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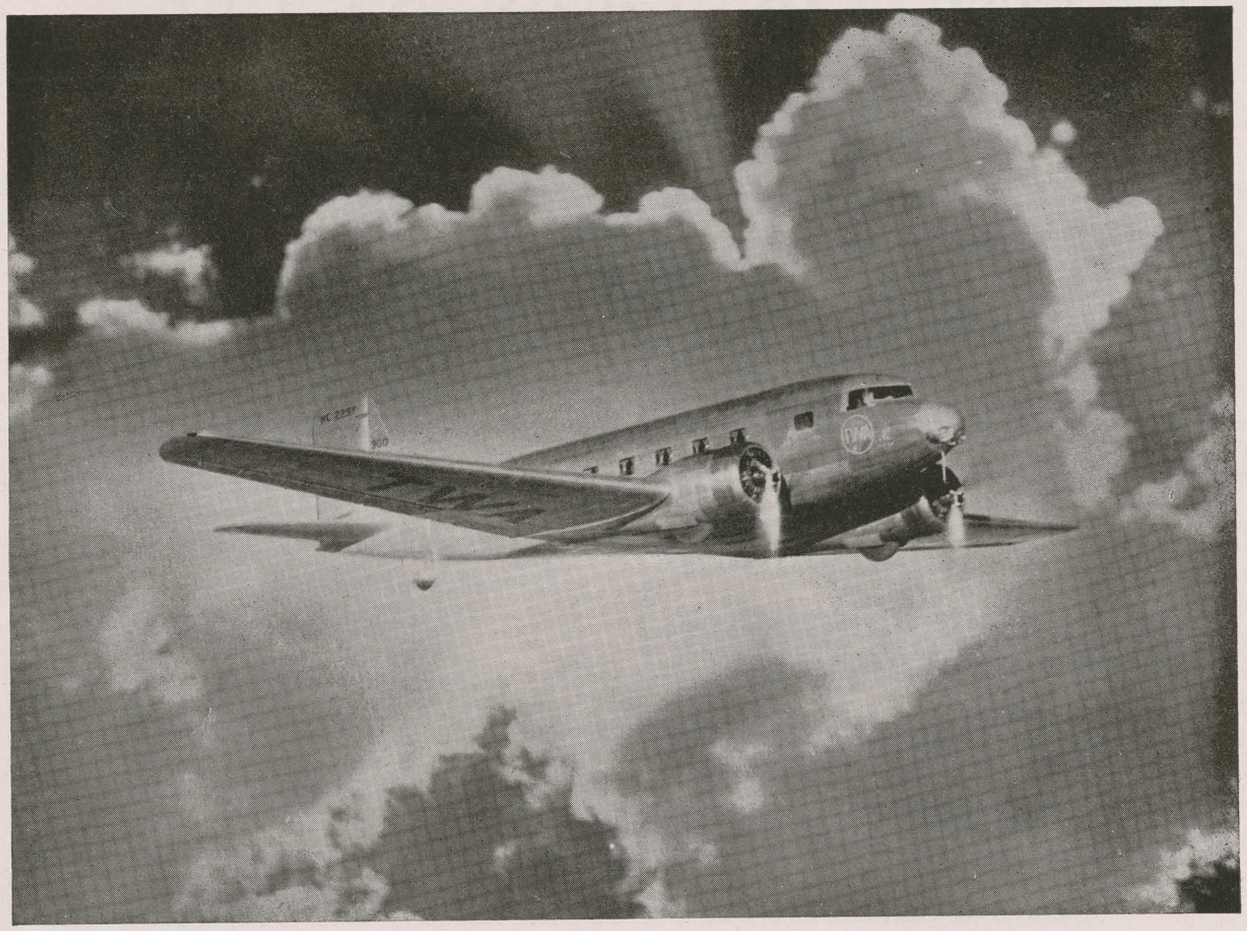


New Douglas Airliner

This photograph shows one of a fleet of 27 Douglas airliners recently purchased for transcontinental service by Transcontinental and Western Air, Inc.

Years of constant research have been spent in achieving the perfection of grace, beauty, speed, comfort, and safety incorporated in these planes. The liners travel at a speed of 210 miles per hour at 8000 feet altitude, and land at 60 miles per hour. A speed of 120 miles per hour can be maintained with only one engine in operation.

Captain Eddie Rickenbacker recently set a transcontinental flight record of 13 hours, 4 minutes with the first of the new planes.

Courtesy "Electrical Engineering"

Problem of Pulp and Paper Wastes

By MERWIN MILLER, *Junior, Ch. E.*

This article is a resume of the report of the technical committee on pulp and paper trade wastes in Oregon.

The scope of the pulp and paper industry is extensive. It extends into every civilized country. Its products are utilized by every man, and yet few of us have any great interest in the workings of the industry, or in its problems. Many people might venture to conjecture that an industry of such long standing and of such breadth should have no problems left, that all its troubles should have been ironed smooth. Such is not the case, however.

Paper is made from a variety of raw materials by several processes of manufacture. Approximately 75 per cent of all paper comes from wood pulp, the rest being made out of rags, waste paper, straw, hemp, jute, cane, and cotton or linen. It is produced by both mechanical and chemical processes, the latter being the most important. Of the chemical methods, the sulphite, soda, and sulphate processes are the three major kinds. This article deals with the sulphite process and its problems, because it is this method of manufacture which is used by the paper mills located in the Willamette valley.

In the sulphite process, the wood which has been cut into fine chips is digested in a large chamber for 10 to 20 hours by means of a solution of sulphurous acid and calcium acid sulphite and the action of steam. Digestion dissolves the lignin and resins and leaves a fiber mass of nearly pure cellulose. After digestion, the liquid is drained off and the mass is washed by water. Waste liquid at this point is called the "waste sulphite liquor." Water is used to transport the fibers until they become paper and this waste liquor is called "white water." Most papers are bleached before they reach the final stage, and there usually results from this operation a "bleach water" waste. The problem of how to utilize these waste liquids to advantage and so remove the possibility of their contaminating any stream into which they may be dumped, is the outstanding problem facing the paper industry at the present time. It is a field of investigation in which relatively little has been accomplished.

Research Completed

This problem is brought to the attention of the public at the present time by the work finished last December in the Engineering Experiment station by the state technical committee on pulp and paper trade wastes. The committee members here at the college — Dr. Charles S. Keevil, professor of chemical engineering, chairman; F. Merryfield, assistant professor of civil engineering; and George W. Gleeson, assistant professor of chemical engineering — carried on the experimental work involved and compiled the final report.

