ALUMNI INTERVIEWS

By LEE P. DOYLE, '27

C. P. COOPER, PRESIDENT, OHIO BELL TELEPHONE COMPANY

EACH quarter the campus is invaded by many speakers and lecturers representing every phase of business and professional life. Some of them are interesting. Some are droll. And others combine a striking personality with technical facts that hold their listeners at rapt attention. To this latter category belongs C. P. Cooper, president of the Ohio Bell Telephone Company, and an alumnus of Ohio State, who spoke before the student branch of the A. I. E. E. March 12.

Approximately 300 embryo engineers heard Mr. Cooper laud the engineering profession as an enormous contribution to the comfort and well-being of the human race. They were assured by the speaker that they had chosen wisely in selecting an engineering course in the university. As an example of the important contributions the profession has given to society, Mr. Cooper cited the following 15 fundamental ideas and inventions of the engineer in the past 50 years:

"The internal combustion engine invented by Otto in 1876.

"The telephone invented by Bell in 1876.

"The phonograph invented by Edison in 1877.

"Exhibition of incandescent electric light by Edison in 1897.

"Commercial use of dynamo in 1880.

"Linotype machine invented by Mergenthaler in 1884.

"Engine invented by Diesel in 1893.

"Selden granted a patent on his automobile in 1895.

"X-rays discovered by Roentgen in 1895.

"Wireless communication invented by Marconi in 1896.

"First airplane flight was made by Orville Wright in 1903.

"The electron tube first used in radio in 1904.

"Modern radio tube formed by Lee DeForest in 1907.

First sustained air flights made by Wright Bros. in 1908.

"First radio telephone message over very long distance in 1915.

"The over-all results of these wonderful developments and the practical application of them, as worked out by engineers, has been a marvelous raising in the living standards of our people," said Mr. Cooper. "A good idea of the living standards can be gained by going back a relatively short period of years and comparing the comforts and conveniences of 25 years ago with those of the present day," he said.
said.

"Twenty-five years ago," he continued, "even the extremely wealthy people were living in less comfort and with fewer conveniences than are today commonplace with the man of moderate income. A few of the important items made commonplace by the engineer, as pointed out by Mr.

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CHARLES F. KETTERING, PRESIDENT, GENERAL MOTORS RESEARCH CORPORATION

TO quote freely from Abraham Lincoln, we have met a great man and found him to be no different from anyone else. The great man is Charles F. Kettering, President, General Motors Research Corporation, with whom we had the pleasure of a personal chat through the courtesy of Professor F. C. Caldwell. We were desirous of obtaining Mr. Kettering's views on the college graduate and some engineering problems for the Ohio State Engineer and for that purpose the interview was arranged.

Mr. Kettering shook our hand warmly and asked us to be seated. There was nothing in his manner to suggest a superior being, nor did he assume a superior attitude—this great engineer who has made the General Motors famous. No—Mr. Kettering is just man and as he settled back leisurely in his chair in Professor Caldwell's office. He began to tell us just what he thought of the young college graduate.

"The young engineers of today," he said, "are sadly lacking in knowledge of physics and organic chemistry. They have no respect for the fundamental laws of physics, which are the most important laws, and laws on which all engineering is based. This is the fault of the student as he neglects the details of his problems. The biggest fault of the engineering graduates is that they have no conception of physics. They know the formulae, but they do not know what they mean. If I were giving an engineering course, it would be four years of physics and chemistry, with a little economics thrown in.

"What problems confront the Research Engineer? Most people have an erroneous conception of research engineering. It starts with the elementary details of a problem and worked through to the end. For example laying a pipe. To dig a ditch and place a cast iron pipe in it could be called research. All problems in research are attacked by first starting with the simple details, analyzing them, and then analyzing each step through to a successful conclusion. Start out with a problem and stay with it until you "lick" it. A research man is generally regarded as a nut or a highbrow. As a matter of fact, he just stumbles on things. The scientific papers come later. To do research work one must have intelligent ignorance.

