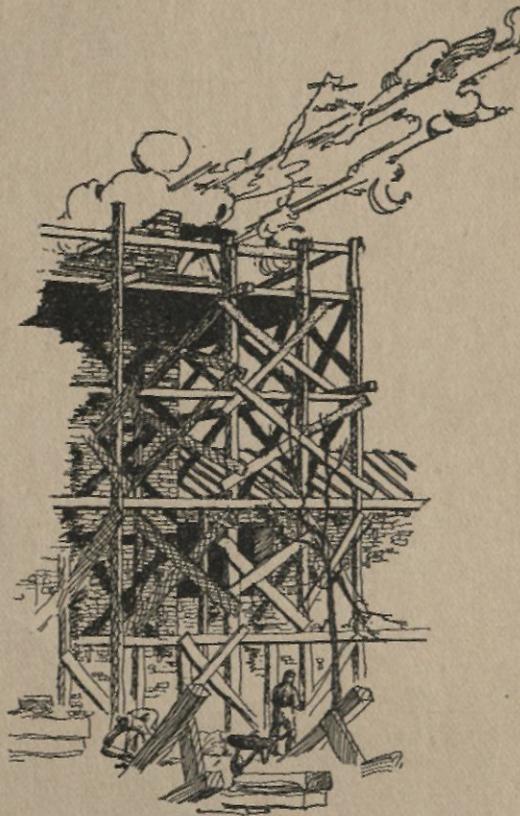


*The*  
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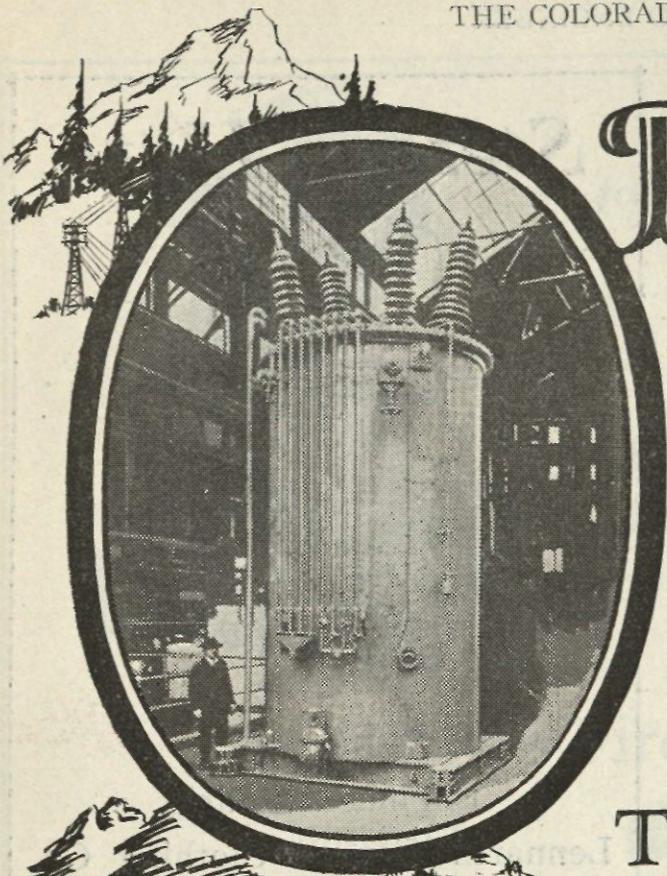
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# Before Alternating Current Dominated the Electrical Industry

*What Engineering Owes to the Far-Sightedness of George Westinghouse*

THE impregnable position now occupied by alternating current was attained only after a bitter struggle, for, due to its supposedly deadly characteristics, practically the entire electrical fraternity once opposed the progress of what was generally referred to as "Westinghouse Current."

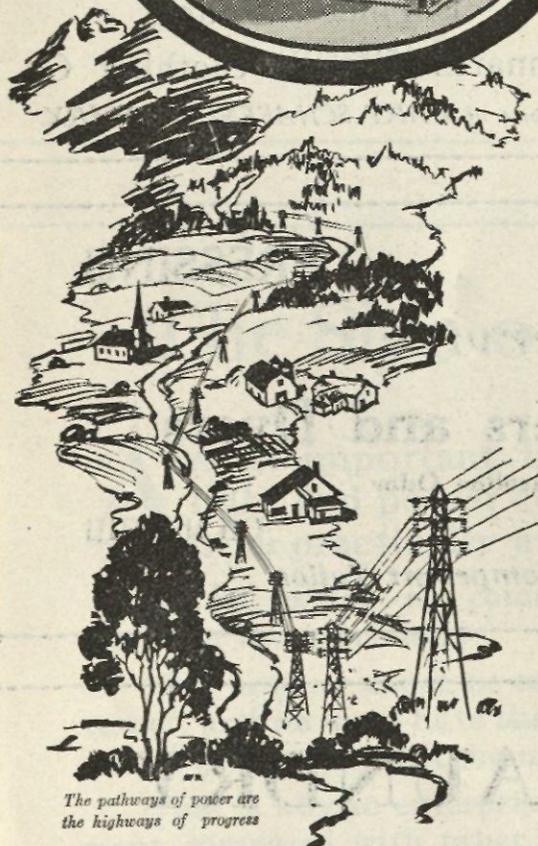
Gaulard and Gibbs originated the alternating current system in Europe. Their system was impractical in many respects, but had been used with some success for lighting.

George Westinghouse became interested, and immediately recognized that the weakness of their system lay in the design and principles governing the transformer.

He devoted the resources of his organization to the development of the transformer. When he made it a practical unit, alternating current, with its vast commercial advantages, then became possible.

The beginning of the bitter struggle by George Westinghouse for the supremacy of alternating current goes back to 1885 and 1886. Remarkable progress has been made since then and voltages as high as 220,000 are in commercial use today.

Engineering owes much to the far-sightedness and fighting qualities of George Westinghouse.



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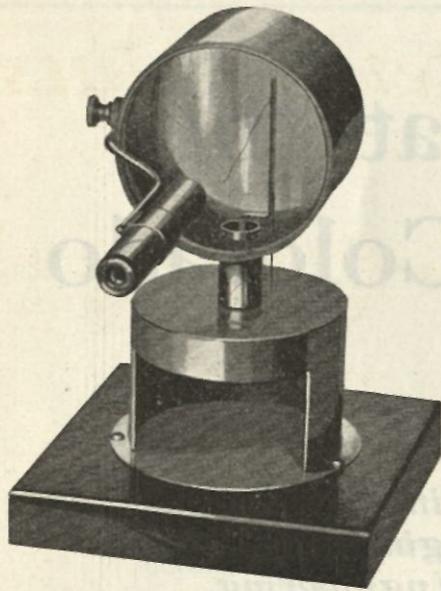
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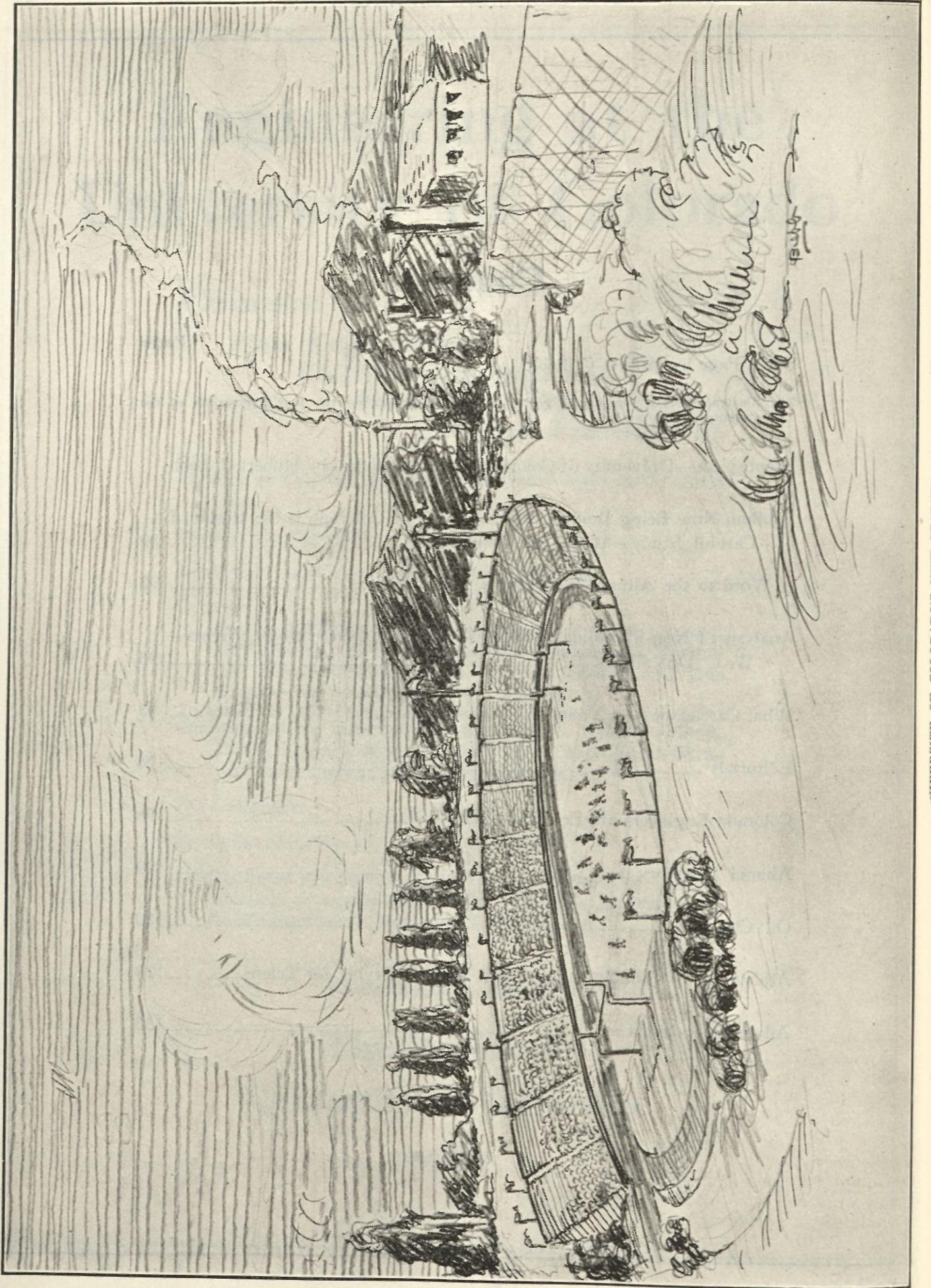
**The Registrar  
University of Colorado**

**BOULDER**

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## Stadium Now Being Built at the University of Colorado Is the Result of Careful Study

WALDO E. BROCKWAY, B.S. (C.E.), '17; C.E., '22

Supervising Engineer, University of Colorado

In reviewing the record of the past football season, Colorado backers feel a certain elation due partly to the success of the team and partly to the fact that Colorado U. has come back into its own in football. What a fitting climax to the season's victories is the announcement recently made by President Norlin that the University is to have a stadium.

To everyone who attended the important games last fall the need for better facilities for handling crowds was apparent. In Denver the inadequacy of Broadway Park for properly handling a crowd was impressed upon every one who attended the Denver University game. In addition to the poor seating arrangement and insufficient number of seats, the playing field has no drainage system and is unfit for use after, or during a storm.

At Colorado Field in Fort Collins conditions are better, the only handicap there being the lack of capacity for important games. The official count at the Aggie-Colorado championship game on last Thanksgiving showed an attendance under 11,000. How many more would have attended that game if they had not anticipated overcrowded conditions it is difficult to say; it is certain that many did not go because they were unable to get reserved seats and did not want to be pushed about in the crowd several hours before the kick-off in order to get standing room.

Football is the main source of revenue for the support of college athletics, and the lack of a suitable place to play important games is a great handicap to managers, as well as a source of annoyance and discomfort to football fans.

The representatives of the athletic boards of schools of the Conference had a hard job before them when the time came to arrange the 1924 football schedule. Several teams in the Conference had strong teams during the past season and will be strong contenders for the 1924 championship. Interest in football promises to be high, and yet, larger crowds cannot be handled with existing facilities. It is manifestly poor business to be unable to care for expansion in the one sport which yields a cash balance. These points were carefully considered by the University Athletic Board and taken up in a meeting with President Norlin before the annual conference for arranging the schedule. Following that meeting the men who were to represent the University were instructed by the President to arrange a schedule with the assurance that a seating capacity

of from 17,000 to 20,000 could be provided at Boulder for home games. About that time President Norlin announced at Student Assembly that there was every indication that a stadium for the University would be an accomplished fact by the opening of the 1924 season.

There is no doubt as to the wisdom and farsightedness of Dr. Norlin's decision to put this important project through at this time. It would be difficult to find a time when all conditions are so favorable. A championship football team combined with a fine new Gymnasium needs only a stadium as a crowning factor to put U. of C. athletics on a new high peak of achievement.

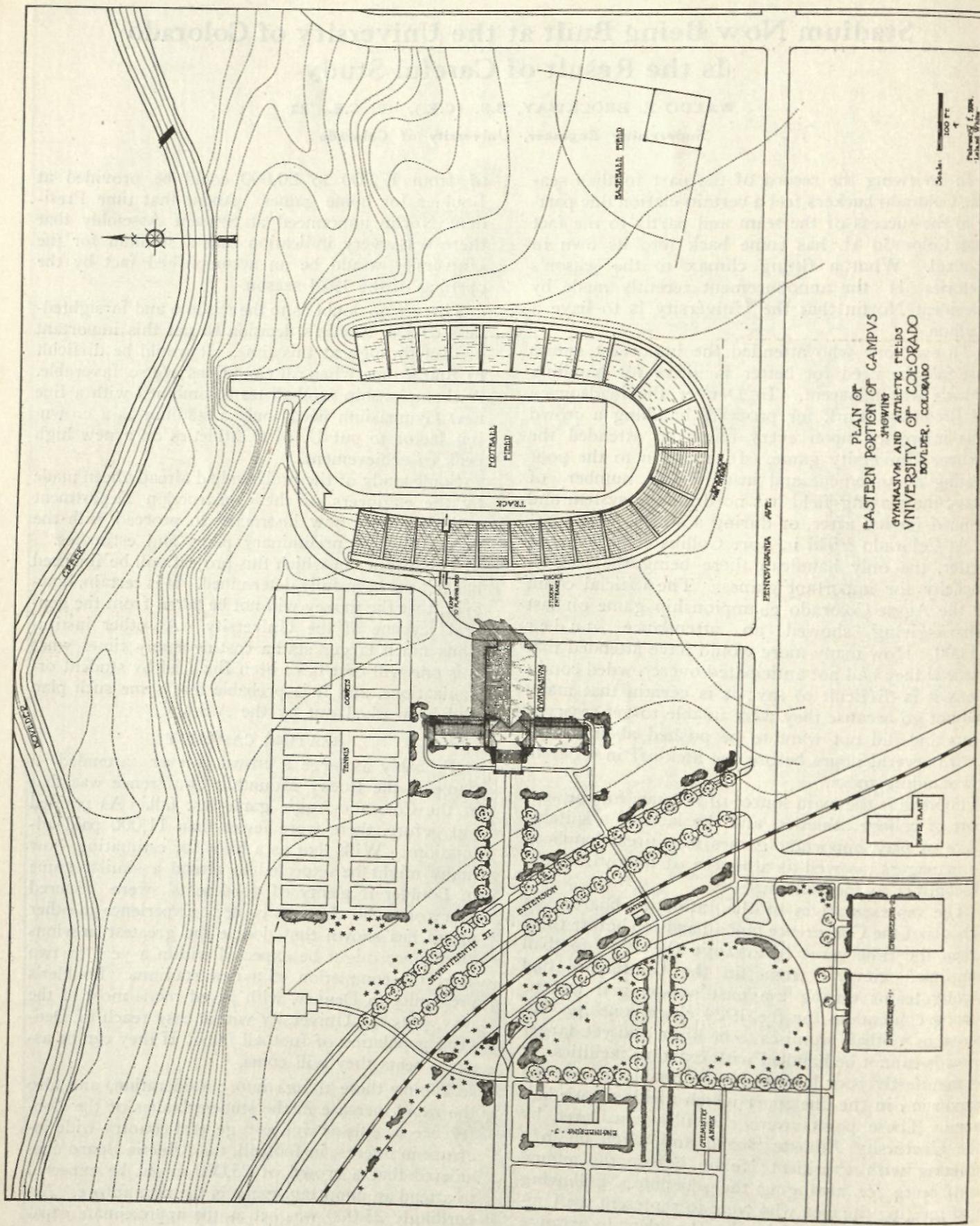
Some study of the problem had already been made by the engineers of the Construction Department and they were now instructed to proceed with the preparation of preliminary plans and estimates.

The manner in which this project will be financed has not yet been fully determined. It is certain, however, that the money will not be taken from the general revenue of the University. At other institutions much larger stadia costing many times what this one will cost have been financed by student organizations, and it is probable that some such plan will be worked out by the A.S.U.C.

### SEATING CAPACITY

Probably as large a crowd as ever attended a game in the Rocky Mountain Conference was that at the Colorado-Aggie game last fall. As pointed out before, there were fewer than 11,000 paid admissions. With that as a basis for estimating, how many might be expected to attend a similar game in Boulder if plenty of good seats were assured every one who chose to come? Experience in other places has shown that double the greatest previous attendance might be expected within a year or two after the completion of a new stadium. Boulder's proximity to Denver, with paved roads most of the way, puts the University within easy reach of Denver's population of football fans. If they can be assured seats they will come.

Taking these things into consideration, and also the rapid increase in the student bodies of the Conference schools as well as a general country-wide increase in interest in football, the Athletic Board considered that a crowd of 25,000 might be expected to attend an important game in the near future. Accordingly 25,000 was set as the approximate capacity which should be provided for.



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## LOCATION AND TYPE

Unlike the problem confronting many universities, the location of the stadium called for but little study. A natural ravine located on the campus and adjoining the new Gymnasium on the east, offered such an ideal site that it was the choice of every one concerned with the selection. On account of its being in the center of that portion of the campus which has been set aside for intra-mural and Varsity athletic activities, on account of its ideal topographic features and the beautiful surroundings of mountain and valley, this site offers every advantage for the construction of an economical and attractive structure.

Like the selection of the location, natural conditions largely governed the type of structure to be

and difficult to place properly upon newly made earth embankments. Concrete is cold and not pleasant to sit on in damp or cool weather. Planks should be used for seats, which is an additional expense. Wood has the disadvantage of shorter life, but the advantage of low first cost. The construction is easy, and no serious disadvantage occurs if slight settlement of the banks takes place.

But the problem was largely one of economy. Which would be cheaper in the long run? In an article on the Stanford Stadium, by E. E. Carpenter, in the Engineering News-Record of May 4, 1922, contractors' figures are given and an analysis made, showing the cost of each type over a period of years. The advantage was all with wood. Preliminary esti-



STADIUM LOCATION AND EAST WING OF NEW GYMNASIUM

used. The ravine, open to the north with sloping sides, suggested the horse-shoe type built upon earth embankments. By using this type it would only be necessary to widen the ravine and fill in the bottom, leaving the north end open. Curved sides were considered better than straight sides on account of the better lines of vision to the side lines and corners and on account of the ease with which each occupant can see the entire crowd. In selecting the vertical and horizontal distances between seats, descriptions of stadia built at other universities were carefully studied. The description of the Ohio State Stadium by H. D. Smith, described in the Architectural Record of November, 1920, furnished valuable information. In this article Mr. Smith tabulated the rise and run of seats used in many stadia and commented upon each. The selection of a rise varying from 10½ inches to 14 inches and a run of 30 inches was made after studying Mr. Smith's report.

For materials of which to construct the seats choice was to be made between concrete and wood. Concrete stadia are having a great boom, and if properly constructed have the advantage of durability and low maintenance. But concrete is expensive

mates on wood and concrete were made here, and the result showed that at 6% interest, the investment for a concrete structure would entirely replace the wood seats every four or five years. As the estimated life of the wood structure is fifteen years, the economy in its use is apparent. With these advantages there seemed to be no justification of the more expensive material, and so wood was selected. To prolong the life of the wooden structure all parts coming in contact with the ground will be California redwood dipped in creosote. Other parts will be of Douglas fir.

In the selection of the seats great care was taken to use something that would be comfortable, and afford easy circulation. The type chosen is comfortable and simple to construct. There will be no necessity for crowding.

It was apparent, after studying conditions at the site, that provision could be made in the new structure for football and track, but that baseball could not be accommodated without a large expenditure in grading off the embankment at the north end. Inasmuch as baseball does not attract large crowds and a suitable field could be provided outside the stadium,

(Continued on page 122)

# A WORD TO THE ALUMNI

DR. GEORGE NORLIN

President, University of Colorado

It is a popular idea that state universities are independent of private philanthropy and of that loyalty on the part of the alumni which expresses itself in substantial ways. This is not true. On the contrary, those state universities which enjoy the greatest distinction in our Country have been recipients of private benefactions as well as of state appropriations. The University of Colorado has received many hundreds of thousands in such gifts from individuals and grants from welfare foundations. Such gifts have not only been godsend in themselves; they have stimulated better support from the State. The average member of the legislature has little knowledge of the University. If, then, he believes in it, it is because those who do know it and who are its friends do believe in it and do show their belief in substantial terms.

In the long run the future of the University rests with the alumni. If they, who know it best, are not actively interested in it; if they are not readily mobilized in its support; if they are not conscious of any debt which should be in some measure repaid; then it is to be expected that others to whom the University is little more than a name will care very much about it.

This is as it should be. A university which is not in reality as well as in name a "kindly mother" to those who go out from her halls is somehow a failure; and alumni who think of their university only as a stepping stone, who have no warmth of feeling for her in their hearts—they are failures, too; for they cheat themselves of the blessings of loyalty which is one of the enriching things of life.

As our alumni emerge more and more from the struggle for existence they will be able to do many things for the University which the State may not be expected to do. For one thing the Memorial

Building will, I am sure, materialize as a convincing proof that our former students feel no less of devotion than do those of other universities.

Just now we are struggling with the problem of financing the stadium. The University is building the gymnasium with State money; it has also purchased land for the stadium and for the playgrounds about it, so that the campus now extends as far west as Twenty-fourth Street, between Pennsylvania Avenue and Boulder Creek. But we feel that the stadium itself should not be financed out of State funds. It can in time be paid for largely out of receipts from games. But the Alumni

could help without burdening themselves seriously, either by advancing money to be paid back in the future, or by paying in advance for reserved seats for a period of years as they have done in the University of California.

Excavating is now going on for the stadium, and we expect to be ready for twenty to twenty-five thousand spectators by next fall.

We are extremely fortunate in having the gymnasium, the stadium, and the other athletic fields all together. The combination will be unique in its conveniences and its accommodations.

And now let me close with my best wishes to you all for your happiness and success.



PRESIDENT NORLIN

# Analysis of Non-Sinusoidal Waves as Applied to Alternating Currents

W. C. DUVALL

Professor of Electrical Engineering, University of Colorado

In no other profession except that of the Electrical Engineer does the Fourier's Series play such an important part. Nearly the entire structure of the mathematical solution of alternating current problems is based upon this important mathematical deduction. For a complete discussion of the Fourier's Series, reference is made to Byerly's "Fourier's Series and Spherical Harmonics."

For the best operating conditions, the electromotive force wave should be sinusoidal in which only the first term of the series is present, but in practice this condition is hard to realize, as the third harmonic is often present, and the higher harmonics may appear. The harmonic that has in the past caused considerable difficulty is the fifteenth. The fifteenth harmonic of a 60-cycle circuit has a frequency of 900 cycles per second. Any telephone lines or apparatus close to such a power circuit will by electromagnetic induction have a current induced in them of 900 cycles. Since the average male voice has a frequency of 800, and the female voice has an average of 1,000 cycles per second, any frequency superimposed upon the voice currents in a telephone circuit, approximately the voice frequency current, will produce a very undesirable interference.

In addition to the above condition there are phenomena in power circuits known as transients, or disturbances, that last for only a short period of time. The cause of these transients can be determined, and they can be reduced or eliminated only after the cause is known. The greatest step in the elimination of such disturbances is accomplished by taking an oscillogram of the disturbance in the line. By analyzing the wave form secured, separating the various harmonics, and getting not only the order in which they appear, but their relative magnitudes, has made it possible to build large alternators, and large super-power areas. The principle of superimposed frequencies has been a tremendous help in the wireless field, wired wireless, carrier current telephony and in many other epoch-making developments.

There are two step-by-step methods of analyzing a non-sinusoidal wave: the Fischer-Hinmen and the 36-ordinate method. The first is quick and comparatively accurate where no harmonic appears above the seventh. The 36-ordinate method is more tedious, but is accurate, and will give each harmonic present as far as the forty-fifth or beyond, which is far above those present in practice.

For a complete description of the Fischer-Hinmen method, reference is made to the Electric Journal,

1908, Volume 5, Page 386, also *Electrotechnische Zeitschrift*, 1901, Volume 22, Page 396.

In addition to the step-by-step methods there are several mechanical analyzers. A typical one is described in the *Electric Journal*, 1914, Volume II, in an article by Chubb.

All the wave analysis methods are built upon the following relation, which gives the value of the ordinate for any value of  $wt$  for any non-sinusoidal wave that may be chosen:

$$y = A_0 + A_1 \sin wt + B_1 \cos wt + A_2 \sin 2wt + B_2 \cos 2wt + A_3 \sin 3wt + B_3 \cos 3wt + \text{etc.}$$

The above equation is simplified because in alternating current waves the upper and lower loops are similar. This condition can be accomplished only by having the even terms vanish. The above equation as applied to alternating current will be

$$y = A_0 + A_1 \sin wt + B_1 \cos wt + A_3 \sin 3wt + B_3 \cos 3wt + \text{etc.}$$

where  $A_0$  is the distance above the abscissa on which the line through the center of the complex wave is superimposed.

$$\frac{2\pi}{T}$$

In the above,  $wt = \frac{2\pi}{T}t$  where  $T$  is the periodic time of the fundamental sine curve;  $wt$  is also the abscissa corresponding to the ordinate  $y$  and is measured from the zero point of the fundamental sine curve.

Use is made of the following theorems to find values of the constants  $A_1, A_2, A_3, \dots$ :

- I. If  $X$  is any angle, then the average value of  $\sin X$  or  $\cos X$  taken at equal small angular distances over 360 degrees, is zero.
- II. The average value of both  $\sin^2 X$  and  $\cos^2 X$  taken in the same way is one half.
- III. The average value of  $\sin X \cos X$  and of  $\sin nX \sin mX$  or  $\cos nX \cos mX$  taken in the same manner of 360 degrees is zero.

The truth of theorem I is obvious, for in a sine wave there are as many positive ordinates as negative and their algebraic sum is zero.

Theorem II is proved as follows:

$$\begin{aligned} \cos^2 x &= \cos^2 x - \sin^2 x = 1 - 2 \sin^2 x = 2 \cos^2 x - 1 \\ \sin^2 x &= \frac{1}{2} - \frac{1}{2} \cos 2x \\ \cos^2 x &= \frac{1}{2} + \frac{1}{2} \cos 2x \end{aligned}$$

The average value of  $\sin^2 x$  must be  $\frac{1}{2}$ , because the average value of  $\cos^2 x$  taken over small increments between  $x=0$  and  $x=2\pi$  is zero. The same reasoning holds for  $\cos^2 x$ .

Theorem III is proved as follows:

$$\sin(n+m)x = \sin nx \cos mx + \cos nx \sin mx$$

$\sin(n-m)x = \sin nx \cos mx - \cos nx \sin mx$   
 hence  $\sin nx \cos mx = \frac{1}{2} \sin(n+m)x + \frac{1}{2} \sin(n-m)x$ . Accordingly, the average value of  $\sin nx \cos mx$  must be equal to zero because the average values of  $\sin(n+m)x$  and  $\sin(n-m)x$  are each equal to zero when averaged over 360 degrees. Likewise  $\cos nx \cos mx$  and  $\sin nx \sin mx$  are each equal to zero when averaged over 360 degrees, with one exception: when  $n=m$ , then we have theorem II.

Rewriting the original equation

$$(1) y = A_0 + A_1 \sin wt + B_1 \cos wt + A_2 \sin 3wt + B_2 \cos 3wt + \text{etc.}$$

Draw a number of equally spaced ordinates  $y_1, y_2, y_3, \dots$  over one complete period or 360 degrees; then the algebraic average of these ordinates must be equal to  $A_0$ ; that is, the wave is raised  $A_0$  above an axis of reference, usually  $A_0 = 0$ .

Multiply both sides of equation (1) by  $\sin wt$ . Then,  $y \sin wt = A_0 \sin wt + A_1 \sin^2 wt + B_1 \cos wt \sin wt$

By taking the average of all the terms, the right hand member reduces to zero except  $A_1 \sin^2 wt$ , which equals  $A_1$  or  $A_1 = 2y \sin wt$  averaged over a complete cycle.

By multiplying them successively by  $\cos wt, \sin 3wt, \cos 3wt, \dots$  we can prove that

$B_1 =$  twice the average value of  $y_1 \cos wt$

$A_2 =$  twice the average value of  $y_2 \sin 3wt$

$B_2 =$  twice the average value of  $y_2 \cos 3wt$

$$(2) \text{ Given } A \sin x + B \cos x = \sqrt{A^2 + B^2} \sin(x + \alpha)$$

$$\text{where } \tan \alpha = \frac{B}{A}$$

$$\text{Therefore } y = A_0 + \sqrt{A_1^2 + B_1^2} \sin(\omega t + \alpha_1) + \sqrt{A_2^2 + B_2^2} \sin(3\omega t + \alpha_2)$$

$$\text{Let } \sqrt{A_1^2 + B_1^2} = C_1, \sqrt{A_2^2 + B_2^2} = C_2$$

$$\text{Then } y = C_1 \sin(\omega t + \alpha_1) + C_2 \sin(3\omega t + \alpha_2) + C_3 \sin(5\omega t + \alpha_3)$$

$\frac{B_1}{A_1}$  is the tangent of  $\alpha_1$ ,  $\frac{B_2}{A_2}$  is the tangent of  $\alpha_2$ . The above is Fourier's series as applied to alternating waves of non-sinusoidal form, having only the sine terms. See Page 42, Lawrence. Proof of formula (2) above is as follows:

$x$  is any circular angle;  $y$  any other angle;  $\tan \alpha = \frac{B}{A}$ ;  $\sqrt{A^2 + B^2} \sin x = A \sin x + B \cos x$ ; where  $A$  and  $B$  are the two legs of a right triangle.

$$\sin(y + x) = \sin y \cos x + \cos y \sin x$$

$$= \frac{A}{\sqrt{A^2 + B^2}} \sin y + \frac{B}{\sqrt{A^2 + B^2}} \cos y$$

$$\sqrt{A^2 + B^2} \sin(y + x) = A \sin y + B \cos y$$

THE FISHER HINMEN METHOD FOR ANALYZING A NON-SINUSOIDAL WAVE

This method is based on the following facts:

1. The algebraic sum of any  $n$  equally spaced or-

dinates of a sine wave, when these ordinates are spaced  $\frac{k\lambda}{n}$  of a wave length apart, where  $k$  is an integer, which is not a multiple of  $n$ , is zero.

2. The algebraic sum of  $n$  ordinates of a sine wave when these ordinates are spaced  $\frac{k\lambda}{n}$  wave lengths apart, where  $k$  is a multiple of  $n$  is equal to  $n$  times the ordinates of this wave at any one of these points.

3. The maximum ordinate of any sine wave is equal to the square root of the sum of the squares of any two ordinates spaced a quarter wave length apart.

4. Let  $y_1$  be the ordinate of a sine wave at any point at an angular distance  $x_1$  from the origin, and let  $y_2$  be another ordinate of this wave a quarter wave length to the right of  $x_1$ . Then the angular distance measured from the point  $x_1$  toward the left to the point at which this wave first crosses the x-axis in the positive direction is

$$c = \tan^{-1} \frac{y_1}{y_2}$$

Proof of (1) is evident.

Proof of (2) as shown by the following diagram, figure 1:

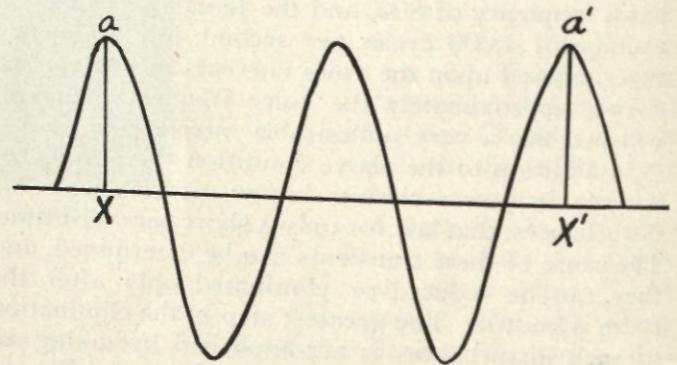


Fig. 1.

Example: Let  $n=2, k=4$ , the  $\frac{k}{n}=2$  from  $x$  to  $x'$  is 2 wave lengths and  $x'a' + xa = 2ax = 2a^2x'$

Proof of (3) any ordinate is equal to  $x \sin y$  where  $x$  is the maximum ordinate. Two ordinates  $90^\circ$  apart would be  $x = x \sin y + \sin(y + 90)$

$$\sin(y + 90) = \cos y$$

$$x = x(\sin y + \cos y)$$

$$x = (x^2 \sin^2 y + x^2 \cos^2 y)^{1/2}$$

$$x = [x^2(\sin^2 y + \cos^2 y)]^{1/2}$$

$x = x$ ;  $x$  was the sum and  $x \sin y$  and  $x \cos y$  were any two ordinates  $90^\circ$  apart.

Proof of (4)

(Continued on page 125)

## What Carelessness of Yours May Cause An Accident?

M. C. EVANS

Safety Engineer, International Harvester Company

Not long ago a friend was laying a new floor in the attic of his home. In sawing off a board he picked a round-top trunk for a bench. The board slipped and the saw ripped through his thumb-nail. The sudden pain made him straighten up quickly and his head bumped a rafter so hard that he was partially stunned. As he sat down to think things over he dislodged a pinch bar that was leaning against an upright. In falling, it walloped him heavily on the cheek bone. The next day he looked as if he had been through a battle. Three distinct and painful injuries from three distinct causes inside of five seconds and each due to a separate bit of carelessness!

The lesson of this incident may be found in the fact that this man is an earnest student and powerful advocate of Safety First. He has been in the movement from the beginning. You would think Safety First was a fixed habit of his life—was second nature to him, but it was only a business habit, a professional habit, an industrial habit.

The moral is that until Safety has generally become a personal habit with us Americans, an individual second nature, it cannot become a national attribute. Until then our United States must continue under the reproach of being, for all its progress in culture and civilization, the Country of Carelessness.

Many of us, perhaps most of us, are occasional chance-takers. Somehow our American philosophy confuses caution with cowardice, and, broadly speaking, we haven't much use for the man without "nerve," the man that won't risk something to gain something. Thus we put an unconscious premium on chance taking.

We take a chance to make money; we take a chance on the weather man and leave raincoat and rubbers at home when good judgment says, "take them along." Some of us take a chance with our lives, or, worse than that, with the lives of others. We are greatly disturbed the first time an automobile barely misses us at a street crossing and we resolve to be more careful next time; but after it has happened a few times and we have taken a few more chances and won, we consider it all in the day's work and begin doing the things habitually with the rest

morning, however, we wake up in the hospital and of the crowd to save a minute's time. Some fine wonder how it happened.

The child who touches a red-hot stove because it is pretty is not likely to do the same thing again.

That is one way of finding out what is safe and what is not safe. On the other hand, the mother may repeatedly tell the child that the stove is hot and will burn or hurt. Finally the child knows and believes the safety lesson its mother has been teaching, and this without injury to itself. This is safety by education.

Some grown-up children have been told about the dangers of railroad crossings, but find it advisable to wreck their cars before they learn to "stop, look, and listen."

Engineers, by nature of their profession, are placed in a position where Safety should become an axiom, heading the list of many others which have been drilled into them in college. How often, I wonder, have serious accidents occurred due to a slip of a slide rule, or the improper use of a factor of safety? Do we, when we design a machine, have in mind at all times the safety of the operator of that machine, or as I believe is often the case, do we think only in terms of production and cost? A jig or a die, although it be designed by the best engineer in the country, should not be used if it requires the operator to place his body in danger while operating it. Too often it has been necessary for the writer to admit, in following up a serious accident, that the operator was not entirely to blame because some engineer designer had made a machine for him to work with that was really a "man killer." Large industries who are leaders in Safety First work are requiring that Safety in Production be the first requisite of design.

I would not mean by this that all the dangerous machines now in use in our factories should be discarded and consigned to the scrap heap, (many of them should) because it is always possible to build safeguards and attachments which not only do away with the danger, but often increase the productivity of the machine and reduce the cost of operation.

(Continued on page 128)

"Many of us, perhaps most of us, are occasional chance-takers. Somehow our American philosophy confuses caution with cowardice, and, broadly speaking, we haven't much use for the man without 'nerve,' the man that won't risk something to gain something. Thus we put an unconscious premium on chance-taking," says Mr. Evans, Safety Engineer, in his article written for the COLORADO ENGINEER.

# THE COLORADO ENGINEER

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## Editorials

**THE ALUMNI ISSUE**

Alumni, this issue has been prepared for you; and we hope that the articles of a general nature regarding the University will be to your liking. Although the directory is not of especial interest to all of our readers, we hope it will be of actual service to you.

Even if you may be far from the school near the hills you cannot forget, we want you to feel that the COLORADO ENGINEER is your magazine, and that any interest taken in it by you will be appreciated.

**THE BRANCH-STUDENT MEETINGS**

Recently the different professional societies on the campus have held joint meetings with the branches whose memberships are composed of engineers practicing in the state. Entertainments, addresses, and exhibits were prepared that were of interest to the two classes of attendants.

The visitors said that they enjoyed inspecting the laboratories here and being with the students in their meetings; but had they any ideas of the worth of their visits to the students? In such combined meetings there is an association which creates an inspiration within the student that could not be secured otherwise—seeing into the future and lightening the everyday tasks at hand.

May the branch societies be influenced to meet here again in the future so that the students may enjoy this association and become acquainted with the way things are done in the field!

**OUR CAMPUS NUISANCE**

One glance at the map showing the expansion of the campus to the east causes a person to stop and express regret that a railroad right-of-way is so much in evidence. With the recreational interests being moved to the east it will be necessary for thousands of students and visitors to cross and recross the tracks. There is no need to call to the attention of those who have been associated with the school, the inconvenience of having trains passing so near the buildings, or the danger of the crossings on Twelfth Street.

It is hoped that the State will join forces with the City and secure the moving of the right-of-way to some location near Twenty-fourth Street.

**THE ALUMNI DIRECTORY**

In compiling a directory such as contained in this issue, much clerical work is necessitated, and of the help given to the Alumni Editor, special mention should be made of the work of Miss Grace Black of the Engineering Library.

## HIGH-VOLTAGE LABORATORY OPENED

Within several months the Electrical Engineering Department will have made an addition to its laboratories which will make it one of the best equipped high-voltage laboratories in this section of the country. The first big realization of the plans that have been made by this department came with the recent installation of a 200,000-volt transformer in the laboratory. Students as well as instructors are working in the laboratory and plans are rapidly materializing in the development of the addition.

The laboratory has already attracted much attention from engineers throughout the state. Several demonstrations have been given with the new transformer in testing insulators for their flash-over voltages. An interesting exhibition was given with the transformer at a combined meeting of the University of Colorado and Denver branches of the American Institute of Electrical Engineers. Other demonstrations have been given before officials of the Public Service Company.

Students of the electrical department will be afforded the opportunity to study high voltages in the class room as a result of the new project. To make the laboratory as practical as possible, a miniature high line is to be built behind Engineering 1 and connected with the laboratory. This small power line, which is to be 600 feet in length, will represent a true practical system in that the various appliances characteristic of an actual power line system will be included in the test line. Regulation lightning arresters have been secured and will be used in the laboratory system. Some research work in lightning will be done. Usual and unusual conditions on the system will be obtainable for study. Insulation for 500,000 volts will be provided on the outdoor line. A line installed within the laboratory has been insulated for 700,000 volts. These values of voltage are by far the highest obtained in the Rocky Mountain region, and, in view of this, the laboratory will mark the first provision for studying high voltage behavior in the high altitudes of this part of the country.

All demonstrations made so far with the transformer have been made with insulators used on power lines of from 40,000 to 50,000 volts. Several manufacturing concerns have sent stock insulators here to be tested, and the Public Service Company has brought many insulators which are being used on the power lines in northern Colorado to the laboratory for inspection. Over two hundred insulators have been given the usual test. Voltages as high as 200,000 volts have been attained in a number of the experiments.