The committee supplemented the work done on river pollution in the Willamette by the Engineering Experiment station's sanitary survey of 1929. The problem consisted of determining the effect on the Willamette river of samples of waste liquors from the different paper mills of the Willamette valley. Furthermore, they were to study similar work which has been done in other parts of the country as well as in Europe. Finally, in view of the facts brought out by their own work and that of others, the committee was to suggest action for Oregon's own particular problems.

Experimental Procedure

There are five paper mills now operating in the Willamette valley, one at Lebanon on the Santiam river, one at Salem, and two at Oregon City. Newberg has a plant which resumed operations January 1, and was included in the experimental results, chiefly by means of data taken from the Sanitary Survey of 1929. The studies were made for periods of low water, of course, for such are the times when waste materials would have the greatest effect on the river. Data came from two sources: from questionnaires sent to the paper mills inquiring about quantities of waste per unit of product and other pertinent plant data, and from experimental work carried out on actual samples of the waste liquors obtained from the mills.

The principal laboratory tests carried out were concerned with what is known as the biochemical oxygen demand, usually expressed in letters, B. O. D. Essentially this determination is a measure of the quantity of dissolved oxygen consumed by the waste from a solution over a period of time. It is principally this consumption of oxygen from the water by a waste material which causes "pollution." With the loss of dissolved oxygen, water loses its sparkle, it is less able to support fish life, it is less able to purify itself, and sludge banks may form contaminating the river bed. The procedure in making the B. O. D. tests was to prepare suitable dilutions of the wastes with oxygenated water with a controlled pH of 7.2 (very nearly a neutral solution) and to which had been added a very small portion of river water. The dilutions were

incubated at 20° C. in small bottles, and at various intervals, dissolved oxygen tests were made both on the samples and on parallel blanks of the dilution water. Each particular sample was tested for a period of 20 days, a longer period of time than previous tests by other workers. The 20-day period was considered the maximum time required for the wastes to reach the ocean from the Willamette river.

The entire project involved the use of over 1500 bottles of samples. In addition to the B. O. D. tests, specific gravity, total solid, suspended solid, and dissolved solid determinations were made upon all samples. It was found that specific gravities and solid contents of the samples from the different mills varied due to sampling conditions, and corresponding corrections were made in the B. O. D. determinations, thus placing the data for the different mills on a comparable basis.

Conclusions hinge around the fact that the effect of the wastes of the four mills (Newberg excluded) is equivalent to the domestic sewage of a population of 489,000 persons. According to the latest census, that figure represents about three-fourths of the people living in the Willamette valley including Portland. The effect of paper mill wastes above Oregon City, however, is equaled by the wastes of other industries. Therefore the committee concluded that conditions in the lower Willamette river at periods of low water are approaching a critical stage.

Treatment of Wastes

Highly valuable information in regard to the problem of treatment or utilization of the pulp and paper waste liquors was gathered and correlated by the committee. There are two questions to be answered: Can the liquor be utilized in some profitable manner? Can these wastes be treated so as to alleviate their ill-effects if the situation demands it, whether the method is economical or not?

When an approach is made to the problem presented by the first question many difficulties are encountered. At the present time only two or three plants for the recovery of the valuable parts of the sulphite liquor are in operation, although several plans for plants have been worked out. In many plants, the bleach liquors and some of the white waters are recycled, and the efficiency of the plant increased in that manner. There are, however, possible uses for the sulphite liquor. It is feasible to make a binder for roads and briquets with the liquor, but the needs for such purposes would not begin to use up all the sulphite liquor produced in the country. The tanning industry is able to use a small amount of the material. In Scandinavia alcohol has been and is still being made along with yeast from sulphite liquor. But one must turn to agriculture for opportunities of making use of large quantities of the sulphite liquor. It is thought that it may be utilized for cattle fodder or as fertilizer, probably in the form of a lignin gel. Both of these possibilities, however, will require a great deal of research to make them practicable.

It is obvious, of course, that nearly any product that might be made from the waste liquid, would involve as a first step, some sort of evaporation for the concentration of the liquor. Here again, great difficulties are found. The high corrosive power of the sulphite liquor and its tendency to form a scale, would introduce almost insurmountable troubles with ordinary equipment. Stainless steel apparatus has been developed which will fit the case, but its cost is rather high.

If plants discharging waste liquors become too numerous, it will be necessary to alleviate the pollution regardless of economy. Ponding and aeration has been studied with the view of obtaining a simpler, cheaper and more direct method of solving the problem than by actual utilization of the waste liquors. Studies show that the oxygen demand of the wastes may be substantially decreased by ponding and aeration. Such procedures are more effective if carried out while the sulphite liquor is still hot. Studies indicate well over a 50 per cent reduction by common ponding methods. The suggestion of ozonization of the wastes has been made, but such a method does not seem commercially feasible.

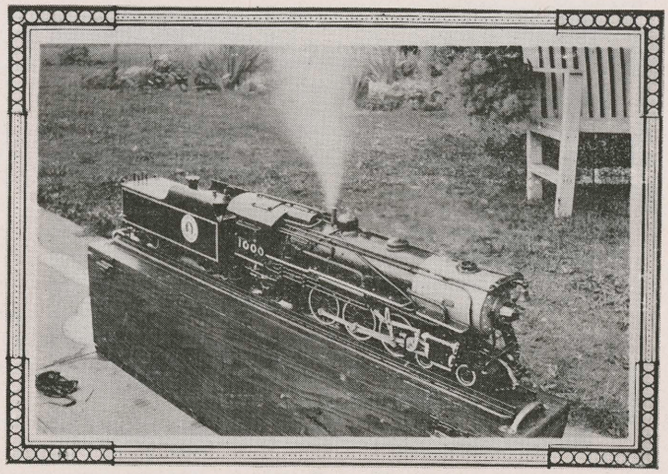
Attempts are being made, also, to combine the paper wastes with ordinary sewage and run the two through a sewage disposal plant together. This method would require the availability of the domestic sewage of a large population. All of the above discussion only serves to emphasize that the field of treatment of pulp and paper trade wastes is open to further investigation and research.

