



While youths in Europe wear gas masks, engineering students at O.U. (like the two above) wear masks to learn arc welding.

Engineering Progress

MARCH is traditionally the month of the engineers. Students celebrate in honor of St. Pat; engineering alumni visit the campus to join in the festivities with their undergraduate colleagues in the green shirts; and University officials review the progress of the College of Engineering through the past twelve months.

A short time ago an alumnus who had been out of the state for several years dropped by the office of Dean W. H. Carson in the Engineering Building.

"He expressed surprise," the dean said, "to find we did not have a new engineering building, or even one under construction. I explained, of course, that we did not receive an appropriation at the last session of the legislature for a new structure, because there wasn't enough money in the public building fund to permit such expenditure.

"We hope, however, that the oil wells around the capitol will soon bolster the public building fund sufficiently to justify the construction of a petroleum engineering building in the University campus."

Engineering students are more crowded than ever this year. The total enrollment in the College of Engineering for the school year 1938-39 was 1,704, and this year's enrollment will top that figure by at least one hundred. Last year's graduation class set a record when one hundred sixty-four received degrees.

The recent graduates of the college have found the going somewhat more difficult than those of several years ago. All but twelve of the 1939 class, however, have reported that they have obtained perma-

nent employment. Incomplete figures show that about three-fourths of the sixty students who graduated at the end of the first semester in January, 1940, have located positions. Dean Carson believes that although business conditions at present are more or less unsettled, other graduates of the 1940 class will experience little difficulty in securing employment.

"There is a definite upward trend in the scholarship records of the students of the College of Engineering," the dean reports. "This may be explained first, by the fact that a "C" average is now required for graduation, and second, by an improved advisory system which gives the students more personal supervision and professional guidance."

A survey of the past year in the College of Engineering reveals the following:

ARCHITECTURE

During the last year the students in the School of Architecture have continued to bring national recognition to the University of Oklahoma.

In order to keep a constant check on the accomplishments of its students, in comparison with those in other architectural schools in the United States, the school has maintained the policy of encouraging them to present their problems to the Beaux-Arts Institute of Design in New York City, where they are judged in competition with problems submitted by other architectural schools.

In the national competition Sooners have received a total of seventy-five awards in the last school year. Seven designs receiv-

ed the highest possible awards, and seven were published in the Bulletin of the Beaux-Arts Institute of Design, which is nationally circulated.

The goal of every architectural student in the United States is to secure first place in the Paris Prize Competition. The winner of this competition receives \$2,500 for foreign study and travel. Along with the cash prize comes national recognition which often insures a bright future for the student in his profession. The competition is held in three stages, first and second preliminary, and final. In the national competition three students from the University of Oklahoma were selected to enter the second preliminary. From that round, one Sooner, Paul F. Jeffries, '40ex, was chosen for the finals. Only ten such students are selected in the entire United States. This is the first time that any student in Oklahoma has gained such a distinction. Moreover, he was the only student west of the Mississippi to receive the honor. In the Paris Prize Final he placed seventh.

In the Spiering Prize Competition, in which a cash award of twenty-five dollars is given, an O.U. boy tied for first place. In the Productive Home Competition, sponsored by the *Architectural Record*, a University student won a \$100 prize.

As a result of the showing of University architectural students, two scholarships were obtained for graduate students. One was granted to Keith Hibner, '39eng, for graduate study at Massachusetts Institute of Technology and the other to Charles Genter, '39eng, for work at Armour Institute of Technology.

Resulting, perhaps, from such recognition, the number of major students in architecture has steadily increased to a point where now there are more than sixty students training for positions in the building industry, which is recognized as the second largest industry in America.

CHEMICAL ENGINEERING

Although the School of Chemical Engineering has witnessed a gradual increase in its enrollment from year to year, the staff looks upon its progress more in the terms of the development of sounder instruction in the fundamental principles and in the carrying forward of a number of research projects.

Two years ago the refinery engineering branch of petroleum engineering was absorbed by the School of Chemical Engineering in order to coordinate the laboratory facilities. Under this new plan the students in chemical engineering are receiving preparation, through the study of the unit operations and processes, to fit them for positions in a large number of industries. Situated as it is in the center of the mid-continent oil fields, the school naturally finds an outlet for a majority of its students in the refining and oil producing divisions of the petroleum industry.

Under the direction of Professor J. W.

