

a sheath break before an interruption of service occurs. the cables are frequently maintained under gas pressure. Nitrogen gas, free from moisture, is used since it is inert, non-toxic, and relatively inexpensive. An underground cable is normally maintained under nine pounds per square inch pressure. Through a Bourdon tube and electrical circuit arrangement, an alarm is sounded in the control office when the pressure in the cable has dropped to six pounds per square inch because of a leak. By making accurate mercury-manometer measurements of the pressure in the cable at a number of points and plotting a pressure gradient curve, maintenance men can determine the location of a leak fairly closely. This method of locating sheath breaks is used when the nature of the break is such that no circuits within the cable have been interfered with. If the normal electrical condition of any circuit in the cable is changed, electrical tests provide a much faster means of determining the location of the trouble. Very small holes leak gas so slowly that many hours, possibly several days, may elapse before the pressure has dropped sufficiently to actuate the gas pressure alarm. However, gas escaping through the sheath break prevents the entrance of moisture, if the hole is small and the water pressure on the cable is less than that of the gas. A desiccant such as anhydrous calcium sulphate or colloidal silica is used to absorb moisture from the paper conductor insulation when a sheath opening is made for splicing or maintenance purposes.

SURFACE WATER ALSO PROBLEM

In hilly or rolling country it is necessary to restore the right-of-way after the passage of the plow train to its original condition as nearly as possible. The cut made by the plow share disrupts the normal drainage and creates a soft channel through the earth. Check dams of many types of materials, earth fills, contour plowing, new channels, etc., may be resorted to in order to retard erosion and force the run-off water to follow some course other than along the cable. Quick growing grasses and other vegetation are also used to hold the soil in place. Protective measures may be required for several years after the ground has been disturbed before the situation is again stabilized.

When ravines, streams, marshes, rivers, bays or similar obstacles must be crossed, a number of different methods and types of construction may be used. In certain instances, as has already been mentioned, the cable may be plowed beneath the surface of stream beds. In other cases, one of the many types of submarine cables may be the most practical means of crossing. Anything from a string of floating oil drums to a specially equipped boat or barge may be used in placing submarine cable, depending upon the conditions. Sometimes, instead of using a submarine cable, a land type cable is attached to a bridge or placed on a self-supporting structure of its own. The method of crossing chosen is based on a study of possible causes of damage to the cable, hazards to the continuity of the circuits, economics, and future plans of the public and the telephone company.

BURIED CABLES FOR LONG DISTANCES

Buried cables are particularly adapted to long toll routes involving many circuits. They are used across mountains, plains, agricultural land, and desert areas. Sometimes direct routes are the most economical; hence the cable may not follow highways or railroads but cross country after the fashion of the crow and the airlines. A strange combination of tractors, heavy trailer equipment, and cable reels, far from the beaten path, may seem at first to present an incongruous scene, but it may be just another plow train burying telephone cables for the most progressive telephone system in the world and for the most talkative people in the world.

Steel in the War

(Continued from Page 14)

Specifically with respect to the West Coast, there are now several steel producing plants and many steel fabricators with up-to-date mills and shops which have the latest equipment and facilities for the production of steel and its products. Columbia's new rod mill at Pittsburg Works is considered to be the finest mill in the United States at present. Geneva Steel Company at Provo, Utah, and Kaiser Steel Company at Fontana, California, both have the latest equipment in structural mills. All up and down the Pacific Coast, there are a great many steel, iron, and non-ferrous foundries which can produce practically every type of casting.

With respect to steel fabrication, it may be said that products of practically every type are produced on the Pacific Coast, some in large and others in small quantities, including automobile assemblies, road building equipment, stoves, refrigerators, ships, hydraulic equipment, and many others.

The steel industry realizes that the postwar period will be a challenge. It has great productive capacity which must operate at a reasonable rate to avoid excessive overhead cost and to compete with other metal industries which now also have great productive capacities. Aluminum, magnesium, and plastics are all potential or active competitors with steel in certain applications. New uses will be found for all of these materials, and it is possible that the peacetime markets will be expanded to make them serve the requirements of mankind in ever increasing measure.