The transformer was installed in the laboratory by the Public Service Company of Colorado. It is the property of this company. The transformer was obtained from Pueblo where the recent flood buried it in a sea of mud and debris. A great deal of work

(Continued on page 130)

## JOHN THORPE STOKES

1891-1924

One year ago the COLORADO ENGINEER carried an article in its personalities column which said that the editor had been forced to withdraw from his editorial duties on account of his health. On January 21 of this year "30" was written below the closing chapter of the life of the man who gave his all that the College of Engineering might be represented by a publication which should demand respect where ever it might go.



Only to those who were closely connected with him in his work, was it understood what a sacrifice it was for him to keep up his editorial work and yet retain the very highest of a scholastic record. Handicapped as he was, he was always pleasant and cheerful to those on the staff, and it was a pleasure to work with him.

No better comment could be made on the attitude he had on life than by quoting the following excerpt from one of the editorials in his first issue: "It is necessary to give our very best and give it with a whole heart in order to do our full duty."

While a candidate for an officer's commission in Company F, Seventh Provisional Training Regiment at Fort McPherson, Georgia, Mr. Stokes lost his health. After living in Boulder for about a year he entered the University in the Civil Engineering Department. Last August he was taken to the home of his parents in Lake Worth, Florida, where he remained until his death.

He gave his very best and gave it cheerfully that others might profit by it.

### METERMEN'S SHORT COURSE

The Electrical Engineering Department is making extensive plans for the Short Course for the Electrical Metermen of the Public Utilities of the Rocky Mountain Section during the week March 24-29, 1924. This course is backed by the National Electric Light Association, Institute of Electrical Engineers, and the instrument manufacturers.

The article written for the COLORADO ENGINEER for the May, 1923, issue, entitled "The Action of Steam in Distillation Processes," by Alvah M. Hovlid, appeared in full in the October, 1923, *Hexagon* of Alpha Chi Sigma.



ELSIE EAVES, '20



MRS. A. S. MERRILL, '20  
(LOU ALTA MELTON)



MRS. A. L. EDGECOMB, '19  
(HILDA COUNTS)

## Colorado Engineers are Proud of Their Co-Eds

The College of Engineering has a just right to be proud of her co-eds who have gone out into the engineering profession, for they have all made good in their chosen work. It is recorded that one was the first woman to be accepted on a graduate student course at a factory, one held the position of Junior Bridge Engineer in the United States Bureau of Public Roads, and another is now secretary to a very well-known consulting engineer.

At the present time there are three co-eds taking engineering courses in the University of Colorado. Miss Given is taking her senior year in Chemical Engineering, Miss Bretnall is a Sophomore in Civil Engineering, and Miss Kaufman is spending her first year in the Mechanical Department.

The first woman graduate from the Engineering School was in the class of 1903. She was Minnette Ethelma Frankenberger, and she received a degree in B.S. (C.E.).

The next graduate was in the class of 1919, when Hilda Counts (Mrs. A. L. Edgecomb) completed her work in Electrical Engineering and went to the Westinghouse E. & M. Co. She went into the student course, and was the first woman to attend the Westinghouse Engineering School taught by Mr. B. G. Lamme, the Chief Engineer of that Company. At the present time she is with the Colorado Public Service Corporation in Boulder.

In 1920 Elsie Eaves and Lou Alta Melton (Mrs. A. S. Merrill) completed their work in the Civil Engineering Department. Miss Eaves taught mathematics in the Engineering College and later was with the State Highway Department. At the present time she is secretary to H. S. Crocker, Consulting Engineer. Mrs. Merrill accepted a position with the United States Bureau of Public Roads, and after serving in the drafting department, was promoted to Junior Bridge Engineer.



EDNA BRETNALL

LUCILE KAUFMAN

JACQUELINE GIVEN

CO-EDS NOW ATTENDING THE COLLEGE OF ENGINEERING

# 1897-1923 ALUMNI DIRECTORY

## College of Engineering, University of Colorado

1897

**Whiteside, Frederick William**, B.S. (C.E.), M. Am. Soc. C. E., Tau Beta Pi, Colo. Soc. Engineers, Past Pres., The Rocky Mountain Coal Mining Institute of Colo., Wyoming, Utah, and N. M.; Resident Eng., Denver Union Water Co.; do., Colo. & Wyo. and D. & R. G. R. R.'s; Division Eng., El Paso-Rock Island R. R.; Asst. Eng., C. F. & I. Co.; Chief Eng., Victor-Am. Fuel Co., Colo. & Southeastern Ry. Co.; 1906 to date; do., The Redstone Marble Co., 1912-16; do., Mountain Telegraph Co.; V. P. and Chief Eng., The Wolf Creek R. R. Co., 1916 to date; Chief Eng. and Director, Redstone Improvement Co., 1916 to date; Consulting Eng., 302 Ernest & Cranmer Bldg., Denver, Colo.

**Wood, Franklin Porter**, B.S. (E.E.), M.A.I.E.E., Tau Beta Pi. Electrical Eng. Liberty Bell Gold Mining Co., 1906-08; Supt., Black Hills Traction Co., 1908-10; Gen. Mgr., Colo. Ry., Light & Power Co., 1910-12; Elec. Eng., Ark. Valley Ry., Light & Power Co., 1912-13; Gen. Mgr., Trinidad Elec. Transmission, Ry. & Gas Co., 1913-17; member firm Wood & Weber, Consulting Engrs., to date. 507 Tramway Bldg., Denver, Colo.

1898

**Fox, John Phillips**, B.S. (C.E.).

**Stahl, John Henry**, B.S. (E.E.), Mgr., El Paso Branch for J. P. Paulson, 1906-15; Mgr., Brunswick-Balke-Callender Co., 1915 to date. Box 580, El Paso Texas.

1899

**Brown, Garry Estep**, B.S. (E.E.), Assoc. A.I.E.E. Elec., G. E. Co., 1900-01; do., Canadian Niagara Power Co., 1901-07; Asst. Gen. Mgr., Edison Light Co., 1907-09; Distribution Eng. and Asst. Elec. Eng., Brooklyn Edison Co., 1907 to date. 360 Pearl Street, Brooklyn, N. Y.

**Burnham, Joseph Lloyd**, B.S. (E.E.), Assoc. A.I.E.E. Elec., Testing Dept., G. E. Co. Eng. in charge large Direct Current Apparatus Design, 1906 to date. 19 Ray Street, Schenectady, N. Y.

**Choute, Joseph Kittredge**, B.S. (C.E.), M. Soc. C.E. Civil Eng., 1872-83; Chief Eng. of Construction, New York City; R. R. Mgr., 1883-90; Eng. of Construction, Erie R. R.; Gen. Supt., Colo. Division, Union Pacific R. R.; Gen. Mgr., Nevada Central R. R.; Pres., Overland Cotton Mills Co., 1906-08; V.-P. and Gen. Mgr., Oneonta & Mohawk Valley R. R., 1908-13; V.-P., J. G. White Management Corporation, 1913 to date; Receiver, Aurora, Elgin & Chicago R. R.; V.-P., August-Aiken Ry. & Elec. Corp.; Director, Eastern Pa. Rys. Co.; Director, Helena Light & Ry. Co.; Director, Manila Elec. R. R. & Lighting Corp.; V.-P. and Director, Manila Elec. Co.; Director, Matanzas-American Sugar Co.; Director, Poughkeepsie & Wappingers Falls Ry. Co.; Director, Southern Utilities Co.; Pres., Morris Co. Traction Co.; V.-P. and Director, Liberty Light & Power Co.; Director, Foreign Rys. of Nicaragua, Vice-Pres. Staten Island Edison Co., Vice-Pres. Richmond Light & Ry. Co., 43 Exchange Place, New York City.

**Dillon, Edward Paul**, B.S. (E.E.), M.A.I.E.E. Asst. Eng., Power Dept., Cochiti Gold Mining Co.; Elec. Eng., The Telluride Power Transmission Co.; Gen. Mgr., Pike's Peak Hydro-Electric Co.; do., Colo. Springs Elec. Co.; do., Colo. Springs Light & Power Co., 1906-10; Sales Eng., W. E. & Mfg. Co., 1910-15; Asst. Mgr., Ry. and Light Sales Dept., do., 1915-16; Mgr., Power Division, do., 1917-1918; Gen. Mgr., Research Corporation, 1918 to date, 25 W. 43rd St., New York City.

**Glaze, Henry Clarence**, B.S. (E.E.), Elec., Sales Dept., G. E. Co.; Apparatus Salesman, do., 1907-11; Sales Mgr., do., 1911-16; District Mgr., Apparatus Sales, do., 1916 to date. 1460 Fairfax Street, Denver, Colo.

**Holland, Samuel Eduard**, B.S. (C.E.), Rodman, P. & E. R. R., Williamsport, Pa., 1901-01; Transitman, P. R. R., Altoona, Pa., 1901-02; Asst. Supervisor, P. R. R., East Greensburg, Pa., 1902-03; do., Philadelphia, Pa., 1903-05; Supervisor, P. R. R., Reading, Pa., 1905-06; do., Barnsboro, Pa., 1906-11; do., Philadelphia, Pa., 1911-16; do., St. Marys, Pa., 1916-18; do., Newport, Pa., 1918-19; Division Eng., Wheeling Div., P. R. R., 1919 to date. Wheeling, W. Va.

**Montchyk, Edward Maurice**, B.S. (E.E.), A.B., Harvard Univ., 1900. Graduate Student in Math. and Physics, and Whiting Fellow in Physics at Harvard Univ.; Elec. Eng., Recording Instruments Dept., G. E. Co., 1900-02; Eng., W. E. Co., 1902-07; Telephone Eng., Bell Telephone Mfg. Co., Antwerp, Belgium, 1908-10; Chief Eng., do., 1910-14; Telephone Eng., W. E. Co., N. Y., 1915 to date. Care Western Electric Co., 463 West Street, N. Y. City.

**Rubidge, Frederick Taber**, B.S. (C.E.), E.M., Columbia School of Mines, 1901. Mem. A. I. M. M. E., Mem. Min. & Met. Soc. of Am., Tau Beta Pi, Asst. Supt. of Mines, New Jersey Zinc Co., 1906-11. Vice-Pres. and Gen. Mgr. St. Lawrence Pyrites Co., New York Pyrites Co., A. & St. L. R. R. Co., 1921-23; Vice Pres. do., 1923 to date, Treas. and Gen. Mgr. J. B. Preston Co., 1923 to date, 25 Broad Street, New York City.

**Shaefer, Robert Walker**, B.S. (E.E.), Stockman, 1906-09; Mgr., Elec. Dept., Hendrie & Bolthoff Mfg. & Supply Co., 1909-13; Stockman, 1913 to date. Weldona, Colo.

**Siekman, Davy Vance**, B.S. (E.E.), Sec., Elec. Supply & Construction Co.; Mgr., Elec. Dept., Hendrie & Bolthoff Mfg.

<sup>1</sup> Deceased.  
<sup>2</sup> Unknown.

Co., 1901-09; District Mgr., Crocker-Wheeler Co., 1909 to 1913; Pres., Alliance Coal Co., Wolf Park Coal Co., 1913 to 1918; Pres., The Non-Explosive Mining Appliance Co., 1919 to date. 1500 Park Ave., Boulder, Colo.

<sup>2</sup> **Wagner, Harry Ewing**, B.S. (E.E.), Elec., Colo. Telephone Co., 1906-14.

**Wightman, Lucius Irving**, B.S. (E.E.), Asst. Eng., Cochiti Gold Mining Co., 1899-1900; Designing Eng., J. Geo. Leyner Eng. Works, 1900-03; Eng., New Century Light & Power Co., 1903-04; Sales Eng., Bullock Elec. Co., 1904-05; Advertising Mgr., Ingersoll-Rand Co., 1905-10; Counsellor in Technical Advertising, 1910-23. Permanent member of faculty of American Correspondence School, Pres. Wightman-Hicks, Inc., Technical Advertising Agents, 1924 to date. 50 Union Square, New York City.

1900

<sup>1</sup> **Coad, Robert Ewing**, B.S. (C.E.), Civil Eng., Chicago & Northwestern R. R., 1906-07; Asst. Eng., do., 1907-08.

<sup>2</sup> **Doty, James Cummings**, B.S. (C.E.), Civil Eng., N. Y. Central & Hudson River R. R., 1906-07; Civil Eng., San Diego, Calif., 1907-08; do., Fargo, S. D., 1908.

**Humphrey, Robert Guy**, B.S. (E.E.), Elec. Eng., Colo. Springs Elec. Co.; do., Famora, State of Michoacan, Mexico, 1906-07; do., with Curtis & Hine, 1907-09; do., Central Colo. Power Co., 1909-13. 639 Colorado Street, Davenport, Iowa.

**Rowe, Charles Elmer**, B.S. (C.E.), E.M., Colo. School of Mines, 1902. Draftsman, C. F. & I. Co.; and Mining Eng., Victor Fuel Co.; Designer, Am. Smelting & Refining Co.; in charge of School of Mines, Univ. of Texas, 1906-12; Airplane Designer, Packard Motor Car Co., 1918; Head of Dept. of Drawing, Univ. of Texas, 1912 to date. 1711 Rio Grande Street, Austin, Texas.

**Wardenburg, Frederic August**, B.S. (E.E.), M. Am. Soc. M. E. Elec., C. F. & I. Co., 1900; do., Telluride Power Co., Tomboy Gold Mines, Ltd., 1901; do., Am. Smelting & Refining Co., 1902; Asst. Eng., do., 1903-06; Directing Eng., L. H. & P. Dept., E. I. duPont DeNemours & Co., 1906-15; V.-P., duPont Eng. Co., and Asst. Chief Eng., Eng. Dept., E. I. Du Pont de Nemours & Co., 1916 to date. 8042 duPont Building, Wilmington, Del.

1901

<sup>2</sup> **Clark, Paul Loveridge**, B.S. (E.E.), Commercial Eng., G. E. Co., 1906.

**Curtis, Kenneth Livermore**, B.S. (E.E.), E.E., Leland Stanford, Jr., Univ., 1906. Assoc. A.I.E.E., Tau Beta Pi. Head of section, Testing Dept., G. E. Co.; Instructor in Elec. Eng., Stanford Univ., 1906; Asst. Prof. of Elec. Eng., do., 1907-08; Consulting Eng., 1908-11; Chief Eng., A. & J. M. Anderson Mfg. Co., 1911-20; Consulting Eng., 1921 to date. 152 East 22nd St., New York City.

<sup>2</sup> **Georgenberger, Benedict**, B.S. (E.E.), Elec. Eng., Mitau, Kurland, Russia, 1906.

**Jay, Clyde Homer**, B.S. (C.E.), M.A.I.M.E., M. Colo. Soc. of Engineers, Chemist, C. F. & I. Co., Pueblo, Colo., 1901-03; Chemist, charge Experimental Plant, General Metals Co., Colo. Springs, Colo., 1903-04; Special Chemist, C. F. & I. Co., Pueblo, Colo., 1904-05; Inventor and Patantee of the Jay-Cyanide Process; Mgr., Clyde H. Jay & Co., Assayers and Chemists, 1907-08; Supt., Jennie Gold Mine, 1908-13; V.-P., and Mine Mgr., Giant-Eclipse Consolidated Mines Co., 1913-17; Pres. and Gen. Mgr., do., 1917 to date; City Eng. of Salida, 1915-20; Chaffee County, Surveyor, 1917-19. Residence, 403 Ogden St., Denver, Colo.; P. P. Box 833, Denver, Colo.

<sup>2</sup> **Richardson, Guy Hawthorne**, B.S. (C.E.), Asst. Eng., Camp Bird Mine; City Eng., Ouray, 1908-07; Civil and Mining Eng., Ouray, 1907-08; Civil Eng., Denver, Laramie & Northwestern R. R. Co., 1909-10; U. S. Surveyor, General Land Office, 1910-16; Supt. of Health Resort, Lava Hot Springs, Idaho, 1916-17.

1902

**Carroll, Edward James**, B.S. (E.E.), Testing Dept., G. E. Co.

**Doyle, Thomas James**, B.S. (C.E.), Civil Eng., Bridge Co., 1906-08; Erecting Eng. with Heyl & Patterson, 1908-12. 2594 S. Logan Street, Denver, Colo.

<sup>2</sup> **Gates, Loren Johnson**, B. S. (E. E.). Elec. Eng., C. F. & I. Co., 1906.

**Gildersleeve, George Snyder**, B.S. (C.E.), Assoc. M. Am. Soc. C. E., Tau Beta Pi. Graduate Student, Columbia Univ., 1902-03; Draftsman, Phoenix Bridge Co., Phoenixville, Pa., 1903-05; Draftsman, S. Pearson & Sons Co., Long Island City, N. Y., Contractors for Pa. East River Tunnels, 1905-06; Asst. to Chief Eng. Truscon Steel Co., Detroit, Mich., 1906-09; Mgr. of Sales, Eng. Dept., do., 1909-11; Contracting Eng., do., 1911-12; Assoc. Branch Mgr., Syracuse, N. Y., do., 1912-15; Branch Mgr., Buffalo, N. Y., do., 1915-18; Eng., Foreign Trade Dept., New York City, do., 1918 to date. 90 West Street, Room 1009, New York City.

<sup>1</sup> **Haywood, Charles Francis**, B.S. (E.E.), Apprentice, Testing Dept., G. E. Co., 1905-06.

**Johnson, John Barent**, B.S. (E.E.), A.B., Columbia Univ., 1900. Elec. Eng., Denver Gas & Elec. Co., 1906-07; Farmer, 1910-16; Eng. Dept., Denver Union Water Co., 1916-17; Elec. Eng., Mountain States Tel. & Tel. Co., 1917-18; Farmer, 1918 to date. Littleton, Colo.

**Metcalf, George Leslie, B.S. (E.E.).** Eng., Vineyard Station, L. A. P. R. Co.; Elec. Eng., Edison Elec. Co., 1911-12; Board of Public Utilities, Los Angeles, Calif.

**Phillips, William Hale, B.S. (C.E.)** Assoc. M. Am. Soc. C. E. Graduate Student, Univ. of Calif., 1905-06; Civil Eng., 1906-10; City Eng. Office, Spokane, 1910-14; Consulting and Designing Eng., 1914 to date.

## 1903

**Allen, H. Wilfrid, B.S. (E.E.).** Assoc. A.I.E.E. Testing Dept., W. E. & Mfg. Co., 1905; Elec. Signal Dept., Union Pacific R. R., 1906-07; Asst. Chief Elec., Los Angeles Pacific Co., 1907-13; Elec. Eng., Graham Reynolds Elec. Co., 1913 to date. 300-2 E. 3rd Street, Los Angeles, Calif.

**Buell, Miner Willard, B.S. (C.E.).** Civil Eng. with U. S. Geological Survey, 1905; do., U. S. Coast and Geodetic Survey, 1906-07; Hydraulic Surveyor, U. S. Navy, 1907-13; Draftsman, U. S. Naval Dept., 1913 to date. 2517 Hall Place, Washington, D. C.

**Coffin, Stanley D., B.S. (E.E.).** Tau Beta Pi. Testing Dept., Stanley Elec. Co., 1903-05; Canadian Gen. Elec. Co., 1905-06; Sales Eng., W. E. Co., 1906-08; Coffin & Co., mercantile business, 1908-10; Coffin Mercantile Co., Longmont, Colo., 1910-23; Elec. Construction, S. Calif. Edison Co., 1923 to date. 4143 1/2 W. Pico, Los Angeles, Calif.

**Fertig, Jerome H., B.S. (C.E.).** M. Am. Soc. C. E. Graduate Student in Mineralogy and Chem., Univ. of Colo., 1903-04; Asst. Eng., U. S. Reclamation Service, Uncompahgre Valley Project, Montrose, Colo., 1904-17; Construction Eng., Ochoco Irrigation Dist., Prineville, Ore., 1917-19; Eng. for Ralph Schneeloch Co., Portland, Ore., 1919-20; Project Eng., Grants Pass Irrigation Dist., Grants Pass, Ore., 1920-23; Construction Eng., Bitter Root Irrigation Dist., Hamilton, Montana, 1923 to date.

**Fowler, John Clair, B.S. (C.E.).** Civil and Mining Eng., U. S. Deputy Mineral Surveyor, 1903-09; Division Eng., City of Spokane, 1909-16; Principal Asst. City Eng., City of Spokane, 1916-18; City Asphalt Supt., 1918 to date. 1604 Mission Avenue, Spokane, Wash.

**Frankenberger, Minnette Ethelma, B.S. (C.E.).** Draftsman, 1906-09.

**Jacobs, Edwin Heman, B.S. (E.E.).** Testing Dept., G. E. Co., 1906-07; Inspector, Chicago Edison Light & Power Co., 1907-1909; Elec. Eng., do., 1909-13; Consolidated Gas & Elec. Co., 1913-15; Western States Gas & Elec. Co., 1915-19; died at San Diego, Calif., 1919.

**La Rue, Edgar Everett, B.S. (E.E.).** Testing Dept., W. E. & Mfg. Co., 1906; Elec. Eng., 1907-11; Chicago Edison Co., 1911-12; Elec. Eng., 1912-15; Eng. Salesman, C. C. Moore Co., 1916 to date. 5779 Shafter Avenue, Oakland, Calif.

**Moore, George Holmes, B.S. (E.E.)** 1903, B.S. (C.E.) 1904. Assoc. A.I.E.E. In charge transformer-testing, Wagner Elec. Co., 1904-05; from apprentice to Supt., switchboard output, W. E. Co., 1905-06; Construction Eng., Wash. Coal Briquette Co., 1907-08; Hydrographic and Power-site expert, City Eng. Office, Seattle, 1908-20; Senior Elec. Eng., Public Service Commission of Wash. (now Dept. of Public Works), 1920 to date. Care Public Service Commission, Olympia, Wash.

**More, Orlo Safford, B.S. (E.E.).** 1913. M.A.I.E., Tau Beta Pi. Apprentice, W. E. Co., 1903-05; Elec. Eng., do., 1905-11; Chief Eng., Fairbanks-Morse & Co., 1911-15; More Electric Co., 1915 to date. 1073 S. Downing Street, Denver, Colo.

**Mors, Fritz Charles, B.S. (E.E.).** Electrical Engineer, Tin Plate Co.

**Pughe, John Franklin, B.S. (C.E.).** Office of State Engineer of Colo., 1906; Asst., U. S. Mint, 1907-12; Farmer, 1912 to date. R. F. D. No. 3, Longmont, Colo.

**Rubidge, Harold Spaulding, B.S. (E.E.).** Student, Columbia School of Mines; Electrical and Mining Engineer, 1906; Engineer, Garfield Water Co., 1907-10; Electrical Engineer, 1910-16; Engineer, Boulder Tungsten Production Co., 1916-17. Bay Point, Calif.

## 1904

**Bullock, William Harrison, B.S. (E.E.).** Assoc. A.I.E.E., Tau Beta Pi. Apprentice, W. E. & Mfg. Co., 1904-06; Representative, do., 1906 to date. 1052 Gas & Elec. Bldg., Denver, Colo.

**Cassell, Isaac Michel, B.S. (E.E.).** Electrical Expert, G. E. Co., 1906; Commercial Eng., do., 1907-13; Production Eng., Lincoln Elec. Co., 1916 to date. 11407 Ashbury, Cleveland, Ohio.

**Dwight, Herbert Bancroft, B.S. (E.E.).** E.E. 1914. M. A.I.E.E., Sigma Xi. Student Apprentice, G. E. Co., 1904-05; Asst. to Eng., in charge, Animas Power & Water Co., 1905-06; Engineering and Drafting Dept., do., 1906-07; Chief Electrician, Central Colo. Power Co., 1907; Engineering Dept., Denver Union Water Co., 1907-08; Field Draftsman and Eng., Field, Fellows & Hinderlider, Eng., 1908; Prof. of Mechanics, Univ. of Okla., 1908-16; Prof. of Elec. Eng., Univ. of Colo., 1916-19; Elec. Eng., Public Utilities Commission of Colo., State Office Building, 1919 to date. 1850 Vine Street, Denver, Colo.

**Elliot, George Alexander Miller, B.S. (E.E.).** M. Am. Soc. C. E.; M. Am. Water Works Assoc.; Field Eng., Calif. Gas & Elec. Corp., 1906-08; Supt., Transmission Line Const., Great Western Power Co., 1908-09; Supt., Operation and Maintenance, Spring Valley Water Co., 1909-15; Eng., do., 1915-18; Chief Eng., do., 1918 to date; Supervising Eng., U. S. Army, Const. Division, Const. of Camp Fremont, Palo Alto, 1917; Supervising Eng., U. S. Army, Const. Division, Construction of T. N. T. Plant, Giant, Calif., 1918. 425 Mason Street, San Francisco, Calif.

**Fick, Oscar Arthur, B.S. (E.E.).** Assoc. A.I.E.E., Apprentice, W. E. & Mfg. Co., 1906; Eng., do., 1907; Erecting Eng., do., 1908; Asst. Mgr., Presumscot Elec. Co., 1909 to date. 895 Main Street, Westbrooke, Me.

**Fitterer, John Conrad, B.S. (C.E.).** B.Sc. Ohio State Univ., 1898, B.S. (C.E.) 1904, C.E. 1912. Assoc. M. Am. C. E., Am. Math. Soc., Math. Assoc. of Am., Am. Soc. Test. Mat., Inter. Soc. Test. Mat., S.P.E.E., Tau Beta Pi, Phi Kappa Phi, U. S. Geological Survey; Asst. Eng., U. S. Reclamation Service, 1906; Resident Eng., Glenwood Springs Tunnel, Prof. of Civil & Irrigation Engr. 1908 to date, Univ. of Wyo., Acting Dean, College of Eng., Univ. Wyo., 1922 to date, consulting work in addition, 1908 to date. 511 S. Eleventh Street, Laramie, Wyo.

**Ford, Howard Carlton, B.S. (C.E.).** M.S. 1905. C.E. 1907. Assoc. M. Am. Soc. C.E., Tau Beta Pi, Sigma Xi. Instructor in Civil Eng., Univ. of Colo., 1906-08; Asst. Prof. of Irrigation Eng. and Surveying, Iowa State College, 1908-12; Assoc. Prof. of Civil Eng., do., 1912 to date; Eng., U. S. Explosives Plant "C," 1918; Draftsman, Denver Steel & Iron Works Co., 1921; Chief Draftsman, do., 1922-23; Draftsman, Midwest Steel & Iron Works Co., Denver, Colo., 1924 to date.

**Funk, Charles Earle, B.S. (C.E.).** Chemist, Great Western Sugar Co., 1905; Draftsman, O. S. L. R. R., 1906; with F. C. Armstrong, Mining Eng., 1906-07; Civil Eng., Eastern Colo. Power Co., 1908; Draftsman, Denver Reservoir & Irrigation Co., 1909-10; Civil Eng., Colo. Refining Co., 1910-11; Assoc. Editor, The Engineering Magazine, 1911-14; Managing Editor, do., 1915-17; Sec. and Editor, Industrial Extension Inst., 1917 to date. 217 Woodlawn Ave., New Rochelle, New York.

**Holbrook, Winfield, B.S. (C.E.).** Assoc. M. Am. Soc. C. E., Tau Beta Pi. Civil Eng., Denver, 1906-08; Resident Eng., with Geo. G. Anderson, Consulting Eng., 1908-10; Chief Eng., Beaver Land & Irrigation Co., 1910-15; Eng. The Garden City Sugar & Land Co., 1915-18; Captain Eng., U. S. A., 1918-19; Gen. Mgr., Texas Land & Development Co., Plainview, Texas, 1919 to date. Plainview, Texas.

**Jenkins, David Rhys, B. S. (E.E.).** E.E. 1907. Assoc. A.I.E.E., Ill. Eng. Soc., S.P.E.E., A.A.A.S., Sigma Xi, North Dakota Soc. of Eng. Elec., C. F. & I Co., 1904-05; Instructor in Elec. Eng., Univ. of Colo., 1905-08; Asst. Prof. of Elec. Eng., do., 1908-19; Prof. of Elec. Eng., Univ. of North Dakota, University Station, Grand Forks, North Dakota.

**Kroger, Fred Hutton, B.S. (E.E.).** M.S. 1905. M. A.I.E.E. and I.R.E., Assoc. M. of Physical Society, Tau Beta Pi, Sigma Xi. Experimental Eng., Wash., 1906; Instructor in Elec. Eng., Cornell Univ., 1907-12; Elec. Eng., National Elec. Signaling Co., 1912-15; Chief Eng., do., 1915; Division Eng., Affiliated with Marconi Wireless Tel. Co., 1919 to date. 54 Martense Street, Brooklyn, N. Y.

**Miller, John Newton, B.S. (E.E.).** Construction Dept., W. E. & Mfg. Co., 1906; Erecting Eng., do., 1907-08; Dist. Eng., do., 1908-18; Dist. Service Mgr., 1918 to 1920. Died January 1, 1920, at St. Louis, Mo.

**Moore, George Holmes, B.S. (C.E.).** B.S. (E.E.) 1903. (See Class of 1903.)

**Neill, William Hickman, B.S. (E.E.).** Telephone Eng., W. E. Co., 1906; Switchboard Dept., do., 1907-11; Eng., Pittsburg Ry. Co., 1911-16; Asst. Right of Way Eng., do., 1916 to 1922. Asst. Designing Eng., 1922 to date. 131 W. College Street, Canonsburg, Pa.

**Strong, Arthur James, B.S. (C.E.).** U. S. Reclamation Service, 1906; Civil Eng., Denver, 1906-07; Strong Mercantile Co., Brighton, Colo., 1907-21; Civil Engineer, Brighton, Colo., 1921 to date. Brighton, Colo.

**Willard, George Frank, B.S. (E.E.).** Electrical Eng., Albuquerque Gas & Electric Light Co., 1906; Asst. Supt., W. E. Church, Kerr & Co., 1907-08; with Denver City Tramway Co., 1908-10; Chief Elec., Great Western Sugar Co., 1910-14; Automobile Garage, 1914-21; Master Mechanic, Great Western Sugar Co., 1921 to date. Loveland, Colo.

## 1905

**Anderson, Charles Irving, B.S. (C.E.).** Tau Beta Pi. Member A.S.C.E. and W.S.C.E. Struct. Engineers' Assn. Chief of field party U.S.G.S., 1905; Masonry Bridge and Building Inspector, Illinois Central R. R. Co., 1905-08; Supt. of Construction, Geo. B. Swift Co. and Bates & Rogers Co., Chicago, 1908-11; Asst. Eng., charge of bridge construction lines south of Ohio River; Office Eng., B. & B. Dept.; Asst. Eng., Bridges and Building, Valuation Dept.; Acting Asst. Valuation Eng., 1911-18; Supervising Eng., U. S. Explosives Plant "C," Nitro, W. Va., 1918; Eng. of Bridges and Buildings, Illinois Central, Yazoo & Mississippi Valley and Chicago, Memphis & Gulf R. R. Cos., 1918-20; Asst. Eng., Chicago Terminal Improvement, 1920 to date. Room 1000, Illinois Central Station, Chicago, Ill.

**Anderson, John Victor, B.S. (E.E.)** Assoc. A.I.E.E., N.E.I.A. Apprentice, W. E. & Mfg. Co., 1906-06; Sales Dept., do., 1906-08; Electrical Eng., Colo. Springs & Cripple Creek Dist. Ry. Co., 1908-10; do., Ernestine Mining Co., 1910-11; Mgr. Monte Vista Light, Heat & Power Co., 1911-1915; Dist. Mgr. Colo. Power Co., Alamosa, 1913 to 1918; Dist. Mgr. Colo. Power Co., Sterling, 1918 to 1923; Dist. Mgr. N. Mo. Power Co., 1923 to date. Brookfield, Mo.

**Barrett, Archibald Campbell, B.S. (C.E.).** Tau Beta Pi. Masonry Inspector, Illinois Central R. R., 1905-08; Eng. of Construction, Eldora Railroad Co., 1908-13; Asst. Supt., Silver Lake Mines, 1913-15; Supt., Concentration Plant, Backus & Johnston Mining Co., Casapalca, Peru, S. A., 1915 to date. On year's leave of absence, 1917; Co. B. 27th Engineers, 1918; Supt. of Copper Mill, Cerro de Pasca Copper Corporation, Casapalca, Peru, S. A. (Home) 1600 Hillside Road, Boulder, Colo.

**Chaney, Hallack Teller, B.S. (E.E.).** Apprentice, G. E. Co., 1905-07; Testing Dept., Denver Gas & Elec. Co., 1907-16.

**Forbess, Alvin J., B.S. (E.E.).** Tau Beta Pi. Apprentice, 1906-07; Gen. Supt., Supt., Richmond Electric & Power Co., Supt., San Bernardino Division, Southern Sierra Power Co., 1911-17; Dist. Supt., do., 1917-20; Elec. Eng., The Amalgamated Sugar Co., 1920 to date. 2557 Brinker Ave., Ogden, Utah.

**Fulwider, Harold, B.S. (E.E.).** Tau Beta Pi. Testman, G. E. Co., 1905-07; Heating Dept., do., 1907-08; Commercial Dept., do., 1908-15; Commercial Eng., do., 1915-18; Agr., Industrial Heating Sales, do., 1918 to date. 7 Oxford Place, Schenectady, N. Y.

**Gillaspie, George, B.S. (E.E.).** Telephone Dept., W. E. Co., 1906-10; Elec. Eng., 1911 to date. Hyde Park, Calif.

**Grieve, Thomas, Jr., B.S. (C.E.).** Hydrographic Aid, U. S. Reclamation Service, 1905-07; Engineering Aid, do., 1907-08; Hydrographer, State of Colo., 1908-17; Irrigation Div. Eng., Central Block, Pueblo, Colo.

**Heaton, Harry Herbert, B.S. (E.E.).** Electric Power Station Operator, Helena Power Transmission Co., 1908-08; do., Mo. River Power Co., 1908-10; do., Madison River Power Co., 1910-12; Foreman, do., 1912-14. Died March 5, 1914.

**MacDonald, George A., B.S. (E.E.).** Tau Beta Pi. Testman, G. E. Co., 1905-07; Switchboard Dept., do., 1907-13; President and Gen. Mgr., Electra Power Co., 1913-15; Nevada-Calif. Power Co., 1917-18; Elect. Eng., Holton Power Co., 120 E. Fourth, Los Angeles, Calif.

**Mitchell, William Angus, B.S. (E.E.).** Assoc. A.I.E.E. Chief Elec., Rocky Mountain Paper Mills, 1906-07; Night Elec., Great Western Sugar Co., 1907-08; Chief Elec., do., 1908-11; Elec. Eng. and Traveling Eng., do., 1911-17; Asst. Chief Eng., do., 1917 to date. 1225 Penn., Denver, Colo.

**Mosley, Earl Louis, B.S. (C.E.).** Assoc. M. Am. Soc. C. E., Tau Beta Pi. Masonry Inspector, Illinois Central R. R., 1905-08; Instrumentman, Asst. Eng., Asst. to Supt. Transmission Line Dept., Central Colo. Pk. Co., 1908-09; Chief Eng., Grand Junction and Grand River Valley R. R., 1909-11; Asst. Eng., Canadian Northern Ry., 1911-15; Asst. Eng., Valuation Dept., Illinois Central R. R., 1915-18; Supervising Eng., U. S. Explosives Plant "C", 1918-19; Asst. Eng., Valuation Dept., Illinois Central R. R., 1919-21; Stock Raising, Littleton, Colo., 1921 to date. 2603 Vine Street, Denver, Colo.

**Read, Norman, B.S. (E.E.).** Mem. A.I.E.E., N.E.L.A. and A.I.M.M.E. Tau Beta Pi. Eng. Dept., The Denver Gas & Electric Co., 1905-06; Eng., Salesman, The Nerst Lamp Co., 1906; Chief Eng., The Hug Water Wheel Co., 1907-09; Consulting Hydraulic Work, 1909; Elec. Eng., The Denver Tramway Co., 1909-11; Elec. Eng. and Supt. of Power, do., 1911-13; Asst. Gen. Mgr., The Colorado Power Co., 1913-16; V.-P. and Gen. Mgr., do., 1916 to date. 824 Symes Bldg., Denver, Colo.

**Sorensen, Royal Wasson, B.S. (E.E.).** Fellow A.I.E.E., N.E.L.A., S.P.E.E. Honorary Member Tau Beta Pi. Testman, G. E. Co., 1905-06; Foreman, Transformer Test, do., 1906; Eng., Transformer Eng. Dept., do., 1906-10; Assoc. Prof. of Elec. Eng., Throop Polytechnic Institute, 1919-11; Prof. of Elec. Eng., Calif. Institute of Technology (formerly Throop College of Technology), 1911 to date; Consulting Eng., Pacific Light & Power Corporation, 1914-17; Consulting Eng., U. S. Elec. Mfg. Co., 1917-20; Chairman Los Angeles Section A.I.E.E., 1920-21; Consulting Eng., U. S. Elec. Mfg. Co., 1922 to date; Chairman, Joint Technical Soc. of Los Angeles, 1923-24. 589 N. Madison Ave., Pasadena, Calif.

## 1906

**Allen, Edwin Perkins, B.S. (E.E.).** Signal Dept., Union Pacific R. R., 1906-08; U. S. Surveyor, Genl. Office, 1908-09; Signal Dept., Chicago, Milwaukee & St. Paul Ry., U. S. Survey or Genl. Office-Examiner Surveys, 1911-12; Signal Dept. C. M. & St. P. Ry., Ch. Draftsman, Inspector, Supervisor, 1912 to date. 1314 North Cedar Street, Tacoma, Wash.

**Boring, George Albert, B.S. (E.E.).** Testman, G. E. Co., 1906-07; Asst. Head Transformer Dept., 1908; Head, 1909; Power and Mining Eng. Dept., 1910; Commercial Eng., 1911; Elec. Eng. and Sales Mgr., Pacific States Elec. Co., Portland, 1913; Gen. Mgr., Northwest Division Pacific States Elec. Co., 1918 to date. 379 E. 26th St., Portland, Ore.

**Cochran, Charles C., B.S. (M.E.).** Tau Beta Pi, Mem. A.S.M.E. Prof. of Mechanical Drawing, Univ. of Kansas, Lawrence, Kans., 1906-17; Salesman, Emerson Inst. of Ind., 1917-18; Salesman, Holcomb & Heke, 1919; Salesman, La Salle Extension Univ., 1919-20; Asst. Prof. M. E., Penn. State College, 1920 to date, in charge of M. E. Lab, 1922 to date.

**Dennison, Augustus Seymour, B.S. (E.E.).** Assoc. A.I.E.E., Tau Beta Pi. Testman, G. E. Co., 1906-07; Asst. Examiner, U. S. Patent Office, 1907-11; Patent Solicitor, 1911-16; Patent Attorney, 1916 to date. 67 Wall Street, New York City.

**Gardner, Harry Carter, B.S. (C.E.).** C.E. 1909. M. Am. Soc. C.E. Structural Draftsman, with J. B. C. Lockwood, 1906-08; Graduate Student and Instructor in Bridge Eng., Univ. of Pa., 1909-12; Estimator and Designer, L. F. Shoemaker & Co., 1912-16; Chief Eng. with John H. Wickersham, Designing and Contracting Eng., 1915 to date. 722 N. Lime Street, Lancaster, Pa.

**Jordan, Leonard Crouch, B.S. (C.E.).** C.E. 1910. Assoc. M. Am. Soc. C.E. Designing Eng., Westinghouse, Church, Kerr & Co., Consulting and Designing Engineer. 62 Siwanoy Avenue, New Rochelle, N. Y.

**Knight, Roger Davis, B.S. (E.E.).** Treasurer, Campbell-Sell Baking Co., 1906-09; Manager, Macklem Baking Co., 1909 to date. 815 Vine Street, Denver, Colo.

**McMullin, Albert Ray, B.S. (E.E.).** Tau Beta Pi. Salesman, G. E. Co., 1906-15; Mgr., Northwest Sales Division, Busch-Sulzer Bros., Diesel Engine Co., 1915-17; U. S. Army, Aug. 1917-Feb. 1919; Asst. Sales Mgr., Busch-Sulzer Bros., Diesel Engine Co., to date. St. Louis, Mo.

**Murdoch, Harvey Ellison, B.S. (M.E.).** 1906. M.E. 1908. C.E. 1911. Am. Soc. A.E., S.P.E.E., Tau Beta Pi. Instructor in Theoretical and Applied Mechanics, Univ. of Ill., 1906-12; Levelman, Rocky Mountain Ry. Co., 1906; Maintenance of Way Eng., S. P. Co., 1907; Irrigation Eng., U.S.D.A., 1913-14; Agricultural Eng., Prof. Agricultural Engineering, Univ. of Montana, 1914 to date. University of Montana, Bozeman, Mont.

**Myers, Earl Colman, B.S. (E.E.).** Draftsman, Animas Power and Water Co., 1908-13; Elec., Southern Elec. Co., 1913-15; Mgr., Motor Dept., do., 1915 to date. 2238 Harrison Street, San Diego, Calif.