Conclusions

The survey of the technical committee, then, reports that thus far, science has been unable to equip man with the tools to cope with the problem of economically using the wastes of the paper industry or to destroy their effect upon fresh water streams, but that there is possibility that in the not far distant future the problem will be solved. They point out further that the situation of stream pollution by industrial wastes here in Oregon demands immediate attention for the protection of the Willamette river, and that further research, particularly in aeration and ponding should be carried on with a view to constructive action in the near future.

Working Model of Steam Locomotive

By DELBERT BIERSDORF, *Senior, M. E.*



D. Biersdorf's Model

Nearly every boy has had at one time or another a longing to become a locomotive engineer. Few actually arrive at this goal, as childish ambition usually fades with the passing years. The writer, in order to release some of his "high-powered" ambition, constructed a working model of a well known type of steam locomotive and at the same time became both president and engineer of his railroad.

Model Is Passenger Type

The Pacific or 4-6-2 type of engine, a model of which the writer constructed, is used extensively in fast passenger service. The above number classification refers to the wheel arrangement—the engine having four wheels on the leading truck, six coupled drive wheels, and two wheels on the trailing truck. It is not a reproduction of the locomotives used by the road whose name appears on its nameplate. However, since a name is desirable for exhibition purposes and since the model closely resembles the Great Northern locomotives, the nameplate shown in the illustration was used. These locomotives are used in passenger service between Portland and Seattle. About two years of spare-time work were required to complete the engine.

Construction Details Given

The frame of the model is of the built-up type assembled with machine screws. The main bearings are babbitted and have individual springs which give self-equalization on an uneven roadbed. The cylinders are individual castings, are jacketed, and have double bar crosshead guides. The pistons are turned from brass, packing grooves being used instead of piston rings. The valves, of the inside-admission type, were turned from cold-rolled steel and slide in bronze bushings which contain the ports.

The cylinders are fitted with individual drain cocks. The connecting rods and the side rods are channeled to give them a realistic appearance. The crank pins have full-floating bushings and are lubricated by means of oil wicks. The valve gear is of the modified Walschaerts type with sliding block, giving prompt and full admission of steam at the beginning of the stroke with all positions of cut-off.

The trailing truck supports the weight of the fire box, the weight being transmitted through a spring support. The boiler shell is constructed of a 4½ inch boiler tube with the fire box forged in the same piece. The boiler is made of brass and is a single fire tube, the ends being held in place with stay bolts. All seams are brazed. The boiler has been tested to a pressure of 400 pounds per sq. in.

The engine is fired with a gasoline torch which forces a flame the entire length of the boiler tube. The steam pipe leading from the throttle to the cylinders passes through the boiler tube and acts as a superheater. The tender contains the fuel tank, the fuel pump, the water supply, and the batteries for the electric lights.

Equipment Complete

All the engine controls are located in the cab. The cab fittings are complete and consist of the following: throttle valve, blower valve, pressure gage, water glass, gage cock, whistle valve, fuel valve, reverse lever, boiler blow down valve, electric light, and light switch. The cab itself is of the sloping front type and is built up of sheet metal.

Other equipment on the engine includes: Whistle, safety valve, bell, electric headlight, feed water heater, and air pumps. The feed water heater and air pumps are the only dummy equipment on the engine. All the exposed steam pipes are jacketed.

The engine can be steamed to working pressure in less than ten minutes. The safety valve is set to blow off at a pressure slightly below 100 pounds.

Performance Tests

Due to a lack of track the engine has not been given a good chance to show its performance. A test stand has been built and consists of three rollers upon which the drive wheels work. A brake is fitted to the rollers to give full load conditions. On a heavy pull the drivers slip considerably, and the engine produces a heavy exhaust.

Physics Building

A Jump in Front

Now is a time for the engineer to be alert. Indications point toward the beginning of an era of expanding opportunity. The future promises freedom from the economic shackles of the past few years and a great broadening of the fields in which an engineer may play a role of service to society.

Some say that the Tennessee valley project and the Columbia river developments are merely forerunners of a golden age of cheap power. What does the development of radically new railroad transportation, now an actuality, indicate? Where does the appearance of absolute departures from the accepted pattern in automobile construction point? Is it not to a spirit of progress, to a feeling of things new to come?

Such an atmosphere is fresh, indeed, for since the beginning of 1930 up until recent months, all of us have lived lives of mental depression. Those who have been learning during that period are most fortunate, for they have progressed while the world stood still.

Such people as ourselves, students, are a jump in front; but now comes the time for a lifting of heads, and a breathing in of the wind, even to exhileration. Opportunity will soon be abroad for the engineer, hard to find at first it is true, but it will be there for the man who has an alert and vigorous enthusiasm for doing something well.

EDITORIAL

Comradeship

Our college career is a period of preparation for the future and it is eminently fitting that we should so regard it. However, while we are getting our technical training, there are many by-products that may prove in the future to be as valuable assets for life as the specific training we receive in our classes.

One of these is the comradeship we enjoy with our classmates and associates. In our daily work, we are thrown into intimate contact with our fellows. We work side by side, elbow to elbow, encountering similar difficulties and achieving similar successes. The keynote of our relationship is cooperation rather than competition. While success is achieved by individual efforts, it is augmented and enhanced by the success of the group.

These four years can be the happiest and best parts of our lives. We shall probably never again enjoy such worthwhile friends and such a wholesome companionship.

It is a deeper appreciation of this comradeship that we should like to emphasize. There is nothing in life that one looks back upon with more joy and satisfaction than the association with one's college classmates. Let us not sacrifice it for the uncertainties ahead, but let us get the utmost value from it.

One thing more. How much pleasanter life in industry is when the spirit of cooperation and comradeship developed in college is carried on into it. Good evidence of this is furnished by contrasting the attitudes of college-trained men in industry with the attitudes of men who have not had such training. It is not always the technical training of the college man that enables him to succeed in industry, but very often it is his ability to cooperate with his fellows, to appraise them for their true worth, and to appreciate their viewpoint. Practice in the art of comradeship during one's college career is one of the best preparations for this kind of success.—W. H. Martin, professor of heat engineering.

Engineering Experiment Station Is Active

By Harmon Traver

Although there was considerable interest in research in the Oregon State engineering school previous to 1927, it was not until then that a formal organization was established. The new organization, which was named the Oregon State Engineering experiment station, has continued to thrive and produce many valuable reports. The purposes of the station are to develop the research spirit in the faculty and students for the benefit of engineering education, to make investigations of interest and importance to industry and others, and to publish results of research of the greatest value to the people of Oregon. The publications of the station consist of bulletins covering original research, circulars containing compilation of valuable data, and reprints of technical papers and reports which have appeared in other publications.