ALUMNI NEWS

CALIFORNIA TECH CLUB, WASHINGTON, D. C.

THE Washington California Tech Club held a dinner meeting on Thursday, November 16, at the 2400 Hotel with 75 members and guests present. Dr. Robert A. Millikan, chairman of the Executive Council of the California Institute of Technology, and Dr. Frank B. Jewett, '98, were guest speakers. The meeting was planned to coincide with Dr. Millikan's attendance at the Fall Meeting of the National Academy of Sciences of which Dr. Jewett is president.

Both speakers discussed the role of science and engineering in modern war. Dr. Millikan told of the Institute's enormously expanded program for the development and production of the instruments of war, including rockets and anti-submarine equipment. Dr. Jewett, who is a member of the National Defense Research Committee of the Office of Scientific Research and Development, gave a comprehensive picture of the nation's war research organization.

Brief talks also were made by Dr. R. W. Sorenson, head of the department of Electrical Engineering, and by Dr. Theodore von Karman, director of the Guggenheim Aeronautics Laboratory, both of whom are presently engaged in war research work in the East. Dr. Jewett was introduced by Dr. Richard C. Tolman, Dean of the Graduate School, who now is vice-chairman of the N.D.R.C. The meeting chairman was Frederick J. Groat, '24, president of the California Tech Club of Washington. Club Secretary: Baker Wingfield, '28, 613 Knollwood Drive, Falls Church, Virginia. Telephone: Falls Church 2110-J.

ATHLETICS

By H. Z. MUSSELMAN,

Director of Physical Education

WITH a third of the basketball season past, Caltech's record shows two wins and three losses.

After opening the season with an 84-36 victory over Vultee, the team dropped close contests to U.S.C. 46-39 and Santa Ana Army Air Base 55-52. Bouncing back in the win column, the Engineers defeated Camp Ross 47-43, but were on the short end of the return match with Camp Ross 58-51.

Coach Shy still has to arrive at a regular starting lineup. Co-Captains Hugh West forward and Paul Nieto guard, together with center Bernie Wagner, have started all games. Stuart Bates and John Schimenz have been alternating at the other forward spot, with Dennis Ahern and Jerry Schneider battling for the guard spot.

The team is playing a fast and aggressive type of ball, and has scored an average of 55 points per game. Hugh West has led the scoring in all games and has an average of 18 points per game. However, lack of height has proved the real weakness of the team, and has been a real handicap, for the ability of lengthy opponents in controlling the ball off both backboards has been a contributing factor in all the defeats.

Coach Dr. Hane's cross country runners placed well in all meets. Victories were registered against Compton J.C. 27-28 and 26-29, U.C.L.A. 18-42 and Oxy 25-32 while Redlands led by Roland Sink, a V-12 trainee and the former U.S.C. distance runner, trounced the Beavers 25-30 and 24-31. George Gill, Tech ace, placed first in all meets except those against Redlands. A four way meet at U.C.L.A. found Redlands again victorious with 31 points, Caltech second with 40, while Oxy and U.C.L.A. tied for third with 72 points apiece.

Progressive Education

(Continued from Page 3)

institution that proposes to maintain decent standards of professional work. When the war is over, the Institute, in all probability, can continue to select from applicants for admission a full freshman class of adequately prepared students. But it can do so only by a drastic process of selection; and unless what seems to be a pretty general trend in high school education is reversed, a larger and larger number of high school graduates who are potentially good engineering and scientific material will be automatically excluded from consideration.

The four-year professional courses are continually working with the problem of not enough time for all that should be done. Surely the solution is not to dilute and superficialize the work of the high schools. Readers of *Engineering and Science* may well give serious thought to this whole problem. As citizens and taxpayers they have a legitimate concern with whether the public schools are giving them their money's worth. If they have children, they have a more immediate concern; and if they have any doubts about the adequacy of the grade and high school education that their sons and daughters are receiving, then let them do something about it.