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Engineering Progress Report

(CONTINUED FROM PAGE 10)

Donnell, '25, '31ms, groups of students are working on these research problems: the study of temperature and humidification gradients in a forced draft water-cooling tower; investigation of mono-molecular films and oiliness, both in connection with the solving of certain lubrication problems; the flow of lubricating oil through clay filter beds in order to determine the mechanism of the flow, such as viscous or turbulent; the drying of solids in a vacuum tray apparatus; the visual study of the boiling of ammonia in a single tube heating exchanger; and the investigation of centrifugal extraction in order to improve upon the solvent refining of oils.

Dr. C. T. Langford, '18, '20ms, is supervising the investigation of the removal of hydrogen sulphide from gas by catalytic oxidation; the visual study of film boiling for various liquids; the determination of the nature of the flow of gases through pyrex glass pipes; and the analysis of soil for the determination of small quantities of hydrocarbons.

Pyrolysis of natural gas is being investigated under the combined direction of Professors Donnell and Langford.

Investigation of the following problems is in charge of Dr. R. L. Huntington: the mixing of gases in porous media as a means of determining the amount of dilution which may be expected in repressuring distillate pools in the gulf coast area; the flow of heterogeneous fluids through porous media, a problem of particular interest in connection with waterflooding of partially depleted oil fields; the gravitational flow of oil through sand, as a function of the physical properties of the different oils; the study of the evaporation losses from atmospheric storage tanks containing crude oil and gasoline; and the flow of heat through porous media.

The school's staff members are keeping abreast of the developments in industry through employment with different companies during the summer and in making visits to various plants. Last summer Professor Donnell inspected a number of chemical plants on his trip east to the Massachusetts Institute of Technology where he is working toward a doctor's degree in chemical engineering. Dr. Langford was employed in the geophysical department of the Continental Oil Company and carried on research pertaining to soil analysis for the location of small quantities of hydrocarbons. Dr. Huntington worked in the natural gasoline division of the Phillips Petroleum Company. He dealt with a number of special problems concerning natural gasoline reserves and plant manufacturing processes.

The results of various research projects have been published in technical and trade journals.

CIVIL ENGINEERING

The past year has seen no changes in the personnel of the faculty of the School of Civil Engineering. Professors Brookes, Wolfard, Sandifer, Mills and Matlock are on the job.

Realizing that in addition to a student's passing the required courses, it is essential to provide him an opportunity to gain an insight into the professional side of engineering, the school's officials arrange short courses, conferences and professional meetings. On November 3 and 4 the School of Civil Engineering sponsored the Fourth Annual Street and Highway Conference. Professor N. E. Wolfard, general chairman, spoke on "Earth Admixtures and Stabilizing Agents for Subgrades and Surfaces of Traffic Ways." Professor M. E. Mills presented a paper on "The Use of Cotton Fabric and Cotton Bats in Highway Construction." Outside speakers presented material on the stabilization of soils for improved stability, supporting power and wearing qualities. The trend is toward admixtures of asphalt, cement, salt, and other materials. This information is being edited by Professor Wolfard and will be printed for distribution. The registered attendance totaled ninety-seven.

The director of the School of Civil Engineering, Professor J. F. Brookes, has been a member of the nominating committee of the state section of A.S.C.E., and chairman of district eight of the Oklahoma Society of Professional Engineers. In co-operation with the chairman of district ten, he arranged a joint meeting of the two districts on the campus last November. It was devoted largely to discussions of activities vital to the registered engineers in Oklahoma.

While funds have not been available for the purchase of new major equipment, present equipment has been completely overhauled. With the approval of the University, the School of Civil Engineering aided state and federal surveys in Oklahoma.

In the line of research, Professor Mills has been studying the theory of indeterminate stress design in answer to a demand in practice to effect economy in the size of structural members. A soils investigation consisting chiefly of compaction tests has been discontinued until more standardized methods of procedure are recognized and equipment ceases to undergo such rapid changes.

In May the junior and senior classes, accompanied by Professor Brookes, visited the Grand River Dam Project in north-eastern Oklahoma. This is Oklahoma's largest engineering undertaking and will exceed twenty million dollars in cost. When completed, it will be the highest multiple-arch dam in the United States. Through the courtesy of Holway and Neuffer, the consulting engineers, full opportunity was provided to visit all parts of the work.

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ELECTRICAL ENGINEERING

No changes in the School of Electrical Engineering teaching staff have occurred during the past year. The only change in the curriculum has been the addition of the requirement of a speech course in the second half of the second year.