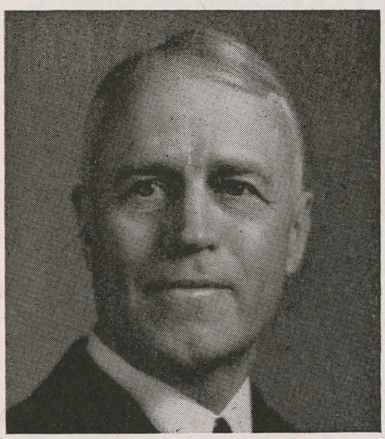
At present the acting dean of the school of engineering, R. H. Dearborn, is also acting director of the experiment station. The actual administration of the station is handled by a committee composed of the heads of the departments of the school of engineering with Prof. S. H. Graf, director of engineering research, as chairman. The main part of the work is carried on by members of the faculty and graduate students with some assistance from seniors. Although the lack of funds has made it impossible to grant any fellowships this year, six seniors and graduate students are now being paid to work on various projects under the direction of members of the faculty.

S. H. GRAF
Director of Engineering Research

A resume of some of the projects under way at the present time will aid in giving an understanding of the value and nature of the work of the station. Two graduate students are working under the direction of Prof. S. H. Graf on the micro-structure of metals used in bimetallic thermostats. The research of these two students is only a part of the investigation concerning the use of these thermostats as control and safety devices which will be carried on here. Professor Graf had the need of such information brought to his attention last summer when he was working on safety equipment for gas appliances. This research is being completed in cooperation with the American Gas Association testing laboratory at Cleveland, Ohio.

Research concerning radio interference from high voltage transmission lines has been in progress for several years under the direction of F. O. McMillan, research professor in electrical engineering. The corona formed where the conductors make contact with the insulators was found to be the main cause of the interference. This effect was observed in all porcelain insulators of the pin type. The work this year has been to develop equipment for determining the maximum field strength caused by the discharge, because the ordinary equipment proved inadequate to secure the proper results, and to cooperate with power companies in eliminating interference in existing lines. Methods of decreasing this interference by change in design has also been worked out in cooperation with companies manufacturing the porcelain insulators. This work will be of considerable benefit to radio reception especially in heavily populated districts and has been heartily welcomed by those concerned.

Several other projects are being investigated at this time. Boiler feed water studies have recently been completed by R. E. Summers, assistant professor of mechanical engineering, and Dr. C. S. Keevil, professor of chemical engineering. Prof. Summers



R. H. DEARBORN
Acting Director of the Engineering Experiment Station

presented their paper on the work at the last annual meeting of the A.S.M.E. The report is concerned with the formation of siliceous boiler scale. An indicator for high speed automotive engines operating on the piezo-electric principle is being developed by W. H. Paul, instructor in mechanical engineering. Fred Merryfield, assistant professor of civil engineering, is carrying on a survey of pollution of the Willamette river to determine facts needed in decisions on treating plants for city sewage. The first phase of sulphite waste studies has been completed by G. W. Gleeson, assistant professor of chemical engineering, and Fred Merryfield, assistant professor of civil engineering, under the direction of a committee headed by Dr. C. S. Keevil, head of the department of chemical engineering. The study treats of the wastes being discharged into the Willamette river by paper mills.

Evidence of the value of the work of the station and the enthusiasm with which it has been received is represented by the success of a circular concerning "The Adjustment of Automotive Carburetors for Economy." The work on this report was completed by Prof. S. H. Graf and Prof. G. W. Gleeson. The first edition of the circular of 5000 copies has been exhausted and the report is being revised for another edition. It is estimated on the basis of gasoline consumption that if only one-half the economy as outlined in the report were effected, the annual saving to motorists in the State of Oregon alone would be $2,500,000. The investigation has actually saved hundreds of thousands of dollars. This one project itself is an indication of the value of the work being done by the Oregon State Engineering Experiment station.

M. E. Laboratory

TECHNICAL SOCIETIES

Engineers Hold "Superheated Stomp"

The "Superheated Stomp," annual dance sponsored by the student engineering societies, was held Friday evening, February 16, in the engineering laboratory. Hal Bondeson, general chairman for the dance, reports an attendance of about 200 couples.

Several features added to the interest of the event. The admission price was determined by mutual inductance and self inductance measurements conducted on the couple as they entered. The electrical engineers contributed to the entertainment with the installation of high voltage equipment for discharging the output of a bank of condensers through a fine wire, completely ionizing it.

The operation of a large Corliss steam engine by vacuum was featured by the mechanical engineers. A burlesque of a surveying party was put on by the civil engineers. Professor Othus operated the 600,000 pound Southwark - Emery universal testing machine, crushing large blocks of wood under compression loads. To illustrate further the accuracy of the machine, he measured the load required to crack a walnut.

Music for the dance was furnished by the "Bonneville Blues Blowers." Four freshmen busily "dished out" punch to the thirsty engineers and their partners.

Communications Club Organized

Thirty students interested in communications met on February 20 and formed a Communications club. An election of officers was held and the results were as follows: Jack T. Naylor, senior in electrical engineering, president; Harmon R. Traver, junior in electrical engineering, vice-president; and Harold C. Anderson, sophomore in electrical engineering, secretary-treasurer. The advisers to the group are E. A. Yunker, assistant professor of physics, and A. L. Albert, assistant professor of electrical engineering.

The purpose of the organization is to allow the presentation by students of papers and projects concerning communications, to secure outside speakers in the field of communications, and to promote fellowship and co-operation among the members.

A library of technical books and bulletins is to be formed, and an index of material available in the college library will be compiled.

ELECTRICAL ENGINEERS

A.I.E.E. Hears Hoff

O. C. Hoff, general plant engineer of the Pacific Telephone and Telegraph company, was the guest speaker at a meeting of the student branch of the American Institute of Electrical Engineers held February 8 in the Memorial Union. Mr. Hoff spoke on "The Job of the Telephone Engineer," and, while his statements about present prospects for employment in the telephone industry were conservative, he expressed a firm belief in the future of his field. He remarked that in his opinion what the young engineer needed most was the ability to sell himself and his training to the commercial world.

