a sight which was well worth coming 7000 miles merely to see. Appropriately enough, the corona appeared in the shape of a five-pointed star which, with the hammer and

(Continued on Page 12)

Cotton as a Reinforcement for Bituminous Road Surface

BY RALPH SCHMIDT

The use of cotton fibers as reinforcement for bituminous road surfaces is being viewed with interest throughout the country. Although the idea of using cotton fibers as reinforcement is not a new one, having been used in New England nearly 25 years ago, the present widespread interest is of quite recent origin.

Since cotton occupies the dominant position in the agricultural, manufacturing, and consequently the economic life of a number of our southern states, it is not surprising that cotton interests and certain southern states have been placing decided emphasis on the possibilities of a new and comparatively large outlet for cotton fibers. The New Uses Division of the Cotton-Textile Institute, Inc., has been quite active in advocating this new use for cotton.

The purpose of the cotton fiber membrane in a bituminous road surface is to act as a "shock absorber" in the bituminous material. In function, the cotton mesh is closely analogous to the wire mesh reinforcement commonly found in Portland cement pavements. The cotton membrane, as claimed by interested parties, and as later demonstrated in experimental roads, prevents surface cracks by absorbing undue pressures exerted by road-bed changes. By greatly reducing the raveling and erosion which result from surface cracks, the cotton fabric obviously cuts maintenance costs. The cotton membrane, being impregnated with bituminous material, acts as a blanket in preventing water from seeping through from the top surface.

In general, cotton fabrics have been used in that type of bitumi-

nous construction called surface treatment. While the details of construction may vary, surface treatments are applied essentially in the following manner:

The existing road which is to act as a base for the surface treatment is brought to the proper condition, that of a smooth, uniform surface. This base is then given a prime coat of liquid bituminous material, either asphalt or tar. The cotton fabric, of open mesh construction and coming in rolls averaging 72" in width, is laid on the prime coat, either immediately after the prime has been applied or after the prime has dried and hardened. Hot- or cold-application asphalt or tar is then placed on the cotton fabric, and is immediately covered with a layer of mineral aggregate. After the surface has been thoroughly rolled, the road is opened to traffic.

South Carolina, through her state highway department, has been a pioneer in cotton-bituminous road experiments. As early as 1926, she had constructed a short test section. This section has furnished the best basis for estimates regarding the economic life of cotton-bituminous surfaces. Prior to 1936, cotton fabrics had been used in experimental roads in South Carolina, Texas, Georgia, New Jersey, Mississippi, and in several other states.

Interest in the use of cotton in road surfaces has been furthered by a project of the Agricultural Adjustment Administration, approved by the Secretary of Agriculture and begun in March, 1936. The project provides for the allocation of \$1,300,000 for the purchase of 80,000 cotton curing mats and

sufficient fabric for the construction of a total of 1000 miles of road. The cotton fabric membrane costs, on an average, \$600 per mile of 18-foot road. The project is intended to provide means for thoroughly checking the possibilities of the use of cotton fabric in road construction and is being administered jointly by the Agricultural Adjustment Administration and the United States Bureau of Public Roads. Twenty states have requisitioned enough cotton fabric to reinforce 1000 miles of bituminous surface. Twenty states actually contracted for construction work in 1936 and four more states will definitely see cotton roads in 1937.

In several years, sufficient results will be obtained from the experimental roads now constructed or in the process of construction to determine conclusively whether or not the saving in maintenance charges through the use of cotton fibers in the bituminous surface will outweigh the additional costs introduced by the additional investment. Results obtained thus far substantiate the assertion that the introduction of cotton fabric into bituminous surfaces is a very economical procedure.

According to an important official in a large cotton organization, 600,000 of now unimproved dirt roads which will ultimately be given a bituminous surface represent a potential market for from 5,000,000 to 6,000,000 bales of cotton, and the 45,000 miles of bituminous-surfaced highways resurfaced annually, all eligible for the application of cotton fabric reinforcing membrane make an annual new market in this field alone for from 360,000 to 460,000 bales.

RECENT DEVELOPMENTS IN PLASTICS

BY JOHN LANDFRIED

Of the useful products developed during the late depression, none has shown more brilliant promise of utility than plastics. By plastics we mean substances which are shaped by molding or casting and used for quantity production of articles of small size.

It is a striking fact that many of the "new" plastics and resins which have recently been introduced were discovered in the Nineteenth century. Production has been made possible by the recent development of chemical engineering equipment to the point where such organic syntheses were made economically and technologically possible on a large scale. As a rule all plastics are organic substances made by polymerization processes. Such materials are complex in structure and their reactions are not easily understood. Notwithstanding these difficulties, new techniques and equipment have produced amazingly versatile plastics at quite low cost.

These plastic materials may be grouped according to several classifications. By sources, we have the resins made from cellulose, from proteins, from unsaturated hydrocarbons, or from organic chemicals in general. Some classes of plastics are transparent, others are translucent, still others opaque. They are often described by their physical characteristics as regards solubility in water and the common organic solvents, tendency to swell, thermoplasticity, shock resistance, stability toward light, hardness, machinability and initial reaction toward heat. All these characteristics are important in the application of resins to the needs of industry.