In April, 1939, Professor C. T. Almquist and six senior electrical engineering students attended the Southwestern District American Institute of Electrical Engineers meeting in Houston, Texas. In connection with this convention there was a student conference of representatives from the electrical engineering schools of the Southwestern District, including about fifteen schools. A paper was presented to the group by Richard Townsend, then a senior engineering student.

A joint meeting of the Oklahoma City A.I.E.E. Section and the O.U. student branch was held on the University campus in May. It was a dinner meeting attended by one hundred members. Two senior students, Frank Griese, '39eng, and Mr. Townsend, presented papers. Mr. Townsend has since joined the General Electric Company at Schenectady, New York, and Mr. Griese the Bell Telephone Laboratories in New York City.

Professor Almquist delivered a paper before the Oklahoma City Section of the A.I.E.E. last December describing the research connected with his development of an A.C.S.R. compression joint and sleeve fault locator for finding flaws in joints in aluminum cable transmission lines. Several of these have been built and are in active use.

The University recently purchased a television demonstration set which has been used several times before the radio short course and before student meetings. Several hundred dollars worth of other electrical instruments have been purchased for the electrical laboratories.

Last April the Fifth Annual Radio Short Course on the campus was attended by two hundred men. It was under the direction of Professor C. L. Farrar with the cooperation of several radio manufacturing companies.

ENGINEERING PHYSICS

Enrollment in the School of Engineering Physics, although not large, continues to increase as industrial organizations find that they need men trained in physics and engineering. In the work of the school a balanced emphasis upon teaching and research is maintained.

Dr. Homer L. Dodge, director of the school, is serving as a member of a national committee concerned with studies of the most desirable programs of training for work in engineering physics.

The faculty of the School of Engineering Physics has recently been engaged in a great deal of research in applied physics as a result of the demands upon it which have come from industrial organizations.

A few years ago Dr. J. Rud Nielsen's

work on Raman Spectra was regarded as "pure physics" but in these times industry does not have to wait long to make use of the most recent discoveries and methods. Recently two large industrial concerns, well known in the oil industry, have asked Dr. Nielsen to set up research programs in which they can participate. One will require a half-time research fellow who will work toward his doctor's degree. Among the practical problems which are being attacked in Dr. Nielsen's laboratory are the detection of metallic elements in plant and animal tissues and the detection of traces of hydrocarbons in the soil.

Dr. Nielsen spent last summer in Europe visiting engineering colleges in Copenhagen and Stockholm. He attended the Fifth Scandinavian Chemical Congress and, after his return to this country, participated in the International Congress for the Unity of Science at Harvard University. He has recently been appointed an associate editor of *The American Journal of Physics*.

Dr. George Van Lear's research activities in the field of applied physics led to his appointment to the Research Committee of the Illuminating Engineering Society which met in October at Austin, Texas. With financial assistance from an industrial concern it has been possible to expand the facilities for the scientific study of reflex reflectors such as are used as reflector buttons for signs and warning signals on the rear of trucks and busses. A research assistant has also been furnished.

Dr. Van Lear has worked out the mathematical theory of light-flux measuring systems and applied it to determine the validity of schemes which have been used in a rule-of-thumb manner. Dr. Van Lear is at the present time the leading authority in this field and his work will result in methods of test, specification, and standardization, which will be of great value to state highway departments and manufacturers of reflex reflectors of all types.

The School of Engineering Physics is also giving attention to the needs of its teaching program. H. C. Roys, who has charge of the course in electrical measurements, has been developing the course through the introduction of new apparatus, including two new galvanometers, a 1000 cycle oscillator a capacitance bridge, and two new standard cells. A high grade 1200 cycle oscillator and other pieces of equipment have also been received as a gift from the Western Electric Company. The enrollment in this course has increased to such an extent that it is now necessary to offer sections each semester.

Dr. Charles Whitmer, assistant professor of physics, is in charge of all elementary physics laboratory work. He is at present editing a complete revision of the laboratory manual used by engineering students. The new manual will place increased emphasis on experiments of fundamental importance to engineers. Dr. Whit-

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mer was elected assistant secretary-treasurer of the Oklahoma Academy of Science at the annual meeting in December.

Students in a related course under Mr. Roys designed and constructed a radium detector which will be of use in the course and can also be used to locate lost radium. This apparatus will be demonstrated at the engineers' openhouse this year.