Plans were discussed for the annual safety meeting of the A.I.E.E. to be held next term. Alvin Funk, senior in electrical engineering, is chairman of the safety committee and will be in charge of arrangements for this meeting.

MECHANICAL ENGINEERS

A.S.M.E. Joint Meeting to Be April 21

The annual joint meeting of the Oregon section and the student branch of the A.S.M.E. will be held April 21. The program deals with hydraulics and hydraulic equipment used in mechanical engineering. Included for the program are talks by Professor C. A. Mockmore, professor of civil engineering, and Professor Fred Merryfield, assistant professor of civil engineering. Prof. Mockmore plans to give a presentation of results obtained in a study of draft tubes to be used in the Bonneville power house. Prof. Merryfield will discuss hydraulic machinery and its mechanical nature, possibly illustrated by equipment required in sewage disposal plants.

A presentation of research work under way in the engineering school is planned as a feature of inspection of the laboratories by visitors. As usual, entertainment will be provided for the ladies.

CHEMICAL ENGINEERS

Chemical Engineers Hear Dr. Chambers

Dr. O. R. Chambers, professor of psychology, gave a talk on "Attention and Hypnotism" at the last regular meeting of the student chapter of the American Institute of Chemical Engineers.

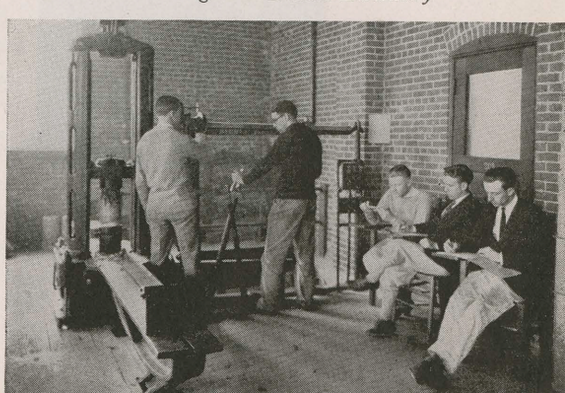
After presenting the psychological aspects of the subject, Dr. Chambers conducted several interesting hypnotic tests upon those present. His object in conducting these tests was to demonstrate possibilities and effects of hynotism.

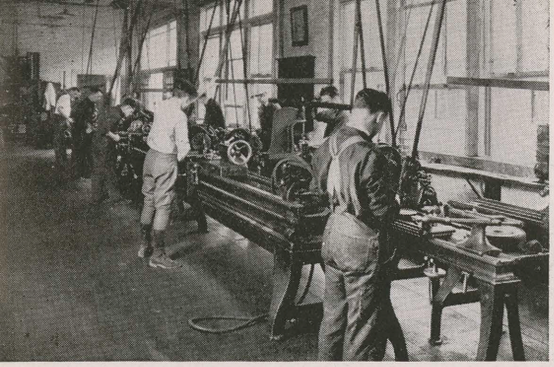
Ivan R. McGinnis, sophomore, was presented with a student chapter pin of the American Institute of Chemical Engineers. This pin is presented each year to the sophomore who as a freshman made the highest record in chemical engineering.

Students Visit Chair Factory

About twenty students in the industrial arts department recently visited the Veal and Son chair factory in Albany. Mr. W. S. Richards, superintendent and chief designer of the plant, conducted the group through the various departments and explained the manufacturing processes.

Testing In Materials Laboratory





Machine Shop

HONOR SOCIETIES

PHI LAMBDA UPSILON

Phi Lambda Upsilon Plans Spring Meeting

Phi Lambda Upsilon, national honor society in chemistry, held its regular meeting on February 19. The group voted to present an award to the most outstanding chemistry or chemical engineering freshman of last year. The award, being given in cooperation with the national organization, is to be presented at the next regular session at which time the annual spring pledging will also occur.

SIGMA TAU

Sigma Tau Fellowship Awarded to Timothy J. Coleman

The first Sigma Tau fellowship was awarded to Timothy J. Coleman, a member of Zeta chapter, who received his bachelor of science degree in chemical engineering from Oregon State college in June, 1933. This fellowship entitled him to attend Massachusetts Institute of Technology. He is there now doing graduate work in chemical engineering toward a Ph. D. degree.

Sigma Tau Will Give Two Freshman Awards

The Oregon State chapter of Sigma Tau will make two freshman awards this year, a silver medal and a bronze medal. These medals will be given to the two engineering school sophomores who as freshmen were outstanding. The awards are to be made next term.

Heretofore Sigma Tau has made but one freshman award.

ETA KAPPA NU

Eta Kappa Nu Cabin Attains National Prominence

The local chapter of Eta Kappa Nu received national recognition in an article written by Fred E. Helber, '32 in electrical engineering, and published in the January issue of "The Bridge of Eta Kappa Nu," the quarterly magazine of the national organization. The article, entitled "Pi Chapter's Mountain Rendezvous," concerns the cabin built by the local chapter on Mary's Peak.

The cabin is located in the Big Elk creek watershed on the northeast slope of the mountain. Construction began on May 1, 1929, and has been continued annually to the present year. The local chapter holds its spring initiation at the cabin every year, at which time work is done on the cabin. Since some definite project toward its improvement is carried out by the group each year, the cabin is now an adequate shelter from the elements even though it lacks a few modern conveniences.

The cabin is 20 feet long by 14 feet wide and 16 feet to the comb of the roof. It is built entirely of fir logs, with a roof of shakes. As yet, the walls and the gables are unchinked, but a sheet iron fireplace radiates heat in good style, as well as giving forth copious quantities of smoke. At present there is no permanent cookstove, the construction of one being a project planned for this spring.

The location of the cabin at the junction of the trail leading to the summit and the road leading up to the mountain makes it an ideal base for mountain climbing, skiing and hunting parties. It is approximately seven miles from the paved highway, but only four miles of this is negotiable during wet weather.

Like any private property open to public use, certain limitations and restrictions such as fire precautions and cleanliness must be observed. The chapter extends a courteous welcome to all who might like to use the cabin but at the same time asks reasonable care of the property.

Alvin Funk Initiated

At a meeting held on February 14, Eta Kappa Nu initiated Alvin L. Funk, senior. Plans were made at the meeting for the annual spring initiation to be held in the cabin on Mary's Peak.