A brief description of some of the important new plastics will be helpful to a better understanding of them.

Probably one of the oldest and most widely used of synthetic plastics is nitrocellulose. The quality of this product has been greatly improved by increasing the purity of the refined cellulose and water supplies, improvement in the mechanical features of nitration, and the use of better materials for construction of plant equipment. A newcomer in this type of plastic is the ether called ethyl cellulose. It is marketed as a white molding powder made by treatment of alkali cellulose with an alkylating agent such as ethyl chloride. It is similar to other cellulose plastics in that its viscosity can be varied by the extent of reaction. Some of its valuable properties are stability toward light and heat, extraordinary flexibility, resistance to acids and alkalis, miscibility with waxes and resins, and solubility in low cost solvents.

In the formaldehyde group of resins there have been new developments of a transparent amber-colored Bakelite; a heat-setting resin analogous to phenol-formaldehyde made by the reaction of phenol with furfuraldehyde; and a resin made from urea and formaldehyde. This latter is being extensively used because of its high shock resistance, its ability to be molded into large pieces such as radio cabinets and lighting fixtures, and because of the beauty of its moldings.

A co-polymer of vinyl chloride and vinyl acetate called Vinylite has been developed which is so

versatile that an entire house has been made with it—windows, dishes, floors and walls.

A class of new resins to attract considerable attention is that consisting of polymerized esters of acrylic and methacrylic acids. These are crystal-clear resins being marketed under trade names of Acryloid and Lucite. In appearance they are water-white, but may be delicately tinted and colored to give handsome effects. The resins are thermoplastic, insoluble in most chemicals, and will not absorb moisture. They are easily worked, and in addition to having some of the desirable properties of glass, transmit ultra-violet light well. The monomers of this group may be used as impregnating agents for wood, cloth, and paper, rendering them proof against water, oils, and chemicals.

There are several methods of forming or fabricating plastics: The hot, freshly prepared liquid plastic is often run into molds, solidifying into special forms or into blocks for machining stock. Special shapes are made in molds either by compression, injection, or transfer molding. In compression molding, the molding powder is placed in an open mold and the mold closed by pressure. Injection molding, a newer development, uses a closed, chilled mold and operates faster than the first process. Transfer molding is similar to injection molding with the exception that thermosetting resins are used in the process, which is operated hot rather than cold. For structural uses plastics are sometimes laminated. For the filler in safety glass, the sheet may be sliced

(Continued on Page 13)

Opportunities for Seniors Increase

The opportunities for graduating seniors, apparently keeping in step with Dean Johnson's program of expansion and the latest improvements in the Engineering School, have become greater. There has been an increase of more than twofold, this year over last, in the number of senior engineers offered positions by business firms in various cities throughout the country. This is significant in that certain fields of the business world show, along with their trend toward better conditions, a preference to Missouri Engineers. But may we congratulate these men on their fine work in the University and wish them successful futures in the new tasks which are before them.

The seniors who at the present time have positions are: C. E. Owings, E.E., R. F. Kolde, E.E., R. F. Schmidt, E.E., C. B. Briggs,

M.E., and T. Scanland with General Electric at Schenectady, N. Y.

W. R. Biskel, E.E., J. O. Coates, C.E., T. H. Rubey, C.E., with the Empire District Oil Company at Bartlesville, Oklahoma.

W. L. Banks, Ch.E., R. C. Garret, Ch.E., with the Texas Oil Company at Port Arthur, Texas.

M. O. Hildebrand, E.E., H. L. Gratsch, M.E., with Union Electric at St. Louis.

L. A. Gettinger, M.E., T. O. Thompson, M.E., with Bailey Meter Company at Cleveland, Ohio.

B. Flannery, M.E., A. Nienhueser, E.E., with the Westinghouse Electric Company at Pittsburgh, Penn.

T. Harper, Ag.E., R. Rickets, Ag.E., and J. Park, Ag.E., with the United States Soil Conservation Service

L. P. Johnston, Ch.E., with Hercules Powder Company, Parlin, New Jersey.

W. P. Salisbury, C.E., will be with the Milwaukee Railway Company.

J. M. Estes, Ch.E., with E. I. duPont de Nemours and Company at Wilmington, Delaware.

H. L. Pearlstein, Ch.E., with Laclede Light and Power Company, St. Louis.

F. Johnson, C.E., with Donner Hanna Coke Company at Buffalo, New York.

S. H. Sides, Ch.E., with Certain-Teed Products, Kansas City.

W. M. Petry, M.E., will be located at Borger, Texas.

H. A. Satterlee, M.E., has a job with a plumbing and heating establishment in Joplin, and C. A. Wenner, M.E., will be with the Sunnens Products Company in St. Louis.

The Revised Curriculum

. . . Dean Johnson

The further revision of the several curricula of the College of Engineering as shown in the new catalogs just off the press is a direct result of the activities of the Engineers' Council for Professional Development.