Mr. Gene Pelsor, '37ms, attended the meetings of the American Physical Society and the American Association of Physics Teachers in Columbus. Besides his teaching, he is working toward a doctor's degree. This is also the case with Donald Coles and Mr. John Dalke, '39ms. Mr. Coles is working in the field of spectroscopy under the direction of Dr. Nielsen. He has been helping to build a liquid prism spectroscope which will be the largest in the world. The instrument is housed in the "catacombs" in the basement of the Administration Building. There the apparatus with its delicate temperature controls and adjustments is operated under the most trying conditions. Mr. Dalke's research work is under the direction of Dr. William Schriever. It deals with magnetic susceptibilities in weak fields and promises to be of value to the oil industry.

Dr. Schriever is also directing the work of a candidate for the master's degree in the same general field of magnetic susceptibilities. For this project, which requires force measurements of the greatest precision, a new microbalance has been purchased. During the fall Dr. Schriever attended the meeting of the Society of Ex-

ploration Geophysicists, of which he is a member.

Dr. Arthur Hemmendinger has undertaken an extensive study in the field of nuclear physics. Essential parts of the extensive equipment are a transformer and induction regulator which are a gift from the Western Electric Company.

GENERAL ENGINEERING

The government aeronautics program in the University has been responsible for the few minor changes in the curriculum of the School of General Engineering. The interest in the field and the consequently increased enrollment in the aeronautical engineering courses have led to an expansion of these courses. Professor L. A. Comp, '27eng, '35ms, has been active as a member of the committee to handle arrangements for airport facilities, transportation, and selection of candidates at the University for the course sponsored by the Civil Aeronautics Authority. He also gave a course of lectures in the ground school.

Last spring Professor Comp took a group of students in airplane design on an inspection tour of the airplane manufacturing plants at Tulsa and Wichita, Kansas. Five of the seniors landed jobs with these companies as a result of those contacts. Professor Comp is also faculty sponsor for Tau Omega, national aeronautics fraternity.

Professor V. E. Willoughby, '30eng, has been acting as faculty adviser for the Engineers Club and the St. Pat's Day Board. He taught several mechanics courses in

the 1939 summer school. Professor A. M. Lukens has been faculty adviser for Sigma Tau and Tau Beta Pi for the year.

Head of the Department of Mechanics, Professor R. V. James, '18eng, has been active in promoting the Club of General Engineers. He was one of the representatives from the University at the annual convention of the Oklahoma Society of Professional Engineers at Tulsa in January and has taken part in other activities of the society. The *Oil Weekly* issue of September 11 carried the article, "High Rod Stress in Deep Pumping is Expensive," by Professor James. It contained some of the data being gathered in connection with the investigation of the physical properties of oil well sucker rods.

The fatigue tests of the sucker rods are under way again under the ministrations of Joe Haynes, laboratory assistant in mechanics. The new impact testing machine will give interesting data on the resistance of these materials to shock in tension, bending and twisting. The repair and calibration of the Brinell tester has made this equipment available for use in the hardness tests.

GEOLOGICAL ENGINEERING

The curriculum of the School of Geological Engineering has been changed to broaden the training. One addition has been a course in aerial mapping as a recent development in exploration. The student is also given a wider choice of geological electives in the senior year.

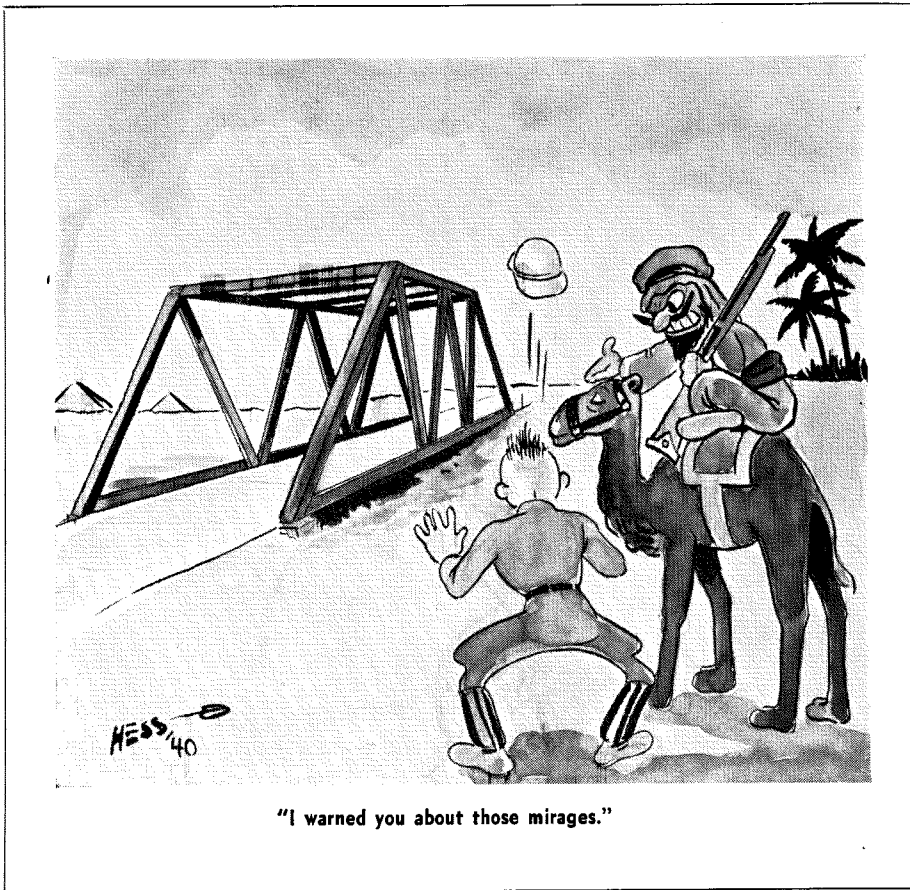
Professor G. E. Anderson presented a paper on the "Origin of the Color Line in Redbed Deposition" before the Oklahoma City Geological Society and spoke before the Field Conference of the American Association of Petroleum Geologists preceding their meeting in Oklahoma City in March, 1939, on the "Sedimentary History of the Pennsylvanian and Permian of the Mid-Centroid Area."