**Pereau, Ralph Warren, B.S. (E.E.).** Testman, G. E. Co., 1906-08; Edison Elec. Illuminating Co., 1908-10; Elec. Eng. Co., 1911-12; Elec. Phelps-Dodge Corporation, Copper Queen Branch, 1913 to 1920; Truck Farming, Plant City, Fla., 1920 to date. Plant City, Fla.

**Roberts, Ray Clayton, B.S. (C.E.).** Tau Beta Pi. Gen. Sec., Y. M. C. A., and Graduate Student, Colo. School of Mines, 1906-08; Graduate Student, Univ. of Colo., 1908-09; Asst. Educational Director, Y. M. C. A., Seattle, 1909-12; Secretary, Y. M. C. A., 1912 to date. Y. M. C. A., Changsha, China.

**Wall, George Albert, B.S. (C.E.).** Assoc. M. Am. Soc., C. E. Tau Beta Pi, Sigma Xi. Civil Eng., 1906-08; Principal Asst. Eng., Central Colorado Power Co., 1908-09; Civil Eng., 1909-13; Asst. Eng., Canadian Pacific Ry., Irrigation Dept., 1913-16. 515 S. Alexander Ave., Los Angeles, Calif.

**Wright, Rene Barber, B.S. (C.E.).** M. Am. Soc. C. E. Ore. Soc. C.E. Cert. Mem. Am. Assoc. Eng., Mem. Military Engr. Soc., Draftsman Am. Bridge Co., 1906-07; Draftsman with J. B. C. Lockwood, 1907; do., Pacific R. R. & Navigation Co., 1907; Draftsman with C. G. Sheeley, Bridge Contractor, 1908-09; Draftsman and Checker, Am. Bridge Co., 1909-10; Draftsman and Inspector Union Pacific R. R. Co., 1910-13; Eng. on Construction of Buildings, Brayton Eng. Co., 1913; Bridge Designer, O. W. R. R. & N. Co., 1914; Bridge Eng. in charge of bridges and concrete construction, City of Portland, 1915-19; Senior Highway Bridge Eng., Dist. No. 1, Wash., Ore., Mont., Idaho, and Alaska; U. S. Bureau of Public Roads, 1919 to date. 1415 Milwaukee Street, Portland, Ore.

## 1907

**Affolter, Paul, B.S. (E.E.).** Assoc. A.I.E.E., Tau Beta Pi. W. E. Co., 1907-09; Power Station, Laramie, Wyo., 1909-10; Sales Eng., Fairbanks, Morse & Co., 1910-16; Mgr. Elec. Dept., do., 1916-19; Garland-Affolter Eng. Co., 1919 to date. 5805 Keith Avenue, Oakland, Calif.

**Bliss, Frederick Van Ostrand, B.S. (E.E.).** Testman, G. E. Co., 1907-08; Asst. in Physics, Univ. of Colo., 1909-11; Instructor in East Side High School, 1911-17. Eng. of Tests, Ordnance Inspection Dept., 1918-19; Instructor, East Denver High School, 1919 to date. 776 Newport Street, Denver, Colo.

**Cook, Paul Tyler, B.S. (E.E.).** Testman, G. E. Co., 1907-11; Sales Eng., do., 1911 to date. 1035 Downing Street, Denver, Colo.

**Curtis, Edward Claud, B.S. (E.E.).** Testman, G. E. Co., 1907-09; Transformer Eng., do., 1909-12; Elec. Eng., Elec. Bond & Share Co., 1912-17; Eng. Kansas Gas & Elec. Co., 1917 to date. Kansas Gas & Electric Co., Wichita, Kan.

**Doolittle, Frederick William, B.S. (C.E.).** 1907, C.E. 1911. A.B. Princeton, 1905. Assoc. M. Am. Soc. C.E., Am. El. Ry. Eng. Assoc., Tau Beta Pi, Sigma Xi. Union Pacific Ry. Co., 1903-05; Boston Consolidated Mining Co., 1907; Consolidated Coal & Coke Co., 1908; Chicago, Milwaukee & St. Paul Ry. Co., 1909-10; Instructor in Civil Eng., Univ. of Ill., 1908-09; do., Univ. of Colo., 1909-10; Asst. Prof. of Mechanics, Univ. of Wisconsin, 1910-14; Special Investigator, Wisconsin R. R. Commission, 1910-14; Acting Sec., Ill. Public Utilities Commission, 1914; Director, Bureau of Fare Research, Am. Elec. Ry. Assoc., 1915-16; Consulting Eng., 1916 to date. 60 Broadway, New York City; Vice-Pres. The North American Co., 1923 to date.

**Eby, Eugene DeWitt, B.S. (E.E.).** Assoc. A.I.E.E. Testing Dept. G. E. Co., 1907-09; Designing Eng., Transformer Eng. Dept., do., 1909-16; Eng., High Voltage Bushing Eng., do., 1916 to date. 100 Holmes Road, Pittsfield, Mass.

**Hanley, Newton Franklin, B.S. (E.E.).** Mem. Western Soc. of Engrs., M. A.I.E.E., Sec. A.I.E.E., 1918-20, Mem. Am. Statistical Assoc. 1922. Designer G. E. Co., Pittsfield, Mass., 1908-15; Production Eng., do., 1915-18; Asst. to Works Eng., 1918 to 1920; Asst. to Mgr. (Eng. of Statistics), do., 1920 to date. 38 Arlington St., Pittsfield, Mass.

**Kellogg, Ira Newell, B.S. (E.E.).** Tau Beta Pi. Testman G. E. Co., 1907-10; Designing Eng., do., 1910 to date. 93 Bruce Street, Scotia, N. Y.

**Kesner, Henry James, B.S. (C.E.).** C.E. 1911. B.A. 1905. Assoc. M. Am. Soc. C.E., Phi Beta Kappa, Tau Beta Pi, Sigma Xi. Sec., Univ. of Colo.; Junior Eng., Reclamation Service; Instructor in Civil Eng., Univ. of Minn., 1907-08. Instructor in Civil Eng., Univ. of Calif., 1909-11; Asst. Prof. of Civil Eng., do., 1911-13; Assoc. Prof. of Structural Eng., Purdue Univ.; Assoc. Prof. of Civil Eng., Armour Institute of Technology, Chicago, Ill.; Civil Eng. 3300 Federal Street, Chicago, Ill.

**Kingwill, Henry McDougall, B.S. (C.E.).** Civil Eng., Denver Union Water Co., 1907-10; Eng., Consolidated Eng. Co., 1910-11; U. S. Reclamation Service, 1911-16; Horticultural Inspector, Glenn County, 1916-20; Deputy Hort. Commissioner of Glenn Co., 1920; Hort. Commissioner of Glenn Co., 1920 to date. Box 389, Orland, Calif.

**Lewis, Walter Wallace, B.S. (E.E.).** 1907; E.E. 1923; M.S. (Union College) 1923; M.A.I.E.E., Tau Beta Pi, Testing Dept., G. E. Co., 1907-09; Transformer Eng., Dept., do., 1909-13; Asst. to Works Electrical Eng., do., 1914-16; Power & Mining Eng. Dept., do., 1916-21; Lighting Eng. Dept., do., 1921-23; Central Station Eng. Dept., 1923 to date. 120 Woodland Ave., Schenectady, N. Y.

**McLellan, Alden, Jr., B.S. (E.E.).** Seamless Hosiery Manufacturer, Alden Mills, 1907-12; Asst. Mgr., Alden Mills, 1912 to 1919; Vice-P., John R. Bailey Co., Chicago, Ill., 1921 to date. 1101 Peoples Gas Bldg., Chicago, Ill.

**Phelps, Howard Eastwood**, B.S. (C.E.). 1907; C.E. 1916. M. Am. Soc. C. E., Tau Beta Pi, Sigma Xi. Masonry Inspector, Ill. Central R. R., 1907-08; Field and Office Draftsman, Field, Fellows & Hinderlinder, 1908; Instructor in Civil Eng., Univ. of Penn., 1908-09; Draftsman, The Arnold Co., 1909-10; Asst. City Eng. of Boulder, 1910-12; City Eng., do., 1912-14; Asst. Prof. of Civil Eng., Univ. of Colo., 1914-18; Sanitary Eng., U. S. Public Health Service, 1918-19; Highway Eng., Ford & McCrear, 1919; Prof. of Highway Eng., State College of Washington, 1919 to date, 1816 Monroe St., Pullman, Wash.

**Roose, Arthur Julius**, B.S. (E.E.). Assoc. A.I.E.E.E., Tau Beta Pi. Testing Dept., G. E. Co., 1907-10; Construction Dept., 1910-12; Air Brake Eng. Dept., 1912-14; Ry. Equip. Dept., 1914. Nederland, Colo.

**Streamer, A. Camp**, B.S. (E.E.). Assoc. A.I.E.E.E., Tau Beta Pi. Apprentice, W. E. & Mfg. Co., 1907-10; Sales Dept., do., 1910-16; Mgr., Switchboard Section Supply Dept., do., 1916-20; Asst. to Mgr., Supply Dept., do., 1920 to date. Newport and Berlin Roads, Edgewood Acres, Wilkensburg, Pa.

**Thomson, William Edgar**, B.S. (E.E.). Construction Eng. United Wireless Tel. Co., 1907-09; Broker, 1909-12; Combustion Eng. Dept., Southern Calif. Edison Co., 1912-17; Combustion Eng., do., 1917-18; Efficiency Eng., Steam Power Plants, do., 1918 to 1923; Generation Eng., 1923 to date. 700 Edison Bldg., Los Angeles, Calif.

**Trudgian, William**, B.S. (E.E.). Apprentice, W. E. & Mfg. Co., 1907-09. Salesman, do., 1909-18; Elec. Eng., U. S. Explosives Plant "C", 1918; Salesman, W. E. & Mfg. Co., 1919 to date. 1052 Gas and Electric Bldg., Denver, Colo.

**Venemann, Henry Gerald**, B.S. (M.E.). Instructor in Mech. Univ., 1909-10; Colo Ice & Cold Storage Co., 1911-12; Chief Eng., El Paso Ice & Coal Co., 1912-16; do., Des Moines Ice & Cold Storage Co., 1916-17; Refrigerating Eng., Baker Ice Machine Co., 1917-23; Sales Manager, do., 1923 to date. Care Baker Ice Machine Co., Omaha, Neb.

**Weiland, Adelbert Aloazo**, B.S. (C.E.). B.A. 1904. M. Am. Soc. C. E., Tau Beta Pi. Hydraulic Eng., C. F. & I. Co., 1907-10; Chief Eng., Ark. Valley Ditch Assoc., 1912 to date; State Eng. of Colo., 1915-17; Consulting Eng., 1910 to date. 717 Thatcher Bldg., Pueblo, Colo.; 711 U. S. Natl. Bank Bldg., Denver, Colo.

## 1908

**Bailey, Joshua Harold**, B.S. (C.E.). Instrumentman, U. S. Reclamation Service, 1908-09; do., Arnold Eng. Co., 1909-10; do., Goldsborough Co., 1910-11; Asst. Eng., do., 1912-13; Instrumentman and Inspector, U. S. Reclamation Service, 1914; Chief of Party, do., 1915; Hydrographer, State of Colo., 1916; First Lt., U. S. Army Eng., 1918; Chief Hydrographer, State of Colo., 1917-18, and 1919 to date. 2330 Glenarm Street, Denver, Colo.

**Bennetts, Richard**, B.S. (C.E.). Eng., Denver Reservoir & Irrigation Co., 1908-12; Civil Eng., Colo. & Southern Ry. Co., 1912-15; Eng., Denver Union Depot, 1915-18; do., U. S. Gen. Hospital, 1918 to date. 1752 Dunkeld Place, Denver, Colo.

**Bishop, Lyman Edgar**, B.S. (C.E.). M. Am. Soc. C.E., Tau Beta Pi. Asst. Eng., Arnold Co., 1908-10; Resident Eng., Goldsborough Co., 1910-13; Civil-Hydraulic & Irrigation Eng., private practice, 1913-15; Deputy State Eng. of Colo., 1915-17, Consulting Civil-Hydraulic and Irrigation Eng., private practice, 1917 to date. First National Bank Bldg., Denver, Colo., 1934 Grant Street, Denver, Colorado.

**Booth, George Anthony, Jr.**, B.S. (E.E.). Station Operator, Spokane and Inland Empire R. R., 1908-12; Eng., British Columbia R. R., 1915; Prof. of Eng., Chinese Gov. Eng. College, Taushau, N. China.

**Buchanan, Harry S.**, B.S. (E.E.). Assoc. A.I.E.E.E. Station Operator, Telluride Power Co., 1909-10; Instructor in Telluride Inst., 1910-11; Chief Dispatcher, Utah Power and Light Co., Salt Lake City, Utah, 1911-23; Elec. Eng., Bur. of P. & L., Los Angeles, Calif., 1923-24; Draftsman, S. Calif. Edison Co., Los Angeles, Calif., 1924 to date.

**Curtis, Harry Alfred**, B.S. (Ch.E.). M.A. 1910. Ph.D., Univ. of Wis., 1914. Am. Chem. Soc., Am. Inst. Chem. Eng., Tau Beta Pi, Sigma Xi. Instructor in Chem., Univ. of Colo., 1908-12; Asst. Prof. of Chem., do., 1912-13, 1914-15; Fellow in Chem., Univ. of Wis., 1913-14; Prof. of Physical Chem., Univ. of Colo., 1915-17; Captain, Ord. Dept., Chief of Reserves Lab., Government Nitrate Plant No. 1, Sheffield, Ala., Director of Arlington Experimental Station; Executive Officer for the Fixed Nitrogen Research Lab. Ord. Dept., Wash., D. C., 1917-19; Prof. of Chem., Northwestern Univ., 1919-20; Chem. Eng. International Coal Products Corp., 1920-21; Gen. Mgr., Clinchfield Carbocool Corp., 1921-23; Prof. Chem. Eng. Yale Univ., New Haven, Conn., 1923 to date.

**Dodds, David Metheny**, B.S. (C.E.). Assoc. M. Am. C.E., Tau Beta Pi. Asst. in Gen. Eng. Drawing, Univ. of Colo., 1908-09; Draftsman, Lassing Plant, Am. Bridge Co., 1909; do., Crocker & Ketchum, 1910, do., with F. O. Browne, Structural Eng., 1910; do., Holly Sugar Co., 1910-11; Estimating Dept., Chicago office, Am. Bridge Co., 1911-12; Checker, Kansas City Terminal Ry., 1912-14; Draftsman, Heidenreich Eng. Co., 1915; Junior Structural Eng., Division of Valuation, Interstate Commerce Com., 1915-16; Squadman, Kansas City Terminal Ry., 1916-17; Office Eng., do., 1918-19; Structural Eng., Wight & Wight, Architects, 1919 to date. 724 Hamilton Terrace, Kansas City, Mo.

**Goldhammer, M. H.**, B.S. (E.E.). Tau Beta Pi. Construction and Operating Sub-stations, Denver Tramway Co., 1908-09; Testing Dept., G. E. Co., 1909-11; Small Motor Dept., do., Chicago office, 1911-13; Commercial Eng., Power and Mining Dept., do., 1913 to date. In charge of Power and Mining Proposition Routine and Training of Junior Commercial Engineers, do., 1913-21; Commercial Elec. Eng., G. E. Co., Denver office, 1921 to 1922, do., New York office, 1922 to date. Address c/o Gen. Elec. Co., 120 Broadway, New York, N. Y.

**Greenwald, Eugene Ludwig**, B.S. (E.E.). LL.B., National Univ. Law School, Tau Beta Pi, Mem. A.A.E. Operator, Power Station, Pike's Peak Hydro-Elec. Co., 1908; Lab. Asst., Bureau of Standards, 1909; Asst. Examiner, U. S. Patent Office, 1909-12, Patent Attorney, 1912 to date. Union Carbide and Carbon Research Labs. Long Island, N. Y.

**Handley, Lawrence Ridley**, B.S. (E.E.). Draftsman, H. L. Woohenden, 1908-09; Eng., Carstarphen Elec. Co., 1909-12; do., Mine & Smelter Supply Co., 1912 to date. Care Mine & Smelter Supply Co., El Paso, Texas.

**Harwitz, Jake**, B.S. (E.E.). Eng., Central Colo. Power Co., 1908-11; Construction Foreman, Oro Elec. Corporation, 1913; Stone & Webster Construction Co., 1913-14; Eng., Great Western Power Co., 1913; Plant Eng., Libby, McNeil & Libby, Sacramento, Calif.

**Heaton, Roy C.**, B.S. (E.E.). Apprentice, W. E. & Mfg. Co., 1909-11; Salesman, do., 1911-14; Pacific Iron & Steel Co., 1914-16; Chief Eng., Bilrowe Alloys Co., 1916-22; Receiver, do., 1922; Construction Eng., Tennent Steel Co., 1923 to date. 3610 N. Union Avenue, Tacoma, Wash.

**Holden, Omar Williard**, B.S. (E.E.). Elec. Elizabeth Lake Tunnel, 1908-09; Testman, G. E. Co., 1909-12; Elec., Los Angeles, 1917; Bur. of Power & Light, 120 E. 4th, Los Angeles, Calif.

**Ireland Harold Leader**, B.S. (E.E.). M.S. 1909. Sigma Xi. Graduate Student and Assistant in Elec. Eng., Univ. of Colo., 1908-09; Apprentice, W. E. & Mfg. Co., 1909-12; Dept. of Sales, do., 1912-16; Asst. Mgr. and Sales Dept., Columbia Graphophone Co., 1916 to date. 150 Haven Ave., New York City, N. Y.

**Jacobucci, Joseph Harry**, B.S. (E.E.). Assoc. A.I.E.E.E. Station Operator, Rawlins Elec. Light & Fuel Co., 1908-10; Mgr., Williams Elec. Supply Co., 1910-11; do., Rawlins Elec. Light & Fuel Co., 1911-18; Pres. and Mgr., Green River Elec. L. & P. Co., 1918 to date. Box 277, Green River, Wyo.

**Kendall, Gorge Dyke, Jr.**, B.S. (Ch.E.). Farmer, 1908 to date; Foreman, Great Western Sugar Co., 1915-16. Motor Route A, Goodpasture, Colo.

**Logan, Hal Helm**, B.S. (C.E.). B.A. 1908. Tau Beta Pi. Asst. Eng., Denver Reservoir & Irrigation Co., 1908-09; Construction Eng., Colo. Irrigation Construction Co., 1909-10; Asst. Chief Eng., Interstate Land & Development Co., 1911-14; do., Carlisbad Plantation & Orchards Co., 1914; Consulting Eng. for city Atty of Denver, 1915; Mgr., Logan Shoe Co., 1915 to 1919; Pres., Farrow-Crouch-Logan Co., 1919-20; Pres., Continental Drug and Chem. Co., 1920 to date. 1017 Texas Street, El Paso, Texas.

**Meisel, Benjamin William**, B.S. (E.E.). Station Operator, Light & Power Co., Ord. Neb., 1908; Signal Construction Foreman, C. R. I. & P. R. R., Chicago, 1909; Signal Draftsman, Chicago & Northwestern R. R., 1909-11; Chief Draftsman, Signal Dept., Chicago & Northwestern R. R., 1911-13; Asst. Eng., Signal Dept., do., 1916-18; Assoc. Editor, Ry. Age, Ry. Signal Eng. and Ry. Elec. Eng., Simons-Boardman Pub. Co., Chicago, Ill.; Eng. of Operations, Resident Man., Regan Safety Devices Co., Inc., Chicago, Ill. 546 N. Humphrey Avenue, Oak Park, Ill.

**Salberg, John Theophil, Jr.**, B.S. (E.E.). Pole Line Construction Northern Colo. Light & Power Co., 1908-09; Elec. Great Western Sugar Co., 1909-10; Representative, W. E. & Mfg. Co., 1910-18; Ensign, U. S. N. R. F., 1918-19; W. E. & Mfg. Co., Salt Lake City, 1920 to date. University Club, Salt Lake City, Utah.

**Stekmann, Everett L.**, B.S. (E.E.). Meter Tester, Northern Colo. Power Co., 1908-10; Salesman, W. E. & Mfg. Co., 1910-16; Power Sales Dept., Colorado Power Co., 1916-19; District Mgr., The Colo. Power Co., 1919 to date. 815 Spruce, Leadville, Colo.

**Smith, Guy Watson**, B.S. (E.E.). M.S. 1909. Ph.D., Univ. of Ill., 1917. Math. Assoc. of Am., Am. Math. Soc., A.A.A.S., Sigma Xi. Instructor in Eng. Math., Univ. of Colo., 1909-13; Asst. in Math., Univ. of Ill., 1913-16; Graduate Student, do., 1916-17; Instructor in Math. and Physics, Beloit College, 1917-18; Instructor in Math., Univ. of Ky., 1918-20; Asst. Prof. of Math., Univ. of Kan., 1920 to date. Lawrence, Kan.

**Soverelgn, Harry Evans**, B.S. (C.E.). Tau Beta Pi. Sigma Xi. Eng. Field, Fellows & Hinderlinder, 1908-11; do., Wilcox Canal Co., 1911-15; Designing Eng., Compania de Minerales, 1915-16; Compania de Combustibles Agujita, S. A., 1916-18; Purchasing Dept., Am. Metal Co., 1919-21; Pur. Agt., Cia. Minera de Penoles, S. A., 1921 to date. Apt. 251, Monterrey, N. L., Mexico.

**Stitzer, Ralph Bourquin**, B.S. (E.E.). Tau Beta Pi. St. Louis Storage Battery Co., 1908-11; Cadet Eng., Denver Gas & Elec. Co., 1911-15; Supt., Spokane Gas & Fuel Co., 1915 to 1919; Supt., Empire (Ohio) Chem. Co., 1919-21; Chief Eng., Atlas Chem. Co., 1921 to date. 661 Lincoln Avenue, Toledo, Ohio.

**Thorson, Andrew Richard**, B.S. (E.E.). Tau Beta Pi. Meter Tester, Northern Colo. Power Co., 1908-09; Power Eng., do., 1909-12; Eng., International Steam Pump Co., 1912-17; to 1922; Sales Eng. Worthington Co., 307 Sharon Bldg., San Francisco, Calif., 1922 to date. 1216 Bernal Ave., Burlingame, Calif.

**Walker, Henry Samuel, Jr.**, B.S. (C.E.). Civil Eng., Mexico City, 1910-16; Mexican Gulf Oil Co. to date. Apar. 106, Tampico, Mexico.

<sup>1</sup> **Whitehead, Harry Ralph**, B.S. (C.E.). U. S. Mint, 1908-15; Foreman of Electrolyte Refinery, do. 1915-19. Died, 1919.

**Wolf, Emil Elmer**, B.S. (E.E.). Eng., Pike's Peak Hydro-Elec. Co., 1908-13; Elec. Eng., Great Western Sugar Co., 1913 to date. Longmont, Colo.

## 1909

**Allen, Alfred Horace**, B.S. (Ch.E.). B.A. 1909. Tau Beta Pi. Sigma Xi. Chemist, 1909-12; Asst. Supt., Fajardo Sugar Co., 1912 to date. Care Fajardo Sugar Co., Fajardo, Porto Rico.

**Barra, John Louis**, B.S. (M.E.). Eng., Colburn Automobile Co., 1909-10; International Motor Truck Co., 1910-12; Cadet Eng., Denver Gas & Elec. Co., 1912-14; Eng. of Tests, Denver Rock Drill Mfg. Co., 1917-18; Experimental Eng., Denver Rock Drill Mfg. Co., 1918 to 1920; Chief Draftsman Denver Rock Drill Mfg. Co., 1920 to date. 1617 Vine Street, Denver, Colo.

**Borden, Edmund Gilbert**, B.S. (Ch.E.). Tau Beta Pi. Chief Eng., Independent Coal and Coke Co., 1909 to 1910; Chemist, Bureau Mines, 1911; Asst. Examiner, U. S. Patent Office, 1912-14; Patent Attorney, 1914 to date. Bus. Address, 67 Wall Street, New York City. Home Address, 9126 Queens Road, Queens, N. Y.

**DeBacker, Lester**, B.S. (E.E.). Northern Colo. Power Co., 1909-10; Real Estate and Insurance, 1910 to date. 919 Pennsylvania Avenue, Boulder, Colo.

**Dendahl, Henry**, B.S. (C.E.). Tau Beta Pi. Asst. in Mech. Drawing, Univ. of Colo., 1909-10; Mercantile Business, 1910 to date. Santa Fe, N. M.

**Funk, Norman Will**, B.S. (C.E.). Assoc. M. Am. Soc. C. E. Detailer, Kansas City Structural Steel Co., 1909-12; Designer, Bridge Dept., Kansas City Terminal Ry. Co., 1912-15; Structural Eng., J. B. Klein Iron & Foundry Co., 1915; Junior Structural Eng., Division of Valuation, Interstate Commerce Com., 1915-17; Senior Structural Eng., 1917; Structural Eng., Kansas City Structural Steel Co., 1920-21; Contracting Eng., 1921 to date. 5901 Locust St., Kansas City, Mo.

**Gay, George Inness**, B.S. (C.E.). C.E. 1912. Assoc. M. Am. Soc. C.E., Tau Beta Pi. Instrumentman, Fraser River Sources Irrigation Project, 1909; Instructor in Civil Eng., Univ. of Colo., 1909-10; do., Univ. of Ill., 1910-11; do., Univ. of Calif., 1911-14; Chief Asst. Eng., Haviland & Tibbetts, 1916; Eng., Leland Rosener, 1916; in charge of Statistics, Com. for Belgian Relief, 1918; Hon. Sec. of Am. Com. of Engineers in London, 1917-1919; Director in charge European Liquidation, Com. for relief in Belgium, 1919 to date; Director, Commission for Relief in Belgian Educational Foundation; Asst. Director Am. Relief Administration, London Office, 1919; Special Investigator, Hoover War Survey, Stanford Univ., 1923 to date. Box 73, Stanford Univ., Calif.

**Gregg, Albert Mervin**, B.S. (E.E.). Assoc. A.I.E.E. Elec. Eng., Gt. Western Sugar Co., Mitchell, Neb., 1909-23; Elec. Eng., Holly Sugar Corp., Delta, Colo., 1923 to date.

**Heath, Ralph Sidney**, B.S. (E.E.). Telluride Power Co., 1909-10; Apprentice, G. E. Co., 1910-13; Representative, do., 1913 to date. Care General Electric Co., Salt Lake City, Utah.

**Heaton, Archibald Burdette**, B.S. (E.E.). M.D. 1914. Operator, Denver & Interurban R. R. Co., 1909-10; Student, School of Medicine, Univ. of Colo., 1910-14; Physician and Surgeon, 1914 to date. 3715 N 28th, Tacoma, Wash.

**Heaton, Carl Edwin**, B.S. (E.E.). Apprentice, W. E. & Mfg. Co., 1909-11; Salesman, do., 1911-12; Light and Power Salesman, Duquesne Light Co., Pittsburgh, 1912-17; Elec. Dept., Todd Drydock & Const. Co., 1917-19; City of Tacoma, Light and Power Dept., 1919 to date. 3414 N. 26th., Tacoma, Wash.

**Houston, Robert Bruce**, B.S. (C.E.). Assoc. M. Am. Soc. C. E., Tau Beta Pi. Detailer, Checker Squad Leader, Kansas City Structural Steel Co., 1909-15; Senior Structural Eng., Division of Valuation, Interstate Com. Com., 1915 to 1920. Structural Eng. and Supt. for Gates & Horn, Architects, February, 1920, to June, 1920; Senior Structural Eng., Bureau of Valuation, Interstate Com. Com., 1920 to 1922; Kansas City Structural Steel Co., Kansas City, Mo., 1922 to date.

**Jones, Laurence Dean**, B.S. (E.E.). M.S. 1910. Asst. in Elec. Eng., Univ. of Colo., 1909-10; Apprentice, G. E. Co., 1910-11; Consulting Eng., Dept., do., 1911-13; Utah Lt. & Ry. & Oregon Short Line, 1913-14; G. E. Co., San Francisco, 1915-16; G. E. Co., Ry. Locomotive Eng. Dept., Schenectady, 1916; G. E. Co., Direct Current Eng. Dept., Schenectady, 1916 to date. 18 Snowden Avenue, Schenectady, N. Y.

**Kimmel, Joseph Glenn**, B.S. (C.E.). Tau Beta Pi. Surveyor, Routt County, 1909-12; Cravens & Kimmel, Civil Eng., 1913 to date. Arcadia, Fla.

**Knight, Stephen James**, B.S. (C.E.). Tau Beta Pi. The Campbell-Sell Baking Co., 1909 to date. 124 Sherman Street, Denver, Colo.

**Knowles, Robert Rely**, B.S. (Ch.E.). Asst. in Chem., Univ. of Colo., 1909-10; Chemist, Western Chem. Co., 1910-11; Assay Supply Dept., Mine & Smelter Supply Co., 1911-12; Book-keeper, Bradley Paper Co., 1912; Teacher, State Prep. School, 1912-13; Inspector with Prewitt Reservoir Co., 1913; Teacher, Logan Co. High School, 1913-21; Principal, Sterling Branch Logan Co. High School, 1921 to date. Sterling, Colo.

**Levitan, Samuel Clemens**, B.S. (E.E.). Meter Dept., Denver Gas & Elec. Co., 1909-10; Silver State Elec. Co., 1910-12; Representative, Oliver Typewriter Co., 1915-17; 703 Pantages Bldg., Los Angeles, Calif.

**Lobb, John David**, B.S. (E.E.). Apprentice, Steel Car Co., 1909-11; Asst. Eng. of Costs, do., 1911-15; Chief Clerk, Executive Dept., do., 1915-16; N. Y. Representative, Iron & Steel Dept., F. W. Horne Co., Tokyo, Japan, 1917; N. Y. Mgr. and Sec., do. Oriental Mgr., Allied Machinery Co. of Am., 1918 to 1920, New York City; Man. Director Horne Co., Ltd., Tokyo, Japan, 1920 to date. Present Address, 721 Grand Ave., Kansas City, Mo.

**Lowther, Willis Henry**, B.S. (Ch.E.). Asst. Eng., Indep. Coal & Coke Co., 1909-10; Mining Eng., Utah Copper Co., 1910-11; Instrumentman and Levelman, Ore. Short Line R. R. Co., 1911-13; Office Eng. and Division Eng., Ore.-Wash. R. R. & Navigation Co., 1913-15; Asst. Eng., Ore. S. L. R. R. Co., 1915-17; Div. Eng., Ore. S. L. R. R. Co., 1917-19; Div. Eng., Union Pacific R. R. Co., 1919 to date. Room 256, Union Station, Denver, Colo.

**Nichols, William Pryne**, B.S. (C.E.). Tau Beta Pi. Govt. Road Building, N. Y. State, 1902-12; Designing Eng. Office, N. Y. Central R. R., 1912-14.

**Penberthy, Frank H.**, B.S. (E.E.). Apprentice, G. E. Co., 1909-12; Kansas City Tramway Co., 1912-13; Sales Dept., G. E. Co., 1913-18; Dist. Sales Mgr., Elliott Co., 1910 to date. Care Elliott Co., 306 Elmhurst Bldg., Kansas City, Mo.

**Preston, Arthur Charles**, B.S. (C.E.). Tau Beta Pi, Sigma Xi. Irrigation and Hydro-Electric Development, 1909-14; Graduate Student, U. of C., 1914-15; Chile Exploration Co., Chuquicamata, Chile, 1915-17; U.S.N.R.F., 1918-19; Supt. of Copper Refinery "Sociedad Espanola de Construcciones Electro-Mecanicas" 1920 to date. Gran Capitan, 15, Cordoba, Spain.

**Reid, Murray Brown**, B.S. (M.E.). Apprentice, Union Pacific R. R., 1909-13; Motor Car Expert, do., 1913-18; Second Reserve Officers' Training Camp, Fort Sheridan, 1917; Commissioned First Lt., Corps of Eng., U. S. R., Eatonville, Wash.

**Reynolds, William LeRoy**, B.S. (C.E.). M. Am. Soc. C.E. Eng. with Field, Fellows & Hinderlider, 1909-13; Asst. Eng., City and County of Denver, 1913-14; Eng., Public Utilities Com., 1914-16; Asst. Eng., Van Sant-Houghton Engineering Co., 1916; Eng. on Construction, Am. Smelting & Refining Co., 1916-18; Supervising Eng., U. S. Explosives Plant, 1918; Chairman, Plant Salvage Board, 1919-20; Civil and Irrigation Eng., 1920-23; Silt, Colo. Railway Hydraulic Eng. Public Utilities Commission, State of Colo., Denver, Colo., 1923 to date.

**Ritter, John Albert**, B.S. (E.E.). Tau Beta Pi. Testman, G. E. Co., 1909-10; Eng., do., 1910-15; Mgr., Motor Dept., Southwest G. E. Co., 1915; Dallas Willys Light & Power Co., Dallas, Texas. Fisher & Fisher, Architects, Denver, Colo.

**Smith, Ernest Albert**, B.S. (E.E.). Operator, Pike's Peak Hydro-Elec. Co., 1909-12; Elec. Eng., 1912-15.

**Sorenson, George Walter**, B.S. (E.E.). Apprentice, G. E. Co., 1909-11; Representative, do., 1911-16; Capital Elec. Co., 1916 to date. Care Capital Electric Co., Salt Lake City, Utah.

**Walsh, Frank David**, B.S. (C.E.). Mining, 1909; Engineering, 1910-12; Sales Mgr., Pacific Building Co., 1912-13; Developing Eng., San Diego, Calif., 1913-17; Farm Implement and Machinery Merchant, 1917 to date. Lancaster, Calif.

**Watters, Harrison H.**, B.S. (E.E.). Tau Beta Pi. Otis Elevator Co., 1909 to date. 250 11th Avenue, New York City.

**Welner, Rudolph Sigmund**, B.S. (Ch.E.). Eng., Independent Coal & Coke Co., 1909-10; Sales Eng., Sullivan Machinery Co., 1910-18; Army, 1917-18; Lt. Eng., 1919; Mgr., Sullivan Machinery Co. Home address, 511 Mills Bldg., El Paso, Texas.

**Wheeler, Hugh Flower**, B.S. (E.E.). Tau Beta Pi. Apprentice, Denver Gas & Elec. Co., 1909-10; Supt., Street Dept., Spokane Gas Co., 1910-12; Supt., Gas Dept., Hattiesburg Traction Co., 1912-15; Gen. Mgr., do., 1915-21. Garnsey and Wheeler, Ford Dealers, Greeley, Colo.

**Young, Alman Garfield**, B.S. (M.E.). Draftsman, Pierce, Richardson & Neller, 1909-13; Mech. Eng., D. H. Burnham Co., 1914-15; do., International Harvester Co., 1916 to date. 2619 Windsor Avenue, Chicago, Ill.

## 1910

**Adams, Charles Gale**, B.S. (M.E.). Welding Dept., Am. Ship Building Co., 1915-16; Mgr., Western Welding & Supply Co. 1033 W. Lake, Chicago, Ill.

**Allen, Ernest Charles**, B.S. (M.E.). Special Testman on Experimental Steam Turbine Work, G. E. Co., 1910-11; Designer, Allis-Chalmers Mfg. Co., Milwaukee, Wis., 1911-16; Asst. Chief Draftsman, Manistee Iron Works, Manistee, Mich., 1916-19; Asst. to Chief Eng. Steam Turbine Eng. Dept., Allis-Chalmers Mfg. Co., Milwaukee, Wis., 1919 to date. 594 66th Avenue, W. Allis, Milwaukee, Wis.

**Beeler, Vernard Milburn**, B.S. (E.E.). Apprentice, W. E. & Mfg. Co., 1910-11; Sales Eng., do., 1911; Mgr. Motor Appliance Section, do., Sales Eng., Westinghouse Elec. Co., Hanna Bldg. Annex, Cleveland, 1922 to date. 1308 E. 112th St., Cleveland, Ohio.

**Berg, Albert Leonard**, B.S. (E.E.). Testman, G. E. Co., Eng. of Transformers, Duncan Elec. Mfg. Co., 1915-18; Elec. Eng., W. E. & Mfg. Co., 1918 to date. 307 Biddle Avenue, Wilkesburg, Pa.

**Clem, Joseph Earl**, B.S. (E.E.). Testman, G. E. Co., 1910-11; Transformer Eng., do., 1911 to 1922; G. E. Co., 23 Water St., Yokohama, Japan, 1922 to date. Home Address, 92 Lennox Avenue, Pittsfield, Mass.

**Clucas, Richard Milton**, B.S. (E.E.). Dept. Mgr., Trorlicht-Duncker Engineer Underwriters Laboratories, 1910-17; Captain, C. W. S. U. S. A. 1917-19. Care of Trorlicht-Duncker, Locust at Twelfth, St. Louis, Mo.

**Duff, Carl Mathias**, B.S. (C.E.). M.S. 1912. Tau Beta Pi, Sigma Xi. Asst. in Eng. Math. and Eng. Drawing, and Graduate Student, Univ. of Colo., 1910-11; Instructor in Eng. Math., 1911-13; Erection Eng. Morava Construction Co., 1913-16; Agricultural Work, 1916 to 1919; Asst. Prof. Eng. Drawing, Univ. of Neb., 1919-20; Asst. Prof. Applied Mech., do., 1920 to date. Summer, 1920. Computer, Tractor Testing, Univ. of Neb.; Summer, 1921-23. Asst. Testing Eng., Highway Inspection, State of Neb. University of Nebraska, Lincoln, Neb.

**Gill, Arthur William**, B.S. (E.E.). Chief Clerk, Division Plant Supt., Rocky Mountain Bell Tel. Co., 1910-11; Mountain States Tel. Co., 1911-14; Mercantile Business, 1914 to 1919; Pres. and Mgr., Greeley Garage Co., 1919 to date. 1115 Eighth Avenue, Greeley, Colo.

**Goldborough, James**, B.S. (E.E.). Assoc. A.I.E.E. Apprentice, W. E. & Mfg. Co., 1910-11; Commercial Eng., do., 1911 to date. in charge Industrial Sales, N. J. territory. 185 Broadway, New York City.

**Hall, Charles A.**, B.S. (M.E.). Jun. Am. Soc. M. E. Mech. Dept., Mine & Smelter Supply Co., 1910-15; Eng. with E. Posselt, 1915-16; do., Am. Smelting & Refining Co., 1916 to date

**Huntington, Whitney Clark, B.S. (C.E.).** C.E. 1912. M.S. 1913. Tau Beta Pi, Sigma Xi; Assoc. M. Am. Soc. C. E.; S.P.E.E.; Engineer, Crocker & Ketchum, 1910; Asst. in C. E., U. of C., 1910-11; Instructor in C. E., do., 1911-14; Bridge Designer, C. B. & Q. R. R., 1915; Asst. Prof. C. E., U. of C., 1914-18; Acting Prof. of C. E., do., and Asst. Dean of College of Eng., do., 1918-19; Professor of C. E., do., 1919 to date. In charge of Construction Dept., U. of C. to date. University of Colorado, Boulder, Colo.

**Imrie, George Campbell, B.S. (C.E.).** Draftsman, Colo. Tel. Co., 1910-13; Draftsman and Surveyor, Mountain States Tel. & Tel. Co., 1913 to date. Denver, Colorado.

**Knoettge, Carl Harman, B.S. (C.E.).** B.A. 1907. Assoc. M. Am. Soc. C. E., Tau Beta Pi, Draftsman, Am. Bridge Co., 1911-12; Designer, Chicago, Milwaukee & St. Paul Ry., 1912-13; do., with H. S. Crocker, Consulting Eng., 1913-14; Instructor in Bridge Eng., Cornell Univ., 1914-17; Instructor in Civil Eng., Univ. of Colo., 1917-18; Corn Products Co., Chicago, Ill., 1918 to 1921; Structural Designer with Lieberman and Hein, Civil Engineers, Chicago, 1921 to date. 7619 Stewart Avenue, Chicago, Ill.

**Metcalf, Virgil Ellsworth, B.S. (E.E.).** E.E. 1914. Assoc. A.I.E.E. Testman, G. E. Co., 1910-12; Elec. Eng. with W. R. Grace & Co., N. Y. City, 1912-14; Asst. Eng., N. Y. & Honduras Rosario Mining Co., 1915-16; Elec. Eng., Hershey Corporation, N. Y. City, 1917; Lt. U. S. N. R. F., 1917-18; Elec. Eng., Cuban-Am. Sugar Co., 1919 to date. Care Cuban-Am. Sugar Co., Delicias, Province of Oriente, Cuba. Home address, 2043 Pine Street, Boulder, Colo.

**Millard, Floyd Hays, B.S. (C.E.).** C.E. 1913. Tau Beta Pi, Sigma Xi. Research Fellow, Eng. Experiment Station, Univ. of Ill., 1910-12; Instructor in Theoretical and Applied Mech., do., 1912-13; Wis. R. R. Com., 1913-15; Consulting Work on R. R. Costs of Operation, 1915-17; Asst. Mgr. Statistical Bureau, Western R. R., 1917-19; Special Asst. to Director of Traffic, U. S. R. R. Admin., 1919-20; Asst. Mgr., Statistical Bureau, Western R. R., 1920; Executive Asst. to Pres. of Cotton Belt Ry., 1920 to date. 1707 Ry. Exchange Bldg., St. Louis, Mo.