Following a careful inspection of colleges in the East last year, this national council representing the recognized national professional engineering societies, the National Council of State Boards of Engineering Examiners and the Society for the Promotion of Engineering Education extended its work throughout the rest of the country this year.

Five representatives of the Engineers' Council for Professional Development inspected the University of Missouri. Their visit was helpful and welcome.

The attitude of our faculty and University administration officers was to consider carefully all recommendations made by the inspecting committee. To the fullest extent possible it was their resolve to follow immediately every suggestion that would insure the operation of our College of Engineering on a level equal to the highest. Thus from entrance requirements to requirements for graduation the specifications were advanced. In each curriculum some changes and rearrangements were made. The effect has been to place more emphasis on fundamentals and at the same time give more time to technical subjects. This has been accomplished by increasing requirements for graduation as noted and by sacrificing some opportunities for election.

The method of securing these changes drives more sharply home the limitations of a four year course in which to give an engineer the work he must have to meet competition in a profession where knowledge and technique are so rapidly expanding and at the same time offer him opportunity for broadened interests. While at the present time no definite steps are contemplated it may be considered that the situation brings nearer the day when engineering, as medicine and law, will require a certain amount of college training for entrance or foundation before building the structure of a professional engineer's technical training.

ALUMNI NEWS

Oscar H. Schmidt, BS in Eng. (CE) '07, is a Contractor in St. Joseph, Missouri. He has a son, Edward, who is a sophomore in the College of Engineering this year.

Raymond S. Scott, BS in Eng. (EE) '35, is a Student Engineer with the Buick Motor Company in Flint, Michigan.

Lauren V. Seares, BS in Eng. (EE) '10, is Vice-President & General Manager of the Arizona Power Company at Prescott, Arizona.

Earl B. Smith, BS in Eng. (ME) '03, MS in '05, is Professor of Mechanical Engineering at the College of the City of New York.

L. Vernon Uhrig, BS in Eng. (CE) '25, is employed in the City Water Department at Houston, Texas.

Bert A. Williamson, BS in Eng. (EE) '07, is Electrolysis Engineer for the Los Angeles Gas & Electric Corporation in Los Angeles, California.

Clinton T. Yates, BS in Eng. (EE) '09, is Assistant Manager of the Arizona Edison Company at Phoenix, Arizona.

W. B. Clark, BS in Eng. (EE) '23, is with the General Electric Company at Salt Lake City, Utah.

Cleo F. Craig, BS in Eng. (EE) '13, is in the employ of the American Telephone & Telegraph Company at New York City.

George E. Crews, BS in Eng. (CE) '18, is with the Texas Company in Port Neches, Texas.

Roland R. Muench, BS in Eng. (EE) '28, has been transferred from the Wichita, Kansas office to the St. Louis, Missouri division of the American Telephone & Telegraph Company.

Clarence O'Daniel, BS in Eng. (EE) '16, is Sales Engineer for the Century Electric Company in St. Louis, Missouri.

George L. Crow, BS in Eng. (EE) '29, is employed in the Federal & Marine Department of the General Electric Company at Schenectady, New York.

William N. Crumpler, BS in Eng. (ME) '28, for the past six years has been with the Chemical & Pigment Company in Collinsville, Illinois.

Fred E. Dawkins, BS in Eng. (CE) '29, is employed in the Materials Department of the Missouri State Highway Department at Jefferson City, Mo.

Dudley W. Dehoney, BS in Eng. (CE) '19, is with the National Paper Box Company in Kansas City, Missouri.

Norbert A. Eisen, BS in Eng. (Ch. E) '24, is in the Chemical Research Department of the Mid-Continent Petroleum Corporation at Tulsa, Oklahoma.

Julius L. Englesberg, BS in Eng. (Ch. E) '34, is employed in the Research Laboratories of the Abco Rubber Company at Long Island City, N. Y.

Thomas E. Everly, BS in Eng. (EE) '22, is with the Southwestern Bell Telephone Company at St. Louis, Missouri.

Karl Hoffman, BS in Eng. (Ch. E) '33, who has been with the Bemis Bag company for several years, is now with the Mallinckrodt Chemical Works in St. Louis, Missouri.

Ed Donnelly, BS in Eng. (ME) '36, is in the employ of the Frick Ice Company in Scranton, Pennsylvania.

Robert Kolde, BS in Eng. (EE) '37, is with the General Electric Company in their Erie, Pennsylvania plant.

Joseph Estes, BS in Eng. (Ch. E.) '37, is with the E. I. du Pont de Nemours Company at Waynesboro, Virginia.

Harold Pearlstein, BS in Eng. (Ch. E) '37, is with the Laclede Lt. & Pr. Company in St. Louis, Missouri.

Ralph A. Galbraith, BS in Eng. (EE) '33, will receive his Doctor's Degree in Engineering from Yale University this June. He has already accepted a position in the research department of the Detroit Edison Company.

Norman Bers, BS in Eng. (EE) '33, who has been a Rhodes Scholar at Oxford University during the past four years, will complete his work there this spring and will return to the University of Missouri where he has accepted a position as instructor in the mathematics department.

Philip Watson, BS in Eng. (EE) '36, is soon to join the staff of sub-station department of the General Electric Company in St. Louis, Mo.