INDUSTRIAL EDUCATION AND ENGINEERING SHOPS

The department of Industrial Education and Engineering Shops conducted two new short courses last spring. The Welding Conference and Short Course, held March 9 and 10, 1939, was attended by more than two hundred welders and industrialists in Oklahoma. The Machinist's Short Course had an attendance of sixty machinists, shop owners and machine tool dealers from Oklahoma and several states in the western and southern parts of the United States.

The purpose of the short courses was to bring to the tradesman the most recent developments by means of papers and demonstrations. The Machinist's Short Course received unsolicited publicity in several foreign countries through the publication of the details of one of the demonstrations in a trade magazine published in England.

Several research projects were begun last year by the shops and were supported



through the cooperation of interested Oklahoma industries. The partial results of one of these projects, "Cutting Costs Using Butane, Propane, and Acetylene" was reported by Otis Eads, a student, at a meeting of the Fuels and Lubricants Division of the Society of Automotive Engineers in Tulsa, November, 1939, and later appeared as an article under the same name in the December issue of *Iron Age*. Another of these projects, "Weld Inspection by Means of Trepanned Plugs," was reported on by William Tiffin, instructor in Welding, at the meeting of the American Welding Society in Chicago, October, 1939, and later appeared as an article in the January, 1940, issue of *The Welding Journal*. Dr. Robert A. Hardin, head of the department, addressed the Industrial Arts Section of the Oklahoma Education Association in Oklahoma City, February 15, 1940, on the subject, "Looking Ahead in Industrial Arts."

Other publications by staff members include a book, "Instruction and Information Units in Wood Pattern Making," by Dr. Hardin, printed in July, 1939.

The new equipment installed in the engineering shops two years ago has made possible the advanced work now being done by the students. One student has completed a telescope with its mountings. The machining and assembling of drill presses and turning lathes constitute the work for advanced classes in machine shop. The latest piece of equipment installed is a Rockwell Hardness Tester, used in determining the hardness of metals.

MECHANICAL ENGINEERING

This school continues to enjoy a steady increase in enrollment, attributed by officials of the school to the fact that mechanical engineering graduates of recent years have readily found employment in industry upon graduation.

Dean W. H. Carson, who is also director of the School of Mechanical Engineering, has been active in professional and extra-curricular pursuits as well as University activities. He has accepted numerous appointments among which are: member of the five-man executive committee of the Petroleum Division of the American Society of Mechanical Engineers; chairman of the Research and Projects Committee of the Mid-Continent Section of the American Society of Mechanical Engineers; and member of the Accrediting Committee of the Engineering Council for Professional Development. In addition, he is arranging programs for the Southwestern Gas Measurements Short Course, Petroleum Fluid Metering Conference and a meeting of the Petroleum Division of the A. S. M. E., all of which will be held at the University of Oklahoma in April.

Professor E. E. Ambrosius is directing the research project on fluid meters which is being conducted in cooperation with the A. S. M. E. Funds for the work have been secured through a Works Progress Administration grant of \$8,505. A full crew of seven men is actively engaged in the work.