**Morgan, Newlin Dolbey, B.S. (C.E.).** Tau Beta Pi. Draftsman, Am. Bridge Co., 1910-12; Detailer, A. Bolter & Sons, 1912-13; Structural Designer, Chicago, Milwaukee & St. Paul Ry., 1913-18; Bridge Eng. Bureau Public Roads, Denver, Colo., 1918-23; Instructor, C. E. Dept. U. of C., 1923 to date.

**Morrill, Joseph Bradley, B.S. (E.E.).** E.E. 1914. Tau Beta Pi, Sigma Xi. Asst. in Elec. Eng., Univ. of Colo., 1910-11; Elec. Eng., Reed Zinc Co., 1911-13; Asst. Prof. of Eng. Math., Univ. of Colo., 1913-15; Acting Prof. of Elec. Eng., do., 1915-16; Supt., Reed Reduction Co., 1916-17; Western Elec. Co., 1917-20; with Trorlicht-Duncker Carpet Co., 1920 to date. 5592 Pershing Avenue, St. Louis, Mo.

**O'Connor, John Francis, B.S. (E.E.).** Tau Beta Pi. Mem. A. I. E.E. Cadet Eng., Denver Gas & Elec. Co., 1910-12; Asst. Supt., Distribution Dept., Empire Dist. Elec. Co., 1912-15; Results Eng., do., 1915-16; Supt., Massillon Elec. & Gas Co., 1916-19; Gen. Mgr., The Acme Power Co., 1919-20; V.-P. and Gen. Mgr., do., 1920-21; Elec. Eng., The Toledo Edison Co., 1921 to 1923; Mgr. Electrical Dept., do., 1922 to date. Care The Toledo Edison Co., Toledo, Ohio.

**Pickering, Dale Augustus, B.S. (E.E.).** Apprentice, W. E. & Mfg. Co., 1910-12; Sales Dept., do., 1912-16; Meterman, Montana Power Co., Butte, 1916-17; Sales Dept., Westinghouse E. & M. Co., East Pittsburgh, Pa., 1917-23; Marine Sales, do., 1923 to date.

**Pine, Percy P., B.S. (E.E.).** Testman, G. E. Co., 1910-13; Boston-Colo. Power & Water Co., 1913-16; Power Salesman, San Diego Consolidated Gas & Elec. Co., 1916 to date. 2036 Fern St., San Diego, Calif.

**Putnam, Merritt Howard, B.S. (E.E.).** Installing Tel. Central Office Equipment, Western Elec. Co., 1910-16; Editing Eng. in Equipment Eng. Branch, do., Chicago, 1916 to 1919; Eng. Checker 1919-24; Pricing Division, 1924 to date. 1104 N. Latrobe Ave., Chicago, Ill.

**Rank, Frank Addison, B.S. (E.E.).** Testman, G. E. Co., 1910-11; Instructor in Drawing, Rensselaer Polytechnic Inst., 1911-13; Salesman, G. E. Co., 1914-17; Second Reserve Officers' Training Camp, Presidio; Commissioned First Lt., U. S. R., 1917-19; Salesman, G. E. Co., 1919 to date, 1446 Gilmer Ave., Salt Lake City, Utah.

**Roberts, Roy Powderly, B.S. (C.E.).** Civil Eng., 1910-16; Asst. Eng., Shanghai Municipal Council, 1916 to date. 7 Darrock Road, Shanghai, China.

**Robertson, Elon Arthur, B.S. (E.E.).** Jun. A.I.E.E. Apprentice, W. E. & Mfg. Co., 1910-12; Sales Correspondent, Ry. & Lighting Dept., do., 1912-14; Sales Eng., do., St. Louis, Mo., 1914. 6751 Merrill Ave., Chicago, Ill.

**Scott, Ralph Albert, B.S. (Ch.E.).** Sales Eng., Sullivan Machinery Co., 1910-15; do., Denver Rock Drill Mfg. Co., 1915-16; Dist. Mgr., Salt Lake, do., 1916-20; Director, Domestic Sales, 1920 to 1921. Sales Mgr. Denver Rock Drill Mfg. Co., 1921 to date. 4625 E. 25th., Denver, Colo.

**Shumate, Churchill, B.S. (M.E.).** Sergeant, 8th Service Co., Signal Corps, U. S. N. A., 1918-19. Glenwood Springs, Colo.

**Simmering, Siebelt L., B.S. (M.E.).** M.E. 1916. M.S., Univ. of Ill., 1913. Assoc. M. of A.S.M.E.; Tau Beta Pi. Instructor in Mech. Eng., Univ. of Colo., 1910-12; Fellow in Mech. Eng., Univ. of Ill., 1912-13; Instructor in Industrial Eng., Penn. State College, 1913-14; Instructor in Steam and Gas Eng., Kansas State Agricultural College, 1914-15; Asst. Prof. of Steam and Gas Eng. and sometimes acting head of Dept., do., 1915-18; Research Assoc., Eng. Experiment Station Univ. of Ill., 1918-19; Assoc. Prof. in Mech. Eng., Univ.

of Colo., April, 1918 to Sept., 1922; Prof. Mech. Eng. Univ. Colo., 1922 to date. 860 14th St., Boulder, Colo.

**Singleton, Joseph Frederick, B.S. (E.E.).** Asst. Cashier, Bank of Alma, 1910-15; Pres., do., 1915 to date and V. Pres Bank of Fairplay, 1914 to date., Alma, Colo.

**Smith, Julius Carroll, B.S. (M.E.).** Magna Power Plant, Utah Copper Co., 1913-15; First Lt., Aviation Corps, 1918.

**Starks, Verne Eugene, B.S. (E.E.).** Apprentice, W. E. & Mfg. Co., 1910-15; Salesman, Elec. Products Co., 1915-17.

**Sunnergren, Arvid Peter, B.S. (E.E.).** Apprentice, W. E. & Mfg. Co., 1910-11; Industrial Motor Testing Dept., do., 1911-15; Eng., Spark-no-Ignition Lock Co., 1915-16; W. E. & Mfg. Co., 1916 to date. Lincoln Place, Pa.

**Tyler, Eugene Magnus, B.S. (E.E.).** Farmer, 1910-15; Jeweler, 1915 to date. Mankato, Kan.

**Walrath, Andrew Judson, B.S. (E.E.).** Apprentice, W. E. & Mfg. Co., 1910-11; Salesman, do., 1911-15; do., O. C. Allen Co., 1915-16; Elec. Eng. Dept., Ford Motor Co., 1916.

**Weber, Edward Roland, B.S. (E.E.).** Apprentice, G. E. Co., 1910-12; Eng., Pueblo & Suburban Traction & Lighting Co., 1912-16; Ark. Valley Ry., Light & Power Co., 1916 to date. 1416 Vernon, Pueblo, Colo.

## 1911

**Blake, Roland Patton, B.S. (Ch.E.)** Assoc. Am. Soc. M.E., M.A.S.Ch.E. Apprentice, W. E. & Mfg. Co., 1911-12; Eng., Underwriters Lab., 1912-14; Eng., Independence Inspection Bureau, 1916-17; Asst. Supervising Eng., Independence Bureau, 1916-17; Asst. to V.-P., U. S. Housing Corporation, 1918; Supervising Eng., Independence Bureau, 1919-20; Asst. Gen. Supt. Joliet Plant, The Rubberoid Co., 1921 to date. Joliet, Ill.

**Brown, Frank Logan, B.S. (C.E.).** S.P.E.E. Tau Beta Pi. Transitman, Union Pacific Ry., summer of 1911; Assistant in Civil Engineering, University of Colorado, 1911-12; Instructor in Civil Engineering, do., 1912-13; Assistant Professor of Mechanics, University of Kansas, 1913-19; Associate Professor of Mechanics, do., 1919-22; Professor of Mechanics and Head of the Department, do., 1922 to date; Draftsman, summer of 1916, M. K. & T. Ry.; Draftsman, summer of 1918, Cantonment Location, Ft. Riley, Kans.; Draftsman, summer of 1918, A. T. & S. F. Ry.; Detailer, summer of 1918, Kansas City Terminal Ry. Co.; Instructor in charge of concrete work, summer of 1919, S.A.T.C., University of Kansas; Designer, summer of 1920, Harrington, Howard & Ash, Kansas City, Mo.; Designing Engineer, summer and fall of 1921, Memorial Athletic Stadium, University of Kansas, Room 103, Marvin Hall, University of Kansas, Lawrence, Kans.

**Brown, Ralph Leigh, B.S. (M.E.)** 1921. Night Supt., Merchant Mills, C. F. & I. Co., 1911-12; Bureau of Consultation & Tests, R. W. Hunt & Co.; Inspector at Dominion Iron & Steel Co., Gary Plant and South Chicago Works, Ill. Steel Co., 1912-13; Designing Eng., Youngstown Sheet & Tube Co., 1913-18; Sanitary Eng., C. F. & I. Co., 1916-18; Master Mech. of By-product Coke Plant, C. F. & I. Co., 1918; Mech. Eng., do., 1919-20; Asst. Eng., New Jersey Zinc Co., 1920; Asst. Supt. Semet-Solvay Co., 1921; Supt., S. S. Co.; Asst. Construction Eng., S. S. Co., Syracuse, N. Y., to date.

**Cowell, Franklin Wier, B.S. (C.E.).** Eng., Great Western Sugar Co., 1911-16; Traveling Eng., do., 1916 to date. 1374 Emerson St., Denver, Colo.

**DeRemer, James Silas, B.S. (E.E.).** Tau Beta Pi. Asst. in Dynamo Elec. Mach. and Elec. Lab., 1910; Asst. in Eng. Drawing, Univ. of Colo., 1911; Office of Division Eng., D. & R. G. R. R., Salida, Colo., 1916-17; Pilot Eng., D. & R. G. R. R., 1917 to date. Care D. & R. G. R. R., 641 Equitable Bldg., Denver, Colo.

**Dierstein, Arthur Lewis, B.S. (C.E.).** Draftsman, Am. Bridge Co., 1911-13; Designer, Chicago, Milwaukee & St. Paul Ry., 1913; Instructor in Civil Eng., Purdue Univ., 1913-15; do., Penn. State College, 1915-18; Eng., Director's Dept., U. S. Explosives Plant C, 1918-19; Summer, 1914, Designer, C. M. & St. P. Ry. Co.; 1915, Road Asst. Am. Portland Cement Mfg. Assoc.; 1917, Asst. Eng., Costilla Reservoir; Designing Eng., U. S. Eng. Office, Wash., D. C., 1919-20; Construction Eng., Yeager & Sons, Danville, Ill., 1920 to date. Danville, Ill.

**Duff, Arthur Mitchell, B.S. (C.E.).** Draftsman, Am. Bridge Co., 1911-14; Inspector, Pittsburgh Testing Lab., 1914-17; Structural Eng., Fargo Eng. Co., 1917; U. S. Army in France, 1918-19; Draftsman, Whitehead & Kales Iron Works, 1920; Instructor, Univ. of Ill., 1921-23; Urbana, Ill.

**Fawcett, Charles De Van, B.S. (E.E.).** Member A.I.E.E. Construction Work, City of Boulder, 1911; Instructor in Elec. Eng., Univ. of Colo., 1911-12; Testman, G. E. Co., 1912-13; Eng. Dept., do., 1913; Instructor in Elec. Eng., Univ. of Penn., 1913-16; Consulting Eng., 1913-16; Asst. Sec., Illuminating Eng. Soc., 1916-17; Authorized Representative, Emergency Fleet Corporation, 1918; Asst. Prof. of Elec. Eng., Univ. of Penn., 1919; Consulting Eng., 1919 to date. Dept. of Elec. Eng., Univ. of Penn., Philadelphia, Pa.

**Finley, Robert Byron, B.S. (E.E.).** E.E. 1914. Tau Beta Pi. Testman, G. E. Co., 1911-13; Instructor at Towne Scientific School, Univ. of Penn., 1914-16; Commercial Engineering, 1913-14; Transformer Designing Eng., G. E. Co., 1916 to 1923; Gen. Elec. Co., Sales Office, 1923 to date. G. E. Co., Rialto Bldg., San Francisco, Calif.

**Giroux, Roy Mortimer, B.S. (E.E.).** Testman, G. E. Co., 1910-12; Eng., Designing Rotary Converters, do., 1912-14; Graduate Student, Union College, 1914-15; G. E. Co., 1915-18; Lt. U. S. N. R. F., Lighting Eng. Dept. 826 Stanley, Schenectady, N. Y.

**Hall, James Arthur**, B.S. (C.E.). Tau Beta Pi. Draftsman, Am. Bridge Co., 1911-12; Asst. Foreman in bridge erection, Stupp Bros. Bridge & Iron Co., 1912-13; Draftsman, Stone & Webster Eng. Corporation, 1913; Draftsman, Leonard Construction Co., 1913; Detailer, Checker, Field Auditor, Draftsman in Charge Tank Dept., Kansas City Structural Steel Co., 1913; Mgr. Tank Dept., to date. 4033 Metropolitan Ave, Kansas City, Kan.

**Hart, Alexander Platt**, B.S. (E.E.). Apprentice, W. E. & Mfg. Co., 1911-14; Operating and Maintenance Dept., Gas & Elec. Co., 1914-15; Farmer, 1915 to date. Nunn, Colo.

**Hartford, Fred Dalley**, B.S. (C.E.). Assoc. M. Am. Soc. C. E., Tau Beta Pi. City Eng., Berthoud, 1910-11; Detailer and Checker, Am. Bridge Co., 1911-13; Designer, H. S. Crocker, Consulting Eng., 1913-15; Mech. Eng., Western Chem. Mfg. Co., 1915-19; Eng., Gen. Chem. Co., Denver Works, 1919 to date. 1550 Lafayette Street, Denver, Colo.

**Heinz, Langley**, B.S. (C.E.). Tau Beta Pi. Draftsman, Am. Bridge Co., 1911-14; Draftsman, Dominion Bridge Co., 1914-15; Michigan State Ry. Com., 1915-16; Asst. Chief Eng., Gary Tube Plant, National Tube Co., 1916-18; Draftsman, Thompson Starrett Co., 1918-19; Dept. of Eng., San Luis Obispo, Calif. Electric Bond & Share Co., New York City.

**Johnston, Alexander Laughlin**, B.S. (E.E.). E.E. 1913. Assoc. A.I.E.E., Tau Beta Pi. Instructor in Elec. Eng., Penn. State College, 1911-13; Elec. Eng., Penn. State College, 1911-13; Elec. Eng., Luzerne County Gas & Elec. Co., 1913-15; Elec. Construction Eng., Hudson Coal Co., 1915-18; Supt. of Elec. Construction, M. A. Hanna Co., 1918 to date. 615 Greenwood, Pottsville, Pa.

**Kelly, Alfred Allen**, B.S. (M.E.). Tau Beta Pi. Sigma Xi. Student, W. E. Co., 1911-12; Mfg. Methods Dept., do., 1912-16; Mech. Methods Dept., Chief of Cable Section, do., 1916-17; Night Gen. Foreman, Cable, Rubber and Insulating Dept., do., 1917-18; Chief of Cable, Rubber and Insulating Planning Dept., 1918 to date. Western Springs, Ill.

**Kurtz, Julius**, B.S. (E.E.). Testman, W. E. & Mfg. Co., 1911-13; Elec. Eng., Tonopah Placer Co., 1913-14; Elec. Eng., N. Y. Eng. Co., 1914-15; Sales Eng., W. E. & Mfg. Co., 1915-19; Chief Elec., International Smelting Co., 1919-23. Elec. Eng. of International Smelting Co., 1923 to date. Box 464, Tootie, Utah.

**Madden, Maurice Michael**, B.S. (C.E.). Draftsman, Am. Bridge Co., 1911-12; Structural Detailer, Atchison, Topeka & Santa Fe Railway, 1912-16; do., Strauss Bascule Bridge Co., 1916 to date. 7641 Union Avenue, Chicago, Ill.

**Mathis, Charles Clifford**, B.S. (E.E.). Tau Beta Pi. Arnold Co., 1911; Field Elec. Eng., Fed. Light and Traction Co., 1911-13; Eng. on Estimates, Designs and Specifications, and Construction Supervision, Utah Power & Light Co., Salt Lake City, 1913-18; Ensign (Civil Eng. Corps), U. S. N. R. F.; Project Eng. in charge of construction, Newport, R. I., 1918-19; promoted to Lt., Junior Grade, 1919; Gen. Supt. of Light & Power, Monongahela Valley Traction Co., Fairmont, W. V., 1919; Eng. and Gen. Supt. of Construction and Maintenance, Brunswick-Balke-Collender Co., Muskegon, Mich., 1919-21; Asst. Eng., Elec. Eng. Dept., West Penn Power Co., Pittsburgh, Pa., 1921-22; Eng., Elec. Eng. Dept., Elec. Bond & Share Co., 1922 to date. 71 Broadway, New York City.

**Matthews, George**, B.S. (E.E.). Cadet Eng., Denver Gas & Elec. Co., 1911-12; Sec., Citizens Gas & Elec. Co., Mt. Vernon, Ill., 1912-13; Auditor, Danbury & Bethel Gas & Elec. Co., Danbury, Conn., 1913-17; Asst. Mgr., Crew Levick Co. (of Del.), Fort Worth, Texas, 1917-19; Empire Gas & Fuel Co., Oil Hill, Kan., 1919 to 1923, do., Wichita Falls, Tex., 1923; Bartlesville, Okla., 1923 to date.

**McClurg, Verne Orva**, B.S. (C.E.). Draftsman, Am. Bridge Co., 1911-13; Masonry Ins., Ill. Central R. R., 1913-14; Draftsman and Bridge Insp., do., 1914-17; Structural Draftsman, Bureau of Yards and Docks, 1917-18; U. S. Explosives Plant, 1918-19, with E. C. and R. M. Shankland, Civil Envs. 209 So. La Salle, Chicago, Ill.

**McNeil, Orange Malcolm**, B.S. (C.E.). Draftsman, Am. Bridge Co., 1911-13; Draftsman, Dominion Bridge Co., 1913-14; Lewis & Hall Structural Steel Co., 1914-15; A. A. Smith Construction Co., 1915-16; Instructor in Bridge Eng., Univ. of Michigan, 1916-17; Lt., National Naval Volunteers, 1918-19; Sales Eng. with Frank D. Chase, Incorporated, Industrial Eng., Chicago, Ill., 1919-20; with George W. Goethals & Company, N. Y. City, 1921 to date. Phi Gamma Delta Club, 44 W. 44th St., New York City.

**O'Brien, John Thomas**, B.S. (E.E.). Equipment Eng., W. E. Co., 1912-16; District Insp., Pittsburgh Dist., do., 1916-18; Industrial Sales Expert, Pittsburgh Dist., do., 1919-21; Production Service 1921-22; Production Clerical Methods, 1921-23; Routines and Methods of Storekeeping, 1924 to date. Box 49, Congress Park, Ill.

**Oshorn, Verdon Outwater**, B.S. (E.E.). W. E. & Mfg. Co., 1911-16; Asst. Foreman, Large Industrial Test, do., 1916-18. 7472 McClure Street, Swissvale, Pa.

**Pease, Carl James**, B.S. (E.E.). Apprentice, Western Elec. Co., 1911-14; Asst. Eng., Chicago Surface Lines, 1914 to date. 2544 Race Street, Denver, Colo.

**Prince, Ernest**, B.S. (E.E.). Assoc. A.I.E.E. Mining Dept. Allis-Chalmers Co., 1911-12; Apprentice, W. E. & Mfg. Co., 1912-13; Salesman, do., 1913.

**Prouty, Winfred Lafayette**, B.S. (C.E.). Transitman, Hahn's Peak & Pacific Ry., 1911-12; Office Eng., Goldsborough Co., 1912-13; Eng. with Park Dept., City of Denver, 1914-16; Designing Eng., Victor-Am. Fuel Co., 1916-17; Structural Designer, Western Chem. Mfg. Co., 1917-19; Chief Eng., Colo. Chem. Mfg. Co., 1919-20; Chief Draftsman, Gates Rubber Co., 1920; Senior Draftsman, U. S. Reclamation Service, 1920-22; Civil Engineer, Representing Rapid Drainage Pipe Corp. and National Water Main Cleaning Co., 1922 to date. 4550 Julian Street, Denver, Colo.

**Rayor (Rachofsky), Morris Oscar**, B.S. (E.E.). State Manager, Success Co.'s Branch Offices, 1911-16; Sec., Mozell Oil Co., 1916-19; Petroleum Eng., 1919 to date. 418 Book Bldg., Detroit, Mich., and Luling, Texas.

**Read, Lee Wheeler**, B.S. (E.E.). Testman, G. E. Co., 1911-12; Supt., Nat. Roofing Co., 1912; Supt., A. H. Read Co. (Paving Contractors), 1912 to date. Care of Mrs. E. H. Read, Council Bluffs, Iowa.

**Rohde, Earnest Conrad, Jr.**, B.S. (C.E.). M.S. 1912. Sigma Xi. Graduate Student, Univ. of Colo., 1911-12; Auditor, Southern Pacific Ry. Co., 1912-14; Clothier, 1914-17; Aviation Corps, U. S. Army, Kelley Field, 1917-19; Clothier, 1919 to date. Home address, State Center, Iowa.

**Rose, John G.**, B.S. (C.E.). Assoc. M.A.M. Soc. C. E. Location Eng., Goldsborough Co., Denver, Colo., 1911-12; Draftsman, Kansas City Structural Steel Co., 1912-13; Eng., Consolidation Coal Co., Jenkins, Ky., 1914-15; Draftsman, Am. Bridge Co., Gary, Ind., 1915-16; Location Eng., Atchison, Topeka & Santa Fe Ry., 1916-18; Asst. Eng., U. S. Reclamation Service, 1918-19; Highway Eng., Bureau of Public Roads, 1919 to date. 301 Custom House, Denver, Colo.

**Shulters, Gardner Alvah**, B.S. (C.E.). Shop Inspector, Am. Bridge Co., 1910-11; Instrumentman, Am. Bridge Co., 1911-12; Draftsman, do., 1912-14; do., Chicago Steel Products Co., 1913-14; do., Sachawanna Bridge Co., 1914; do., Bollinger & Andrews Construction Co., 1914; do., McClintic-Marshall Construction Co., 1914-15; Eng., Smith & Caffrey Co., 1915-18.

**Sperry, Charles Stillman**, B.S. (C.E.). B.A. 1911. C.E. 1915. Math. Assoc. of Am., Am. Math. Soc., Sigma Xi. Inspector, Construction Dept., Northern Pacific Ry. Co., 1911-12; Graduate Student, Univ. of Colo., 1913; Instructor in Eng. Math., do., 1913-15; Asst. Prof. of Engineering Math., 1915-18; Prof. of Eng. Math., do., 1918 to date. University of Colorado, Boulder, Colo.; on leave of absence since June, 1921. 1605 Hillside Road, Boulder, Colo.

**Stocker, Harry Short**, B.S. (C.E.). Eng., Stocker & Fraser, 1911-18; Eng., U. S. Gen. Hospital, 1918; Eng. Allison Stocker, 1918 to date. 217 Chamber of Commerce Bldg., Denver, Colo. Bx. 174, R. 2, Arvada, Colo.

**Tomlinson, Harley Elba**, B.S. (C.E.). Tau Beta Pi. Foreman, Utah Copper Co., 1911.

**Vernia, Harry Edwin**, B.S. (C.E.). Tau Beta Pi. Asst. in Eng. Drawing, Univ. of Colo., 1911. Died at New Albany, Ind., February 21, 1912.

**Wightman, James Wesley**, B.S. (E.E.). E.E. 1914. Assoc. A.I.E.E., Tau Beta Pi. Testman, G. E. Co., 1911-12; Consulting Eng. Dept., do., 1912-13; Commercial Eng., P. & M. Dept., do., 1913-15; Sales Eng., do., 1915-20; Dist. Mining Specialist, 1920 to date. 41 Burns Ave., Sta. R., Cincinnati, Ohio.

## 1912

**Abel, Richard James**, B.S. (E.E.). Apprentice, W. E. & Mfg. Co., 1912-15; Eng., do., 1915-16; Wire Chief, Western Union Tel. Co., 1916 to date. 322 N. Oxford, Los Angeles, Calif.

**Accola, Edward Conrad**, B.S. (M.E.). Western Elec. Co., 1912-15; Lamp Dept., do., 1915-16; Methods Eng., do., 1916-18. Died December 28, 1918.

**Blakey, Marcus Austin**, B.S. (M.E.). Apprentice, W. Machine Co., 1912-13; Instructor in Physics, Colo. College, 1913-14; Factory Eng., Bulck Motor Co., 1915-18; Foundry Eng., Wilson Foundry & Machine Co., 1919-20; International Harvester Co., Milwaukee, Wis., 1920 to date.

**Bloch, Marx**, B.S. (C.E.). Draftsman, Am. Bridge Co., Bridge and Building Dept., do., 1915-16; Valuation Dept., do., 1916-17; Asst. Eng., Valuation Dept., do., 1917; Designer, Bridge Dept., I. C. R. R. 1000 Central Station, Chicago, Ill.

**Briggs, Alfred Poyneer**, B.S. (Ch.E.). Graduate Student, Stanford Univ., 1913-15; do., Univ. of Calif., 1915-17; Student, School of Medicine, Columbia Univ., 1917 to date.

**Carver, Walter Lewis**, B.S. (E.E.). Sec.-Treas. Steamboat Service Co. Steamboat Springs, Colo.

**Cragin, Harold Paul**, B.S. (Ch.E.). B.A. 1911. Am. Chem. Soc. Denver Gas & Elec. Co., 1912; Asst. Chemist, Gen. Chem. Co., N. Y., 1912-18; Chem. Eng., do., 1916-18; U. S. Nitrate Plant No. 1, Sheffield, Ala., 1918-19; Atmos. Nit. Corp., Syracuse, N. Y., 1920-23; Sun Oil Co., Syracuse, N. Y., 1923 to date. (Home address) 601 Ocean Ave. Brooklyn, N. Y.

**Crawford, Ivan Charles**, B.S. (C.E.). C.E. 1915. Assoc. M. Am. Soc. C.E. Tau Beta Pi, Sigma Xi. Masonry Insp., Ill. Central R. R., 1912; Instructor in Civil Eng., Univ. of Colo., 1912-16; Asst. Prof. of Civil Eng., do., 1916-19; Summers, 1913, '14; Bridge Insp., Denver & Rio Grande R. R., 1915; Masonry Insp., Ill. Central R. R., 1916; Captain, Commanding Co., B. Eng., Colo. National Guard, 1916-17; Major, 115th Regiment Eng., 1917-19; Assoc. Prof. of Civil Eng., Univ. of Colo., 1919 to 1922; Prof. Civil Eng., Acting Head of Dept., do., 1922-23; Dean of College of Eng. and Prof. of C. E., Univ. of Idaho, Moscow, Idaho, 1923 to date.

**Crisman, Clarence Obed**, B.S. (C.E.). Office of City Eng. of Denver, 1912-13; Office of State Eng. of Colo., 1913-15; Public Utilities Com., 1915; Van Sant-Houghton Eng. Co., 1916-17; with Field, Fellows & Hinderlinder, Consulting Eng., 1917; Eng., Producers & Refiners Corporation, 1917-18; U. S. Army, 1918; Eng., Emergency Fleet Corporation, 1918 to 1920; Astoria, Ore., Standard Oil Co., (Ind.) 1920 to date. 624 S. Center St., Casper, Wyo.

**Day, Calvin Lester**, B.S. (C.E.). Tau Beta Pi. Asst. City Eng., Boulder, Colo., 1912; Structural Draftsman, Am. Bridge Co., Gary Plant, 1913-18; Ship Draftsman, La Salle Eng. Co., Chicago, Ill., 1918; Designing Eng., Robins Conveying Belt Co., 1918 to date. 7030-B Creighton Ave., Chicago, Ill.

**Des Brisay, George Stephen**, B.S. (C.E.). Tau Beta Pi. Draftsman, Kansas City Structural Steel Co., 1912. Mesabi Iron Co., Babbitt, Minn.

**Dodds, Eugene Haddock**, B.S. (Ch.E.). Am. Chem. Soc., Tau Beta Pi. Student Course, Western Elec. Co., 1912-13; Analytical Chemist, 1913-16; Eng. (Research) Chemical, 1916 to date. 611 Thomas Ave., Forest Park, Ill.

**Du Vall, Willet Clinton**, B.S. (E.E.), 1912. E.E., 1921. Member A. I. E. E.; S. P. E. E.; Eta Kappa Nu. Operator Central Colo. Power Co., 1912-13; Fairbanks-Morse Elect. Co., 1913-15; Instructor Elect. Eng., Univ. of Penn., 1915-1918; Asst. Prof. Elect. Eng., Univ. of Penn., 1918-19; Summer 1917, Cable Dept., Bell Tel. Co., Phila., Pa., 1918; Asst. to Wks. Mgr. Brill Car Co., Phila., Pa.; Assoc. Prof. Elect. Eng., Univ. of Colo., 1919-21; Prof. Elect. Eng., 1921 to date; Counsellor for U. S. V. B., 1919-23. Boulder, Colo.

**Fraser, Andrew Chauncey**, B.S. (E.E.). Tau Beta Pi. Apprentice, Western Elec. Co., 1912. Died at Boulder, Colo., Nov. 16, 1912.

**French, Carson Tracy**, B.S. (C.E.). Draftsman, Kansas City Structural Steel Co., 1912-13; Transitman, Knoxville Power Co., 1916; Highway Bridge Work in Dominican Republic, 1918-19.

**Giroux, Carl Hunting**, B.S. (E.E.). Testing Dept., G. E. Co., 1912-13; Eng. Ry. Equipment Dept., do., 1913-17; Eng., Marine Eng. Dept., Washington, D. C., 1917-23. 18 Kedron Ave., Morton, Pa.

**Greenwood, Arthur Irving**, B.S. (E.E.). Tau Beta Pi. Apprentice, W. E. & Mfg. Co., 1912-14; Instructor in Elec. and Physics, West Tech. High School, Cleveland, Ohio, 1914-19; Farmer, Hotchkiss, Delta Co., Colo., 1919 to 1923; Elec. Draftsman United Verde Copper Co., Clarkdale, Ariz., 1923 to date. Box 472, Clarkdale, Ariz.

**Hartman, Warder Nathan**, B.S. (M.E.). Signal Apprentice, Penn. R. R., 1912-16; Asst. Supt. of Signals, Trenton Division, do., 1916-17; Asst. Supervisor of Signals, Office of Valuation Eng., do., 1917 to date.

**Hull, Robert Harsh**, B.E. (E.E.). Jun. A.I.E.E.E., Tau Beta Pi. Apprentice, W. E. & Mfg. Co., 1912-14; Sales Correspondent, do., 1914-15; Draftsman, Am. Beet Sugar Co., 1915-16; Eng. on Construction, Dyer Construction Co., 1916-17; Lt. (Jg.), U. S. N. R. F., U. S. S., Virginia, 1918-19; Draftsman, Great Western Sugar Co., 1919; Vocational Instructor, Univ. of Colo., 1921-23; Instructor in Elec. Eng., U. of C., 1923 to date, Boulder, Colo.

**Huntington, Glen Herbert**, B.S. (C.E.). Draftsman, Minneapolis Steel & Mach. Co., 1912; do., Am. Bridge Co., 1912-14; Masonry Insp., Ill. Central R. R., 1914-16; Draftsman, Am. Bridge Co., 1915; do., Ill. Central R. R., 1915-16; do., Great Western Sugar Co., 1916; Building Insp., Ill. Central R. R., 1916-17; Second R. O. T. C., Ft. Sheridan, Ill. Commissioned 1st Lt., F. A. U. S. R., 1917; A. E. F., France, 1918-19; Ill. Central R. R., 1919; Stoolmen Construction Co., Champaign, Ill., 1920. 1650 High St., Denver, Colo.

**Kettering, Walter Henry**, B.S. (E.E.). Apprentice, Fairbanks-Morse Co., 1912-14; Asst. Dist. Insp., Public Service Co., of Northern Ill., Joliet, 1914-17; Co. E, 2nd Eng., A. E. F., France, Germany, 1917-19; Asst. Dist. Insp., P. S. Co., of No. Ill., Joliet, 1919-23; Asst. Eng., Public Service Co., of N. Ill., 1923 to date. 72 W. Adams, Chicago, Ill.

**Leonard, Lynn Ruliff**, B.S. (E.E.). M.S. 1913. E.E. 1915. Instructor in Elec. Eng., Univ. of Colo., 1912-16; Tungsten Mining, 1916-17. Scottsbluff, Neb. 1917 to date.

**Limprecht, Elwood George**, B.S. (M.E.). Apprentice, A. T. & S. F. Ry., 1912-14; Supervisor of Manual Training, Bisbee Public Schools, Bisbee, Arizona, 1914-18; Instructor, Machine Design, S. A. T. C. W. Va. Univ., Morgantown, W. Va., 1918-19; Supervisor Manual Training, Bisbee Public Schools, Bisbee, Arizona, 1919-20; Owner Diller Auto Co., Diller, Nebr., 1920-23; Supervisor, Industrial Arts and Teacher Trainer of Voc. Education, Board of Education, Lincoln, Nebr., 1923 to date. 2954 Ryons St., Lincoln, Nebr.

**Lonnecker, George Vye**, B.S. (E.E.). Tau Beta Pi. Testman, G. E. Co., 1912-15; Eng., do., 1916 to date. 929 Monadnock Block, Chicago, Ill.

**Lummls, Herbert Claire**, B.S. (C.E.). Asst. Eng., with Bion J. Arnold Consulting Eng., San Francisco, 1912-13; do., Board of Supervising Eng., Chicago Traction, 1913-16; do., representing Com. Arnold, Chicago Traction and Subway Com., 1916-17; do., Arnold Co., 1917 to date. 756 Bitter Sweet Place, Chicago, Ill.

**Markley, Walter Raymond**, B.S. (E.E.). Apprentice, W. E. & Mfg. Co., 1912-14; Comm. Eng., 1914-17; do; Service, U. S. Signal Corps, 1917-19; Commercial Eng., W. E. & Mfg. Co., 1919 to date. 411 East End Ave., Pittsburgh, Pa.

**Mason, Marion Albert**, B.S. (E.E.). Testman, G. E. Co., 1912-14; Operator in Substantion, Pacific Light & Power Co., 1914-18; Western Light & P. Co., 1918 to date.

**McGinnis, W. Lynn**, B.S. (C.E.). Draftsman, Am. Bridge Co., Gary Plant, 1912-13; Lassig Plant, do., 1913-15; Roberts & Schaeffer Co., 1915; Donovan Wire & Iron Co., 1915-16; Am. Bridge Co., Pencoed Plant, 1916-17; Detroit Plant, do., 1916-17; Supt. of Erection, Service Dept., Blaw-Knox Co., Pittsburgh, Pa., 1917-24; The Bond & Mortgage Co., Denver, Colo., 1924 to date. Foster Bldg., Denver, Colo.

**Moulton, Victor Channing**, B.S. (E.E.). Jun. A.I.E.E.E., N.E.L.A. Apprentice, W. E. & Mfg. Co., 1912-14; Commercial Eng., do., 1914-16; Sergeant, Border Service, Penn. Radio Co., N. G., Pa., 1916 to 1917; Chief Elec. Eng., Union Pacific Coal Co., 1917-18; Master Signal Electrician, Army, Park "A", Headquarters 2nd Army, Toul, France, A. E. F., 1918-19; Asst. Chief Elec. Eng., Union Pacific Coal Co., 1919; V.-P., The Simms-Moulton Stores Co., Meeker, Colo., 1919 to date. Home address, Meeker, Colo.

**Mueller, Charles Augustus**, B.S. (E.E.). Load Dispatcher, Utah Power & L. Co., 1916 to date. Care Utah Power & L. Co. Terminal Station, Salt Lake City, Utah.

**Newkirk, Guy St. Clair**, B.S. (C.E.). A.I.M. & M. Eng., Concrete Insp., Compania Agricola de Fuerza Electrica Del Rio Conchos, 1912-13; Eng., Moffat Coal Co., 1914 to date. Oak Creek, Colo.

**Page, Wilfred Leroy**, B.S. (E.E.). Tau Beta Pi. Mt. States Tel. & Tel. Co., 1912-17; U. S. Reclamation Service, 1917 to date. Box 101, care Elec. Supply Co., Rupert, Idaho.

**Phillips, George Burton**, B.S. (E.E.). A.I.E.E.E. Testman, G. E. Co., 1912-16; Gen. Eng. Lab., do., 1916 to date. 104 James St., Scotia, N. Y.

**Rachofsky, Oscar Morris**, B.S. (C.E.). Tau Beta Pi. Draftsman, Am. Bridge Co., 1912-13; Designer, Chicago, M. & St. P. Ry., 1914-15; Elec. Dept., 1915-16; Designer, C. M. & St. P. Architectural Dept., 1916-17; Designer, Western Chem. Co., Denver, 1917-18; Asst. Eng., Western Chem. Co., 1918-19; Member Firm, New York Store Merc. Co., 1919 to date. 935 Cleveland Avenue, Loveland, Colo.

**Raymond, Harold Newnam**, B.S. (E.E.). Testman, G. E. Co., 1912-15; Gunner No. 85130, R. C. H. A., the British Exped. Force, 1915.

**Rich, John Dillon**, B.S. (C.E.). Draftsman, Denver City Tramway Co., 1912-16; Eng., Colo. Builders' Supply Co., 1916-18; U. S. Explosives Plant, 1918-19-20-21; National Fuse & Powder Co., 1921 to date. 2270 Forest Street, Denver, Colo.

**Rupp, Harry Kent**, B.S. (C.E.). Draftsman, Kansas City Structural Steel Co., 1912-13; Designer, Texas-Carnegie Steel Assoc., 1913-19; Chief Draftsman, do., 1919-20; Chief Eng., 1920 to date. Care Texas Carnegie Steel Association, Galveston, Texas.

**Skerry, Harry Allen**, B.S. (C.E.). Tau Beta Pi. Draftsman, Am. Bridge Co., 1912-14; Structural Draftsman, Western Chem. Co., 1916-17; Second Lt., Corps of Eng., U. S. Army, 1917-18; Captain, Corps of Eng., A. E. F., 1918; Captain, Corps of Eng., U. S. Army. Camp Benning, Ga. (Home address) 785 S. Washington St., Denver, Colo.

**Sproule, Turner Lumley**, B.S. (M.E.). Signal Apprentice, Penn. R. R., 1912-14; Asst. Insp. of Signals, do., 1914-16; Asst. Supervisor of Signals, Philadelphia Division, do., 1916-17. Died June, 1917.

**Twiss, Robert H.**, B.S. (E.E.). Testman, G. E. Co., 1912-15; Designing Eng., do., 1915-17; U. S. Navy Insp. Bureau, 1917-20; Designing Eng., G. E. Co., 1920 to date. 998 Eastern Ave., Schenectady, N. Y.

**Van Gundy, Cecil**, B.S. (C.E.). Tau Beta Pi. Masonry Insp., Ill. Central R. R., 1912-14; Draftsman, Bridge and Bldg. Dept., do., 1914-15; do., Valuation Dept., do., 1915-16; Bldg. Insp., do., 1916-17; Draftsman, Bldg. Dept., do., 1917; First Reserve Officers' Training Camp, 1917; First Lt., 107th Eng., 1917-1919; Eng. Construction, Ill. Central R. R., 1919; Denver Tramway Co., 1921; Bldg. Dept., I. C. R. R., 1921 to date. Dowle Bldg., Chicago, Ill.

**Warkley, John Crosswell**, B.S. (C.E.). Jun. Am. Soc. C.E. Eng., Goldsborough Co., 1912-13; Draftsman, Am. Bridge Co., 1913-14; Masonry Insp., Ill. Central R. R., 1914-18; Valuation Dept., do., 1918 to date. 714 S. Grant Ave., Casper, Wyo.

**Wightman, Irving Leslie**, B.S. (E.E.). Student Eng., G. E. Co., 1912-13; Ry. Eng., do., 1913-14; Eng., Safety Insulated Wire & Cable Co., 1914-16; Insp. Elec. Bond & Share Co., 1916; Asst. Mine Eng., Vindicator Consolidated Gold Mining Co., 1916-17; Mine Eng., Sunnyside Mining & Milling Co., 1917; Valuation Eng., Denver Tramway Co., 1918-19; Designing Eng., The Dorr Co., 1919-23. 2914 Java Ct., Denver, Colo.