AROUND THE COLUMNS

OFFICE OF THE DEAN ACQUIRES NEW BLINDS

From his office in the Engineering Building, Dean Johnson may now view the Red Campus through the evenly spaced ports of Venetian blinds. These blinds may be adjusted to effect indirect lighting, thereby eliminating the glare of unshaded windows that had before made the lighting system undesirable. Not only are they mechanically successful, but these blinds add the last touch to the lately refinished office and make it more fitting to the name Office of the Dean of the College of Engineering.

Before, visitors and guests entered the office and were confronted with the unchallenged boldness of five or six over-sized, gleaming, window panes, the bad effect being emphasized by the number of windows. However, the five or six wide open spaces are now beautifully covered and soft light is reflected by the shellacked folds of Venetian blinds. It is interesting that these blinds had to be constructed to fit windows that are exceptionally high and narrow.

Mr. Oscar Lee, who received his B.S. degree in electrical engineering from this University in 1909, presented these blinds to the Engineering School as a gift. Mr. Lee met Dean Johnson recently in Chicago at a gathering of Missouri Engineers.

May this express the student's gratitude for the interest in improving the Engineering School shown by Mr. Lee.

Prof: "Young man are you the teacher of this class?"

Stude: "No, sir."

Prof: "Then don't talk like an idiot."

T. O. THOMPSON SWIMS IN LAB.

It has been rumored that T. O. Thompson is now a little more careful with his fifty-cent piece, which he used to flip continually. Due to some error in his calculations, T. O. failed to catch the coin on its downward trip, and the half-dollar rolled in the water tank beneath the Hydraulic Lab. Tommy proceeded to strip and



plunge, and recovered his money on the first time down. Hiding behind a large tank in the lab. Mr. Thompson dressed without the notice of Prof. Sogard who was leading the class in a centrifugal pump experiment.

FACULTY-SENIOR BASEBALL GAME ENDS WITH SCORE 8-12

Wednesday afternoon, May 12 the Faculty Furies met the Senior Slayers in the worst battle of the century. The Furies, under the close supervision of Manager Holt, of the Dean's office. Holt, played one of the best games we have ever seen. Every player was in tip top shape, and their team work was like the operation of some master time piece, but they lost the game. Some people believe that the loss was due to the

absence of the deep fielder Scorah, who was unable to play. The Slayers were in poor shape but great in number, so they won by a score of 12 to 8.

The starting lineups were as follows:

Faculty Furies	Senior Slayers
MoormanC.....	Riddle
WallisP.....	Marshall
Dean Johnson 1.....	Ebbe
Vaille2.....	Carl
LaRue3.....	Hildebrandt
PepperS.S.....	F. Johnson
KeuchlerS.F.....	McCann
LoganL.F.....	Bretscher
WoodC.F.....	Dawson
SogardR.F.....	Coates
HoltManager.....	Scheely
Umpire	Ralsky

ENGINEERS ELECT OFFICERS

At a meeting May 12 The Engineers Club held its spring election of officers. After several political speeches the Engineers elected James J. Hill as their president, James Trebilcott as Chairman of St. Pat's Board, Jack Baker, Secretary, John Davis, Publicity Director, Robert Johnson, Vice-President; George Stobart, Treasurer; George LaRue, Secretary of St. Pat's Board.

The other title for Sweet Adeline is The Bottle Hymn of the Republic.

Nothing annoys a woman like having her friends drop in unexpectedly to find the house looking as it usually does.

"Quite the contrary," the man on shipboard answered, when asked if he had dined.

He called his girl "Brown Sugar" because she was sweet but unrefined.

WILDLIFE PROJECT

About eighteen miles southeast of Columbia, near Ashland, Missouri, 2300 acres of rough, poor land are being converted, under the direction and financing of the Resettlement Administration, into an area which will serve as an arboretum and an experimental laboratory for the study of plant and animal life here at the University of Missouri. When completed, this tract will be leased for fifty years, at practically no cost, to the University of Missouri.

Construction work is progressing rapidly. The core wall of the major earth-fill dam, which will hold the waters of a sixteen-acre lake, has been built up to twenty feet with twenty-five more feet yet to be built. The rough excavation for the spillway, which is located in the solid rock of an adjacent hillside, has been completed. The weir and apron to the spillway have not been built. A number of smaller ponds have been completed and more are in the process of construction. When completed, the dam will be 250 feet wide at the base, 50 feet high, and 275 feet long.

The development of this wildlife project is of especial interest to Missouri engineers in that, last year, four men in Advanced Hydraulic Engineering, under the supervision of Professor Rodhouse, obtained topographic data of a watershed area of 1284 acres partially within the project, estimated the maximum runoff from this

watershed, determined the most logical point for a dam, designed six dams for the point, and submitted their entire report, together with all necessary explanatory maps and drawings, to the U. S. Engineers' offices at Champaign, Illinois. It is interesting to note that practically all of the suggestions given by the students were accepted. The men who were engaged in the work were A. K. Roberts, R. A. Elsnor, R. J. Short, and C. R. Wilders, all B.S. in Eng. (C.E.), '35.