ALUMNI DINNER DANCE

The Annual Alumni Dinner Dance will be held February 10 at the Oakmont Country Club in Glendale. Bob Mohr's orchestra will provide the music and the party will be informal. Dinner will be served at 8:00 P.M. Dancing will be from 9:00 P.M. to 12:30 A.M. Tariff for dinner and dancing will be \$6.00 per couple; for dancing only, \$2.40 per couple. Reservations should be made immediately through the Alumni office.

PERSONALS

1921

ALLIN CATLIN is a lead engineer in the North Hollywood district of the Southern California Telephone Company.

1922

K. A. LEARNED is a district engineer in the Alhambra area of the Southern California Telephone Company.

1923

DONALD SCOTT is at the Johnson Foundation of the University of Pennsylvania at Philadelphia, Pa.

1925

M. E. SALSBURY has been made president of the Los Angeles Section American Society of Civil Engineers at a recent meeting. C. W. Sopp, '17, was elected a vice-president and Arthur Pickett, '24, secretary.

MAJOR J. J. DEVOE, Signal Training Battalion at Camp Crowder, was in southern California on business for the government.

GLENN M. SCHLEGEL is now with Union Iron and Steel Company in Los Angeles as assistant manager in charge of operations.

1926

HERBERT V. INGERSOLL, a prisoner of the Japanese, has sent his wife a message, through an intercepted propaganda broadcast from Japan, stating he is in good health, uninjured and is receiving letters and personal boxes.

ERNST MAAG in December was made vice-president of the Structural Engineers Association of Southern California.

1927

CAPTAIN FRANK S. HALE is "somewhere in Belgium" doing photo interpretation which keeps him well informed on our part in this campaign and as he says, "makes him prouder than ever to be an American."

1928

HUGH HOSSACK is a lead engineer at the Van Nuys office of the Southern California Telephone Company.

1929

LIEUTENANT (j.g.) HAROLD CORBIN is on a destroyer in the South Pacific engaged in anti-submarine warfare.

RAYMOND KIRCHER has joined the vacuum tube development department of the Bell Laboratories.

1930

CAPTAIN LAWRENCE NYE, U.S.A., sent greetings on Christmas Day from his station in Australia to his family in Los Angeles.

1931

DR. CHARLES KIRCHER is the father of a new daughter, Josephine McCullom, born in October. Dr. Kircher is associated with the Du Pont Company.

1932

E. C. KEACHIE is a Captain in the Engineers Corps, U.S.A., with headquarters in San Francisco.

THOMAS F. ANDERSON is working with viruses and the electron microscope at the Johnson Foundation, University of Pennsylvania.

PHILIP SCHOELLER is associated with American Arabian Oil Co., Saudi Arabia,

having arrived there the middle of September after 45 days of travel. Mr. Schoeller is doing engineering in non-processing construction such as the pier, salt water intake, roads, pipe lines, etc.

ERIC J. MILES is now with Mellon Securities, Pittsburgh, Pa., as assistant to the vice-president in charge of investment counsel.

1934

ROBERT SCHRECK is district engineer for the Orange County district of the Southern California Telephone Company.

1935

ROBERT P. JONES, U.S.N.R., was recently promoted to full Lieutenant. In September he became father to a second son.

PERRY POLENTZ is connected with McKinney and Co., management consultants, San Francisco, Calif.

JAMES N. SMITH, engaged on a war research project for Columbia University, has returned to southern California and is now working for Caltech on a war research project.

DR. JESSE E. HOBSON has taken over the position of director of the Armour Research Foundation in Chicago. He was formerly head of the electrical engineering department at Illinois Tech, during which time he also was director of the Army Signal Corps training program. Dr. Hobson was responsible for the opening of two new college graduate training programs at Commonwealth Edison and Allis-Chalmers in which industrial employees work toward advanced college degrees in their own plants.