## 1913

**Armor, Claude Arnett**, B.S. (E.E.). Apprentice, W. E. & Mfg. Co., 1913-15; Elec. Locomotive Insp., Pocahontas Division, Norfolk & Western R. R., 1915-16; Power Director, N. & W. R. R., Elec., Bluefield, W. Va., 1916-18; Ry. Service Dept., W. E. & Mfg. Co., East Pittsburgh, Pa., 1918-21; Field Eng. for W. E. & Mfg. Co., installing elec. equipment, Hell Gate Power Plant, United Elec. L. & P. Co., N. Y. City, 1921-22; Asst. Gen. Supt. of Construction for W. E. & Mfg. Co., Chilean State Ry. Elec., Valparaiso, Chile, South Am., after April 1, 1922. Care Westinghouse International Co., Valparaiso, Chile, So. Am.

**Barker, Lawrence Ward**, B.S. (C.E.). Tau Beta Pi. Contractor, Barker Construction Co., 1913. Master Eng., Hdqrs. Detach., 109th Eng., A. E. F.; Prop. Clarkdale Garage to date. Box 608, Clarkdale, Ariz.

**Beresford, Robert Morrison**, B.S. (C.E.). Eng., Wootton Coal Co., 1913-15; Draftsman, Western L. & P. Co., 1915; Masonry Insp., Ill. Central R. R., 1916.

**Blair, Tom Arthur**, B.S. (C.E.). Instructor in Civil Eng., Univ. of Colo., 1913-14; Eng. R. McF. Doble, Eng., 1914-15; Transitman, A. T. & S. F. Ry., 1915; Office Transitman, do., 1915-16; Office Eng., do., 1916-17; Second Lt., Co. B, 115th Regiment Eng., 1917; First Lt., do., 1918-19; Steel Insp., Wyo. State Highway Com., 1919; Office Eng., A. T. & S. F. Ry., 1920-21.

**Bonner, Clyde Rayburn**, B.S. (C.E.). Eng., Barker Construction Co., 1913-14; Tungsten Mining, 1916-17.

**Brace, Porter Hiscock**, B.S. (E.E.). Apprentice, W. E. Mfg. Co., 1913-14; Research Dept., do., 1914 to date. 421 Montview Place, Wilkinsburg, Pa.

**Bradfield, Louis George**, B.S. (M.E.). Pres., L. J. Bradfield Oil Co., 1914 to 1923; Sales Eng., Northwestern Expanded Metal Co., Los Angeles, 1923 to date. 501 Stimson Bldg., Los Angeles, Calif.

**Cavers, Robert Lionel Gilbert**, B.S. (E.E.). Testman, G. E. Co., 1913-16; National Roofing Co., 1916; Meterman, Ark. Valley Ry., L. & P. Co., 1916-17; G. E. Co., 1918. Died 1920.

**Christian, William Jacob**, B.S. (M.E.). Sigma Xi. Instructor in Eng. Math., Univ. of Colo., 1913-14; Instructor in Mech. Eng., do., 1914-17; Western Chem. Co., 1917; Mo. Cobalt Co., 1918. Died at Fredericktown, Mo., Feb. 24, 1918.

**Dahms, Robert Albert**, B.S. (C.E.). Asst. Eng., Minnesota State Highway Com., 1913-14; do., State Rural Highways, 1914-15; County Drainage Eng., Hubbard Co., 1915-16; Judicial State Rural Highway, No. 82 Eng., 1916-17; Eng., Hub-

hard County Ditches, 1917-18; Drainage Eng., 1918-19; County Highway Eng., Hubbard County, Minn., 1919-23. County Eng. of Hubbard and Cass Co., Minn., 1923 to date. Park Rapids, Minn.

**Doerner, Henry Alfred**, B.S. (Ch.E.). Tau Beta Pi, Sigma Xi. Chemist, U. S. Bureau Mines, 1913-16; Eng., Barkalow & Hughes, 1916.

**Elliott, Preston Green**, B.S. (E.E.). Instructor in High School, 1916-17; G. W. Sugar Co., 1917-18; Baldwin Locomotive Co., Philadelphia, Pa., May to Sept., 1918; G. E. Co., Schenectady, N. Y., 1918; Elec. Eng., William Wharton, Jr. & Co., Easton, Pa., 1921-22; New Jersey Power & Light Co., Dover, N. J., 1922 to date.

**Eisberg, Harry**, B.S. (C.E.). Tau Beta Pi. M. Wes. Soc. Eng. Draftsman, Bridge Estimator, Chicago, Burlington & Quincy Ry., 1913-16; Structural Designer, Arnold Co., 1916-17; Leonard Construction Co., 1917; First Reserve Officers' Training Camp, 1917; Eng. Dept., Corn Products Refining Co., 1917 to 1923; Structural Designer, Holabird and Roche Co., 1923 to date. 2935 N. New England Ave., Chicago, Ill.

**Eveland, George Harmon**, B.S. (E.E.). Tau Beta Pi, Sigma Xi. Testman, G. E. Co., 1913-15; Chief Operator, Denver City Tramway Co., 1915-16; Eng., U. S. Reclamation Service, 1916-17. 1733 Marion Ave., Berkeley, Calif.

**Forsythe, Carl Payne**, B.S. (C.E.). Draftsman, Kansas City Structural Steel Co., 1913-14; do., Kansas City Terminal Ry. Co., 1915-16. 1605 Houston, Kansas City, Mo.

**Gartland, Frank Joseph**, B.S. (E.E.). Cadet Eng., Denver Gas & Elec. Co., 1913-15; do., Street Ry. Dept., Toledo Ry. & Light Co., 1915-16; Supt., Gas Plant, Pueblo Gas & Fuel Co., 1916-17. Supt. of Operation, Public Service Co. of Colorado, Denver, Colo.

**Gleim, Ernest John**, B.S. (E.E.). Apprentice, W. E. & Mfg. Co., 1913-14; Junior Elec. Eng., U. S. Bureau of Mines, 1914-19; Asst. Elec. Eng., do., 1919-21; Eng., Charles M. Means Co., 1921; Assoc. Elec. Eng., U. S. Bureau Mines, 1922 to date. 738 Kelly Ave., Wilkesburg, Pa.

**Hall, John Temple**, B.S. (E.E.). Tau Beta Pi, Sigma Xi. Testman, G. E. Co., 1913-16; Des. Eng., do., 1916-17; Lt. U. S. N. R. F., 1917-19; Des. Eng. G. E. Co., 1919-21; Commercial Eng., 1921 to date. 55 Sacandago Rd., Scotia, N. Y.

**Irish, Willis Luther**, B.S. (E.E.). B.A. 1913. Tau Beta Pi. Student Course, Western Elec. Co., 1913-15; Power Units Clerk, Loading Rates Dept., 1915-18; Section Head in Loading Rates Dept., 1918-19; Chief of Loading Rates Dept., 1919; Salesman, W. H. Wright & Co., 1919 to date. 832 So. Euclid Ave., Oak Park, Ill.

**Jeffrey, William Maxson**, B.S. (C.E.). Tau Beta Pi. Asst. Forest Ranger, U. S. Forest Service, 1913-16; Surveyor-Draftsman, do., 1916-17; Junior Highway Eng., Office of Public Roads and Rural Eng., 1917 to date; Com. Provisional Second Lt., Corps of Eng., 1917; 46 Co. 20th Eng., France, 1918-19; Chief of Party, 1919-20; Highway Eng., Bureau of Public Roads, 1920 to date. 301 Custom House, Denver Colo. 49 S. Clarkson St., Denver, Colo.

**Kettle, James Robert Patrick**, B.S. (C.E.). Tau Beta Pi, Sigma Xi. Draftsman, Am. Bridge Co., Principal Examiner of Efficiency, Cook Co., Civil Service Comm.; Checker and Designer, Am. Bridge Co., 1913-17; Asst. Eng., Ordinance Plant Const., Gary Plant, Am. Br. Co., 1917-19; Eff. and Rate Eng., Am. Br. Co., 1919 to date. 240 Ellsworth St., Gary, Ind.

**Koenig, Samuel Adolph**, B.S. (E.E.). Testman, G. E. Co., 1913-17; Second Reserve Officers' Training Camp; Com. First Lt., Coast Artillery Corps, 1917. (Home Address) Golden, Colo.

**List, Alvin Fred**, B.S. (E.E.). Testman, G. E. Co., 1913-15; Induction Motor Eng. Dept., do., 1915-17; Lt. U. S. N. R. F., 1917-19; Induction Motor Eng. Dept., G. E. Co., 1919 to date. 419 Bradywine, Schenectady, N. Y.

**McKinney, Harry David**, B.S. (E.E.). Tau Beta Pi, Sigma Xi. Mech., Holinster Trans. Co., 1913-16; Clerk, do., 1916; Dist. Mgr., Driver-Harris Co., Chicago, to date. 656 Gordon Terrace, Chicago, Ill.

**Merrill, James Lynn**, B.S. (C.E.). Asst. in Eng. Drawing, Univ. of Colo., 1913-14; Instructor in Eng. Drawing, do., 1914-18; Am. Bridge Co., Gary, Indiana, 1918-23; Merrill Corporation, 446 N. State St., Chicago, Ill., 1923 to date.

**O'Connell, William Ward**, B.S. (C.E.). Draftsman, Kansas City Structural Steel Co., 1913; Masonry Insp., Ill. Central R. R., 1914-16; Draftsman and Asst. Eng., Valuation Dept., 1916-17; Second Lt., Eng., 1917-18; Wyo. State Highway Dept., 1919; Sec., Ames-Braisted Construction Co., 1920-21; Chicago Terminal Improvement Office, I. C. R. R., Dowle Bldg., Chicago, Ill.

**Purmort, George Ely**, B.S. (C.E.). Tau Beta Pi. Draftsman, Chicago, Burlington & Quincy Ry., 1913-14; Instructor in Civil Eng., Univ. of Idaho, 1914-16; Detailer, Wis. Bridge & Iron Co., 1916-17; Designer, Concrete Builders' Assoc., 1917 to 1919; Designer, Excavating Machinery, Pawling and Henschelger, 1919-20; Eng., R. L. Reisinger and Co., 1920 to date. 731 57th, Milwaukee, Wis.

**Randell, William Edward**, B.S. (E.E.). Wagner Elec. Co., 1913-16.

**Rehm, Herbert Eugene**, B.S. (C.E.). Surveyor, U. S. Forest Service, 1914-15; Transitman, A. T. & S. F. Ry., 1915-17; Office Eng., do., 1917-20; Transitman, Construction New Shops for A. T. & S. F. Ry., Albuquerque, N. M., 1920-21; Transitman, Pueblo, Colo., 1921 to 1922; Office Eng., 1922 to date. Care A. T. & S. F. Ry., Division Eng., Pueblo, Colo.

**Royce, Clarence Louis**, B.S. (C.E.). Asst. Eng., Big Horn Canon, Irrigation & P. Co., 1913 to 1919; Asst. City Eng., 1919 to date. 3309 4th Ave. N., Billings, Mont.

**Russell, Austin Phelps**, B.S. (C.E.). Transitman, U. S. General Land Office Survey, 1913; Asst. Eng., Mt. Whitney

P. & E. Co., Visalia, Calif., 1913-14; Forest Ranger, U. S. Forest Service, Denver, Colo., 1914; Surveyor, U. S. Forest Service, Colo. and Wyo., 1915-17; Sergeant, Co. "M," 23rd Eng., and Sergeant-Instructor, Army Eng. School, A. E. F., 1917-19; Resident Eng., Highway Construction, U. S. Forest Service, Laramie, Wyo., 1919; Resident Eng., State Highway Dept., Rock Springs, Wyo., 1920 to date. Rock Springs, Wyo.

**Sawyer, Arthur Lathrup**, B.S. (C.E.). Tau Beta Pi, Sigma Xi. Draftsman, Am. Bridge Co., 1913-16; do., Wis. Bridge & Iron Co., 1916-17; Structural Eng., Michigan Alkali Co., 1917 to date. 124 Vine St., Wyandotte, Mich.

**Schwer, August Leo**, B.S. (M.E.). Apprentice, A. T. & Service, 1913.

**Short, Clarence Robert**, B.S. (C.E.). U. S. Reclamation Service, 1913.

**Swift, Frank William**, B.S. (E.E.). Cadet Eng., Denver Gas & Elec. Co., 1913-15; do., Toledo Ry. & L. Co., 1915-16; Bartlesville Elec. L. Co., 1916-18; Second Lt., Air Service, 1918; Squadron Radio Officer, 5th Corps Observation Group; Group Radio Officer, 2nd Pursuit Group to 1919; Chief Clerk and Office Mgr., Oil Division, Empire Cos.; Asst. Division Supt. of Oil Production, do., 1919-20; Oil Well Drilling Contracting, 1920 to date.

**Unger, Max Samuel**, B.S. (Ch.E.). Chem. Eng., W. E. Co., 1913-16.

**Uyeda, Seizo**, B.S. (E.E.). Tau Beta Pi. Apprentice, W. E. & Mfg. Co., 1913-16; Eng., do., 1916; Elec. Dept. Japanese Govt. Rys., Takatori Works, Kobe, Japan.

**Watrous, Wallace Edwin**, B.S. (E.E.). Jun. A.L.E.E. Instrumentman, Santa Maria Reservoir, 1913; Testman, G. E. Co., 1913-15; Foreman, Power Motor Tests, do., 1915-16; Gen. Foreman, Motor Test, do., 1916-17; Marine Eng. Dept., do., 1917-21; with Sargent & Lundy of Chicago, located temporarily at Schenectady, N. Y., on Insp. Work for Australian Gov. Wireless Specialty Co., Boston, Mass.

**Wheatley, Walter Hannum**, B.S. (C.E.). Tau Beta Pi. Maintenance of Way Dept., Denver, Salt Lake & Northwestern Ry., 1913-15; with Jas. N. Wright & Co., Brokers, 1916-17; Second Reserve Officers' Training Camp, Com. First Lt., Coast Artillery Corps, 1917. Okmulgee, Okla.

**White, Raymond Merreman**, B.S. (M.E.). Factory Foreman, G. W. Sugar Co., 1913-16; Eng. Dept., do., 1916-17; Asst. Supt., Billings Plant, do., 1917-18; Ensign, Naval Aviation, 1918-19; Asst. Supt., Billings Plant, G. W. Sugar Co., 1919 to date. Care G. W. Sugar Co., Grand Junction, Colo.

**White, John Franklin, Jr.**, B.S. (C.E.). United Fruit Co., Care of Trujillo Railroad Co., Puertura Castillo, Spanish Honduras, Central America, 1920 to date. Home address, Blytheville, Ark.

**Winter, Boyd Wahl**, B.S. (E.E.). Apprentice, W. E. & Mfg. Co., 1913-16; Sales Eng., do., 1916. Seattle, Wash.

## 1914

**Alling, Arthur Rich**, B.S. (C.E.). Assoc. M. Am. Soc. C.E. Highway Dept., State of Idaho, 1914; Paving Insp., City of San Antonio, 1915-16; Resident Eng., Highway Com. of Wash. County, 1916-18; Division Eng., Ark.-Louisiana Highway, 1918; Asst. Eng. Ford & MacRae, Little Rock, Ark., 1918. 710 N. Pine St., San Antonio, Tex.

**Barrier, Grover Watkin**, B.S. (E.E.). Tau Beta Pi. Power Plant Eng. Colo. Yule Marble Co., 1914-16; Electrician, Yak Tunnel, Leadville, Colo., 1917; Power Plant Eng., Colo. Power Co., Salida, Colo., 1917; Chief Electrician, Campbell M. M. & T. Co., Ouray, Colo., 1917 to 1919; Salesman, Okla. Specialty Co., Oklahoma City, Okla., 1919 to date. 703 E. Fifth St., Oklahoma City, Okla.

**Bunger, Howard Phelps**, B.S. (C.E.). Rodman, A. T. & S. F. Ry., 1914-15; Transitman, do., 1915-16; Draftsman, do., 1916-17; U. S. Explosives Plant, 1918-19; Draftsman, Colo. Builders Sup. Co., Denver, Colo., 1919-20; do., U. S. Reclamation Service, 1920 to date. Wheat Ridge, Colo.

**Burton, William Ernest**, B.S. (E.E.). Sigma Xi. Operator, Colo. Power Co., 1914-15.

**Cargo, Robert Wayne**, B.S. (M.E.). Apprentice, W. Machine Co., 1914-15; Sales Dept., W. Machine Co., 1915; do., W. E. & Mfg. Co., 1915-17; Salesman, do., 1917 to date. 1030 Milton Ave., Edgewood, Pa.

**Clark, Cecil Swanger**, B.S. (C.E.). Masonry Insp., Ill. Central Ry., 1914-15; Draftsman, Valuation Dept. of Bridges and Bldgs., do., 1915-17. Asst. Eng. do., 1917-22; Bldg. Estimator, do., 1922-23; Asst. Engr., Bldg. Dept., 1923 to date. Dowle Bldg., I. C. R. R., Chicago, Ill.

**Clark, Everett Francis**, B.S. (M.E.). Tau Beta Pi. Apprentice, Westinghouse Machine Co., 1914-15; Commercial Engineer, Power Dept., W. E. & Mfg. Co., 1915-17; Mgr., Condenser Division, do., 1917; Corporal, 319th Infantry, 1917-18; ordered by War Dept. to Engineer Enlisted Reserve, Inactive List; Asst. Dist. Eng., Marine Dept., W. E. & Mfg. Co., 1918-20; Marine Sales Representative, do., 1920-22; in charge of Marine Sales, do., New York City, 1922 to date. 165 Broadway, 22nd Floor, New York City.

**Davis, Joseph Campbell**, B.S. (E.E.). Tau Beta Pi. Apprentice, W. E. & Mfg. Co., 1914-16; Ry. Eng. Dept., do., 1916-17; Sergeant, Hq. Co., 319th Inf., U. S. N. A., 1917 to date.

**Doland, James Joseph**, B.S. (C.E.). Tau Beta Pi, Sigma Xi. Instructor in Eng. Math., Univ. of Colo., 1914-16; Eng., W. J. Hoy Co., 1916-18; Asst. Eng., in charge of water supply, U. S. Explosive Plant C, Nitro, W. Va., 1918-19. Designer, U. S. R. S., Denver, Colo., 1923 to date. 2068 Holly St., Denver, Colo.

**Downing, Roderick Lyle**, B.S. (C.E.). Rodman, A. T. & S. F. Ry., 1914-16; Draftsman, Ore. Short Line R.R., 1916-17; Chief of Party, U. S. Bureau of Public Roads, 1917 to date.

**Eckel, Clarence Louis**, B.S. (C.E.) 1914. C.E. 1921. Tau Beta Pi, Sigma Xi. Concrete Designer and Detailer with H. S. Crocker, 1914; Instructor in Civil Eng., Univ. of Colo.,

1914-19; Summer, 1915, Supt. Construction, Farmers' Union Co-op. E. & S. Co.; 1916, Draftsman, Am. Bridge Co., and First Lt., Co. B, Eng., U. S. N. G. Colo.; Captain Co. A, 115th Regiment Eng., 1917-19; Asst. Prof. of Civil Eng., Univ. of Colo., 1919; Am. Bridge Co., Pencoed, Pa., Summers 1922-23; Asst. Prof. of Civil Eng., Univ. of Penn., 1919-23; Prof. of C. E., Univ. of Colo., Boulder, Colo., 1923 to date. 1144 11th St.

<sup>2</sup> **Fickes, Leland Stanford**, B.S. (E.E.). B.A. 1914.

**Fiske, Rogers Allen**, B.S. (M.E.). M.E. 1920. Tau Beta Pi. Assoc. Mem. A. S. M. E. Apprentice, Rock Island Ry., 1914-15; Draftsman, Am. Bridge Co., 1915-17; Asst. Dist. Eng., Am. Steel and Wire Co., 1917-22. Mech. Eng., Gen. Boilers Co., to 1922; Assoc. Editor, "Power Plant Engineering," 1922 to date. 2620 Potwyne Pl., Chicago, Ill.

**Galloway, Gerald Fogarty**, B.S. (C.E.). Tau Beta Pi. Draftsman, Chicago, Burlington & Quincy Ry., 1914-15; Instructor in Civil Eng., Rice Institute, 1915-19; Civil Eng. Alma, Park County, Colo., 1919 to date.

**Giger, Joseph**, B.S. (E.E.). Elec. Eng., Western L. & P. Co., 1914-17; Corporal, Co. B, 115th Eng., G. M. S. E., 115 Bn. Signal Corps, 1917-18; 2nd Lt., 1918-19; Elec. Eng., W. L. & P. Co., 1919; Exp. & Construction Eng., Am. Smelting & Refining Co., 1920-21; Supt. New Light & Power Co., Pagosa Springs, Colo., 1922 to date.

**Glendinning, James Inglis**, B.S. (M.E.). Supt. of Manual Training, Victor High School, 1914-15; Cashier, Ark. Valley Ry., L. & P. Co., 1915-16; Co. E. Sec. 2, Marine Barracks, 1918 to date. Mare Island, Calif.

**Griffin, John Homer**, B.S. (C.E.). Tau Beta Pi. Draftsman, Kansas City Structural Steel Co., 1914; do., J. B. Klein Iron Works, 1915; Instructor in Surveying and Mech., Univ. of Colo., Summer School, 1915; Instructor in Math., Manual Training High School, 1915-16; Eng. Model Land & Irr. Co., 1916-17; U. S. Explosives Plant, 1918; Eng. U. S. Army, 1918-19; Asst. Eng., Model Land & Irr. Co., 1919-23; Asst. City Eng., Trinidad, Colo., 1923 to date. 411 Adams St., Trinidad, Colo.

**Grossbard, Sol**, B.S. (E.E.). Testman, G. E. Co., 1914; Elec. Development & Contracting Co., 1914-15; Sales Eng., Northwestern Elec. Equipment Co., 1915-16; Junior Elec. Eng., Public Service Com. for First Dist. State of N. Y., 1916. Garland Bldg., Los Angeles, Calif.

**Haley, John Leslie**, B.S. (E.E.). Cadet Eng., Denver Gas & Elec. Co., 1914-16; Eng., Danbury & Bethel Gas & Elec. L. Co., 1916-17; do., Henry L. Doherty & Co., New York, 1917-21; Gen. Mgr., Hattiesburg Traction Co., 1921-22. Gen. Commercial Mgr., Adirondack Power & Light Corp., Schenectady, N. Y., 1922 to date.

<sup>2</sup> **Hamilton, William Coulter**, B.S. (C.E.). Eng., Wulff Eng. Co., 1914-15; Public Service Com., State of N. Y., 1915-16; Highway Ins., Berger County, 1916.

**Hartman, Warren Peter**, B.S. (M.E.). Apprentice A. T. & S. F. Ry., 1914; Foreman A. T. & S. F. Ry., Albuquerque, N. Mexico.

<sup>2</sup> **Jesse, August L.**, B.S. (Ch.E.). A. E. F., France.

**Jones, Benjamin Franklin**, B.S. (C.E.). Chairman, A. T. & S. F. Ry., 1914-15; Rodman, do., 1915-16; Transitman, do., 1916; Draftsman, Kansas City Structural Steel Co., 1916; do., J. Goldberg & Son, 1916; Detailer, Kansas City Terminal Ry., 1916-17; U. S. Reclamation Service, 1917-18; U. S. Steel Corporation, 1918-19; United Iron Works Co., Iola, Kansas, Chicago Terminal Improvement Dept., I. C. R. R., Central Station, Chicago, Ill.

**Kerr, Henry Hamilton**, B.S. (E.E.). Tau Beta Pi. Associate Mem. A. I. E. E.; Member Overhead Lines Com., N. E. L. A., 1919-20; Member Prime Movers Com., N. E. L. A., 1920-24; Texas & Pacific Coal Co., 1914-15; G. E. Testman, 1915; Cadet Eng., Denver Gas & E. L. Co., 1915-17; Switchboard Designer, Trumbull Public Service Co., 1917; Construction Eng., Denver Gas & E. L. Co., 1917-20; Supt. of Power Plants, Denver Gas & E. L. Co., 1920 to 1922; Asst. Supt. Elec. Dept., Denver Gas and Electric Co., 1922-24; Supt. Elec. Dept. Public Service Co. of Colo., 1924 to date. 152 S. Washington St., Denver, Colo.

**Leisten, Henry Paul**, B.S. (M.E.). Apprentice A. T. & S. F. Ry., 1914; Apprentice Instructor, 1923 to date. Raton, N. M.

**Lines, George Emery**, B.S. (C.E.). Rodman, A. T. & S. F. Ry., 1914-15; Transitman, do., 1915-16; Instrumentman, U. S. Irrigation Co., 1916-17. D. & R. G. R. R., 1917; Salida Lumber Co., 1921 to date. 815 F Street, Salida, Colo.

**Maires, Lewis Kelsey**, B.S. (C.E.). Chairman, A. T. & S. F. Ry., 1914-15; Transitman, Standard Chem. Co., 1915-16; Chief of Party, O. P. R. & R. E., 1916-17; Eng., U. S. Explosives Plant and First Replacement Eng. Co. D. Camp Humphreys 1918; Asst. Eng. U. S. R. S., 1918 to date. Care Reclamation Service, Denver, Colo., 1920 E. 24th Avenue, Denver, Colo.

**Mallory, Walter Frank**, B.S. (M.E.). 1914; M.E. 1921. Tau Beta Pi. Sigma Xi. Assoc. M. Am. S. M. E. Instructor in Mechanical Engineering, University of Colorado, 1914-18; Summer, 1916, Sergeant, Company B, Engineers, U. S. N. G., Colorado; Asst. Professor of Mechanical Engineering, University of Colorado, 1918 to 1922; Assoc. Prof. Mech. Eng., Univ. Colo., 1922 to date. 915 15th St., Boulder, Colo.

**Mann, Clair Victor**, B.S. (C.E.). C.E., '21. Tau Beta Pi. M. Am. Soc. C. E., Member National Conference on City Planning, Mem. Am. Academy of Political and Social Science. Licensed Engineer, Colorado. Instructor in Poplar Bluffs High School, 1914-15; Instructor in State Prep. School, 1915-16; Instructor in Eng. Math., Univ. of Colo., 1916-18; State Inspector and Eng. in Charge at Apishapa Dam., Fowler, Colo., 1918-20; Assoc. Prof. Eng. Drawing, and Head Dept. Drawing Mo. School of Mines and Met., 1920 to date. Box 33, Rolla, Mo.

**Mayne, Earl Leslie**, B.S. (C.E.). Chairman and Rodman, A. T. & S. F. Ry. Co. (Western Lines), 1914-15; Transitman,

do., (Valuation and Maintenance), 1915-18; U. S. Army (France), 1918-19; Transitman, A. T. & S. F. Ry. Co. (Maintenance), 1919; Asst. Eng., do. (Chief Eng. Office), 1919-22. Box 352 Amarillo, Texas.

**McKelvey, Clinton Fiske**, B.S. (E.E.). Assoc. A.I.E.E. Student, Western Elec. Co., 1914-15; Research Eng., do., 1915-16; Equipment Eng. Asst. Mt. States Tel. & Tel. Co., 1916-18; Lt. (Jg), U. S. N. R. F., 1918-19; Supt., Elec. Service and Eng. Co., 1919 to 1922; President and Gen. Man., 1922 to date. Home address, 2842 York Street, Denver, Colo.

<sup>2</sup> **Meyer, Ralph Elwood**, B.S. (E.E.). Cadet Eng., Denver Gas & E. Co., 1914-17; Gas Eng., Empire Gas & Fuel Co. 1920.

**Morrill, Benjamin Franklin**, B.S. (C.E.). Junior Eng., U. S. R. S., 1914-17; Valuation Dept., of Bridges and Buildings, Ill. Central R. R., 1917-18; Civilian Asst. Eng. with Construction Quartermaster, Camp Custer, 1918-19; Eng. with R. M. Templeton, 1919; Private Practice, 1919-21; Map Draftsman, Gulf Refining Co., Port Arthur, Texas, 1922 to date. 1805 Spruce St., Boulder, Colo.

<sup>2</sup> **Morris, Earl Sylvester**, B.S. (C.E.). Rodman, A. T. & S. F. Ry., 1914-15.

**Moyle, Matthew William**, B.S. (M.E.). Tau Beta Pi. Heat Insp. and Asst. in Mech. Eng., Univ. of Colo., 1914-16; Instructor in Mech. Eng., do., 1916-17; Summer, 1916, Corporal, Company B, Eng., U. S. N. G., Colo.; Am. Smelting & Refining Co., 1917-19; Knippon & Cornhill to date. Apt. 97, Chihuahua, N. M.

<sup>2</sup> **Ornauer, Raymond Arthur**, B.S. (E.E.). Cadet Eng., Denver Gas & E. Co., 1914. Died at Denver, Colo., Feb. 3, 1915.

**Redding, Frank Allen**, B.S. (E.E.). G. E. Testing, Pittsfield, Mass., 1915; Merc. Business, 1916-17; Asst. Dist. Man. and Ad. Agent, Colo. Power Co., Sterling, Colo., 1918 to 1920; Sup. Inside Testing, So. Calif. Edison Co., Los Angeles, 1920 to date. 1433 Penn. Ave., Los Angeles, Calif.

**Sells, Charles Harvey**, B.S. (C.E.). Tau Beta Pi. Draftsman, Wulff Eng. Co., 1914-16; Asst. in Office of Eng., County of Westchester, 1916; Deputy County Eng., Chappaqua, N. Y., 1918 to date.

**Shattuck, Lucien Hunt**, B.S. (C.E.). Tau Beta Pi. Draftsman, Wulff Eng. Co., 1914-15; Instructor in Civil Eng., Univ. of Colo., 1915-16; Corporal, Co. B, Eng., U. S. N. G., Colo., 1916; Topographer, United Oil Co., 1916-17; Eng., Sanderson & Porter, 1917; Office of Public Roads and Rural Eng., 1918. Army work, 1919; Eng., United Oil Co., Denver, Colo., 1919-23; Continental Oil Co., Florence, Colo., 1924 to date.

**Slye, John Dolson**, B.S. (C.E.). Rodman, A. T. & S. F. Ry., 1914-15; do., Interstate Commerce Com., 1915-16; Valuation Dept., Chicago, Burlington & Quincy R. R., 1916-17; Eng., Witherspoon-Englar Construction Co., 1917-18; First Lt., Eng., 1918; Bureau Public Roads, Chief of Party, 1921 to 1922; Detroit Edison, Fellow in Highway Eng., Univ. Michigan, 1922-23; Highway Eng. Bureau of Public Roads, Denver, Colo., 1923-24. Home address, 121 S. Ogden Street, Denver, Colo.

**Snyder, Clarence Lane**, B.S. (E.E.). Instructor in Manual Training, Eastern Univ. Prep. School, 1914-17; Bureau of Ordnance, War Dept.; Draftsman, Gun Division, 1917; Bureau of Standards, Asst. Physicist, 1918 to date. 5835 Colorado Ave., Washington, D. C.

**Steele, Leslie Rodney**, B.S. (Ch.E.). B.A. 1914. Consulting Eng. for Oil Refineries, 1914 to date. 1054 Grant St., Boulder, Colo.

**Sweltzer, Leonard Edward**, B.S. (E.E.). G. E. Test, Schenectady, N. Y., and Pittsfield, Mass., 1914-15; Transformer Engineering Dept., do., 1916-18; Radio Expert, U. S. Signal Corps, 1918; Second Lt., Air Service, Radio Officer, 1918-19; Transformer Engineering Dept., G. E. Co., 1919 to date. 50 Burbank Street, Pittsfield, Mass.

**Weber, Walter Raymond**, B.S. (C.E.). Jun. Am. Soc. C. E., Tau Beta Pi. Sigma Xi. Draftsman, with H. S. Crocker, 1914; Eng. C. S. Lambie & Co., 1915-17; Asst. Eng. of Bridges and Bldgs., Denver Tramway Co., 1917-18; F. A. Central Officers Training School; Camp Taylor, 1918; Contracting Eng., The Colo. Builders' Supply Co., 1919 to date. 460 Washington Street, Denver, Colo.

**Wilkinson, Ephraim Bailey**, B.S. (C.E.). Rodman, A. T. & S. F. Ry., 1914-15; Insurance Business, 1915-16; Transitman, A. T. & S. F. Ry., 1916-17; Lt., Corps of Eng., U. S. Army, 1917-19; City Eng., Arkansas City, Mo., 1919 to date. Newcastle, Wyo.

#### 1915

**Bergheim, Milton Nachman**, B.S. (E.E.). Salesman, J. Bergheim & Co., 1915 to 1918; 57th Balloon Co., U. S. Army, 1918-19; Mgr., J. Bergheim & Son, 1919 to date. 1210 Pearl St., Boulder, Colo.

<sup>2</sup> **Beverly, Frank Ferdinand**, B.S. (Ch.E.). Am. Chem. Soc. Asst. in Chem. and Eng. Math., Univ. of Colo., 1915-16; Chemist, Sears, Roebuck & Co., 1916-17; Division Supt., do., 1917-18; Chem. Welfare Service, 1918; Division Supt., Window Shade Factory, Sears, Roebuck & Co., 1919 to date.

**Borden, Phillip Sheridan**, B.S. (E.E.). B.A. 1915. Testman, G. E. Co., 1915-17; Second Reserve Officers' Training Camp, 1917; First Lt., Coast Artillery Corps, 1917-18; Empire Oil & Gas Co., 1918-19; Dougherty Co. Box 42, Oil Hill, Kan.

<sup>2</sup> **Brady, Laban Jenkins**, B.S. (M.E.). Mech. Dept., A. T. & S. F. Ry., 1915-16; Traveling Salesman, Oakland Motor Co., 1916-17; First Reserve Officers' Training Camp; Com. Second Lt., Corps of Eng., 1917.

**Canfield, Robert Hawthorne**, B.S. (C.E.). Tau Beta Pi. Rodman, D. & R. G. Ry., 1915-16; Draftsman, A. T. & S. F. Ry., 1916-17; Office Eng., do., 1917; Eng. Corps, National Army, 1918-19; Instructor, Civil Eng. Dept., Univ. of Colo., 1919-23; Asst. Prof. C. E. U. of C., Boulder, Colo., 1922-23; Detailer, Am. Bridge Co., 1923; Graduate Student Johns Hopkins Univ., 1923 to date. Baltimore, Md.

**Carnahan, Lawrence Barrett**, B.S. (M.E.). Tau Beta Pi, Sigma Tau. Sales Eng. George W. Summers & Co., 1915-16; Development Eng., Mt. States Tel. & Tel. Co., 1916-18; Aviation Eng. School, Mass. Inst. of Tech., 1918; Second Lt., Aviation Corps, 1918; Research Eng., Western Clock Co., 1919-20; Eng. in Charge of Maintenance, 1921-23; Peru, Ill.; Development Engineering, Western Electric Co., 1923 to date. 5121 Washington Blvd., Chicago, Ill.

**Charde, Newell**, B.S. (C.E.). Tau Beta Pi, Sigma Xi. Assoc. Mem. Am. Soc. Civil Eng. Transitman, Gen. Land Office Survey, 1915-16; Survey, Spring Valley Water Co., 1916; Graduate Student, Harvard Univ., 1916-17; with Stone & Webster Eng. Corporation, 1917-18; U. S. Army, 1918-19; Union Oil Co., 1919; Stone & Webster, 1919; with P. J. Walker Co., Mgrs. of Construction, 1920-23; Structural Eng. for L. L. Jones, Architect, Los Angeles, Calif., 1923; Meyer & Holler (Milwaukee Bldg. Co.) Los Angeles, 1924 to date.

**Christian, Ben**, B.S. (M.E.). Draftsman, Denver City Tramway Co., 1915-16; do., Mt. States Tel. & Tel. Co., 1916-17; do., G. W. Sugar Co., 1917-18; Aviation Eng. School, Mass. Inst. of Tech., 1918.

**Condit, Harrison Smith**, B.S. (E.E.). Mill Carpenter, Vasco Mining Co., 1915-16; Student and English Instructor, Denver Bible Institute, 1916-17; Student, do., 1917-19; Mach., Bergstrom-Brewster Motor Co., Cabinet Maker, Standard Store Fixture Co., Denver, 1919; Finish Carpenter, Herbert Mann, Contractor, Phoenix, Ariz., 1920; Carpenter and Builder, Oakland, 1920 to date. 1345 99th Ave., Oakland, Calif.

**Conley, John Edward**, B.S. (Ch.E.). Tau Beta Pi. Foreman, Tungsten Products Co., 1915-16; Junior Chemist, U. S. Naval Proving Grounds, 1916-17; Junior Chemist in Radioactivity, U. S. B. M., 1917-20; Supt., York Metal & Alloy Co., 1920-22; Research Chem., Westinghouse Lamp Co., 1922 to date. 78 Norman St., East Orange, N. J.

**Cooke, Stanley Shields**, B.S. (M.E.). Jun. A.S.M.E., Am. Soc. Marine Draftsman. Student, Rem. Arms, U. M. C. Co., 1915-16; Lake Torpedo Boat Co., 1916-17; Coast Guard, 1917-18. Killed in Service, 1919.

**Craig, James Orville**, B.S. (M.E.). Tau Beta Pi. Commercial Apprentice, Sullivan Mach. Co., 1915-16; Junior Salesman, Truck Dept., Packard Motor Co., 1916-17; Salesman, do., 1917; Second Reserve Officers' Training Camp, 1917; Second Lt., Aviation Section, Non-Flying Signal Corps, 1917; Sec-Treas., Wolverine Storage Battery Co., Grand Rapids, 1921 to date. 226 Brown Street, S. E. Grand Rapids, Mich.

**Davis, Dean Ho'den**, B.S. (M.E.). Tungsten Mining, 1915-18; Mech., Truck Dept., U. S. National Army, 1918. Atwood, Kansas.

**Dobner, Guy Ketterman**, B.S. (C.E.). Chairman, A. T. & S. F. Ry., 1915; Rodman, do., 1915-16; Transitman, do., 1916-17; do., C. F. & I. Co., 1917; Second Reserve Officers' Training Camp, 1917; Second Lt., 121 F. A., A. E. F., 1917-19; Frazier & Co., Cleveland, Ohio; Field Eng., 1919-21; Standard Oil Co., Producing Dept., Bakersfield, Calif., Eng. and Draftsman, 1921 to date; Draftsman Los Angeles Co., 1923, Higgins Bldg., Los Angeles, Calif.

**Flach, John Jacob**, B.S. (E.E.). Tau Beta Pi. Instructor in Eng. Math., Univ. of Colo., 1915 to date. Summer, 1917. Instrumentman, Office of Public Roads and Rural Eng., U. S. Gov. Died at Charleston, W. V., 1919.

**Gates, Irving George**, B.S. (Ch.E.). Chemist, 1915 to date. Box 324, Douglas, Ariz.

**Griffin, Marvin Clay**, B.S. (E.E.). Testman, G. E. Co., 1915-17; Asst. to Supt., Turbine Dept.; G. E. Co., 1917; Sergt. 102, Field Signal Bn., U. S. A., 1917-19; Asst., Turbine Dept., G. E. Co., 1919; Turbine Eng. Dept., G. E. Co., 1919-21; Appraisal Dept., Adirondack Power and Light Corp., Schenectady, N. Y., 1921-22; Turbine Eng. Dept., G. E. Co., West Lynn, Mass., 1922 to date. Home address, Brighton, Colo.

**Harrison, Horace Lippincott**, B.S. (M.E.). Mech. Designer, Nevada Consolidated Copper Co., 1915-16; Draftsman, Door Co., 1917-18; Mech. Draftsman, Ordnance Dept., Bureau of Mines, 1918 to date. Care Joseph Harrison, Symes Bldg., Denver, Colo.

**Henderson, Richard Henry**, B.S. (Ch.E.). Asst. Chemist, Bartlesville Zinc Co., 1915-17; Chief Chemist, do., 1917-20; Ordnance Dept., U. S. A., 1918-19; Asst. Supt., Bartlesville Zinc Co., 1920; Chemist, Barnsdall Oil Co., 1921 to date. Care Barnsdall Refining Co., Barnsdall, Okla.

**Judd, Samuel**, B.S. (C.E.). Eng. Dept., Ill. Central R. R. and Am. Bridge Co., 1915-16; Designer, F. O. Browne Iron Works, 1916; Designer, Bridge Dept., Chicago, Burlington & Quincy R. R., 1916-17; Estimator, Union Pacific Ry., 1917; Chief Draftsman, Denver Steel & Iron Works, 1917-18; Asst. Eng., U. S. Reclamation Ser., 1918 to date. 1055 Washington St., Denver, Colo.

**Lindsay, Richard Wander**, B.S. (C.E.). Draftsman, G. W. Sugar Co., 1915-16; do., Mt. States Tel. & Tel. Co., 1916-18; Designing and Experimental Eng., French Aircraft Mission, 1918-19; Asst. Construction Eng., The Mt. States Tel. & Tel. Co., 1919; Asst. to Outside Plant Eng., do., 1919-21. 2237 Cherry Street, Denver, Colo.