A number of experimental projects for the wildlife area have been planned. One is an exhaustive study of the succession of plant life, to determine how and why one species of vegetation supplants another in a particular area. Another deals with the study of aquatic vegetation—the correlation between the presence of certain types of vegetation and the abundance of fish in a body of water. Another project will compare the effect on certain animal life in an area which is allowed to revert back to the natural state with the effect on the same life under a managed environment. A project, rendered ineffective by the recent drouth, was one in which 2000 chestnut seedlings—native, Asiatic, and hybrids of the two—were planted in an attempt to develop a species immune to chestnut blight and yet able to withstand Missouri's uncertain climate.

ST. PAT'S ESCAPE

During the celebration of 1905 or some time after, the Engineers hung a large tin elephant on the dome of Academic Hall and, in order to make it hard to remove, resorted to a very novel and effective plan. The scuttle, through which one must pass to get into the dome, was filled with wood and then soaked with oil. The oil made the wood swell to such an extent that it had to be chiselled out and the Board of Curators rendered a bill to the Engineers' Club for the sum of two hundred dollars. One night shortly after, a shack mysteriously appeared on the campus. The janitors tried to remove it but there were not enough of them to carry it, so the Engineers displayed their interest and volunteered their services. The shack was moved, set up, oriented, and leveled with much ceremony. The next day the Board of Curators received a bill of two hundred dollars for services rendered.

Just the Thing!

Mountaineer (taking son to school room): "My boy's arter larnin'. What have you got?"

Teacher: "We offer arithmetic, English, trigonometry, spelling, etc."

Mountaineer: "Just give him some of that thar triggernometry; he's the worst shot in the family."

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DEPARTMENTALS

TAU BETA PI

The regular second semester initiation of Tau Beta Pi was held in the Engineering Building April first, followed by a banquet at the Tiger Hotel. Dr. Karl Bopp was the speaker of the evening, and gave an interesting discussion on the similarities between the engineer and the economists. Professor J. R. Wharton of the Mechanical Department acted as Toastmaster.

A smoker is being planned in the near future, at which the newly initiated men will present papers on some non-technical subject, as the last part of their initiations. Election of officers for next year will take place at that meeting. The Tau Betes are making tentative plans for a social event later in the spring, to serve as a farewell party for the senior members.

The members of the Missouri Alpha chapter of Tau Beta Pi have passed through a very successful year, and are looking forward to greater accomplishments in 1937-38. Engineers, strive for the right to wear the Bent of Tau Beta Pi, highest honor attainable by the Engineering students.

A. I. E. E.

At the meeting of March 23, 1937 a sound picture and talk on "Recent Developments in Switchgear" was given by Mr. R. B. Mc Ilvan, Switchgear Specialist, of General Electric, Chicago. This talk was very instructive and interesting to all.

On Friday evening April 16, member of Sigma Zeta and A. I. E. E., as well as a large number of visitors, were entertained in the Physics Lecture room by Dr. Thomas, of Westinghouse Electric. Dr. Thomas's lecture was very interesting and enjoyed by all. He brought an abundance of equipment with

him for this lecture which was very illustrious to his talk.

At the dinner meeting held at Harris's Cafe, April 20, Mr. G. A. Waters, Chief Engineering of Wagner Electric Co., St. Louis, gave a talk on "Some Questions Asked by Engineering Students." Mr. Waters gave a very good discussion of these questions which were chiefly concerned with the problems of graduating seniors.

A. S. M. E.

Twenty-five members of A. S. M. E. left on Thursday, March 24 for an Inspection Trip to St. Louis, Mo. On Thursday morning the group was conducted through the Chevrolet and Fisher Body Assembly Plants. In the afternoon, the group was taken on a specially conducted tour of the Anheuser-Busch Brewery, including inspection of the power plant and refrigerating equipment.

Friday morning was spent in the Cahokia Power Station, an example of the modern powdered coal installation, and in the afternoon trips were made to the Century Electric Foundry and Busch-Selzer Diesel Engine Works.

A trip to Crystal City, Mo., was made on Saturday morning where a trip had been specially arranged through the Pittsburg Plate Glass Plant. The club was very fortunate in being allowed to make this interesting trip since such inspections are not a policy of the company. This trip was made possible, as was the entire trip, through the efforts of Louis Crum, who was in charge of Inspection Trips. The party was accompanied by Prof. J. R. Wharton, Honorary Chairman.

Meeting:

The principal business of the regular meeting of April 6 was

a preliminary presentation of papers to be given at the A. S. M. E. Meeting in Kansas City. B. Flowers presented a paper on "The Sperry System of Gyroscopic Ship Stabilization" at this time.

Annual Student Branch Meeting:

On Friday, April 10, twenty members attended the Student Branch Meeting of A. S. M. E. in Kansas City, Mo. Other schools represented were: Kansas State College, University of Kansas, South Dakota State College, University of Nebraska, University of North Dakota. The University of Missouri was represented by B. Flowers, whose paper received Honorable Mention and T. O. Thomson, whose paper on "Real and Imaginary Gases" was awarded Second Prize of \$25. Interesting inspection trips included Northeast Station, Kansas City Power and Light Company; Sheffield Steel Corporation; New Kansas City Municipal Auditorium and TWA Air Field. The Missouri delegation was accompanied by Prof. J. R. Wharton and Dr. R. L. Scolah.