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Practically all meter manufacturers are co-operating to the extent of supplying meters of the positive displacement type to be used in the various phases of the test work.

It is hoped that the results will reveal the nature and magnitude of errors involved in the use of the volume type of meter. Investigations in connection with slip in sealing, pressure slip relationship, mechanical and hydraulic friction, pressure drop required to drive, and displacement as a reference value are being made.

Professor E. F. Dawson has again been active in professional activities. He has been appointed a member of the board of governors of the Oklahoma Chapter of the American Society of Heating and Ventilating Engineers and a member of the Technical Advisory Committee on Heat Requirements of Building of the A. S. H. and V. E. Professor Dawson acted as a delegate for the Oklahoma chapter of the A. S. H. and V. E. at the national meeting of the society which was held in Cleveland, Ohio, in January. While in Cleveland he also attended the International Exposition of Heating, Ventilating and Air Conditioning Equipment. A Mechanical Engineering Laboratory Guide was prepared last spring by Mr. Dawson and E. M. Sims and is being used in steam laboratory courses.

In the field of aeronautics the civilian pilot training program was inaugurated at the University under the sponsorship of the United States Civil Aeronautics Authority. Professor C. N. Paxton is director of the University program. The ground school instruction has been conducted by Professor Paxton and other members of the regular teaching staff. Professor Paxton's experience in naval and private aviation has been a valuable aid in conducting some of the courses which deal with practical flight subjects. The University quota of fifty students has been undergoing flight and ground school instruction since the program was inaugurated last fall.

Professor Paxton is making a concentrated effort to complete the University wind tunnel, which, when finished, should rank among the five best college wind tunnels of the United States. Lack of funds and personnel required for the work have retarded progress considerably, but he hopes that rapid progress will be made in the future.

Because of the increasing interest in private flying and the need for proper facilities to accommodate the private flier and airplane, the Norman Chamber of Commerce has formed a new Aviation Committee and has named Professor Paxton chairman.

PETROLEUM ENGINEERING

The School of Petroleum Engineering has advanced during the past year at a rate commensurate with the progress of the profession and branch of industry which it represents.

Dean W. H. Carson, director of the

school, holds responsible positions in professional organizations of national scope. Last October he, Dr. R. L. Huntington and Professor W. C. Bednar, '35eng, attended the fall meeting of the Petroleum Division of the American Institute of Mining and Metallurgical Engineers in Galveston, Texas.

Professor W. F. Cloud, '25, '26ms, is directing research on various relationships concerning the production of oil. They include an investigation of the effect of oil temperature, pump submergence, and pumping speed on the volumetric efficiency of sucker rod pumps; a study of the oil recovery percentages obtained with gas drive and water-flood under various conditions of sand permeability and at various rates of drive; a determination of the heats of hydration of various oil well cements under pressure; a microphotographic study of different oil-producing horizons; and the use of an electric resistance retort in the determination of the saturation percentage of oil sands.

Some new equipment for the petroleum engineering laboratory has been obtained by Professor Cloud. This equipment includes new plunger pumps, fluid meters, oil well tubing and apparatus for study of rotary drilling mud characteristics. Professor Cloud was responsible for the organization of the Colloid Symposium conducted at the University last spring by Dr. Ernst A. Hauser of the Massachusetts Institute of Technology.

"Petroleum Industry Could Use Break-Even Charts Advantageously" was the name of an article published in a September issue of *Oil Weekly* by Professor W. C. Bednar. He also wrote an article for *The Oklahoma Magazine* in October which was entitled "Engineering Skill as Developed Through the University of Oklahoma Plays Strategic Role in Development of Oil Industry." Professor Bednar is now directing two student research projects, one of which is concerned with building a new drilling mud viscosimeter, the other with the development of a rapid means of determining rate of flow in making permeability tests on formation samples.

Professor G. M. Stearns, '36eng, delivered a paper entitled "Economics of Welded Oil Well Casing" before the Welding Conference and Short course at the University last March. He delivered a similar paper at a meeting of the Illinois-Indiana Petroleum Association in Robinson, Illinois, in June. He is now directing student research on a study of the effect of acid concentration upon the ease of removal of the "spent" acid from low pressure reservoirs when treating oil wells with hydrochloric acid.

In the spring of 1939 the petroleum engineering students at the University of Tulsa were hosts to the representatives of the Petroleum Engineers Club from O.U. in a joint meeting in Tulsa. Two papers were presented by senior Sooners. W. D.

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