**Lynch, Charles Ramsdell**, B.S. (E.E.). Apperntice, W. E. & Mfg. Co., 1915-16; Eng., do., 1916. Ideal Elec. & Mfg. Co., Los Angeles, Calif.

**Martensen, Maurice**, B. S. (M.E.). Babcock Wilcox Co., 1915-16; Dominion Steel Foundry Co., 1916-18; Dist. Mgr., Laher Spring Co., 1920. Seattle, Washington.

**Martin, William Edgar**, B.S. (E.E.). Commercial Eng., W. E. & Mfg. Co., 1915-19; do., Marine Dept., 1919-22; Marine Representative, Pacific Coast, 1922 to date. Care of W. E. & Mfg. Co., First National Bank Bldg., San Francisco, Calif.

**McCary, Phillip Henry**, B.S. (M.E.). Salesman, 1915-17; Headquarters Co., 341st Field Artillery, National Army, 1917

to June, 1918; Camp Funston, Kan., Staff Office, 2nd F. A., 1st Bn., Camp Jackson, S. C. to Dec. 1918; Owner Machine Shop, 1918 to date. 227 Hill Avenue, Grand Junction, Colo.

**McNeil, Elbert Kerr**, B.S. (C.E.). Eng., Cameo Mine, 1915-16; Rodman, A. T. & S. F. Ry., 1916-17; Transitman, do., 1917. U. S. Army, 1917-19; Transitman, A. T. & S. F. Ry., 1919 to date. Care A. T. & S. F. Ry., La Junta, Colo.

**Means, John Simon**, B.S. (C.E.). Assoc. M. Am. Soc. C.E., Tau Beta Pi, Sigma Tau. Insp. with H. S. Crocker, 1915-16; Designer, Denver Tramway Co., 1916-17; First R. O. T. C., Com. 2nd Lt., Reserve Corps, 1917; 1st Lt., Eng., A. E. F., 1918; Captain, Eng., A. E. F., 1919; Bridge Eng., Colo. State Highway Dept., 1919 to June, 1921; Office Eng., July 1921 to Nov., 1922; Resident Eng. on 16th St. Viaduct with H. S. Crocker, Nov. 1922 to date. Home Address, 1401 Lafayette St., Denver, Colo.

**Miller, Charles Sigmund**, B.S. (E.E.). Apprentice, W. E. & Mfg. Co., 1915-16; Installation, Planning Div., Western Elec. Co., 1916 to date. Box 1030, Station "C", Los Angeles, Calif.

**Moreland, Alfred David**, B.S. (E.E.). Eng., Fritchle Auto & Battery Co., 1915; Ft. Lupton Light & P. Co., 1916; W. U. Tel. Co., 1916-17; Co. C, 115th Regiment Eng., 1917; Fourth Eng. Reserve Officers' Training Camp, 1918; Dist. Supt. Western Union Telegraph Co., Denver, Colo.

**Nelson, George Andrew**, B.S. (E.E.). Tau Beta Pi. Operator, Utah Power & L. Co., 1915-16; Testman, G. E. Co., 1916-18; D. C. Eng. Dept., 1918 to date. Windsor, Colo.

**Paul, Lesley Coolidge**, B.S. (C.E.). Assoc. M. West. Soc. Eng., Mem. Soc. of Amer. Military Engrs; Mem. Central Elec. Ry. Assoc. Field Service Dept., McGraw Pub. Co., 1915-16; Asst. Circulation Mgr., do., 1916-17; Editorial Rep., Elec. Ry Journal, 1917; Western Editor, do., 1917-20; Civil Eng. Editor, 1920; Mgr. Ry. Publicity and Adv., W. E. & Mfg. Co., East Pittsburgh, Pa., 1920 to date. 6925 McPherson St., Pittsburgh, Pa.

**Prouty, Frank Harrison**, B.S. (C.E.). Instrumentman, U. S. F. S., 1915-16; Draftsman, C. F. & I. Co., 1916-18; Special Eng., Rolling Mills Dept., National Tube Co., 1918-20; Asst. Supt., Steam Power, Cambria Steel Co., 1920 to date. 932 Harlan Avenue, Johnstown, Pa.

**Robison, Ralph Turner**, B.S. (E.E.). Apprentice, W. E. & Mfg. Co., 1915-16; Sales Dept., do., 1916-17; School of Military Aeronautics, Univ. of Texas, 1917; Flying Field Scott Field, Bellville, Ill., 1917; Aeronautical Eng., School, Mass. Inst. of Tech., 1918; Second Lt., Aviation Corps, 1918; Sales Dept., W. E. & Manuf. Co., Charleston, W. Va.; Elec. Eng., Seattle, Wash., 1919; Penn Elec. Eng. Co., Scranton, Pa., 1920 to date. (Home address) Fort Morgan, Colo. Scranton, Pa.

**Shimeall, Karl Wallace**, B.S. (Ch.E.). Tau Beta Pi. Chem., State Oil Lab., 1915-16; Junior First Lt., Co. B, Eng., Colo. National Guard, 1916; Asst. Supt., United Oil Co., 1916 to date. United Oil Co., Florence, Colo.

**Smith, Paul Vanderlip**, B.S. (M.E.). Sales Engineer, Ingersoll-Rand Co., 1915 to date.

**Soderstrom, Carl Axel**, B.S. (E.E.). Assoc. A.I.E.E. Operator, Utah P. & L. Co., 1915-16; Switchboard Installer, Mt. States Tel. & Tel. Co., 1916-18; Ensign (R. F.), U. S. N., 1918-19; Salesman, L. R. Steel Service Corp., 1921-23; Test Dept., S. Calif. Edison Co., Los Angeles, Calif., 1923 to date.

**Steiner, Ora Clarence**, B.S. (C.E.). Draftsman, U. S. F. S., 1915-18.

**Victory, Thornton Maltby**, B.S. (E.E.). Tau Beta Pi. Sigma Xi. Testman, G. E. Co., 1915-16; Eng., Transformer Dept., do., 1916-18; Mina Carlotta, Cumana Yagua, Prov. of Santa Clara, Cuba.

**Walker, Edward Smith**, B.S. (M.E.). Construction Eng., Midwest Refining Co., Casper, Wyo. 315 East Seventh, Casper, Wyo.

**White Edward Divine**, B.S. (C.E.). Instructor in Cripple Creek High School, 1915. Las Vegas, N. Mexico.

**Whitney, Paul Brooks**, B.S. (C.E.). Tau Beta Pi, Sigma Xi. U. S. F. S., 1915-16; Topographer, United Oil Co., 1916; Junior Highway Eng., U. S. Office of Public Roads and Rural Eng., 1916-17; Engineer, Continental Oil Co., 1917 to 1922; Eng. and Geologist, Continental Oil Producing Co., 1922 to date. 512 Continental Oil Bldg., Denver, Colo.

## 1916

**Beresford, Lester Treat**, B.S. (C.E.). Rodman, Ill. Division, Ill. Central Ry., 1916-17. 15000 Euclid Avenue, Cleveland, Ohio.

**Billington, Ronald Vedder**, B.S. (M.E.). Draftsman, G. W. Sugar Co., 1916-17; Instructor, Manual Training H. S., Denver, 1920; State Supervisor of Trade and Voc. Training, State Agri. College, Ft. Collins, 1921 to date. Ft. Collins, Colo.

**Blythe, Samuel Judson, Jr.**, B.S. (E.E.). Apprentice, W. E. & Mfg. Co., 1916-17; Eastern Michigan Power Co., 1917; First Lt., 37th Eng., 1918-19; Agent for Deleo Light in Mo. and Kan., 1919-22; Gen. Mgr. Low & Blythe Electric Co., 1922 to date. 320 N. 11th St., Atchison, Kan.

**Boring, Maynard McKay**, B.S. (E.E.). Testman, G. E. Co., 1916; Industrial Service Dept., do., 23 Mynderse Street, Schenectady, N. Y.

**Campbell, Donald Atwood**, B.S. (E.E.). Apprentice, Denver Gas & Elec. Co., 1916-17; Asst. to Supt., Spokane Gas & Fuel Co., 1917; Co. 14, 2nd Regiment Motor Mech., Signal Corps, 1917.

**Dillon, Lee Somerville**, B.S. (C.E.). Masonry Insp., Ill. Central Ry., 1916-17; First Reserve Officers' Training Camp, 1917; Second Lt., Co. B, 2nd Regiment Eng., 1917; Capt., Corps of Eng., 1918-21; Canal Zone, 1921 to date. Care Chief of Engineers, Washington, D. C.

**Dillon, Malcolm White**, B.S. (M.E.). Eng., G. W. Sugar Co., 1916-17; Died in Service, 1918.

- Dungan, Quintan Randolph**, B.S. (Ch.E.), M.S. 1919. Tau Beta Pi, Sigma Xi. Chem., G. W. Sugar Co., 1916; Chem., State Oil Lab., 1916-17; State Geol. Survey, 1917-18; Instructor in Eng. Math., Univ. of Colo., 1918-19; Junior Eng., Empire Gas & Fuel Co., Bartlesville, Okla., 1919-20; Chem. Eng., Dehydrator, Empire Pipe Line Co., Gordon, Kans., 1920-23; Estimating Eng., Empire Gas Fuel Co., 1923; Oil Hill Kansas; in charge Operating Budget Div. Empire Companies, Bartlesville, Okla., 1923 to date.
- Dunn, Paul Joseph**, B.S. (C.E.). Farming, 1916 to date. Olathe, Colo.
- Good, Edison B.**, B.S. (M.E.). Apprentice, W. Machine Co., 1916; Salesman, W. E. & Mfg. Co., 1916-17; Farming, 1917 to date. Chicago, Ill., 1923; Burns, Wyoming.
- Greene, John Fewlass**, B.S. (C.E.). Draftsman, Chicago, Burlington & Quincy R. R., 1916; do., Union Pacific Ry., 1916-17; Instructor in Civil Eng., Univ. of Colo., 1917-18; Second Lt., Eng., 1918-19; Colo. State Highway Com., 1919 to date. 2305 W. Twenty-eighth Avenue, Denver, Colo.
- Hall, Wilfred McGregor**, B.S. (C.E.). Tau Beta Pi. Rodman, with Charles T. Main, Eng., 1916; Instrumentman, do., 1916; Asst. Eng., do., 1916-18; 24th Co., Coast Artillery, 1918; Construction Eng., J. A. P. Clisfield Contracting Co., 1919-20; Resident Eng., Chas. T. Main, Eng., Boston, Mass.; Erecting Eng. U. G. I. Contracting Co., R. D. No 1, St. Johnsville, N. Y.
- Hodges, James Seymour**, B.S. (E.E.). Tau Beta Pi. Apprentice, W. E. & Mfg. Co., 1916; Elec. Eng., Consumers Power Co., 1917-18; Journeyman Elec., Michigan Central R. R., 1918-19; Hodges Elec. Co., Elec. Contractor Dealer, 1920 to date. 1206 West Main Street, Jackson, Mich.
- Idelson, Michael Norman**, B.S. (E.E.). Tau Beta Pi. Apprentice, W. E. & Mfg. Co., 1916; Lab. Asst., Electrolysis Division, Bureau of Standards, 1916-18; Lab., Crocker-Wheeler Co., 1918-21; Instructor, Elec. Eng., U. S. N. A., Annapolis, Md., 1921; Asst. Prof., Post Graduate School, do., to date. U. S. Naval Academy, Annapolis, Md.
- Ivers, Wayne Franklin**, B.S. (E.E.). B.A. 1916. Tau Beta Pi. Phi Beta Kappa. Testman G. E. Co., 1916-17; Second Reserve Officers' Training Camp, 1917; Captain Field Artillery, Reserve Corps, 1917; Commandant and Military Instructor, Yale Univ., R. O. T. C., 1918; Instructor in Gunnery, School of Fire, Ft. Sill, 1918-19; Commercial Eng., G. E. Co., 1919-22; Texas Power and Light Co., Dallas Texas, 1922; Commercial Mgr., Wichita Falls Elec. Co., 1922 to date.
- Locke, Charles Russell**, B.S. (Ch.E.). Fuel & Oil Lab., Bureau of Chem. Dept. of Int., 1916-17; U. S. B. S., 1917. Koppers Co., Operation Dept., Pittsburgh, Pa.
- Lyster, Arthur Frederick**, B.S. (M.E.). M.E., 1922. Tau Beta Pi. Sigma Xi. Construction and Operation Foreman, G. W. Sugar Co., 1916-17; Second Lt., Air Service, U. S. Army, 1918; Eng. Dept., G. W. Sugar Co., Denver, Colo., 1919; Gen. Supt. Great Valleys Sugar Corporation, Denver, 1920; Mech. Eng., Smuggler-Union Mining Co., 1921 to 1922, do., Utah Copper Co., 1922 to date., Garfield, Utah.
- McBride, Paul Francis**, B.S. (E.E.). Apprentice, Denver Gas & Elec. Co., 1916-17; Eng., H. L. Doherty Co., 1917-20; Asst. Mgr., Topeka Overland Co., 1920-21; Empire Gas and Fuel Co., 1921-23; Supt. of Stores, 1923 to date. 513 E. 14th Street, Bartlesville, Okla.
- McClintock, Clyde Hirsch**, B.S. (M.E.). M.E. 1921. Assoc. Mem. Am. Soc. M. E. Draftsman in Eng. Dept., Denver Tramway Co., 1916-17; do., Office of Public Roads and Rural Eng., U. S. D. of A., 1917; Eng., Fed. Light & Traction Co., 1917-20; Private Practice of Eng., 1920; Mech. Eng., Denver Tramway Co., 1920 to date. 1861 Clarkson Street, Denver, Colo.
- Morgan, Nathan Wilson**, B.S. (C.E.). Detailer and Checker, Am. Bridge Co., 1916-19; Designer and Field Eng., Frazier-Sheal Co., Eng. and Constructors, Cleveland, Ohio, 1919; Designer and Field Eng., Osborn Eng. Co., Cleveland, O., 1919-21; Office Eng., E. Burkhart & Sons, Denver, 1921; Asst. Bridge Eng., Colorado State Highway Dept., 1921-23. 3204 Winfield Ave., Baltimore, Md.
- Morrison, Barrett Whitney**, B.S. (M.E.). Jun. Am. Soc. M. E., Tau Beta Pi. Apprentice, W. Machine Co., 1916-17; Eng. Contract Insp. Office, do., 1917; G. W. Sugar Co., 1917; First Sergeant, 32nd Co., 164th Depot Brigade, 1917; Third Reserve Officers' Training Camp, 1918; Saumur Artillery School, 1918; Second Lt., 337th Field Artillery, A. E. F., 1918; Traveling Eng., The G. W. Sugar Co., Scottsbluff, Neb., 1919 to date. Home address, 600 Franklin St., Denver, Colo.
- Nakano, Ryotaro**, B.S. (E.E.). Apprentice, Western Elec. Co., 1916-18; Central Union Tel. Co., 1918-19; Nippon Elec. Co., Tokyo, 1919.
- Nelson, Emil Raymond**, B.S. (C.E.). Masonry Insp. III. Central Ry., 1916-17; Sergeant, Co. B, 115th Regiment Eng., 1917-18; Third Eng. Reserve Officers' Training Camp, 1918; Second Lt., Co. C, 115th Eng., 1918; Asst. Eng., I. C. R. R., 1000 Central Sta., Chicago, Ill.
- Nelson, Walter Kenneth**, B.S. (E.E.). E.E. 1922. Tau Beta Pi. W. U. Tel. Co., 1916-17; Costkeeper, Minidoka Project, U. S. R. S., 1917-19; Instructor, Eng. Math. Dept., Univ. of Colo., 1919-23; Asst. Prof., do., 1923 to date. University of Colorado, Boulder, Colo.
- Park, John Charles**, B.S. (C.E.). Draftsman, Am. Bridge Co., 1916-17; Coke and By-Products Plant, U. S. Steel Corporation, 1917. 2357 Dexter St., Denver, Colo.
- Pearce, William Rolph**, B.S. (C.E.). Tau Beta Pi. Draftsman, Am. Bridge Co., 1916-17; First R. O. T. C., Com. 2nd Lt., Corps of Eng., U. S. Reserve, 1917 to date, Care Admin. Sec. Gen. Staff, Great Headquarters, A. E. F., France. Home address, 3147 W. 28th Ave., Denver, Colo.
- Peterson, Ernest Frederick**, B.S. (E.E.). Tau Beta Pi. Sigma Xi. Apprentice, W. E. & Mfg. Co., 1916-17; Elec. Draftsman, Inside Plant Division, Commonwealth Edison Co., 1917; Student, G. W. Sugar Co., 1917-18; Sergeant, Signal Corps Aerological Service, 1918-19; Construction Foreman, G. W. Sugar Co., 1919; Instructor, Elec. and Mech. Eng., Univ. of N. Dakota, 1919-20; Construction Foreman, G. W. Sugar Co., 1920; Farming, 1921 to date. R. 2, Box 49, Greeley, Colo.
- Rapp, Roy Lee**, B.S. (E.E.). Testman G. E. Co., 1916-19; Transformer Eng. Dept., do., Pittsfield, Mass., 1919-20; Salesbury Co., Denver, Colo. 1014 Adams St., Denver, Colo.
- Reid, Hugh Applegate**, B.S. (C.E.). Draftsman, Am. Bridge Co., 1916-17; do., Mark Mfg. Co., 1917; First Reserve Officers' Training Camp; Com. First Lt., Eng. Corps, 1917. Home address, 247 W. 12th Ave., Denver, Colo.
- Robertson, Frank Wanless**, B.S. (Ch.E.). G. W. Sugar Co., 1916-18; U. S. A. Ordnance Eng. of Test, 1918-19; Research Eng., W. E. & Mfg. Co., 1919-20; Supt. of Construction, Elec. Furnace Dept., Geo. J. Hagan Co., Furnace and Combustion Engrs., Pittsburgh, Pa. Home Address, 300 N. Negley Ave., Apt. 5, East Liberty Station, Pittsburgh, Pa.
- Rusk, Willard Weaver**, B.S. (C.E.). Tau Beta Pi. Second Lt., Co. B, Eng., Colo. National Guard, 1916; Instructor in Civil Eng., Univ. of Colo., 1916 to 1918; First Lt., Co. B, 115th Regiment Eng., 1917; Captain, do., 1917-19; Eng. Producers and Refiners Corporation, 1919 to 1922; Asst. Eng., Pub. Util. Dept., City of Denver, 1922-23; Eng. Draftsman, Bureau of Reclamation, 1923 to date. 3358 Federal Boulevard, Denver, Colo.
- Russell, Marvin Howard**, B.S. (M.E.). Ark. Valley L. & P. Co., Canon City, 1916-17; Mech. Draftsman, U. S. Naval Proving Ground, Indian Head, Md., 1917-18; Mech. Lab., U. S. Naval Eng. Experimental Station, 1918; Smith, Booth and Usher Mfg. Co., Los Angeles, to date. Home Address, Box 216, R. No. 2, Canon City, Colo.
- Sage, John**, B.S. (C.E.). Draftsman, Valier, Montana. Land & Water Co., 1916; Field Draftsman, Ore. S. L. Ry., 1916-18.
- Sawyer, Wilfred David**, B.S. (M.E.). Tau Beta Pi. Assoc. Mem. A. S. M. E., Cert. Mem. A. A. E. Mech. and Structural Designer, G. W. Sugar Co., 1916-18; 2nd Lt., F. A., U. S. A. 1918; Mech. Eng., Baker Steam Motor Car & Mfg. Co., 1919-21; Architectural Designer, Gay Eng. Corp., 1921; Chief Draftsman, Amusement Eng. Corp., 1922; Asst. Eng., do., 1923; Asst. Production Mgr., Security Mfg. Co., 1924 to date. 1201 Gladys Ct., Long Beach, Calif.
- Scheffel, Carl Ludwig Fred**, B.S. (C.E.). Draftsman, Am. Bridge Co., 1916; Contracting, 1916-18; Eng., U. S. Explosives Plant "C," 1918 to date.
- Sherrill, Marcus Henry**, B.S. (Ch.E.). Apprentice, G. W. Sugar Co., 1916-17; Co. B, 115th Regiment Eng., 1917; 158th Inf., 1918; 144th F. A., 1918-19; G. W. Sugar Co., 1919-21; Office of Home Economics, Dept. of Agri., 1921, Washington, D. C.; Pacific Gasoline Co., Taft, Calif.
- Strock, Morris Sperry**, B.S. (E.E.). Student Supervisor Western Union Telegraph Co., 1916-17; Radio Eng., Radio Lab., Bureau of Standards, Wash., D. C. 2831 27th St., N. W., Wash., D. C.
- Tour, Sam**, B.S. (Ch.E.). Tau Beta Pi. Teaching Asst., Dept. of Chem. Eng., Univ. of Michigan, 1916-17; M. S., Univ. of Michigan, 1917; Metallurgist, Ordnance Dept., U. S. Army, 1917-21; Metallurgist, Doehler Die Casting Co., Brooklyn, N. Y. 16 Turner Place, Brooklyn, N. Y.
- Vallet, Victor Emil**, B.S. (C.E.). Tau Beta Pi. Draftsman, Am. Bridge Co., 1916; do., Mark Mfg. Co., 1916; do., Mead, Morrison Mfg. Co., 1917; do., La Salle Eng. Co., 1918; do., H. Coppers Co., 1919; do., Universal Portland Cement Co., 1919; Am. Coke & Chem. Co., 1919. Alpha Portland Cement Co., La Salle, Ill., 1919-22, 245 Elmhurst Ave., Detroit, Mich.
- White, Kenneth Ingram**, B.S. (Ch.E.). Testing Dept., Tooele Plant, International Smelting Co., 1916-17; National Chem. Copper Co., 1917; Corporal, Co. B, 115th Regiment Eng., 1917-18; 1st Sgt., 41st Co., 20th Engineers, 1917-19; Foreman, Apex Ref. Co., Boulder, Colo., 1919-20; Instr. Mach. Draw., Univ. Colo., 1920-21; Foreman, Clinchfield Carbocool Co., So. Clinchfield, Va., 1921-23; Doherty Research Co., New York City, 1923 to date. 212 St. John's Pl., Brooklyn, N. Y.
- Whitney, Parker Richards**, B.S. (C.E.). Assoc. Am. Soc. C. E., Sigma Xi. Draftsman, Am. Bridge Co., 1916-17; do., Thomas A. Gilkey, Consulting Eng., 1917-18; Instructor in Civil Eng., Univ. of Colo. Died, Boulder, March, 1922.
- Worcester, Harold Sidney**, B.S. (M.E.). Sigma Xi. Salesman, Sullivan Mach. Co., 1916-17; Second Reserve Officers' Training Camp, 1917; Mech. Eng., Standard Chem. Co., Naturita, Colo., 1918-22; do., Smuggler Union Mining Co., 1922 to date. Telluride, Colo.

## 1917

- Beattie, Wayne Stephenson**, B.S. (M.E.). M.E. 1921 Tau Beta Pi. Sigma Tau. Ingersoll-Rand Co., 1917; Instructor in Mech Eng., Univ. of Colo., 1917 to 1922; Asst. Prof. Mech. Eng. Univ. Colo., 1922 to date. Boulder, Colo.
- Berry, Standish Edmund**, B.S. (E.E.). Colo. Power Co., 1917; Second Lt., 5th Co., Coast Artillery, 1918; G. Elec. Co., Trenton, N. J., 51 W. 48th Street, New York City.
- Brierley, George Cecil**, B.S. (E.E.). Tau Beta Pi. G. W. Sugar Co., 1917; Flying Cadet, 1917; 2nd Lt. R. M. A. Air Service, Rockwell Field, San Diego, Calif., 1918; Harry L. Dougherty & Co., 1919; Western Light & Power Co., Boulder, Colo., 1920-23; Asst. Commercial Mgr., Public Service Co. of Colo., 1923 to date. 1020 13th Street, Boulder, Colo.
- Brockway, Waldo Emerson**, B.S. (C.E.). C.E. 1922. Tau Beta Pi. Asst. City Eng. of Boulder, 1917-18; Instructor in Civil Eng., Univ. of Colo., 1918; Supt. of Const., do., to 1922; Supervising Engineer, Univ. of Colo., 1922 to date. Boulder, Colo.
- Brunton, Harold James**, B.S. (M.E.). Test Course, G. E. Co., 1917-18; Powers & Mining Com. Dept., G. E. Co., 1918-19;

Dealer in Deleo-Light Products, 1920 to date. Organization Comm. Citizen's Loan & Investment Co., 1923; Asst. Treas. Taxi Service Corp., Denver, Colo. 661 Williams Street, Denver, Colo.

**Burgess, Warren Childs**, B.S. (M.E.). Divisional Foreman, Air Craft Motor Div., Union Switch & Signal Co., 1917-18; Staff Eng., Hasbrouck, Haynes & Co., 1918; Industrial Eng. & Production Man., Burton-Dixie Corp., 1919 to date. 443 S. Catherine, La Grange, Ill.

**Clymer, Charles Clarence**, B.S. (E.E.). Tau Beta Pi, Sigma Xi. Third Reserve Officers' Training Camp, 1918; 2nd Lt., 5th A. A. Battery, C. A. C. to 1919; Testing Dept., G. E. Co., 1919-20; Office Eng., do., Pittsburgh Dist., 1920 to date. Care G. E. Co., 1316 Oliver Bldg., Pittsburgh, Pa.

**Coit, Norman Hubert**, B.S. (E.E.). Mt. States Tel. & Tel. Co., 1917-18; Supt. Western Public Service Co., Auburn, Neb., 1918-23; Asst. Commercial Mgr., Pennsylvania Edison Co., Easton, Penn., 1923 to date.

**Collins, Arthur Gus**, B.S. (M.E.). Salesman, Sullivan Mach. Co.; U. S. N. R., 1918-19; Salesman, Sullivan Mach. Co., 1919 to date. 2006 Railway Exchange Bldg., St. Louis, Mo.

**Curry, Charles Kenneth**, B.S. (C.E.). Office of Public Roads and Rural Eng., 1917; Truck Co., No. 2, First Corps Artillery Park, 1917-19; Am. Bridge Co., 1919-20; The Robins Conveying Belt Co., Chicago, 1920; with Allen & Garcia Co., Consulting Engineers, 1921 to date. c/o Cia Carbonifera de Sabinas, S. A., Rosita, Coahuila, Mexico.

**Curtis, Howard Gray**, B.S. (C.E.). Tau Beta Pi. Eng., Elliott Meaker Drainage Co., 1917-18; U. S. Explosives Plant, 1918-19; International Coal Products Corporation, Graybull, Wyoming, 1919-22; Denver Water Co., 1922 to date.

**Dunford, Samuel Williams**, B.S. (C.E.). Draftsman, Kansas City Structural Steel Co., 1917; Flying Cadet, Squadron 39, Aviation Barracks, 1918.

**Dwyer, Martin Joseph**, B.S. (C.E.). Am Smelting and Ref. Co., 1917-18; U. S. Marine Corp., A. E. F., 1918-19; American Fluorspar Co., 1920-21; Co. Engineer, Mineral Co., Colo., 1920-22; New Mexico Highway and Hydrographic Dept., 1921-22. (Home address) Creede, Colo. 1920 to date.

**Eastman, Harold Lee**, B.S. (E.E.). G. W. Sugar Co., 1917; Graduate Student, Univ. of Colo., 1918; U. S. National Army, 1918; F. C. Hamilton, Consulting Eng., 1919; Empire Companies, Bartlesville, Oklahoma.

**Ekren, Thomas Clarence**, B.S. (E.E.). No. 636 Quartermaster Detachment, 1917; Asst. to Elec. Eng., Construction Q. M., 1917-18; Asst. to Officer in Charge, Light, Power and Ice, 1918; Asst. in Charge, 1918-19; Officer in Charge, Light, Power & Refrig. Dept., Asst. Construction Q. M., 1919-20; Office in Charge, Water Supply & Sewer Dept.; Officer in Charge, Light, Power and Refrig. Dept., 1920; Supt. Construction, U. S. Govt., San Antonio, Texas, 1920-21; Ft. Morgan Ice & Cold Storage Co., 1922 to date. 506 Deuel St., Ft. Morgan, Colo.

**Fertig, John Landon**, B.S. (M.E.). Sergeant, First Class, 115th Regiment Eng., 1917-18; Special Apprentice, A. T. & S. F. Ry., 1919 to 1922; Asst. Round House Foreman, do., 1922 to date. Opera House Apts., La Junta, Colo.

**Foster, Bryant Edgar**, B.S. (M.E.). First Reserve Officers' Training Camp, 1917; Second Lt., Battery B, 34th Field Artillery, 1917-19, A. E. F.; 1st Lt., Co. D, 314 Ammunition Train, 1919; Student, G. W. Sugar Co., Ft. Morgan, 1919; Foreman, do., 1921-23. 941 Mountain Ave., Ft. Collins, Colo.

**Hardenbrook, Morse Evans**, B.S. (E.E.). Apprentice, G. E. Co., 1917 to July, 1920. Died at Schenectady, N. Y., July 16, 1920.

**Hibbard, Lester Carpenter**, B.S. (C.E.). Tau Beta Pi. Office of Public Roads and Rural Eng., 1917; A. T. & S. F. Ry., 1917; U. S. Explosives Plant, 1918; U. S. Gen. Hospital, 1918-19; Eng., Minidoka Project Co., 1919; Bureau of Public Roads, Idaho, 1920; Burkhardt Iron Works, Denver, Colo., 1920 to date. 1628 Welton Street, Denver, Colo.

**Hinkle, Allen Ellsworth**, B.S. (E.E.). Sergeant, Co. B, 115th Regiment Eng., 1917; First Sergeant, Co. F, do., 1917-18; Fourth Reserve Officers' Training Camp, 1918; Second Lt., F. A., 1918-19; G. E. Co., Pittsfield, Mass. Home address, Berthoud, Colo.

**Johnson, Joseph Buskirk**, B.S. (M.E.). Ingersoll-Rand Co., 1917 to date. Care Ingersoll-Rand Co., 11 Broadway, New York City.

**Kettle, William Charles**, B.S. (C.E.). Westcliffe, Colo.

**Kraxberger, Ernest Frank**, B.S. (C.E.). Tau Beta Pi. First Sergeant, Co. B, 115th Regiment Eng., 1917-18; Fourth Eng. Reserve Officers' Training Camp, 1918; First Lt., Co. A, 115th Eng., to date. Home address, Peetz, Colo.

**Krueger, George Henry**, B.S. (M.E.). G. W. Sugar Co., 1917, 1511 Logan Street, Denver, Colo.

**Leroy, Victor Eugene**, B.S. (E.E.). Tau Beta Pi. Efficiency Engineer, Denver City Tramway Co., 1917-18; Co. A, 840th M. G. Bn., 89th Division, 1918-19; Construction Eng., Contractor and Builder, 1919 to date. Home address, 4141 Valjejo Street, Denver, Colo.

**Lutz, Thomas Edward**, B.S. (C.E.). Tau Beta Pi. Draftsman, Am. Bridge Co., 1917-19; Robins Conveying Belt Co., 1919 to 1921; Hansell-Elcock Co., 1921-1922; Robins Conveying Belt Co., 1922 to date. 6123 Woodlawn Avenue, Chicago, Ill.

**Marcus, Jerome Stanley**, B.S. (Ch.E.). Draftsman, Bernstein Mfg. Co., 1917; Asst. Eng., Philadelphia Quartz Co., 1918-19; Eng., Static Motor Co., 1919-20; Research Eng., Southwark Mach. Co., 1920-21; Combustion Eng., do., 1921 to date. 1630 W. Butler St., Philadelphia, Pa.

**Mathew, Steere de Montfort**, B.S. (E.E.). Denver Gas & Elec. Co., 1917; Eng., H. L. Doherty Co., 1917-23; Asst. Marine Eng., H. L. Doherty Co., 60 Wall Street, New York City, 1923 to date.

**McCrum, Douglas Stuart**, B.S. (E.E.). First Reserve Officers' Training Camp, 1917; Second Lt., Coast Artillery, U.

S. R., 1917; 1st Lt., Coast Artillery, 1918; Cadet Eng., Denver Gas & E. L. Co., 1919; Associated with O. C. McCrum in Retail Furniture business, Oneonta, N. Y., 1919 to date. Home address, 49 Center St., Oneonta, N. Y.

**Milroy, James**, B.S. (E.E.). Mt. States Tel. & Tel. Co., 1917-20; Research Lab., Western Elec. Co., New York, 1920-22; Elec. Contracting and Eng., Denver, Colo., 1922 to date. 1072 Cook St., Denver, Colo.

**Morrison, William Scott**, B.S. (E.E.). G. W. Sugar Co., 1917; U. S. National Army, 1918. Home address, 101 E. 2nd Avenue, Denver, Colo.

**Perreten, Arnold, Ervin**, B.S. (E.E.). B.A. 1916. Co. B, 115th Regiment Eng., 1917-18; Fourth Eng. Reserve Officers' Training Camp, 1918; A. S. & R. Co; Asst. Supt., W. L. and Power Co., Boulder, Colo.

**Platts, Harlow Case**, B.S. (M.E.). Ingersoll-Rand Co., 1917-18; U. S. National Army, 1918 to date; Secy.-Treas., West. States Cutlery Co., Boulder, Colo. Home Address, 1005 11th Street, Boulder, Colo.

**Rader, Cranston Bourquin**, B.S. (E.E.). First Reserve Officers' Training Camp, 1917; Second Lt., Coast Artillery Corps, 1917-18; First Lt., do., 1918; Captain, 1918; Owner, Hassler Co. Co., Denver, Colo., 1919 to date.

**Rapp, Earl Alfred**, B.S. (C.E.). Tau Beta Pi. A. T. & S. F. Ry., 1917-18; Second Lt., 20th Engineers, 1918-19; Draftsman, A. T. & S. F. Ry., 1919-20; Asst. Eng., A. T. & S. F. Ry., 1920 to date. Care A. T. & S. F. Ry., Amarillo, Tex.

**Reed, Stanley Morton**, B.S. (E.E.). Died April 10, 1918, at Jerome, Ida.

**Schwend, John William**, B.S. (M.E.). Mercantile Business, 1917 to date. Ouray, Colo.

**Serat, George William**, B.S. (C.E.). Tau Beta Pi. Draftsman for K. C. Structural Steel Co., K. C., Kan., 1917-18; U. S. Explosives Plant, Nitro, W. Va., 1918; Eng. Corps, U. S. A., Washington, D. C. 1918-19; Minidoka Project, U. S. R. S., Burley, Idaho, 1919; Draftsman for K. C. Structural Steel Co., K. C., Kan., 1919-20; Eng., Colo. Builders Supply Co., Denver, Colo., 1920-21; Eng., Anchor Coal Mining Co., Lincoln, Neb., 1921 to date. 405 S. 28th St., Lincoln, Neb.

**Shimeall, Herbert Ray** (B.S. (E.E.)). Co. B, 115th Regiment Eng., 1917; Mess Sergeant, Co. F, do., 1917-19; Denver Gas & Elec. Co., 1919; United Water, Gas & Elec. Co., Hutchinson, Kans., 1920 to 1922; Asst. Cashier, 1st Nat'l Bank, Kanorado, Kans., 1922 to date. Kanorado, Kans.

**Short, Phillip Breen**, B.S. (E.E.). Tau Beta Pi. A. I. E. E. Graduate Student, W. E. & Mfg. Co., 1917; Gen. Eng., do., 1918 to 1922; Denver Tramway Co., 1922; Man. Elk Garage, Denver, 1922 to date. 1150 Lincoln St., Denver, Colo.

**Shugren, Maurice Ulysses**, B.S. (E.E.). Denver Gas & E. Co., 1917. Meter Dept., Dougherty Co. Died 1920.

**Smith, Horace Malcolm Roof**, B.S. (E.E.). Univ. of Denver, Law School, 1917-18; 2nd Lt., Eng. Camp, A. A. Humphreys, 1918-19; M.A., Univ. of Denver, 1919-20; LL.B., Univ. of Denver Law School, 1921. 775 Grant Street, Denver, Colo.

**Strauss, Herman Gross**, B.S. (C.E.). Tau Beta Pi. Valuation Dept. of Bridges and Bldgs., Ill. Central R. R., 1917-18; Instructor in Eng. Math. Univ. of Colo., 1919; State Highway Dept., Denver, Colo., 1919-21; Sales Eng. 1921-23; Eng. of Construction, Absopure Gilsontite Co., Denver, Colo., 1923 to date. 2320 Williams St., Denver, Colo.

**Tashima Yoshio**, B.S. (E.E.). W. E. & M. Co., 1917-18; Switchboard Eng., W. E. & Mfg. Co., 1918-20; Inside Plant Division, Eng. Dept., Commonwealth Edison Co., Chicago, Ill. 1920-23; Div. Eng. and Construction, Stone & Webster, Boston, Mass., 1923 to date.

**Van Arsdall, Leland Burdette** B.S. (C.E.). Tau Beta Pi. Battery B, 341st Field Artillery, National Army, 1917-18; Third Reserve Officers' Training Camp, 1918; First Lt., 1918-19; Am. Bridge Co., Gary Ind. 6123 Woodlawn Avenue, Chicago, Ill. Home address, 1002 17th Avenue, Denver, Colo.

**Woolley, Frederic Hartzell**, B.S. (E.E.). Apprentice, G. E. Co., 1917. Died, 1919.

**Wynn, Hubert Alexander**, B.S. (E.E.). Tau Beta Pi. Sgt. Co. B, 115th Regiment Eng., 1917; Testing Dept., G. E. Co., 1919; Switchboard Sales Dept., 1922; Elec. Eng. Dept., Consumers Power Co., 1922 to date, 1310 Fourth Street, Jackson, Michigan. Home address, Durango, Colo.

## 1918

**Allen, Everett Wait**, B.S. (M.E.). Instructor, School of Military Aeronautics, Univ. of Texas, 1918; U. S. Ord. Engrs.: Moline Plow Co., Tractor Br., Rock Island, 1919; Tool Designer, Eng. Dev. Co., Moline, Ill., 1920; Designer, Antigo Tractor Corp., Antigo, Wis., 1921; Eng., T. B. Funk Co., 1922; Designer International Harvester Co., Tractor Works, Chicago, Ill., 1922; Yellow Sleeve Valve Eng. Works, Inc., E. Moline, Ill., 1923 to date. 1559 28th Ave., Moline, Ill.

**Anderson, Joseph Nathaniel**, B.S. (C.E.). Tau Beta Pi. Master Gunner Coast Artillery Corps, 1918-19; Student, G. W. Sugar Co., 1919; with R. J. O'Rourke, Consulting Eng., 1919 to 1920; Valuation Dept., Colo. & Southern Ry., 1920 to date; Cost Eng., C. & S. Ry. at Present Time. 44 S. Clarkson Street, Denver, Colo.

**Aulsbrook, William John**, B.S. (E.E.). Instructor in Radio Univ. of Colo., 1918; G. W. Sugar Co., Ft. Collins, 1919; Sales Dept., Western Elec. Co., 1919-21; Instructor, Math. and Science, Grainfield High School, 1921 to 1922; Principal Grainfield High School, 1922 to date. Grainfield, Kans.

**Black, Paul Ashby**, B.S. (E.E.). Tau Beta Pi. Fourth Reserve Officers' Training Camp, 1918. 235 Jackson, Glendale, Calif.

**Houss, Arthur James**, B.S. (C.E.). Tau Beta Pi. Deputy County Surveyor, Boulder County, 1918-19; Instructor, Civil Eng., Univ. of Penn., Philadelphia, Pa., 1920-23; Prof. of C. E. Penn. Military Academy, Chester, Pa., 1923 to date.

<sup>2</sup> **Boylan, James Phillip**, B.S. (C.E.). Fourth Reserve Officer's Training Camp, 1918.

**Brown, Charles Matthew**, B.S. (C.E.). Fourth Reserve Officers' Training Camp, 1918; G. W. Sugar Co., 1919 to date. Home address, 433 Franklin Street, Denver, Colo.

**Brubaker, William Felker**, B.S. (C.E.). Tau Beta Pi. Transitman, U. S. Gen. Hospital, Denver, Colo., 1918; Mine Surveyor, Climax Molybdenum Co., Climax, Colo., 1918; Instructor in Dept. of Gen. Eng. Drawing, Univ. of Colo., 1918 to date. Care University of Colorado, Boulder, Colo.

**Burlingame, Charles Raymond**, B.S. (M.E.). Tau Beta Pi. Fourth Eng. Reserve Officers' Training Camp, 1918; Sgt., 542nd Eng., A. E. F., 1918-19; Instructor, Mech. Eng. Dept., Univ. of Colo., 1919-20; Mech. Eng. Dept., W. E. & Mfg. Co., 1920; Stoker Eng., Stoker Supt., St. Louis Dist., 1921 to date, 3958 Botanical Ave., St. Louis, Mo.