Most research engineering problems can be solved by using the formula:

Force+Velocity=Energy.

"Now, the force rides on the carrier which has weight on mass and has three dimensions. For example, if I were to throw this inkwell at you, the inkwell would be the carrier of the energy from my hand to you. First, the carrier has inertia, representing the energy absorbing capacity of the carrier for unit velocity. Second, it has elasticity, representing the energy absorbing capacity for unit force. Third, it has resistance representing the energy converted into heat. If

the mass is great, it is a problem in astronomy. If the mass is minute, say electrons, it is a problem in electricity. If the mass is a bridge, it is a problem in mechanics. In all of these problems we will find only three kinds of trouble. First, too light or too heavy (inertia). Second, Elasticity. Third, Resistance, too much or too little.

"What are you doing in the automobile industry now?" Mr. Kettering. The automobile industry today is on the trend towards higher speed stock cars. The ideal car which the public will demand in the future is one that can be accelerated up to any given speed, in the same time that it would require to bring the car to a stop from that given speed. But why build higher speed cars when our traffic laws limit the speed to less than 50 m. p. h.? Because the automobiles on the road today do not maintain the actual speed that the speedometers seem to indicate. We are using optomistic speedometers on all automobiles today. They register correct over the ordinary driving range, however, above 50 m. p. h. some speedometers register as much as 20 to 25 m. p. h. high (in reading), so that most any car on the road today, when the speedometer reads 75 miles per hour, is actually travelling about 60 or 62 miles per hour. Speedometers that register accurately above the ordinary driving range cost more than the public is willing to pay. They are not necessary as they are correct over the range of driving (up to 50 m. p. h.) that the majority of users do. "What is the fastest stock car on the road today?" It is not generally known, but the Cadillac is the fastest stock car on the road today, being about 6 m. p. h. faster than any other stock car. These tests were made on the General Motors Proving Ground and electrical timing instruments were used to determine the actual speed."

Mr. Kettering was the guest in Columbus, February 27, of the A. I. E. E. He talked to the combined student branches at the University in the afternoon, and the Columbus section of the A. I. E. E. in the evening at the Southern Hotel. He also talked before the Chamber of Commerce noon-day luncheon at the Chittenden Hotel. The following notes were taken at these lectures: "The greatest thing in the world to stop progress is a good theory." "Never hire a man who knows anything about the job at hand. He won't change his mind. Henri Fabre, the French naturalist, in his study of wasps shows that a wasp never changes his mind. He simply won't be helped." "Money is simply historical work. Civilization consists in converting the earth's crust into human utility." "Foreign nations can't understand American quantity production. A Chinaman carries a ton of material a mile a day for ten cents. The American railroads last year did it for one-half a cent. The Chinaman was overpaid twenty times. Yet they say if they get railroads men will be thrown out of work. As long as people want things and keep working, we will have prosperity."

Mr. Kettering is an alumnus and is a former trustee of the Ohio State University.

The main difference between a girl chewing her gum and a cow chewing her cud, is that the cow generally looks thoughtful.

C. P. COOPER

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Cooper, are: greatly improved highways; the automobile; improved lighting systems; the distribution of electric energy to rural sections; bus service; air mail service; the radio; etc.

The telephone was selected by Mr. Cooper as probably the most useful and most important of all recent inventions. He recited a brief history of Alexander Graham Bell and the first telephone. He told of the hardships encountered by Bell when he invented his new instrument in a little attic of an old building on Court Street in Boston, where the young inventor and his assistant worked for months and months in their research and development work.

Mr. Cooper said that today there are thousands and thousands of engineers engaged in original research work in connection with the telephone and telegraph systems. And there are thousands and thousands of other engineers engaged in putting into practical effect and operation the ideas and developments of the Research Branch of the telephone organization. He concluded the history of the telephone by a comparison of the millions of engineers who are working on the telephone today with the one man who invented it 50 years ago.