A. S. A. E.

At a meeting held March 22, 1937, two motion pictures were shown, "The Romance of a Reaper" and "Inconveniences of Farming." At the April 6, meeting a very interesting talk was given by Professor Jones, on "The History and Use of the Slide Rule." April 20 the A. S. A. E. held another meeting to discuss plans for the Farmers' Fair. Vernorr Wood and Charles Timm gave talks at the meeting.

The student branch of A.S.A.E. is planning an annual banquet to be held May 25, 1937.

ECLIPSE HUNTING IN SOVIET RUSSIA

(Continued from Page 4)

sickle, is the emblem of Soviet Russia. The points of the star streaked across the sky making a most awe-inspiring spectacle. In the dark sky beyond the corona the two planets, Venus and Mars, sparkled brilliantly. Around the horizon the sky was much lighter with a reddish cast. As the sun became eclipsed the temperature of the air dropped considerably, hastening the disappearance of the few remaining clouds and causing the observers to put on coats and sweaters.

Fortunately, all the apparatus of the scientific groups at Ak-Bulak worked satisfactorily, and over the whole 8000-mile eclipse path there was bad weather at only a few points where observers were located. After several days of developing records and breaking camp, the astronomers left Ak-Bulak, while the radio party stayed on two weeks more to get more control data. Then we, too, departed. The various members went home by different routes, a party of astronomers spending some time in the Caucasus. The radio party took a trip up the Volga by steamer on the way to Moscow, and arrived there just in time to attend a big Fourth of July picnic given by the American Embassy.

The data obtained by the astronomical expedition will be analyzed this winter, as well as the radio data. Few definite results are known yet, but the quality of the records is such that high hopes are held for the future data to be obtained from them. A magnetic disturbance of world-wide extent was noted the day of the eclipse and the day following. It is believed to have had no connection with the eclipse, but some observers had stated that it probably destroyed the value of the radio records.

However, we are glad to say that a preliminary analysis of these records shows that this is not the case, and that they contain much information of scientific value. We believe that they show definitely that the main ionizing agent of the various layers of the ionosphere is ultra-violet lights from the sun, a result which checks with most previous eclipse data. A detailed examination of the records will doubtless enable us to find out more about this process. For some, the eclipse is over, but for us there is still work to be done. And I feel sure that every one of us is looking forward to the time when we can again visit that most interesting of countries, modern Russia.

In conclusion I wish to acknowledge the very great assistance of the Soviet Academy of Sciences and its eclipse committee under Dr. Gerasimovic who made all our arrangements in the USSR.

Financial assistance for the expedition was obtained in part from grants from the Milton fund and Clark bequests of Harvard University, from the American Philosophical Society, and from the American Academy of Arts and Sciences. The trip of the radio party was made possible by a donation from RCA Communications, Inc. Many commercial companies and scientific laboratories donated tools, materials and various kinds of equipment, this list being too long to include here. It is given in detail in 'The Technology Review' of November, 1936.

DEPARTMENTALS

(Continued from Page 11)

Eta Kappa Nu

At a recent meeting Eta Kappa Nu elected the following five high ranking students for membership, Ben Hildebrant, Jr., Henry Paul Roberts, Jack M. Baker,

Logan E. Setzer, Musaji Irie. Initiation will follow within the next few weeks.

To promote high standards of scholarship in the department, Eta Kappa Nu will present the highest ranking sophomore a paid-up membership in the student branch of A. I. E. E. this spring.

A. I. Ch. E.

The Missouri Chapter of A. I. Ch. E. met Thursday evening, April 15, at Harris Cafe. Dinner was served after which Mr. J. A. Logan, guest speaker, addressed the group. Mr. Logan spoke on Sanitary Engineering and various processes of purification and sanitation in this field.

An election of officers will be held at the next meeting, Thursday, May 14. These officers will preside next year. At this meeting the Award Committee will give a report on its activities in selecting the outstanding junior Chemical Engineer to whom the Junior Award will be given.

Pi Tau Sigma

The spring election of members of Pi Tau Sigma was held on April 15, 1937. James Hill, Fred Powell, and Melvin Yedlin were chosen for membership. These men will be initiated within the next few weeks.

It is planned to alter the custom of initiation procedure this year by holding a joint initiation banquet with Eta Kappa Nu, following the initiation ceremony.

HERE AND THERE

A. W. Robertson, chairman of the Westinghouse Electric and Manufacturing Company, says that by 1986 people will find it more healthful to remain inside most of the time. The building will be soundproof and windowless. Work or rest will be more enjoyable under ultra-violet artificial sunshine and 'pasteurized' air, devoid of germs and fumes.

RECENT DEVELOPMENTS IN PLASTICS

(Continued from Page 6)

from a block of plastic or may be formed by extrusion.