TAU BETA PI

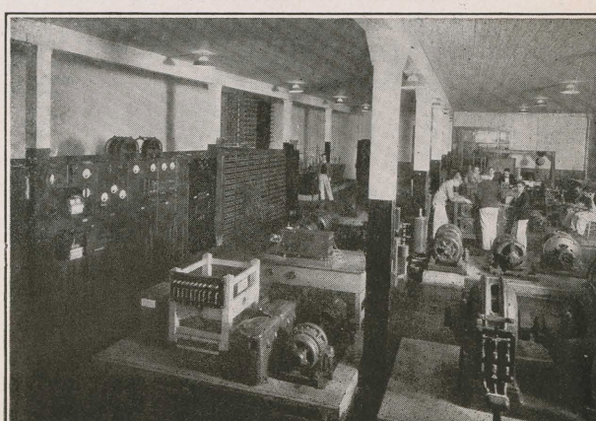
Tau Beta Pi Pledges Eight

Tau Beta Pi, national honor society in engineering, held formal pledging for eight men on January 24. The pledges include Duane Brands, Henry W. Brands, John Gearhart, and James W. Sloat, juniors in civil engineering; Jack A. Gibbs, junior in mechanical engineering, and Clyde T. Robinson, Harmon R. Traver and Harold A. Thomas, juniors in electrical engineering. The duties of these pledges consisted of decorating for and cleaning up after the engineers' dance which was held February 16. Each pledge is also required to write a paper of at least 500 words on an engineering subject and to obtain the signatures of all the Tau Beta Pi members on the campus.

Hollis Little, senior in mechanical engineering, was named chairman of the Tau Beta Pi initiation banquet to be held soon. R. R. Clark, prominent consulting engineer of Portland, will be the guest speaker for the occasion.

The organization voted to get a cut of its official key to head the column devoted to it in the Technical Record.

E. E. Power Laboratory



ENGINEERING SCHOOL WHO'S WHO

DR. C.S. KEEVIL

Chemical Engineering Curriculum Reorganized by Dr. Keevil

By Merwin Miller

The present high standing of chemical engineering at Oregon State college has been effected largely through the efforts of Dr. Charles S. Keevil, head of the department, who came to the college three and a half years ago. Reorganization of the curriculum to conform with those of representative chemical engineering schools in other parts of the United States has been his major objective. Since moving into the Mines building last summer physical facilities have been greatly improved.

Dr. Keevil was born on Long Island, New York. After graduating from the Massachusetts Institute of Technology in 1923, he was employed as a chemical engineer by the Magnetic Pigment company at Trenton, New Jersey. In 1927 he returned to the institute and obtained his master's degree. While working for his doctor's degree, which was given him in 1930, he was employed as an instructor in chemical engineering.

Besides being an associate member of the American Institute of Chemical Engineers, Dr. Keevil is counsellor of the local chapter. He is married and has a son eight years old. In addition to taking a great interest in chemical affairs, Dr. Keevil spends considerable time hiking and fishing.

Donald Finlay Hopes to Become a Designer of Aircraft

By Jack Gibbs

It was on a Tuesday night, when the A.S.M.E. was enjoying a social, that I tracked Donald Finlay to this affair in the engineering laboratory.

As I emerged from the darkness into the entertainment room, there before me, perched on the arm of a class chair with his feet on the seat, was Finlay with a five-cent cup of ice cream in one hand and a sugar-coated doughnut in the other. I grabbed one of those cardboard cartons of cream as I passed the refreshment box and dropped into a chair beside Finlay.

"By the way, Don, are you president of this society of Mechanical Engineers?" I asked.

He informed me, between nibbles on his rapidly diminishing doughnut, that he was elected president of the organization in the spring of 1933.

Drawing my chair a little closer to him and after scooping out an enormous chunk of the frozen cream from the container, I asked him what the past three years at school had revealed to him and what his plans were upon graduating in June.

"Well, that is rather hard to tell," he said, as he reached onto the table and encircled his index finger with two more doughnuts.

"I entered O.S.C. in the fall of 1930 after graduating from Jefferson high school in Portland. At that time my attention was turned toward aeronautics. I registered in mechanical engineering, and for the first two years I encountered little in class dealing with aviation. However, in the spring of 1931 I started taking instruction in flying and soloed in the following September at Portland. In my junior year I took the aeronautical option in mechanical engineering and am continuing it now until my graduation. Upon graduating I hope to enter the aeronautical field as a deisgner of aircraft. Although engineering is my course, I have also taken a great interest in military work. After completing the two years of basic training, I enrolled in the advanced course in "war," and in the spring of 1933 became a member of Scabbard and Blade. These are only the high spots of my college career so far as I can see them now; of course the future must unfold for me as time goes on."

Leaning forward to discard the empty ice-cream carton which I had been aimlessly holding during Finlay's talk, I asked Don if he had any desire to enter the Army Cadet Flying school should he obtain an appointment. To my great surprise he answered negatively, and said that he proposed to follow solely the designing of airplanes.

Since all the refreshments had been consumed by those present, no further attraction remained for me; and after donning my raincoat I ambled homeward well satisfied with my interview with this man Finlay.

Professor Summers Presents Paper at National A.S.M.E. Meeting

By Jack Gibbs

R. E. Summers, assistant professor of mechanical engineering, is recognized by the American Society of Mechanical engineers as one of the best-informed men in America on boiler-feedwater characteristics.

For the past several years Professor Summers has been analyzing samples of boiler water obtained from the Oregon State college heating plant and from other sources. As an outgrowth of his research, he prepared a paper, "Silicon a Major Constituent of Boiler Scale in Western Oregon," for the editorial board of the American Society of Mechanical Engineers. This engineering group found Mr. Summers' paper of such value as to merit its being placed on the program of the annual meeting of the A.S.M.E., December 4-8, 1933.

The adoption of Professor Summers' topic required his presence and personal delivery of the paper before the session and on November 27 he left Corvallis for New York.

At nine o'clock the morning following Thanksgiving, Professor Summers reached Rochester, New York. He was met by Dr. Hallett, formerly of the chemistry faculty on this campus, and was escorted through the Eastman plant at Kodak Park. At this plant Dr. Hallett has a new fully equipped laboratory where he is conducting research entirely in the field of micro-analysis.

A regular reception was given Mr. Summers at the General Electric works at Schenectady by the ex-Oregon Staters. While in Schenectady Mr. Summers visited the homes of Wilfred Johnson, Edward Parker, Virgil Woodcock, and many other Oregon State honor graduates. Mr.