**Catlett, Robert Larkin**, B.S. (E.E.). Assoc. Member A. I. E. E. Elec., U. S. Gov. Explosives Plant, Old Hickory Works, du Pont Eng. Co., Agents, 1918-19; Elec. and Mech., Dye Works, E. I. du Pont de Nemours & Co., 1919-20; Special Tests in Power Dept., do., 1920; Estimating and Service Div., Philadelphia Elec. Co., 1922; Design Div. Transmission and Distribution Dept., do., 1922 to date.

**Croft, Huber Ogilvie**, B.S. (M.E.). M.S. 1923. Tau Beta Pi. Asst. to Chief Eng., Swift & Co., 1918; Aviation Service, 1918; Swift & Co., 1919; Fisher & Fisher, Architects, 1919; Stearns-Rogers 1919; Asst. to Durbin Van Law, 1920-21; Instructor in Mech. Eng., Univ. of Ill., 1921 to date.

**Devalon, Earle Waldo**, B.S. (E.E.). Asst., City Eng. Office of Boulder, 1918-19; Asst. to V.-P. Alamo Marble Co., 1920; Asst. City Eng., 1921 to date. 928 Maxwell, Boulder, Colo.

**Eckel, Raymond Earl**, B.S. (C.E.). Tau Beta Pi. Transitman, office of Public Roads and Rural Eng., 1918-19; Producers & Refiners Corporation, Eng. Dept., 1920 to date. In charge of Eng. Office, do., 1924, Casper, Wyo.

**Eddy, Phillip Eugene**, B.S. (M.E.). Fourth Eng. R. O. T. Camp, 1918; Sgt., 542nd Eng., A. E. F., 1918-19; G. W. Sugar Co., 1919-20; Asst. Supt. Peoples Gas, L. & C. Co., 1923 to date. 6534 Kenwood Avenue, Chicago, Ill.

**Ellison, Muri J.**, B.S. (E.E.). Fourth Field Artillery C. O. T. Camp, 1918; Second Lt., 1st F. A., U. S. A., 1918; Doherty Training School, Denver, Colo., 1919; Construction Dept. United Water, Gas & Elec. Co., 1920 to date. Home address, 3438 W. 38th Avenue, Denver, Colo.

**Elzi, Joseph Andrew**, B.S. (E.E.). Asst. in Radio, Univ. of Colo., 1918; Navy work, Hoboken, N. J.; W. E. & Mfg. Co., 1919-21; Instructor Eng. Math., Univ. of Colo., Boulder, Colo., 1921-23; W. E. & M. Co., E. Pittsburgh, Pa., 1923 to date.

**Flanagan, Victor Evans**, B.S. (E.E.). Fourth Eng. R. O. T. Camp, 1918; 2nd Lt., Eng., 1918; New Jersey Zinc Co.; Replogle Steel Co., Roberts & Shaefer; The Diester Concentrator Co. to date. 610 Greenlawn Ave., Ft. Wayne, Ind. (Home Address) 1121 Macon Avenue, Canon City, Colo.

**Flint, Harry Milton**, B.S. (Ch.E.). Gates Rubber Co., 1918. 124 So. Logan St., Denver, Colo.

**Fraser, Verness Percy**, B.S. (E.E.). Tau Beta Pi. Fourth R. O. T. Camp, 1918; H. F. Doherty Co., 1919; Lincoln Gas & Elec. Co., 1920-21; Denver Gas & Elec. Co., 1922; Virginia Power Co., Cabin Creek, West Virginia, 1923 to date.

**Gittings, William Norton**, B.S. (E.E.). Tau Beta Pi. Testing Dept., G. E. Co., 1918-19; Eng., Switchboard Dept., do., 1919-21; Eng., Automatic Substation Div., do., 1921 to date. 940 State St., Schenectady, N. Y.

**Hinkley, Tracy Luther**, B.S. (Ch.E.). Chem. Radium Co. of Colo.; Asst. Chief Physicist, do., 1921. Sterling, Colo.

**Hum, Justus Clifford**, B.S. (C.E.). Tau Beta Pi. Draftsman, Wurster Constr. Co., Los Angeles, Calif.; Draftsman, Union Pacific R. R., 1919; Sales Dept., Gregg, Whitehead & Co., Investment Dept., U. S. National Bank, Denver, Colo. 1130 Pearl St., Denver, Colo.

**Johnson, Levant**, B.S. (M.E.). U. S. Gen. Hospital, 1918; U. S. Army, 1918; G. W. Sugar Co.; Fairbanks-Morse Co., Beloit, Wis., 1921 to date.

**Leppa, Walter John**, B.S. (M.E.). Enlisted in Naval Aviation, 1918; Great Western Sugar Co., Loveland, Colo.

**Loper, William Brynn**, B.S. (E.E.). U. S. Navy, 1918. Home address, Montrose, Colo.

**Love, Harry Allan**, B.S. (E.E.). Fourth Eng. R. O. T. Camp, 1918; 605th Eng., A. E. F.; Statistician for U. S. Supreme Court Receiver, Okla. vs. Texas Boundary Dispute, to date. 407 City Nat'l Bank Bldg., Wichita Falls, Texas.

**Merritt, Charles Wendell**, B.S. (E.E.). Flying Cadet, Squadron A-46, Aviation Barracks, 1918. 706 Travis Street, Wichita Falls, Texas, 1923. Home address, 760 Magnolia Street, Denver, Colo.

**Morrow, Walter Thomson**, B.S. (C.E.). Fourth Eng. R. O. T. Camp, 1918; Constructing Q. M. Brooklyn, N. Y. Home address, Broadmoor, Colorado Springs, Colo.

**Murphy, James Malcolm**, B.S. (M.E.). A. T. & S. F. Ry. to date. La Junta, Colo.

**Neuman, Robert, Jr.**, B.S. (E.E.). Ensign (R. F.), U. S. N., 1918-19; Senior Student, Southern Sierras Power Co., 1919-20; Supt., do., Corona Dist., 1921 to date. Care Southern Sierras Power Co., Box 58, Corona, Calif.

**Pierce, Charles Brown**, B.S. (E.E.). Coast Artillery School for Non-Commissioned Officers, 1918; Denver Gas & Elec. Co. 630 E. Fifth St., Casper, Wyo.

**Randall, John Dudley**, B.S. (M.E.). Fourth R. Officers' Camp, 1918. Home address, 1705 Arapahoe Street, Boulder, Colo.

**Rifkin, Meyer**, B.S. (C.E.). U. S. Navy, 1918-19; Travelling Salesman, Madente Tailoring Co., 1919-1922, Manager, Rifkin Tailoring Co., 1922 to date. 1632 Champa St., Denver, Colo.

**Roloson, Glenn Brundage**, B. S. (E.E.). Instructor in Radio, Univ. of Colo., 1918; Asst. Prof. Elec. Eng., Colo. Agri. College, 1919-20; E. E. Dept., Colo. Agri. College, Ft. Collins, Colo. Fort Collins, Colo.

**Schloss, Charles Murdock**, B.A., B.S. (E.E.). Tau Beta Pi. Fourth R. O. T. Camp, 1918; Second Lt., Sales Eng., Mining Dept., Lindrooth, Shubart & Co. 520 Boston Bldg., Denver, Colo.

**Sears, Harold Thompson**, B.S. (M.E.). Instructor in Mech. Eng., Univ. of Colo., 1918-19; G. W. Sugar Co., Brighton, Colo., 1919; Baker's Steam Motor Co., 1920; Valuation Dept., Empire Cos., 1920-22; Engineering Dept., Phillips Petroleum Co., 1922 to date. Bartlesville, Okla.

**Thomas, Edwin Abbott**, B.S. (E.E.). Fourth Eng. R. O. T. Camp, 1918; Sgt., 605th Eng., A. E. F., 1918-19; Mt. States Tel. & Tel. Co., Denver, Colo., Casper, Wyo., 1919-20; Instrument Man, Wheeler & Worthington, Eng., 1920 to date. Casper, Wyo.

**Thorpe, John George**, B.S. (E.E.). E.E. 1921. Instructor in Elec. Eng., do., 1918-19; Eng., Trinidad Elec. Trans. Ry. & Gas Co., 1919 to date. 729 W. Baca Street, Trinidad, Colo.

**Titley, Thomas Tracy**, B.S. (E.E.). 1073 St. Paul Street, Denver, Colo.

#### 1919

**Anderson, Albert Severin**, B.S. (E.E.). Tau Beta Pi. Test Dept., G. E. Co., Schenectady, N. Y., 1919-20; Sales Agent, do., Denver Office, 1921 to date. 1060 Lipan Street, Denver, Colo.

**Barr, Harold Alfred**, B.S. (C.E.). Colo. Highway Com., Denver, Colo., 1919; Am. Bridge Co., Gary, Ind., 1920; Asst. Prof., Dept. of Architecture, Kan. State Agric. College, Manhattan, Kan., 1921-23. 503 1/2 Dudley Ave., Venice, Calif.

**Barrett, Willis Chapel**, B.S. (C.E.). Construction Eng. Maplewood, Mo., 1919. Sheridan, Wyo.

**Belser, Carl**, B.S. (Ch.E.). Supt., Elec. Point Mining Co., 1919 to date. Lead Point Washington.

**Brock, Jesse Raymond**, B.S. (E.E.). G. E. Co., Schenectady, N. Y., 1919; Southwest G. E. Co., El Paso, Texas, 1921 to date.

**Burghardt, King**, B.S. (C.E.). Eng., Structural Work, Tamiami Trail, Youngstown, Ohio; Buffalo, N. Y.; Niagara Falls, N. Y.; Miami, Florida, 1919 to 1922; Honsell Elcock Structural Steel Co., Chicago, 1922 to date. 6201 Ingleside Ave., Chicago, Ill.

**Campbell, Ernest Glenn**, B.S. (Ch.E.). Instructor Arvada High School, Arvada, Colo., 1919-20; Peoples Elec. & Gas Co., Chicago, 1920 to date. 3955 W. Jackson Blvd., Chicago, Ill.

**Canis, Frank Herald**, B.S. (C.E.). Eng. with F. A. Fair Eng. Assoc., 1919. 625 Maxwell Street, Boulder, Colo.

**Dobbins, Eugene Victor**, B.S. (Ch.E.). Asst. Chemist Standard Oil Co., (Ind.) 1919 to date. Greybull, Wyoming.

**Duggan, Harold Charles**, B.S. (M.E.). Worthington Pump & Mach. Corporation, Mining Sales Dept., Cudahy, Wis., 1919-20; N. Y. Office, do., 1920-22; Sales Rep., Oakley Chem. Co., 1922 to date. 138 Melrose Avenue, Toledo, Ohio.

**Edgecomb, Mrs. A. L. (Hilda Counts)**, B.S. (E.E.) Math. Assoc. of Am., A.A.A., A.I.E.E., A.A.U.W., W. E. & Mfg. Co., Research Eng., do., 1920-21; Graduate Student, Univ. of Colo., 1922-23; Elec. Eng., Public Service Co. of Colo., 1923 to date. 921 7th Street, Boulder, Colo.

**Elliott, John Paul**, B.S. (C.E.). U. S. Office of Public Roads, Wyo. Tie Co., Du Boise, Wyo., 1919; Am. Bridge Co., 1919-20; Gen. Fire Proofing Co., 1290 to date. 614 Bulletin Bldg., Phila., Pa.

**Eschenburgh, Herman Marinus**, B.S. (C.E.). Am. Bridge Co., Gary, Ind.; Travelling Salesman, Concrete Steel Products Co., K. C. Mo., 1920-21; do., Chicago, Ill., 1921 to 1922, do., Colo. Builders Supply Co., Denver, 1922 to date. 1313 University Avenue, Boulder, Colo.

**Froese, Erhard Albert**, B.S. (Ch.E.). G. W. Sugar Co., Sterling, Colo., 1919-22; Salesman York Mid-West Ice Machine Co., Montana Territory, 1923 to date, Denver, Colo. (Home address) 709 Carson Ave., La Junta, Colo.

**Gillett, Clarence Herbert**, B.S. (Ch.E.). M.S. 1919 Asst. Gen. Supt., 1919 to date; Gates Rubber Co., Denver, Colo. 671 So. Clarkson St., Denver, Colo.

**Gray, Wharton Kinsey**, B.S. (M.E.). G. W. Sugar Co., Longmont, Colo.; Chevrolet Motor Co., Flint, Mich.; Am. Bridge Co., Gary, Ind.; The Holly Sugar Corporation, Grand Junction, Colo.; Western Conc. Products Co., Local Eng., 1922; Manager same, 1922-23; Eng. Dept. Lakeside Construction Co., Valmont, Colo., 1923 to date. 838 14th Street, Boulder, Colo.

**Harmon, Earl Leonard**, B.S. (C.E.). Box 571, Laramie, Wyo.

**Hedgecock, Wendell Thomas**, B.S. (C.E.). Pittsburgh-Des Moines Steel Co., So. Hills Br., Pittsburgh, Pa. 619 Jackson Street, Denver, Colo.

**Hoffman, Roy August**, B.S. (E.E.). Junior Eng., Denver Gas & Elec. Co.; Gas Eng. Dept., do., 1920-21; Eff. Eng. and Plant Supt., Spokane G. & F. Co. 2324 Altamont Blvd., Spokane, Wash.

<sup>2</sup> **Holm, Alvin John** (Ch.E.). Western Chem. Co. 357 W. 62nd Street, Los Angeles, Calif.

**Johnson, Lester Bryan**, B.S. (E.E.). G. E. Co., Schenectady, N. Y., 1919; Supply Sales, G. E. Co., Salt Lake City, Utah, 1921 to date. Salt Lake City, Utah.

- Killian, George Leslie**, B.S. (E.E.). R. B. Weaver Elec. Co., Denver, 1919-20; Westinghouse Distributors, Mexico City, Mexico, 1920-21; Kinney and Killian Agency Co., Denver, 1921 to date. 2525 Dahlia St., Denver, Colo.
- Kretschmar, George Gustav**, B.S. (E.E.). Head Physics Dept., Walla Walla College, 1919 to date. College Place, Washington.
- Lawrence, Wylie Earl**, B.S. (Ch.E.). G. W. Sugar Co., Windsor, Colo., Box 183, Windsor, Colo. 2013 Spruce Street, Boulder, Colo.
- Lee, William Russell**, B.S. (E.E.). Instructor in Science and Math., High School, Holly, Colo., 1919-21; Supt. of Schools, Bristol, Colo., 1921 to 1922; Bond Salesman, Antonides & Co. Denver, 1922 to date. Home Address, 47 Clarkson St., Denver, Colo.
- Lendecke, Hugo Robert**, B.S. (C.E.). U. S. Office of Public Roads, Wyo. Tie Co., Du Boise, Wyo., 1919. Georgetown, Colo.
- Lindsay, James Armour**, B.S. (Ch.E.). Asst. Chem., G. W. Sugar Co., Brush, Colo., 1920-23; Supt. of Schools, Eckley, Colo., 1923 to date.
- Malixi, Juan**, B.S. (C.E.). Colo. Highway Com., Denver, Colo., 1919; Wyo. Highway Com., Cheyenne, Wyo., 1920-21; Survey Eng., Metropolitan Water Dist., Manila, P. I., 1921 to date. Manila, Philippine Islands.
- Matthews, Thomas**, B.S. (E.E.). Instructor, Sibley College, Cornell Univ., 1919 to 1920, do., Univ. No. Dak., 1921; Asst. Prof. Elec. Eng., do., 1921. Asst. Prof. Elec. Eng., Univ. of Iowa, 1923 to date.
- Mellett, Will Wood**, B.S. (Ch.E.). Asst. Chem., Neb. Cement Co., Superior, Neb., 1919; Peoples Gas, L. & C. Co., Chicago, Ill., 1920 to date. 4925 Lake Park Avenue, Chicago, Ill.
- Merritt, Robert Wendell**, B.S. (E.E.). Automatic Sub-Station Insp., The Pacific Elec. Ry., 1919 to date.
- Noek, Henry Thomas**, B.S. (Ch.E.). Gates Rubber Co., Denver, Colo. 3221 W. 31st Ave., Denver, Colo.
- Nord, Arthur W.**, B.S. (E.E.). Testman, G. E. Co., 1919 to 1920, Schenectady; Const. Foreman, do., St. Louis, 1920-21; Testman, do., Schenectady, 1921; Erecting Eng., do., 1921 to date. Box 75, Nassau, Bahamas.
- Oviatt, Edward William**, B.S. (C.E.). Draftsman, State Highway Com., Denver, Colo., 1919-21; Resident Eng., State Highway Dept., Headquarters, Durango, 1921 to date. Box 186, Durango, Colo.
- Pratt, Stuart Wilkins**, B.S. (Ch.E.). Dye Works, E. I. du Pont de Nemours and Co., Wilmington, Del. 24 Delaware Ave., Carney's Point, N. J.
- Sanders, Forest Wayne**, B.S. (Ch.E.). Am. Smelting & Boston, Mass.; Research Chem., Metals Exploration Co., 1922-23; Am. Smelting & Refining Co., Durango, Colo., 1923 to date.
- Skinker, Murray Fontaine**, B.S. (E.E.). M.S. 1921. Instructor, Eng. Math., Univ. of Colo., 1919-21; Rhodes Scholarship Student Oxford Univ., 1921 to date. Exeter College, Oxford, England.
- Smith, Terry C.**, B.S. (E.E.). W. E. & Mfg. Co., 1919-21; The K. C. Rys. Co., 1921 to date. 3015 E. 6th, Kansas City, Mo.
- Vicklund, Claude Alven**, B.S. (M.E.). G. W. Sugar Co., Loveland, Colo.; Voc. Instructor, Univ. of Colo., Boulder, Colo., 1921. 650 So. Lincoln St., Denver, Colo.
- Vicklund, Enoch Rhinehart**, B.S. (M.E.). G. W. Sugar Co., Fort Collins, Colo.; Instructor, Mech. Eng. Dept., Univ. of Colo., Boulder, Colo., 1921 to date, Inspiration, Ariz. Home Address, 650 So. Lincoln Street, Denver, Colo.
- Woodworth, Dean Thorpe**, B.S. (Ch.E.). Californian and Hawaiian Sugar Refinery, Crockett, Calif., 1923 to date.
- Young, Benjamin Uel**, B.S. (E.E.). Asst. Eng., Western L. & P. Co., 1919-23; Boulder, Colo.; Distribution Clerk, Cheyenne L. & P. Co., 1923 to date.
- 1920**
- Alford, Renel Stillman**, B.S. (E.E.). Am. Tel. & Tel. Co., N. Y. City. Castle Rock, Colo.
- Allen, Harold**, B.S. (C.E.). G. W. Sugar Co., 1920; Voc. Instructor, U. of C. 1921; Instructor, Kansas St. Agricultural College, Manhattan, Kans., 1921 to date.
- Apel, Philip George**, B.S. (C.E.). G. W. Sugar Co., Fort Collins, Colo., 1920; City Eng. Office, Boulder, Colo., 1921-22; Eng. Dept., Colo. Builders Supply Co., Denver, Colo.
- Baker, Gano Reeder**, B.S. (E.E.). W. E. & Mfg. Co., Pittsburgh, Pa., 1920-23.
- Ball, James Ogden**, B.S. (C.E.). Eng., Midwest Refining Co., 1920-21; Const. Eng., Std. Oil Co. of Ind., 1921 to date. Plant No. 1, Casper, Wyo.
- Bartlett, Earl Alfred**, B.S. (C.E.). Eng., McNeil Coal Co., Denver, Colo.
- Burkhard, Myron Joseph**, B.S. (Ch.E.). Research Dept., G. W. Sugar Co., Denver, Colo.; Va. Carbro-Coal Corporation, South Clinchfield, Va.; Chief Chemist, United Oil Co., Florence, Colo., 1921-23; Asst. Construction Eng., The Mazophl Copper Co., Ltd., Conception Del Oro, Zacatecas, Mexico, 1923 to date.
- Carpenter, Edwin Gilbert**, B.S. (C.E.). Instrumentman, U. S. R. S., Sherbourne, Mont., 1918; Asst. on Construction, Wyo. Highway Dept., Cokeville, Wyo., 1919; Draftsman, Corn Products Refining Co., Chicago, Ill., 1920; Masonry Insp., Bridge Dept., Ill. Cent. R. R., 1920 to date. Room 1626, 14 E. Jackson Blvd., Chicago, Ill.
- Catterson, Fred Hutchins**, B.S. (Ch.E.). Research Dept., G. W. Sugar Co., Denver, Colo. 216 E. Maple Ave., Denver, Colo.
- Chandler, Harold William**, B.S. (M.E.). Apprentice, Santa Fe Ry., La Junta, Colo., 1921; C. E. Dept. S. P. de Mex., Epalme, Sonora, Mexico, 1923. 435 W. 8th St., Denver, Colo.
- Coulson, Donald Chaney**, B.S. (Ch.E.). Chemist, Sunnyside M. & M. Co., Eureka, Colo., 1920-23; Sales Eng., United States Corp., Chicago, Ill., 1923 to date. 565 W. Washington St., Chicago, Ill.
- Creglow, Frederick Delmar**, B.S. (C.E.). Asst. Eng., Johnson & Benham Consulting Eng., Fireston Bldg., K. C., Mo., 1920; Eng., Construction Dept., Univ. of Colo., Boulder, Colo., 1921-23; Supt. of Construction for Fisher & Fisher, Arch., Denver, Colo., 1923 to date. Parco, Wyo.
- Crispelle, Kenneth Guy**, B.S. (E.E.). Dept. of Oper. and Eng., Am. Tel. & Tel. Co., N. Y. City, 1920 to date 195 Broadway, New York.
- Dungan, Paul**, B.S. (Ch.E.). Goodyear Rubber Co., 1919-20; General Chem. Co., 1920-21; Test Lab., City of Los Angeles, 1921 to date. 5747 6th Avenue, Los Angeles, Calif.
- Eaves, Elsie**, B.S. (C.E.). Sec. to Dean, Univ. of Colo., Boulder, Colo., 1920; Instructor, Eng. Math., do., 1921; Colo. State Highway Dept., Denver, 1921-22; Sec. H. S. Crocker, Consulting Eng., 1922 to date, 1135 Adams Street, Denver, Colo.
- Foukl, Theodore Marlowe**, B.S. (E.E.). Gas Eng., Denver Gas & Elec. Co., 1920 to date. 1934 So. Josephine, Denver, Colo.
- Grove, Arthur Edwin**, B.S. (Ch.E.). Spreckels Sugar Co., Spreckels, Calif., 1920; Santa Cecilia Sugar Corp, Guantanama, Oriente, Cuba, 1921; Chief Chemist, Union Sugar Co., Betteravia, Calif., 1922 to date.
- Hamilton, Robert Fox**, B.S. (M.E.). Texas Light & Power Co., Fort Worth, Texas., 1920-23; Eng. Dept., Denver Tramway Co., 1923 to date.
- Hansen, Arnold Adolph**, B.S. (E.E.). Voc. Instructor, Univ. of Colo., Boulder, Colo., 1920; Long Lines Dept., Am. Tel. & Tel. Co., Denver, Colo. 409 E. 1st St., Denver, Colo.
- Harvey, Eugene Cochrane**, B.S. (C.E.). Instructor in Civil Eng., Univ. of Colo., Boulder, Colo., 1920-23; Eng. with O. G. Bower, Structural Eng., 602 Van Noys Bldg., Los Angeles, Calif., 1923 to date.
- Herman, Harry Hirsch**, B.S. (M.E.). G. W. Sugar Co., Fort Collins, Colo., 1920; Eng. Dept., C. A. Dunham Co., Chicago, Ill., 1921 to 1922; C. A. Dunham Co., 629 Mercantile Bldg., Rochester, N. Y., 1922 to date. Home Address, 1312 Pine Street, Boulder, Colo.
- Hill, Ralph Marcus Douglas**, B.S. (M.E.). Home address, 323 N. 6th Street, Albuquerque, N. M.
- Hyatt, Ernest F.**, B.S. (Ch.E.). Sales Eng., Dorr Co., Denver, Colo. Cooper Bldg., Denver, Colo.
- Iverson, Conrad Marcellus**, B.S. (M.E.). G. W. Sugar Co., Longmont, Colo., 1920. 617 Broad St., Longmont, Colo.
- Jewett, John Quincy**, B.S. (C.E.). Am. Bridge Co., Gary, Ind., 1921; Instructor, Civil Eng. Dept., Univ. of Colo., Boulder, Colo., 1921-23; Office Engineer, Compania Constructora, Richardson, S. A. Esperanza, Sonora, Mexico, 1923 to date.
- Johnson, Algon Benjamin**, B.S. (C.E.). Draftsman, I. C. R. R. Dowle Bldg., Chicago, Ill.
- Jones, Edward M.**, B.S. (Ch.E.). Asst. Chem., G. W. Sugar Co., 1920-22; C. F. & I. Co., 1921; Chem., Tennessee Copper Co., 1922 to date. Copperhill, Tenn.
- Kelsey, Harold Martin**, B.S. (E.E.). Mt. States Tel. & Tel. Co., Denver, Colo., 1920; Asst. Traffic Chief, do., 1921 to date. Co., Denver, Colo., 1920; Asst. Traffic Chief, do., 1921 to 1922. Butte, Mont.; Asst. Toll Facilities Eng., do., Denver, Colo. Care Mountain States Tel. & Tel. Co., Denver, Colo.
- Kerr, Francis Payne**, B.S. (E.E.). Denver Gas & E. L. Co., Denver, Colo., 1920-23; Research Work, H. L. Doherty Co., N. Y., Summer, 1923; Asst. Gas Supt., Salina Lt., Power & Gas Co., Salina, Kans., 1923 to date.
- Levine, Hyman**, B.S. (M.E.). Mech. Eng. Ingersoll-Rand Co., Littleton, Colo., 3971 S. Broadway, Englewood, Colo.
- Lind, Raymond William**, B.S. (C.E.). Clerk of Works, Univ. of Colo., Boulder, Colo., 1920; Eng. Construction Dept., do., 1921; Asst. Supt. of Const., 1921-24; Construction Supt., Shankland, Ristine & Co., Denver, Colo., 1924 to date.
- Merrill, Mrs. A. S. (Lou Alta Melton)**, B.S. (C.E.). U. S. B. of P. R., Denver, Colo., 1920; do., Missoula, Mont., 1920-22; do., Reg. Hg. Office, San Francisco, Calif., 1922. 541 Beckwith Ave., Missoula, Mont.
- Morehouse, Harry Clarence**, B.S. (M.E.). G. W. Sugar Co., Longmont, Colo., 1920. Eng. Dept., Oil Tool Co., Torrance, Calif.
- Murray, Lee James**, B.S. (E.E.). Mont. Power Co., Deer Lodge, Mont.; G. E. Co., Schenectady, N. Y. Tacoma, Wash., 1923.
- Page, Henry Anthony**, B.S. (E.E.). Instructor Eng. Math., Univ. of Colo.; Birney-Page Pub. Co., 617 U. S. Natl. Bank Bldg., Denver, Colo. Home address, 3775 Osceola St., Denver, Colo.
- Rice, Harold Fredrick**, B.S. (E.E.). A. C. Eng. Dept., G. E. Co., Schenectady, N. Y., 1920-22; Elec Eng. Dept., Public Service Co. of Colo., Denver, Colo.
- Richardson, George Sherwood**, B.S. (C.E.). Wyo. Highway Com., Big Piney, Wyo., 1920; Instructor, Univ. of Penn., Philadelphia, Pa., 1920; Inspector, Penn. State Highway Dept., 1921; Pittsburgh McClintock-Marshall Co., 1922; Draftsman, Am. Br. Co., Ambridge, Pa., 1922 to date.
- Ryder, Donald Hugh**, B.S. (E.E.). Mt. States Tel. & Tel. Co., Helena, Mont., 1920-21; Denver, Colo., 1921-23; O. & E. Dept., Amer. T. & T. Co., 195 Broadway, N. Y., 1923 to date.
- Sanders, V. H.**, B.S. (Ch.E.). Home address, Durango, Colo.
- Seudder, Felix Ward**, B.S. (E.E.). 216 Fern, Redlands, Calif.
- Steinmetz, William John**, B.S. (C.E.). Asst. Res. Eng., Calif. Highway Com.; Am. Bridge Co., Gary, Ind.

**Stone, Caleb, B.S. (C.E.).** The National City Company, 1920 to date. 55 Wall Street, New York City.

**Tandy, Ben George, B.S. (E.E.).** Mt. States Tel. & Tel. Co., Denver, Colo., 1920; 689 So. High St., Denver Colo.

**Taylor, Robert Hugh, B.S. (M.E.). M.S. (M.E.).** Harvard Univ., 1922; Jun. Eng., Gas Eng., Public Service Co. of Colo., 1922 to date. 1376 Pearl St., Denver, Colo.

**Warner, Arthur Howard, B.S. (E.E.).** Instructor, Physics Dept., Univ. of Colo., Boulder, Colo., 1920-21; "Assoc.", Physics Dept., Southern Branch, Univ. of Calif., Los Angeles, 929 E. California Ave., Pasadena, Calif.

**Whitney, Russell Lee, B.S. (E.E.).** W. E. & Mfg. Co., Pittsburgh, Pa., 1920-23; do., Philadelphia Pa., 1923 to date.

**Wolff, Hiram Bradley, B.S. (Ch.E.).** Real Estate. 1714 Champa Street, Denver, Colo. Alden Apts., 1170 Corona Street, Denver, Colo.

**Wood, Carl E., B.S. (E.E.).** Mech. Dept., C. M. & St. P. Ry., 1920 to date. 205 N. Tacoma, Tacoma, Wash.

## 1921

**Anderson, Glenn Willard, B.S. (M.E.).** Tau Beta Pi. W. E. & Mfg. Co., Philadelphia, Pa., 1921-22; do., Service Dept., Chicago, Ill., 1922-23, do., Field Eng., Minneapolis, Minn., 1923 to date.

**Blom, Max, B.S. (E.E.).** Instructor Math. and Science, Paonia High School, Paonia, Colo., 1921-22; Supt. Schools, Strassburg, Colo., 1922-23. 1457 St. Paul St., Denver, Colo.

**Bronson, Hubert D., B.S. (E.E.).** Salesman, Elec. Appliances, Hastings, Mich., 1921-23; Elec. Eng. Dept., Consumer's Power Co., Jackson, Mich., 1923 to date.

**Brown, James S., B.S. (C.E.).** 433 Franklin Street, Denver, Colo.

**Buck, Arnold Frederich, B.S. (M.E.).** Eng. Dept., Denver Rock Drill Mfg. Co., 1921; Sales Dept., Westinghouse Elec. Co., East Pittsburgh, Pa., 1922-23; do., Atlanta, Ga., 1923 to date.

**Hunting, Joseph William, B.S. (M.E.).** Meter Dept., West. L. & P. Co., 1921-22; Inst. Vocational Training, Univ. Colo., 1922-23; Instructor Eng. Math., U. of C. 1923; Instructor, M. E., do., 1924 to date.

**Caughy, Clarence Harold, B.S. (M.E.).** Tau Beta Pi. Instructor, Mech. Eng., Univ. of Colo., Boulder, Colo., 1921 to date.

**Clarke, Thomas H., B.S. (E.E.).** Pacific Gas & Elec. Co., 1923 to date. 773 Cola St., San Francisco, Calif.

**Crowley, Corydon H., B.S. (E.E.).** Edgewater, Colo.

**Devenish, George Pushe, B.S. (M.E.).** G. W. Sugar Co., Longmont, Colo.; Denver Municipal Water Works, to date. 2123 S. Franklin, Denver, Colo.

**Divine, Howard E., B.S. (M.E.).** Instructor, Univ. of Colo., Boulder, Colo.

**Dougherty, Vivian Channing, B.S. (M.E.).** Colo. Radium Products Co., Boulder, Colo., 1921; Inst. in Mech. Drawing, Pueblo High School, Dist. No. 20, 1921 to date. 905 Berkeley Ave., Pueblo, Colo. (Home address) Box 176, Salida, Colorado.

**Dunstone, Arnold E., B.S. (E.E.).** G. E. Co., Schenectady, N. Y. (Home address) 3311 Tenneyson Street, Denver, Colo. Care Gen. Elec. Co., Testing Dept., Schenectady, N. Y.

**Easton, Frank Artemus, B.S. (E.E.).** Instructor, Elec. Eng. Dept., Univ. of Colo., Boulder, Colo., 1921 to date.

**Elder, Andrew D., B.S. (Ch.E.).** Inst. Elec. Eng., Univ. Calif. 2409 Ellsworth, Berkeley, Calif., 1923.

**Farrar, Clyde Leo, B.S. (E.E.).** Inst. Voc. Train. in Practical Elec., State College, A. & M., New Mexico, 1922-23; Instructor, Univ. of Idaho, Moscow, Idaho, 1923 to date.

**Greenawalt, Arlo Cornell, B.S. (Ch.E.).** Metallurgical Eng., Mine & Smelter Supply Co., Marcy Mill Dept., 1923 to date. 508 E. Dakota St., Denver, Colo.

**Haffey, Patrick J., B.S. (Ch.E.).** Box 821, Brush, Colo.

**Harris, Albert George, B.S. (M.E.).** Aspen, Colo.

**Harry, John B.S. (C.E.).** 2nd Lt., Officers' Training Course, U. S. Army, Camp Knox, Ky., 1921; 1st Lt., Field Artillery, do., Inst. Summer Training Camp, Camp Travis, Tex., 1922; 12th Field Art., Ft. Sam Houston, San Antonio, Texas, 1922 to date.

**Inman, Brayton James, B.S. (C.E.).** Died 1921.

**Jennings, Frank A., B.S. (C.E.).** Tau Beta Pi. 1001 East Fourth Street, Pueblo, Colo.

**Johnson, Alan Hawley, B.S. (E.E.).** Asst. Elec. Eng. Care Mountain States Tel. & Tel. Co., Boise, Idaho, 1921-23; Div. Transmission Eng. of Coast Div., San Francisco, Calif.

**Johnson, Jerome McKinley, B.S. (M.E.).** Duquesne Light Co., 1922-23; Rush Machine Co., 1923 to date. 99 Grant Ave., Bellvue, Pa.

**Jones, Daniel B.S. (C.E.).** State Hydrographer, Alamosa, Colo.

**Kerr, Clarence LeRoy, B.S. (E.E.).** Tau Beta Pi. Test Dept., G. E. Co., Schenectady, N. Y., 1921-24; Electrician C. M. & St. P. Ry., Deer Lodge, Montana, 1924 to date.

**Koernig, Raymond Chandler, B.S. (M.E.).** G. E. Co., Schenectady, N. Y., 1921-23; G. E. Co., Oakland, Calif., 1923 to date.

**Lallie, Anthony S., B.S. (E.E.).** 126 North 22nd Avenue, Los Angeles, Calif.

**Lillie, Charles W., B.S. (E.E.).** W. E. & M. Co., East Pittsburgh, Penn., 1921-23; do., St. Louis, Mo., 1923 to date.

**McFarlane, Frank Lloyd, B.S. (M.E.).** W. E. & Mfg. Co., East Pittsburgh, Pa., 1921 to date. (Home address) 1773 Williams Street, Denver, Colo.

**McNerny, Townsend, B.S. (Ch.E.).** Tau Beta Pi. Am. Chem. Soc. S. W. Shattuck Chemical Co., Denver, Colo., 1921; Eng. Dept., Edison Lampworks, Harrison, N. J., 1922-23.

**Meyer, Harry, B.S. (C.E.).** Tau Beta Pi. 2nd Lt., Officers' Training Course, U. S. Army, Camp Humphreys, W. Va., 1921; 1st Lt., Eng. Corp., U. S. A., do., Officer in charge of Surveying Party, 1923 to date. Survey Group IV, 2nd Engineers, Clint, Texas.

**O'Kelley, Francis Cornelius, B.S. (E.E.).** Telluride, Colorado.

**Orris, James R., B.S. (Ch.E.).** Seibert, Colo.

**Parr, Elza Wellington, B.S. (C.E.).** 1119 North Weber Street, Colorado Springs, Colo.

**Patterson, Ernest G., B.S. (Ch.E.).** Fort Morgan, Colorado. Crockett, Calif., 1923 to date.

**Peterson, William Charles, B.S. (C.E.).** Asst. Resident Engineer, Colo. State Highway Dept., Delta, Colo.

**Pinsky, Joseph, B.S. (M.E.).** Tau Beta Pi. 1213 Decatur Street, Denver, Colo.

**Robertson, Oscar Lofton, B.S. (M.E.).** Tau Beta Pi. Instructor, Eng. Math., Univ. of Colo., Boulder, Colo., 1921-23; Instructor in Charge M. E. Dept., Univ. of Wyoming, 1923 to date.

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**Shapiro, Isadore Benjamin, B.S. (Ch.E.).** 1921-22. Boiler House Control and Chief Analyst, Industrial Sugar Co., Ft. Lupton, Colo., 1922 to date; Mine and Smelter Supply Co., Denver, Colo. 2101 Franklin St., Denver, Colo.

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**Suess, Wil'ard Frederick, B.S. (E.E.).** Instructor, Math., East Denver High School, 1921 to date. 1131 Steele Street, Denver, Colo.

**Sumners, William Glenn, B.S. (Ch.E.).** 2144 Vine Street, Denver, Colo.

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**Wylam, Clarence, B.S. (M.E.).** Westinghouse Elec. Co., Pittsburgh, Pa., 1922 to date. Home address, 725 Spruce Street, Boulder, Colo.

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**Abrams, Richard H., B.S. (C.E.).** Gen. Mgr. Diamond Motors Co., Butler, Pa., 1923 to date.

**Allan, Walter James, B.S. (C.E.).** 1340 Garfield, Denver, Colo.

**Almgren, Earl William, B.S. (E.E.).** Tau Beta Pi. G. E. Co., Schenectady, N. Y., 1922-23.

**Altwater, Herbert George, B.S. (C.E.).** Colo. State Hwy. Dept., Hot Sulphur Springs, Colo.

**Anderson, David Frank, B.S. (E.E.).** Westinghouse E. & M. Co., E. Pittsburgh, Pa.

**Andrews, Lloyd E., B.S. (C.E.).** Amer. Bridge Co., Gary, Ind., 1922-23. Masonry Inspector, Room 1000 Central Station, I.C.R.R., Chicago, Ill., 1923 to date.

**Bagley, Walter Glenn, B.S. (M.E.).** C. F. & I. Co., 1715 Pine St., Pueblo, Colo.

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**Brainard, Boyd Bertrand, B.S. (M.E.).** Western Elec. Co., 145 Central Ave., Chicago, Ill.

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**Burk, Harold DeWitt, B.S. (Ch.E.).** Gr. W. Su. Co., Sterling, Colo.

**Burroughs, Earl R., B.S. (M.E.).** Stearns-Rogers Co., Wamsutter, Wyoming, 1922-23; Union Pacific R. R. Co., Omaha, Nebr., 1923 to date.

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**Carpenter, Marlon Scott, B.S. (Ch.E.).** Asst. Chem. Dept., U. of C., 1923 to date.

**Cassell, Wallace Lewis, B.S. (E.E.).** Tau Beta Pi. G. E. Co., Schenectady, N. Y.; Daugherty-Welch Elec. Co., Fall River, Mass.

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- Cuthbertson, Robert E.**, B.S. (Ch.E.). Assayer-Chemist, United Gold Mining Co., Granite, Ore., 1922-23; Metallurgical Supt., Independence Mining Co., Granite, Oregon, 1923 to date.
- Daniels, Frank, Jr.**, B.S. (M.E.). Box 210, Folecroft, Pa.
- Dee, Marion**, B.S. (Ch.E.). Tau Beta Pi. Inst. Engr. Math. Univ. of Colo., Boulder, Colo., 1922-23; Testing Eng., Gen. Petroleum Corp., Los Angeles, Calif., 1923 to date.
- Dickey, Donald Edgar**, B.S. (Ch.E.). Tau Beta Pi. General Petroleum Co., Los Angeles, Calif.
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- Fairies, Virgil Moring**, B.S. (M.E.). Inst. M. E. Dept., U. of Colo., Boulder, Colo., 1922 to date.
- Feldmann, Merrick Rogers**, B.S. (E.E.). Tau Beta Pi. Supply Eng. W. E. and M. Co., Pittsburgh, Pa.
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- Gross, Leo Henry**, B.S. (E.E.). 2613 California, Denver, Colo.
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- House, Caldwell Burl**, B.S. (M.E.). Stearns-Rodgers Co., Wamsutter, Wyo., 1922-23; (Home address) 788 Grant Place, Boulder, Colo.
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- Lawrence, Van Buren**, B.S. (M.E.), 2013 Walnut, Boulder, Colo.
- Lee, John Adams**, B.S. (E.E.), W. E. & M. Co., E. Pittsburgh, Pa., 1922-23; U. S. R. S. Camp No. 4, Pilot, Wyoming, 1923 to date.
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- Vidal, Henri B.**, B.S. (Ch.E.). Tau Beta Pi. Field Office, Westinghouse E. & M. Co., Niagara Falls, N. Y., 1923 to date. 706 Main St., Niagara Falls, N. Y.
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- Willard, James Lee**, B.S. (C.E.), C. E. Dept. Empire Co., Bartlesville, Okla., 1922 to date.
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- Abrams, Myron Lee**, B.S. (M.E.). Westinghouse E. & M. Co., E. Pittsburgh, Pa.
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- Chamberlin, Merton Henry**, B.S. (M.E.). Craig, Colo., 1923-24.
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Advanced degrees granted to others than alumni of the College of Engineering:

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**Williams, Clement Clarence**, C.E. 1909. B.S. in C.E., Univ. of Ill., 1907. B.S., Iowa Northern Univ., 1901. M. Am. Soc. C.E., Am. Soc. Test Mat., A.R.E.A., S.P.E.E., Am. Assn. Adv. Science, Kan. Eng. Soc., Kan. Acad. of Science, Tau Beta Pi, Sigma Xi. Eng. work, Delaware, Lackawanna & Western R. R., C. M. & St. P., and Ill. Central Rys.; also Municipal, highway, bridge, and general construction, expert railway rate litigation; Instructor in Civil Eng., Univ. of Colo., 1907-09; Acting Prof. of Civil Eng., do., 1909-10; Asst. Prof. of Civil Eng., do., 1910-14; Prof. of Ry. Eng., Univ. of Kan., 1914-18; Supervising Eng., U. S. Explosives Plant, Nitro, W. Va., 1918-19; Prof. of Civil Eng., Univ. of Kan., 1918-22; do., Head of Dept., Univ. of Ill., 1922 to date. Author: Design of Railway Location; Pub., Wiley & Sons, N. Y.; Design of Masonry Structures and Foundations; Pub., McGraw Hill Book Co., N. Y. Univ. of Ill., Urbana, Ill.