Most plastics require the addition of plasticizers, fillers, and dyes after the substance itself has been formed in order to bring out the best qualities. A common filler is wood flour, either bleached or unbleached. To illustrate the colors possible, one company reports the use of 10,000 different colors in urea-formaldehyde resins.

The uses of plastics are many and varied: toothbrushes, pen and pencil bodies, lighting fixtures, combs, buttons, bottle caps, electrical equipment of all sorts, instrument cases, radio cabinets, varnishes, lacquers, starchless collars, safety glass, dentures, sound records, wire insulation, and automobile accessories of all kinds are specific uses of plastics you will encounter every day. The chemical engineer even uses these products of his ingenuity to further his own craft. The resistance of plastics to moisture, acids, alkalies, oils, and most solvents has made them valuable allies in the fight against corrosion in plant operation. Haveg, a material made of asbestos fiber and phenolic resin, is useful in combatting stubborn cases of corrosion in equipment. Resin coatings on beer and wine vat interiors are resistant to acids and ferments and in addition provide a surface which is easily cleaned. Filter press plates, bearings, gears, pumps, bubble caps, pipe lines, and spray nozzles for handling corrosive liquids are made of resins or plastics. Printing rolls made of Glyptal resins are far superior to the cylinders previously used.

The purpose of this paper has been to indicate the trend of the plastics industry today. Some of the new products will have be-

come commonplace tomorrow as they make their contribution to the comfort and convenience of the world. On considering the vast utility of these materials, we are led to think that an Age of Plastics may soon be upon us.

ALUMNI NOTES

(Continued from Page 8)

Leon H. Albus, BS in Eng. (EE) '21, is Manager of the Natural Gas Distribution Utility Company at Pittsburg, Kansas.

Squire H. Anderson, BS in Eng. (EE) '16, is with the Bell Telephone Laboratories at Hollis, New York.

Royce H. Beekman, BS in Eng. (EE) '10, is in the Federal & Marine Department of the General Electric Company in Schenectady, New York.

Harold O. Peck, BS in Eng. (CE) '12, is with the Mutual Life Insurance Company in Kansas City, Missouri.

Walter Rautenstrauch, BS in Eng. (ME) '02, LL. D in '32, is now Professor of Industrial Engineering at Columbia University, New York City.

Iram O. Royse, BS in Eng. (ME) '16, is Office Manager at the Purina Mills at St. Louis, Missouri.

Paul M. Cox, BS in Eng. (Ch. E) '34, MA '37, left the first of this month for Parlin, New Jersey where he has accepted a position in the Nitro-Cellulose plant of the Hercules Powder Company there. James Yaeger, (Ch. E.) '23, and Steve Elliot, (Ch. E.) '27, are also with Hercules at Parlin.

Ralph Vern Ott (EE) was recently married to Miss Marlea Leshner of Youngstown, Ohio.

Mr. Ott, a member of Eta Kappa Nu, is now with the Carnegie-Illinois Steel Corp. in Youngstown.

Arthur B. Hitchcock, BS in Eng. (ME) '31, is with the Western Electric Company at Chicago, Illinois.

William E. Hoeffin, BS in Eng. (ME) '25, is Industrial Engineer in Power Sales Promotion work in St. Louis, Missouri.

William C. Morehead, BS in Eng. (EE) '08, is President of the Pacific Ocean Products, Ltd. in Pasadena, California.

William Gerig, BS in Eng. (CE) '86, is Head Engineer in the office of Chief of Engineers, Washington, D. C.

Robert J. Bennington, BS in Eng. (EE) '23, has recently been transferred from the Dallas, Texas office to the St. Louis, Missouri branch of the American Telephone & Telegraph Company.

H. J. Bernat, BS in Eng. (CE) '34, is with the Spillway Builders, Inc. at Kansas City, Missouri.

Carl W. Betz, BS in Eng. (Ch. E) '17, is Chief Chemist for the Allegheny County Bureau of Tests in Pittsburgh, Pennsylvania.

F. Gano Chance, BS in Eng. (Ch. E) '29, is Vice-President of the A. B. Chance Manufacturing Company at Centralia, Missouri.

It isn't will power that a girl needs nowadays, but won't power.

Often the one who is absent from the bridge party gets the most slams.

Ideal sport for a good time: just the right degrees of loungitude and lassitude.

BLARNEY

They had been sitting in the swing in the moonlight, alone. No word broke the stillness for half an hour, until—

"Suppose you had money," she said. "What would you do?"

He threw out his chest in all the glory of young manhood: "I'd travel."

He felt her warm, young hand slide into his. When he looked up, she was gone.

In his hand was a nickel.

A married couple were sleeping peacefully when his wife suddenly shouted out in her sleep: "Good Lord, my husband!"

The husband, waking suddenly, jumped out of the window.

Ill. Tech

Curious old lady, "Why, you've lost your leg, haven't you?"

Cripple, "Well, damned if I haven't."

Prof: "When the room settles down I will begin the lecture."

Stude: "Why don't you go home and sleep it off?"

He: "I suppose you dance?"

She: "Oh, yes, I love to."