ENGINEERING RESEARCH

Summers was conducted through the General Electric mercury-steam power plant, one of the two largest plants of this type in the world, which is now under experimental operation. The new sodium-vapor lamp installation along the highway near Schenectady was undergoing trial and showed promise of a great advancement in highway lighting.

At New York, Mr. Summers was held strictly to the business of the meetings from December 4 to 8, however he managed to get a view of the changing New York skyline and to observe a little of New York's life and activity before returning home late in December.

The sessions of the A.S.M.E. technical meeting were held in the Engineering Societies building in downtown New York and were handled in the form of a four-ring circus—many different subjects being discussed during the same hour, each subject, of course, being discussed in a different room. Professor Summers was therefore forced to miss many discussions holding interest for him. On December 7, Mr. Summers gave his paper, "Silicon a Major Constituent of Boiler Scale in Western Oregon," before the boiler feedwater session. Present at this session were 200 members, mostly specialists in feed-water characteristics. Professor Summers' good paper was received with approval and the success of it may well reward him for his time and effort.

Mr. Summers, accompanied by Anton Schwertfeger, '30 in mechanical engineering, went on sight-seeing trips around the city. Instead of always dining at ordinary restaurants like "respectable people," Mr. Summers and Anton chose once to patronize the new type automats which are located throughout down-town New York. They are of the five-cent, in-slot type where five cents in the slot brings forth a cup of steaming coffee with an added squirt of cream at no extra cost. For more substantial dishes, nickels are inserted until the correct number is reached upon which a door flies open and the delicacy awaits removal from the automat.

C. E. Seniors Engaged in Research

At the present time seniors in civil engineering are engaged in six major research problems. Most of these projects are being carried on in cooperation with or for the benefit of some outside agency.

The problem of hazards of grade crossings in Oregon is being studied by Robert L. Tidball. The compilation of data on this subject will be valuable as an aid in the abolishment of these hazards.

William G. Harber is carrying on a study on the corrosion of water mains in the city of Eugene, Oregon, where corrosion has been costly and its remedy will be of immediate benefit.

The Bonneville dam being built on the Columbia river, has presented numerous problems of a wide variety. Morrow W. Whitcomb is engaged in a study of the problem of fish-ways for the dam. Draper C. Mason, in cooperation with the E.E. department, is engaged in an investigation of electrical methods of measurement of the flow of water.

A great deal of controversy has taken place relative to the effect on fish life of sulfite liquors and sulfite wastes being dumped into the rivers by industrial plants. Arnold Z. Greenlaw has undertaken the investigation of the bio-chemical oxygen demand of sulfite liquors and possible methods of treating sulfite wastes.

Faulty dam foundations have often been the cause of failures, especially where solid rock is not encountered. While sand foundations are not necessarily undesirable, information as to flow of water through such foundations is lacking. John W. Daugherty is working on a study of the flow of water under dams built on sand foundations with special reference to outcropping of the water at the toe of the dam.

Wood Working Shop Makes Draft Tube Patterns

The patterns used in forming the pyralin draft tubes for research by the civil engineering department in connection with the Bonneville dam were made in the wood working shop under the direction of E. D. Meyer. The patterns consist of two parts between which the sheet of pyralin is placed. By heating in an oven to about 250° F. and applying pressure, the pyralin takes on the desired shape. Ethan Allen and Leonard Moore, graduate students in industrial arts, and Amo DeBernardis, sophomore in industrial arts, assisted in the work.

Educational Research Is Carried on by Industrial Arts Students

Following the tendency in the past few years, the research being done under the industrial arts department is confined to educational methods as applied to the work. E. D. Meyer, instructor in industrial arts, is studying the correlation and functional relations that should exist between mechanical drawing, descriptive geometry, machine design, and engineering shop courses. A co-ordinated program of industrial arts for the junior and senior high schools of Corvallis is being prepared by L. A. Lovegren, graduate student. An investigation concerning the avocational value of industrial arts subjects is being started by Ethan Allen, graduate student in industrial arts.

Thielemann Conducting Thesis Work

Rudolf Thielemann, senior in electrical engineering, is working on a thesis problem dealing with corona losses and radio interference from high voltage conductors. Equipment used to study these phenomena consists mainly of a high voltage transformer, a low voltage cathode ray oscillograph with a sweep oscillator, a corona current bridge, and a field strength measuring set.

New Die Made in Machine Shop

A new stamping die has been constructed in the college machine shop for cutting fiber and brass discs which are used in making ornamental handles for knives. These hunting and carving knives are made in the forging and welding department.

Chemical Engineers Are Active in Varied Research Work

Dr. C. S. Keevil, head of the department of chemical engineering, was recently appointed to the Portland Chamber of Commerce research committee for the utilization of the power which will be made available upon completion of the Bonneville dam. The committee is to make a survey to determine the uses to which the power may be applied with respect to the raw materials available.

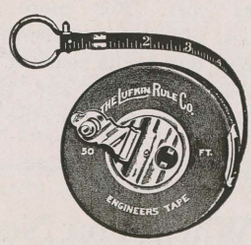
A report revealing the effect of the pulp and paper trade wastes as polluting agents in the Willamette river, has been completed and submitted to the executive committee under which the local technical committee operated. The studies of sulphite liquor demands of oxygen are being continued in the engineering experimental laboratories by Mathew Odell and Arnold Greenlaw.

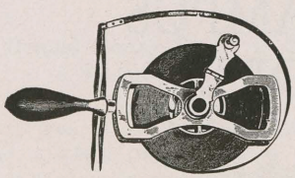
The industrial chemistry laboratory class is conducting research in the reclamation of lead oxide from waste lead-plate storage batteries. At present the most feasible reclaiming process is by hydro-metallurgical extraction with brine. The battery manufacturing concerns have found this reclamation of lead oxide advantageous and economical in new battery construction.

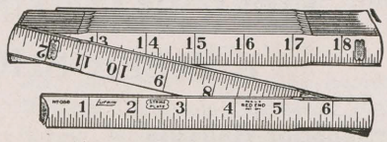
Alfred Jacquot, graduate student in chemical engineering, left school to assume a position in the laboratories of the Crown-Willamette paper company at West Linn.

Harold Berg, graduate student, using a recently developed method, has completed an experimental study upon the resistance of lubricating oils to oxidation and sludge formation.