He: "That's better than dancing."

He: "My treasure!" She: "My treasury."



He: "I'm getting a new siren for my car."

She: "Does that mean we're through?"

A veterinary surgeon was instructing a farmer as to the proper method of administering medicine to his horse.

"Simply place this powder in a gas pipe about two feet long, put one end of it well back in the horse's mouth and blow the powder down his throat."

Shortly thereafter the farmer came running into the veterinary's office in a distressed condition.

"What's the matter?" asked the veterinary.

"I'm dying," cried the farmer, "the horse blew first."

Prof. (taking up quiz paper): "Why quotation marks on this paper?"

Student: "Courtesy to the man on my left."

Dad coming to son's fraternity: "Does Ray live here?"

Brothers: "Sure, carry him in."

Rock-a-by, Baby, On a tree top—Don't you fall out—It's a helluva drop.

"An engineer got pretty fresh with me last night."

"Did you get the upper hand?"

"Yes, but I couldn't do a thing with the one he had on my knee."

According to a scientist the average human male is four times as strong as the female. With all due respects to the modern girl, we should say that this seems no longer necessary.

There was a lot more horse sense on the highways in the old days, but it belonged to the horse.

A prisoner was being led off to execution by a squad of Bolskevik soldiers. It was raining heavily.

"What beasts you Bolsheviks are," grumbled the doomed one, "to march me through the rain like this."

"How about us," retorted one of the squad. "We have to march back through it."

And then there was the Sophomore who thought he got the wrong report card. He claimed the one sent him should have gone to Dizzy Dean, because it was all "I's."

When is a joke not a joke?

Nine times out of ten.

"Hello, is this the weather bureau? How about that shower tonight?"

"Don't ask us. If you need one, take it."

Mr. Smith had just finished putting the seeds in the garden.

"How about the birds eating the seeds?" asked Mrs. Smith. "Hadn't you better put up a scarecrow?"

"Oh, that doesn't matter," was the reply. "One of us will always be in the garden."

"Where are you going, my pretty maid?"

"There are numerous theories, Sir," said she.

Guy: "Since I met you I can't sleep, I can't eat, I can't drink."

Gal: (shyly) "Why not?"

Guy: "I'm broke."

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G-E Campus News



FOR OUTSTANDING ACHIEVEMENT

February 26 was a big day in the lives of thirty-three G-E employees. These thirty-three were selected from the 60,000 persons in the Company's employ to receive the Charles A. Coffin Awards. There were fifteen factory men, twelve engineers, two commercial men, and four administrative and clerical employees. Twelve of the group are college graduates:

Roy T. Adolphson, University of Washington, '34; Eugene W. Boehne, Texas A & M, '26, and M. I. T., '28; Claude P. Hamilton, University of Nevada, '14; George H. Jump, Syracuse U., '10; Jack R. Meador, Texas A & M, '27 and '28; Harry E. Scarbrough, Georgia Tech., '19; Edward J. Schaefer, Johns Hopkins, '23; Alfred A. Thompson, University of California, '05; Carl Thumin, College of City of New York, '17, and M. I. T., '20; Harold E. Treckell, Kansas State, '31; Elmer J. Wade, University of Maine, '19; and Leo F. Worden, West Virginia University, '25.

Each year General Electric makes these awards to employees who have done outstanding work, as provided in the Charles A. Coffin Foundation established in 1922. Charles A. Coffin was organizer and first president of General Electric.



"EXPERIMENTALLY—NOT ON PAPER"

Sixteen years or so ago, Dr. Willis R. Whitney, now Vice President in charge of General Electric research, sent a note to a research worker, suggesting experiments with a motor-generator set sealed

gastight and filled with hydrogen to see if the machine ran cooler, and more efficiently. The results of those experiments promoted the use of hydrogen in synchronous condensers and established the present trend toward the use of hydrogen in turbine-generators.

Windage loss in a rotating machine is reduced about 90 per cent and noise is greatly decreased because of the low density of hydrogen. Heat is carried away much more rapidly through the higher thermal conductivity of hydrogen. Resistance to damage due to corona within the machine is increased. These characteristics increase the electrical output for a given core size and reduce inspection and maintenance expense.

The construction of several hydrogen-cooled turbine-generating units is now going on in the Schenectady turbine shop—perhaps all because of that note written by Dr. Whitney so many years ago.



CALLING ALL FIREBOATS

Fireboats are often away from their docks for several days at a time—not on a fishing trip, but fighting severe marine fires. The communication problem has been solved, however, for the fire-fighting sailors on the nine New York fireboats. General Electric engineers have installed a two-way radio system which will be in operation when the boats are out of telephonic contact with shore. This system will be an invaluable aid in expediting the handling of injured persons or those suffering from exposure.

In size, this system will be second only to the police-car system used in Boston. Two-way conversation will be possible, with no switching operations necessary to change from talking to listening. The equipment will include a remote-control, 500-watt, medium-frequency central transmitter for direct radio communication to all fireboats. The return part of the conversation from the boats will be transmitted by ultra-high-frequency radio to pickup receivers located at strategic points on the shore.

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