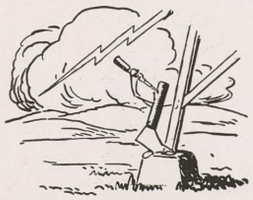
The seniors in the department have been working on the contest problem of the A.I.Ch.E. This problem consists in the selection of the most economical equipment to accomplish a certain filtration operation.







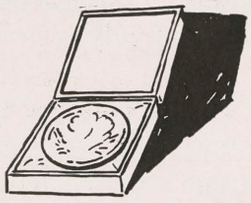
G-E *Campus News*



LIGHTNING SPIES

How many amperes are there in a bolt of lightning? Well, there are too many for comfort, and most of us are willing to let the matter rest there. General Electric engineers, however, were very much interested in knowing, so that they could better protect electric transmission lines and equipment from damage by lightning. And last summer they sent out over 2000 little spies. These spies are metal cartridges, hardly an inch long, which were placed on the legs of transmission towers on lines in Pennsylvania and Virginia. This territory is apparently one of lightning's favorite hangouts. When the surge from a lightning bolt passes through a transmission tower, the little spy is magnetized in proportion to the highest current in the bolt. Linemen carry the magnetized spies back to headquarters, where, when placed in a "surge crest ammeter," they tell their story. Many scores of the little spies have reported, and their stories are really shocking. The highest reading has been 60,000 amperes.

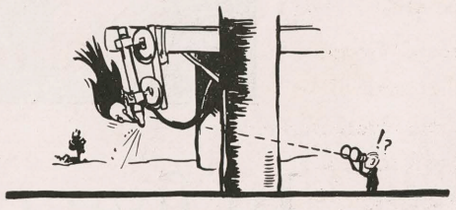
Clifford M. Foust, Carnegie Tech, '21, and Hans P. Kuehni, Ecole Polytechnique Fédérale, Zürich, '20, of our General Engineering Laboratory force, were responsible for the spies and the meter to make them talk.



KEYS, MEDALS, AND RESEARCH

The engineers and scientists of the General Electric Company have individually received many keys of honorary societies, medals, and other tokens. On February 1, however, General Electric received a medal to hang on its collective chest. The donor was the 100-year-old American Institute of the City of New York. And the citation read: "For pioneering in industrial research . . . for great achievements in pure science that have furnished gainful occupation for thousands of workers and that have raised the standard of living, and increased health and happiness."

We mention this with pardonable pride, fully aware, however, that medals and honors are not the purpose of research. The real purpose is the discovery of fundamental facts at the border line of man's knowledge. The practical applications are worked out later. It was with this conviction that Dr. Willis R. Whitney, M.I.T., '90, Ph.D., Leipzig, '96, now vice-president of the company, in charge of research, organized the G-E Research Laboratory in 1900. In maintaining this tradition, he is ably assisted by Dr. W. D. Coolidge, M.I.T., '96, Ph.D., Leipzig, '99, the present director; Dr. Irving Langmuir, Columbia, '03, Ph.D., Göttingen, '06, last year's winner of the Nobel prize in chemistry, associate director; Dr. Saul Dushman, U. of Toronto, '04, Ph.D., '12; and Dr. A. W. Hull, Yale, '05, Ph.D., '09, assistant directors.



SOUTHERN SLEUTHING

Not since Cock Robin have our feathered friends figured in a real good mystery, until the other day. And this was not so much a case of violence as of mistaken identity. Down in South Carolina, a power company had been having a little difficulty. It seems that the cutout fuses, which serve the same purpose on electric distribution lines that fuses do in our homes, were blowing out without apparent reason. Finally, an engineer with a Bird Club in his past unraveled the mystery. He saw a bird pecking at the soft fuse wire, apparently having a fine time. (It wasn't a G-E fuse.) Breathless investigation showed that other circuits had been opened in a like manner.

A G-E salesman on his next call recommended our new fuse links. Having copper in that part which the birds attacked, they proved to be im-peckable, and the trouble ceased. Now the birds are concentrating on worms, the power company on G-E fuse links, and everybody is happy.

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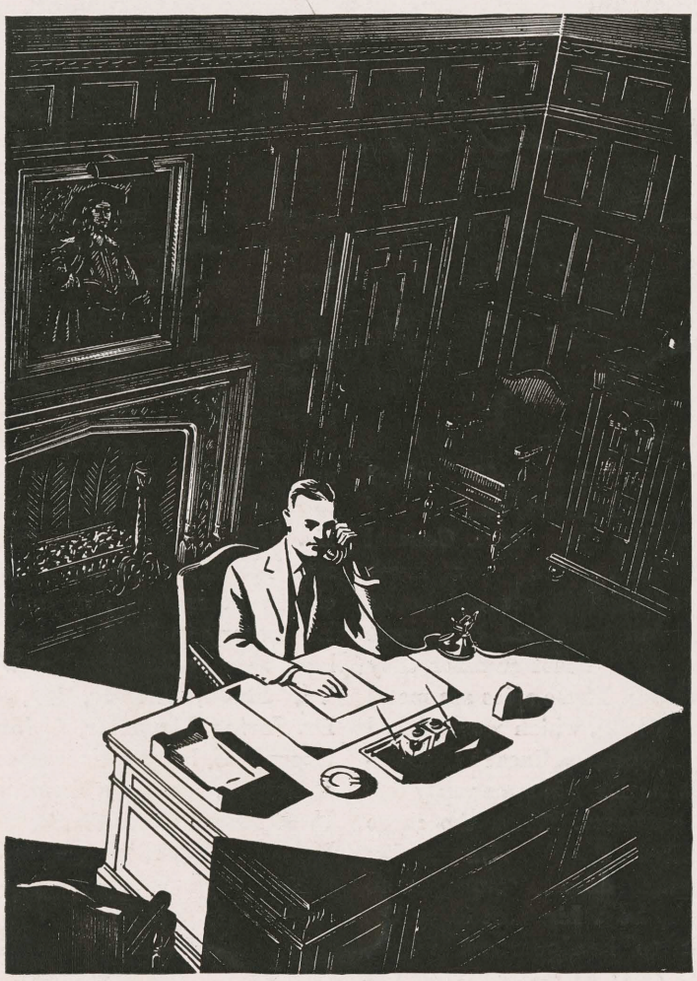
GENERAL ELECTRIC



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