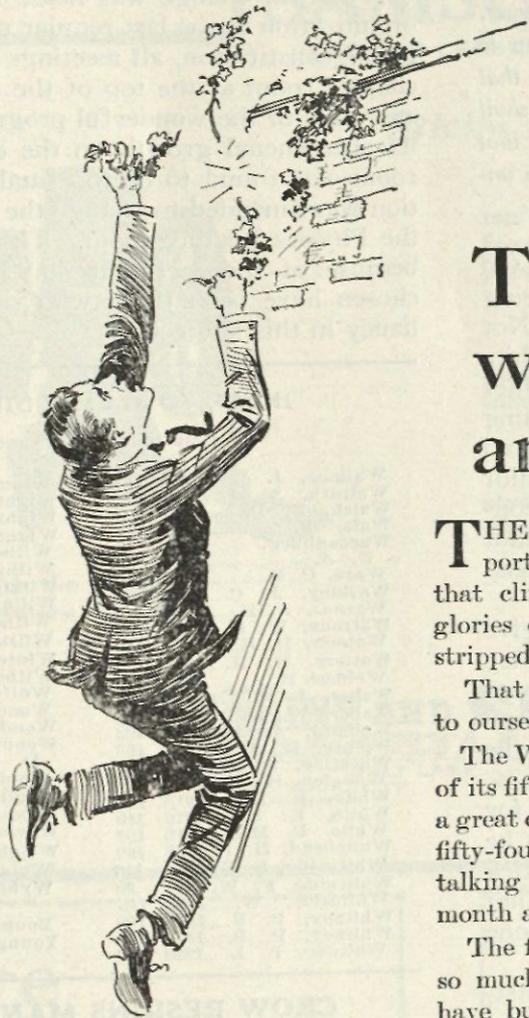
**Sullivan, George L.**, M.E. 1910. B.S. (M.E.), Univ. of Neb., 1908. Ph.D., Univ. of Santa Clara, 1915. Sigma Xi, Sigma Tau, A.S.M.E. Instructor in Mech. Eng., Univ. of Colo., 1908-11; Asst. Prof. of Mech. Eng., Mont. State College, 1911-12; Prof. of Mech. Eng., Univ. of Santa Clara, 1912-19; Ordinance Inspection Dept., 1918-19; Instructor, East Denver Dean of College of Eng., do., 1919 to date. Consulting Eng., Rosenberg Bros. Co., 1916; do., City of Santa Clara, 1917-18; Mech. Eng., with Phelps-Dodge Corporation, Douglas, Ariz., 1918-19; Consulting Eng., Pacific Mfg. Co., 1919; do., Knowles Pottery Co., 1921. Santa Clara, Calif.

**Woods, Harland C.**, C.E. 1911. B.S. (C.E.), Univ. of Neb., 1909. Draftsman, Chicago, Burlington & Quincy R. R., 1909; Instructor in Gen. Eng. Drawing, Univ. of Colo., 1909-13. Prof. of Civil Eng., Robert College, 1913-17; Asst. Eng. Union Pacific R. R., 1917; Roberts College, Constantinople, Turkey.

**Bauer, Frank Stanley**, M.E. 1915. B.S., Univ. of Ill., 1911. Sigma Xi, Sigma Tau, Assoc. Mem. A. S. M. E., Mem. S. P. E. E.



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## The ivy won't save any of us

**T**HE ivy of tradition is a slender support. A man or a team or a college that clings to it, harking back to the glories of yesterday, is likely to be outstripped by some young but sturdy rival.

That is a sermon we have taken home to ourselves.

The Western Electric Company is proud of its fifty-four years of history. But it is a great deal more concerned with the next fifty-four—and that is why we have been talking to the college men of America month after month now for four years.

The future of this business depends not so much on the physical equipment we have built up as on the mental equipment which men of your generation are building—on your habits of study and conduct, on your right choice of a profession and your proficiency in it. So we have made suggestions for your guidance, with the conviction that they can help you—and us.

\* \* \* \*

This company, with its laboratories, its distributing organization and its great telephone factory—in every respect a modern industry and in many respects a leader—will have openings from time to time for men who can qualify.

*Published in  
the interest of Elec-  
trical Development by  
an Institution that will  
be helped by what-  
ever helps the  
Industry.*

# Western Electric Company

*Since 1869 makers and distributors of electrical equipment*

**OIL CAN**



*The Honorary Society of Lubrication Engineering. Dedicated in perpetuity to the services of science, that the cause of lubricity shall lack no champion, and that friction shall not thrive unopposed.*

Of special importance to the members of the Oil Can Society is the news of the successful pledging of Lou Connelly, president of the Senior class. Not only did he make himself eligible to membership, but he also insured for himself the position of Chief Wiper at the next election for his public upholding of the organization. At Senior meeting he wanted to know how many days there would be in Senior week this year. Perhaps he was taking into consideration the fact that this is leap year, and that strange things have been known to happen in leap year.

Chuck Carpenter, Senior Civil, when asked to give the two main types of turbines answered that they were *overshot* and *undershot*. Perhaps Chuck was thinking of the night before, but he has been given the benefit of the doubt, and has been offered the pledge.

Ball, Junior Mechanical, won unanimous vote for membership when in Mechanics of Materials he spent an hour and burned a bearing on his slip-stick trying to calculate the length of a yard-stick. That he finally succeeded in doing so ranks him as one of the coming great scientists.

Melvin Frame, already a member, won the cast-iron spout, emblem of the second degree, when he devised means in Refrigeration of saving all the leaks from the ammonia compressor. The fact that he was silent as to what he was going to do with the leaks after he had caught them leads us to believe that he is working on his third degree.

Don Porter, Senior Electrical, was given honorable mention for his discovery of an important formula which has since proved valuable in the calculation of electrical problems, particularly those relative to Trig. The equation is decidedly new, and can be used to decided advantage in any engineering course. It is

$$A^2 = B^2 + C^2 - 2BC \cos a$$

Perry and Conant, Junior Mechanicals, made the most important discovery in M. E. Lab which has been made for several years. They were working with a friction machine for the testing of oil, and discovered "static motion." Many authorities in oil doubt the value of the friction machine in determining true qualities of lubricating oils, but even their opposition will probably be dropped when they have learned the wonderful things which can be done with it. It is understood that Perry and Conant have

received a summons from Washington to come and try their static motion results on the Teapot.

A radical change was made in the policy of the organization at the last regular meeting. According to the constitution, all meetings must be held in the chapter room at the top of the smoke-stack. However, due to the wonderful progress of the club, and its phenomenal growth on the campus, the chapter room was found to be too small. So the constitution was amended to change the place of meeting to the Physics Lecture room. This room was selected because of the fact that 49.99% of all members chosen have been those who showed especial brilliancy in this subject.

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**CROW RESIGNS MANAGERSHIP**

Owing to the condition of his health, Ralph Crow has been forced to drop a number of his activities. Among these was the managership of the COLORADO ENGINEER. Mr. Crow has been very active on a number of publications on the campus.

To fill the vacancy left by Mr. Crow, John Howard was appointed. Mr. Howard is a senior in Civil Engineering, and is president of the local chapter of the American Society of Civil Engineers.

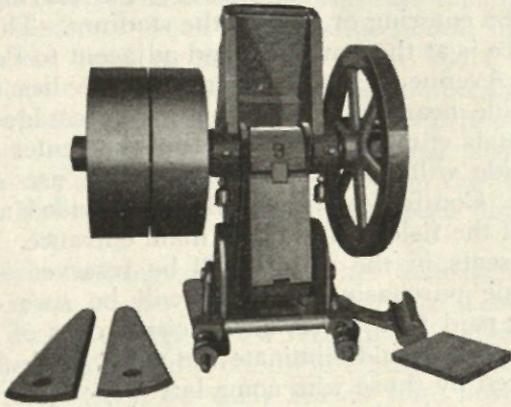
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P R I C E**



**Streamer's Drug Store**

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Phone 109

## COLORADO'S STADIUM

(Continued from page 91)

this was not considered a serious drawback. Accordingly the plans were made to include a gridiron and a 25-ft. quarter-mile track with an extended 220-yard straightway.

### BALANCING OUT THE FILL

After the selection of the general location of the structure, detailed calculations were made to find the exact position in which the stadium could be most economically built. With an approximate capacity of 25,000 decided upon, seats were sketched in surrounding the track and football field. Thirty-one rows of seats were required on the basis of 10 per cent of the space being needed for passages and aisles. A contour map on tracing cloth of the finished structure was then made, using an assumed elevation for the playing field level. This was superimposed upon a contour map of the site, in what seemed to be the best position, and the excavation and embankment were calculated by taking the cuts and fills to be the difference in elevation between the two contour maps at fixed points taken at regular intervals. A line connecting points of intersection of the finished field with the natural surface divided the area into two sections, one all in cut and the other all in fill. By determining the average cut and fill over these respective areas, the total yardage of excavation and embankment was calculated. After several trials, each time using a corrected elevation for the playing field, a condition giving balanced cut and fill was obtained. Using this new elevation of the playing field, the top seat on the west side was found to follow closely the natural ground level. On the east side where the natural surface is somewhat lower, an embankment several feet high will be required.

### DRAINAGE OF THE FIELD

A small stream fed by springs and some surface water which flows through the ravine is being taken care of by a line of 15-in. pipe. To take care of the surface drainage on the track and playing field, a line of pipe will encircle the field near the inside curb of the track. This drain will collect water from catch basins spaced at frequent intervals. The playing field is to be slightly crowned, sloping from the center toward the side drains. The question of providing subdrainage for the football field was carefully considered. It is certain that a properly constructed system of subdrains would enable surface water to be carried away somewhat more rapidly. The objection to such a system lies in the fact that in this climate where lawns must be watered by irrigation, it is very difficult to maintain a good lawn where subdrainage is provided. The more efficient the subdrainage, the more care it requires to prevent the lawn from burning up. For that reason it was decided to omit the subdrains and install them at a later date if experience proves them to be necessary.

## SEATING PLAN

The entire seating area is divided into sections by radial aisles approximately fifty feet apart. These aisles will be fed from a wide path which lies outside of, and on level with, the top row of seats. Entrance can be gained from the top only, and the spectators will not pass through the playing field either on entering or leaving the stadium. The main entrance is at the south end and adjacent to Pennsylvania Avenue. The student entrance lies on the west side near the Gymnasium. A passage under the stands entering the field near the center on the west side will be constructed for the use of the teams. Comfort stations will be provided at both sides of the field and near the main entrance.

All seats in the stands will be reserved so that everyone purchasing a ticket will be sure of the seat he paid for. With an efficient corps of ushers this system should eliminate the usual difficulty experienced by those who come late.

Increases in the capacity of the stadium can be made in two ways. The first consists of the addition of four more sections on the north end, partly closing that end. For this projection the natural topography lends itself well. Five thousand four hundred seats can be added in this way. The second consists of the erection of a super-structure around the entire perimeter. The added capacity to be obtained in this way is about one thousand per row. Thus by constructing the additional end sections and adding ten rows of seats, the total capacity would be increased to about forty thousand; and by adding twenty rows, to fifty thousand.

The problem of providing adequate space for the parking of cars is being carefully considered. In addition to the space used for this purpose on the campus and adjoining streets, several tracts of land recently purchased by the University and near the stadium will be available for use.

### DEVELOPMENT OF EASTERN PART OF CAMPUS

The newly purchased land lying east of the Colorado & Southern Railway will be devoted to physical education and Varsity athletics. As money becomes available the tennis courts will be moved to the location shown on the map north of the Gymnasium. The plan also provides space for Varsity baseball and playing fields for the use of classes in physical education. While many of the details covering the uses to which this ground will be put are not yet complete, the general scheme is outlined on the accompanying map. Much of the planting which is to connect the new athletic center with the old campus will be done next spring.

### LOW ESTIMATED COST

The estimated cost of the stadium is \$65,000. Accustomed as we are to reading of stadia constructed at other universities costing hundreds of

(Continued on page 124)

## Athletes Show Fine Spirit and Hard Fight In Trying for Teams

After such an overwhelming series of football victories, it would seem that Colorado is entitled to a faster basketball team than has been hers during the last two seasons. Such a successful season in one sport should tend to put every other sport on a higher plane of achievement, and the competition at least would indicate that the fighting spirit of the football men is still with us. The race for positions on the basketball team, and especially on the wrestling and boxing squads, has certainly been hot and furious.

The basketball season began rather inauspiciously with a defeat at the hands of the State Teachers quintet, which, though not a recognized conference contender, is admittedly one of the best cage teams in the state. Such an early season loss, however, should not prove a real cause of worry to Colorado supporters, for it served to make evident the points of weakness in the Colorado Five—faults which can or should be easily corrected before the more important games. Colorado's chief weakness seemed to be a poorly developed offensive. On the defensive the team played as well as could be expected of a green team in its first game, but the offense was not up to standard.

Varsity played her first conference game on January 25, with Aggies. The Aggie team did not claim much for itself, and Colorado expected an easy win. The game was lost to Aggies 22 to 16. This game was characterized by worse than high school awkwardness; and Colorado's five that faced the Aggies was a poorer team by far than that which lost to Greeley by one point two weeks previously. Chilson, James, Waite, Nichols and Lewis played a good game, but they played, for the most part, separately.

At this point in the season it is extremely difficult to forecast any prophecy as to who will win the pennant. Basketball is a very difficult game to judge. After weeks of hard work, without visible appearance of great improvement, a coach may realize suddenly that he has developed a winning basketball team. It might really be called a transformation, and it is the spirit of the team, and a psychological something which one might call co-ordination, which really makes the championship basketball team. Perhaps more in basketball than any other sport the team must work as a unit, and a real star is of almost no value of himself alone. He must have support; the various members must co-ordinate, or the showing is poor.

It is the belief of Colorado fans that State has material for a winning team in basketball. The greatest handicap lies in the fact that the men are in-

experienced, most of them have never played together before, and several, though high school stars, are getting their first experience in college basketball. Taken separately the material is good, but it remains to choose a winning combination. Colorado is still out for the championship, and before the season ends will have a good team, but whether or not this team will be developed in time remains to be seen.

On the night of February first, Varsity met Mines. Having previously found itself, in a game with Regis college, the team was out to win, and win it did in a fast game which Colorado rushed to the last minute of play. Team work was excellent, goal-shooting was brilliant, and Mines was completely outclassed. The score was 49 to 24 for Colorado. Apparently Coach Mills has finally found the right combination, and has developed the necessary co-ordination, and hence Colorado is now in line for the championship in earnest. Chilson and Waite look to be the best guards in the conference, and Nichols, James, and Walters are playing up to the standard. Captain Nichols played a stellar game against Mines, and seemed unable to miss the basket.

### INDICATIONS POINT TO A BRILLIANT SEASON FOR WRESTLING AND BOXING

Boxing and wrestling squads are occupying a large share of student attention at present. Although Colorado's mat and ring teams were almost annihilated by graduation last year, the prospect for another championship in these sports is indeed bright. In Donald Kilton, Varsity has a wonderful coach, a man who knows and can teach wrestling. He has some good material again this year, and can be depended upon to develop it. The gap left by the graduation of the Coleman brothers is indeed a hard one to fill, but several good men are being developed. In the 145-pound class, Berninger is first choice and is doing well in practice. Gunter, also a good man in the 145 division, was lost to the squad through an injury. Connell, 135 pounder, is showing championship merit; Westlund and Allison are contending in the 158-pound class; Sunderland is meeting the 175-pound men; and Keim is in the heavyweight division.

Colorado's wrestlers began the season in fine shape by winning every one of their matches in the prelims at the D. A. C. tournament. Sunderland was first to appear for Colorado, and won his bout in eight minutes and fifty-five seconds; Berninger won on decision; Westlund won by a fall in two minutes and thirty-eight seconds; Connell won similarly in three minutes and two seconds; and Peterson, also

three minutes and two seconds; and Peterson, also in the 135-pound class, won by a fall in one minute and thirty seconds.

In the semi-finals, however, only Westlund and Peterson survived, and these two men lost in the finals. However, Coach Kilton is not at all discouraged, and expects the men to put up a far better showing in conference matches.

Thirty men were out for boxing at the beginning of the season, and from that number Coach Franklin has begun to develop some real pugs. Franklin is using a more scientific method than has been used previously at State, and it is believed that he is going to build a championship team. Two veterans, Minna and Dickson, are representing the 158-pound and heavyweight divisions. Both were last year's conference champions, and both are expected to repeat last year's achievement. The squad has been reduced to sixteen men, all of whom look capable of defending Colorado to her advantage in the ring.

Prospects for realizing the ideal expressed in last quarter's slogan of four championships in one year are very bright now with such a fast squad of wrestlers and boxers representing Varsity. Basketball seems to be the weak point. Track prospects are of the best, and if Colorado succeeds in developing a baseball team, the spring quarter promises a brilliant athletic schedule. In track, Varsity is out to win her sixth consecutive championship. In spite of a bad start in basketball, the remainder of the year still promises further brilliant athletic achievements.

—MILTON BOONE.

### COLORADO'S STADIUM

(Continued from page 122)

thousands and even millions of dollars, this amount seems surprisingly low. There are two reasons for this low cost. The first is the topography of the ground which is almost "made to order," and the second is the use of wood instead of concrete for seats. Reducing the total cost to cost per seat, we find that concrete, or concrete and steel stadia built at other institutions have cost from \$15 to \$25.00 per seat. The recently completed stadium at the University of California cost \$1,300,000 and seats about 72,000 people, or at the rate of \$18.50 per seat. Dividing the estimated cost given above by 25,000 we have \$2.60 per seat. The nearest approach to that cost of which we have any knowledge is the stadium at Stanford University. That stadium is very similar to ours in design; that is, earth embankment and wooden seats. The cost per seat was \$3.50.

#### PROGRESS OF WORK

Excavation is well under way, and will be finished about June 1, allowing time to seed down the playing field. The order for all lumber required has already been placed and the work of constructing the seats will be carried on through the summer. There are 68,000 cubic yards of excavation. This work is being done under contract by Arvid Olsen of Den-

ver. The seats will require approximately 300,000 feet of lumber. All work except the excavation will be done by the University Construction Department.

### REFRIGERATION PLANT INSTALLED

Among the several additions which are being made to the laboratories of the various departments of the Engineering School is the refrigeration plant now installed in the steam engine laboratory by the Mechanical Engineering Department. Present plans include both a freezing unit and a thermal room, but the thermal room will not be constructed until some time next year.

The refrigeration plant represents the most up-to-date equipment for small refrigeration units that can be obtained at the present time. The installation includes a type Y-21 compressor driven by a 5-hp. electric motor with an automatic control, and a freezing unit of a capacity of nine 50-pound cakes of ice per ten hours. The entire mechanism is what is known as a 2-ton combined refrigeration unit. It is designed to carry temperatures as low as  $-25^{\circ}$  F. in the freezing unit. Temperatures of  $60^{\circ}$  below zero may be obtained after the thermal room has been installed in the laboratory. The freezing tank contains 425 lineal feet of  $1\frac{1}{4}$ -in. expansion piping. Calcium chloride is to be used for the brine.

The compressor is a gift of the York Manufacturing Company of York, Pennsylvania. It came as a result of the combined efforts of E. W. Gallenkamp, sales manager, and Paul H. Carlson, a graduate of the Engineering School. Both of these men are with the York Mid-West Ice Machine Company, a western branch of the York Manufacturing Company, with its headquarters in Denver. The freezing unit, however, was purchased by the University.

The installation is under the direction of Professor S. L. Simmering of the Mechanical Engineering Department, who installed a similar plant at the Kansas Agricultural College. Excellent results have been obtained from the plant at Kansas Aggies, and results equally as good are expected from the University plant.

Operation of the plant will be purely experimental. There are no plans of producing ice on a commercial basis. After the completion of the thermal room, experimental work will be performed on freezing many different kinds of liquids and substances. A study of heat transmission will also be made in the thermal room.

In view of the fact that the operation of the refrigeration system will prove of interest to many students and others concerned in mechanical engineering, demonstrations of the machine will be made occasionally for visitors. The plant will be exhibited on Engineers' Day as one of the features of that day.

—GALEN CARTWRIGHT

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## ANALYSIS OF NON-SINUSOIDAL WAVES

(Continued from page 94)

Let the equation of the curve of figure 2 be  $y = \sin ax$

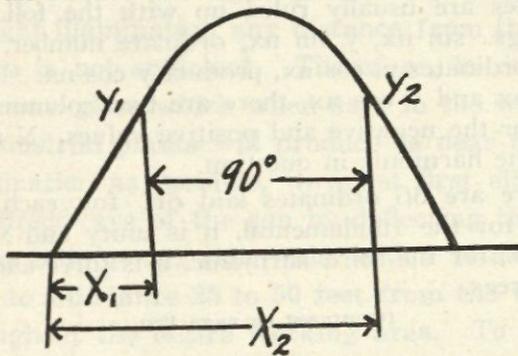


Fig 2.

$$\frac{dy}{dx} = a \cos ax; \text{ at the origin } \cos^{-1} \frac{dy}{dx} = a$$

$$y^2 = a; y^2 = ay^2; y^2 = \sin ax^2; y^2 = a \sin ax^2$$

$$x^2 = x^2 \frac{\pi}{2} \sin ax^2 = a \sin a \left( \frac{x^2 + \pi}{2} \right)$$

$$= a \sin ax^2 \cos a \frac{\pi}{2} + a \cos ax^2 \sin a \frac{\pi}{2}$$

$$\sin ax^2 = 0 + a \cos ax^2$$

$$\frac{\sin ax^2}{a \cos ax^2} = \frac{y^2}{y^2}$$

With the aid of the above, the analysis of a wave containing only the fundamental, the third, fifth, and seventh harmonics is relatively simple. If there were a ninth harmonic present this would be a multiple of the third and a correction would be necessary.

To determine the third harmonic, divide the base line of this resultant half wave into  $2n=6$  equal parts, and measure the ordinates at the beginning of each of these six segments. Let these ordinates be  $y_1, y_2, y_3, y_4, y_5, y_6$ . Let the beginning of the first segment be taken where the given wave crosses the x-axis and call this point the origin; then  $y_1=0$  and therefore

$$A_3 = \frac{1}{3} (y_2 - y_4)$$

$$B_3 = \frac{1}{3} (y_3 + y_5 - y_1)$$

The maximum value of the third harmonic is then  $y_3 = \sqrt{A_3^2 + B_3^2}$  and it cuts the x-axis at the angular distance

$$c_3 = \frac{1}{3} \tan^{-1} \left( \frac{A_3}{B_3} \right)$$

to the left of the origin. The equation of the third harmonic is then

$$y_3 = Y_3 \sin 3(x + c_3)$$

(Continued on page 126)

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Similarly, starting at the same point and dividing the half wave into  $2n=10$  segments

$$A_s = 1/5 (y_s + y_2 - y_3 - y_7)$$

$$B_s = 1/5 (y_2 + y_6 + y_{10} - y_4 - y_8)$$

$$Y_s = \sqrt{A_s^2 + B_s^2}$$

$$C_s = 1/5 \tan^{-1} \left( \frac{A_s}{B_s} \right)$$

and the equation of the fifth harmonic is  $y_s = Y_s [\sin 5(x+C_s)]$

The base line is divided into  $2n=14$  parts and the equation of the seventh harmonic is found at the third and fifth above.

The ordinates of the fundamental at the origin and at the point corresponding to one quarter of a wave length from the origin are then respectively

$$A_1 = -A_2 - A_3 - A_7$$

$$B_1 = y_m + B_2 - B_3 + B_7$$

where  $y_m$  is the ordinate of the given wave corresponding to the point a quarter wave length from the origin (i. e., the mid-ordinate of the given wave), and  $A_2, A_3, A_7, B_2, B_3, B_7$  are the quantities determined above.

The maximum value of the fundamental is then  $Y_1 = \sqrt{A_1^2 + B_1^2}$  and it cuts the x-axis at the angular distance.

$$C_1 = \tan^{-1} \frac{A_1}{B_1}$$

to the left of the origin. Its equation therefore is  $Y_1 = Y_1 \sin (x+C_1)$

The equation of the given wave is then  $y = y_1 \sin (x+C_1) + Y_2 \sin 3(x+C_2) + \dots + Y_7 \sin 7(x+C_7)$ .

$$\text{The r. m. s. value is } Y = \frac{\sqrt{Y_1^2 + Y_2^2 + Y_3^2 + Y_7^2}}{\sqrt{2}}$$

Multiply this equation thru by dx and integrating between the limits  $x=0^\circ$  and  $x=180^\circ$  it is shown that the average value is

$$Y_{ave} = \frac{2}{\pi} [Y_1 \cos C_1 + 1/3 Y_2 \cos 3C_2 + 1/5 Y_3 \cos 5C_3 + 1/7 Y_7 \cos 7C_7]$$

The 36-ordinate method makes use of the same principles, except that the equation contains the sine and cosine terms.

Tables are usually ruled up with the following headings.  $\sin nx, y \sin nx$ , ordinate number, measured ordinates  $y, \cos nx$ , product  $y \cos nx$ . Under  $y \sin nx$  and  $y \cos nx$ , there are two columns, one each for the negative and positive values. N represents the harmonic in question.

There are 36 ordinates laid off for each half wave; for the fundamental, n is unity and x is 5 degrees; for the third harmonic, n is three and x is 15. degrees.

(Continued on page 128)

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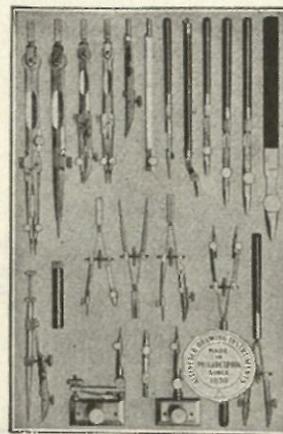


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$C_n = \sqrt{A_n^2 + B_n^2}$  the tangent of  $b_n$ , on the angle to the left of the origin where the  $n$ th harmonic cuts the x-axis will be  $\frac{B_n}{A_n}$ , the origin being taken where the given wave cuts the x-axis in the positive direction.  $C_n$  is the maximum ordinate of the  $n$ th harmonic. By taking the sum of the 36 ordinates and obtaining the average, and by squaring the 36 ordinates and finding the r. m. s. value, the form factor and maximum deviation can be obtained.

This method is rapid if printed sheets for each harmonic giving  $\sin nx$  and  $\cos nx$  are available.

## SAFETY

(Continued from page 95)

Even though the engineer designs a machine which is as safe as is possible to make, we still have the problem of the man who is willfully and persistently careless, and who needs more than education. We will not discuss this type at this time, but will sum the situation up by saying that it is hard to prevent people from committing suicide. Let us concern ourselves here with the type of individual who, through thoughtlessness or lack of knowledge,

does careless things. This person as a rule is open-minded and welcomes suggestions.

Safety education naturally divides itself into three classes: industrial, public, and safety in the home. The same principles hold true in each case, but the application is a little different as will be shown.

About sixteen years ago a few far-seeing men came to the realization that the enormous number of accidents in industry directly attributable to carelessness could be eliminated. They accordingly formulated a plan of safety education in the shop. This original movement has slowly but surely spread throughout the industrial world. We are thankful today for the untiring efforts of these men, because it was their vision and determination, coupled with hard work, that finally persuaded industry of the value of the new movement. Most American industries are organized today to eliminate waste of human life through accidents. Prominent among these are The International Harvester Co., Illinois Steel Co., New York Central R. R., Westinghouse Electric & Mfg. Co., Western Electric, General Electric Co., and many others. In these large institutions you will find that each plant has well organized safety departments which operate in co-operation with the engineering and production departments. It becomes their duty to see that all safety policies are properly executed.

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The fact that large industries are so universally behind the safety movement should indicate to us something of its worth and recommend it to those who are inclined to be personally careless. So general and widespread has the safety work become in American industry that an organization has been formed, known as the National Safety Council, which is a cooperative association run not for profit. Practically all of our large industries are members of this council and receive from it a definite service which helps them to prevent accidents.

It would seem that industrial safety is organized on a pretty sure footing, but it is doubtful if as much can be said of the second type—public safety. You can sum up the worst problem of public safety in the one word "automobile." The auto presents the one great hazard in modern life. Our mania for speed—to beat the train to the crossing, to dodge ahead of somebody else, to expect the impossible of our brakes—is the hardest of all public safety problems. It seems that some of us are happiest when we can go faster than our neighbor. Who has not seen "The Speed Bug" as he rushes down the wrong side of the street, or passes a school yard full of children, or crosses a boulevard without stopping, or, if traffic holds him up a moment, frets until he can "step on it"? We have seen that individual; no doubt, we have been that same individual ourselves at sometime in our lives.

Laws cannot be enforced that will entirely correct such an evil. Not until we begin to feel our own personal responsibility to the other fellow will we learn to control our acts and to be more careful. There is a great deal of room for education of the public in safety matters. The Safety movement is today receiving steady, sincere support in the daily press, monthly magazines, in the pulpit, and through various community organizations. That work is excellent and should be carried on with even more vigor.

The third and very important phase of Safety education is concerned with the home—there we receive our first safety lessons. Approximately one-half of all the accidental deaths in the United States last year occurred in the home. Surely that is food for serious consideration. Walk into some American homes—too often are seen deadly poisons within reach of children; the open grate with its blazing fire for children to play with; the rocking chair used as a stepladder; the ladder itself so shaky as to be unsafe; gasoline for cleaning clothes stored in open cans or bottles; dangerous cellar stairs; the ever present box of matches; oily rags and mops full of potential fire, stored in some closet; and a lot of other things that will occur to the reader. Most of us on inspection will find some of these conditions in our own homes. Any person who reads this is invited to make a safety inspection of his own home.

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Let's get busy with safety—personally busy. Let's get such strong safety habits that unconsciously we shall daily teach Safety by precept and example. The individual should also constitute himself a committee of one to make suggestions that will add mites of influence in helping to prevent accidents that are preventable. The "Safety First Legion" is always after recruits, and everyone, no matter who he is, can serve. The individual owes it to himself, his community and his family to take an active part. His reward may not be material, and he may not earn praise and honor in public places, but certainly he will be contributing his part towards making this world a safer as well as a better place in which to live.

May the future engineers of this country have in mind when they design or build a bridge, construct a skyscraper, build a railroad, or what not, the need of attention to the minutest details, because one slip may cause the loss of human life, or, worse than that, the total incapacitation of some individual for life.

After all, the engineer can do more than any one else to prevent that type of accidents which are hardest to prevent, where the individual is thoughtless or willfully careless. It's up to you; and the extent of your desire to be your brother's keeper will measure your success.

I read an article the other day which had an expression in it that gives in a fine way the thought

in every safety man's mind. It is fitting as a closing thought. "War, Pestilence, and Famine may take their occasional toll of humanity, but I dare to look forward to the time, a long way this side of the millennium, when, because we all shall have answered in the affirmative that question of the ages—'Am I my brother's keeper?'—The fourth dread horseman, whose name is Accident, shall ride no more; and when the crimson record of human carelessness, of useless waste of human life and limb, shall have been bleached white."

### HIGH VOLTAGE LABORATORY

(Continued from page 97)

was necessary in reclaiming the transformer and restoring it to its original condition. Many of the coils had to be replaced, while the others were subjected to a heat treatment to dry them out thoroughly.

The present laboratory as it now exists consists of a standard sphere gap, a standard safety gap, a cross-arm insulator testing apparatus for testing pin types of insulators, a pan test for insulators, and apparatus for testing transformer oil and the dielectric strength of various kinds of insulation. The completed laboratory will be in operation by Engineers' Day and should add greatly to the success of that day with unique and interesting experiments.

—GALEN CARTWRIGHT.

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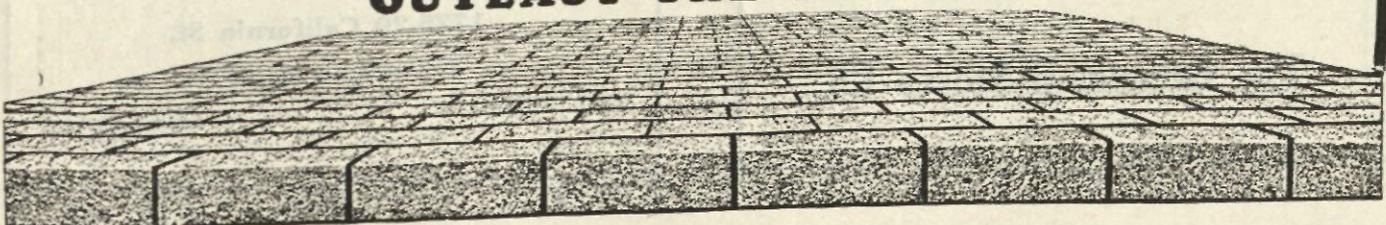
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but

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won't pave a modern  
street to resist modern traffic.  
That job demands tough, husky,  
durable *vitrified paving brick*.  
Just tuck these two facts away  
in the back of your mind for use  
after graduation—*first*, that no  
brick pavement ever wore out  
*from the top down*; *second*,  
that the great majority of all the  
pavements you know that are  
*older than you are*, are of vitri-  
fied brick. Don't let yourself be  
talked into substitutes—insist  
on *vitrified brick pavements*.

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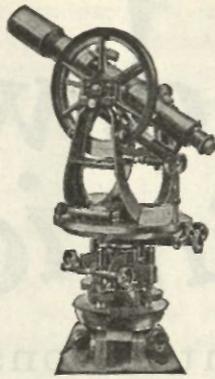
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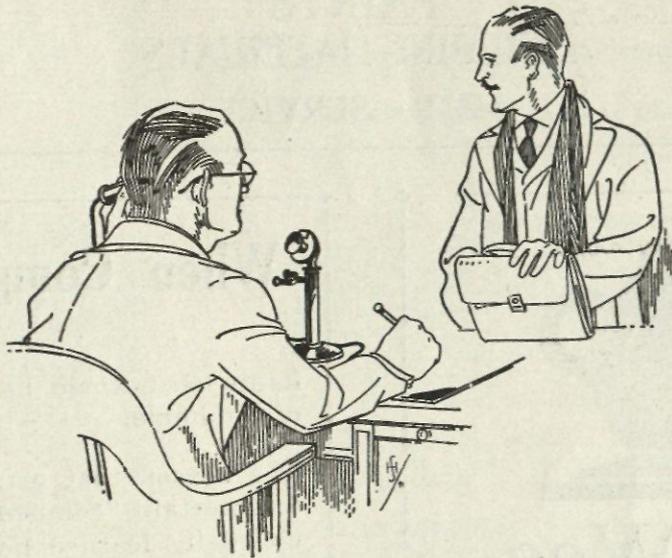
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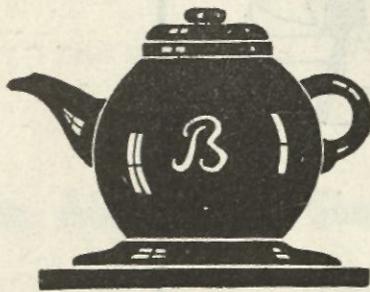
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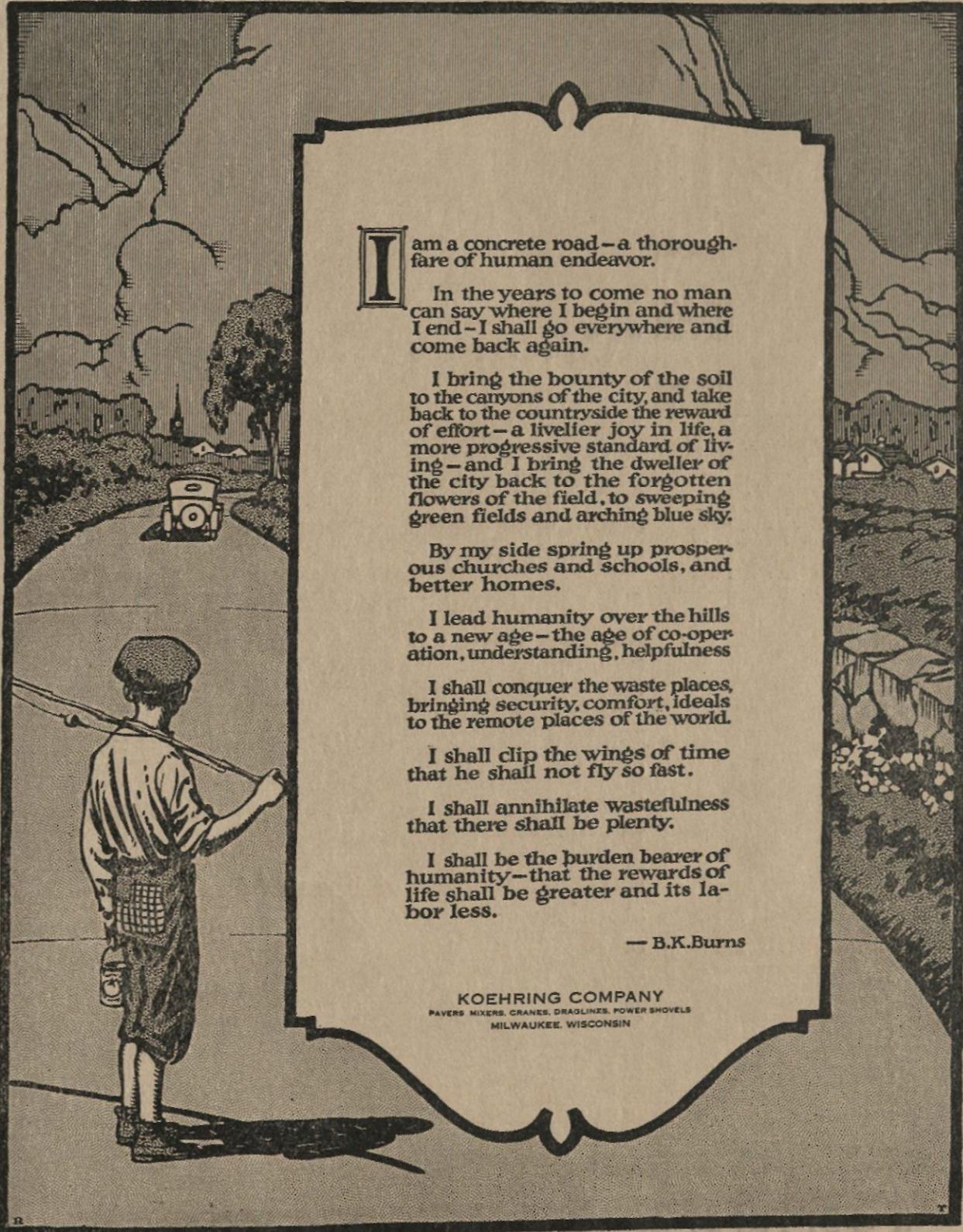
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**I** am a concrete road—a thoroughfare of human endeavor.

In the years to come no man can say where I begin and where I end—I shall go everywhere and come back again.

I bring the bounty of the soil to the canyons of the city, and take back to the countryside the reward of effort—a livelier joy in life, a more progressive standard of living—and I bring the dweller of the city back to the forgotten flowers of the field, to sweeping green fields and arching blue sky.

By my side spring up prosperous churches and schools, and better homes.

I lead humanity over the hills to a new age—the age of co-operation, understanding, helpfulness

I shall conquer the waste places, bringing security, comfort, ideals to the remote places of the world.

I shall clip the wings of time that he shall not fly so fast.

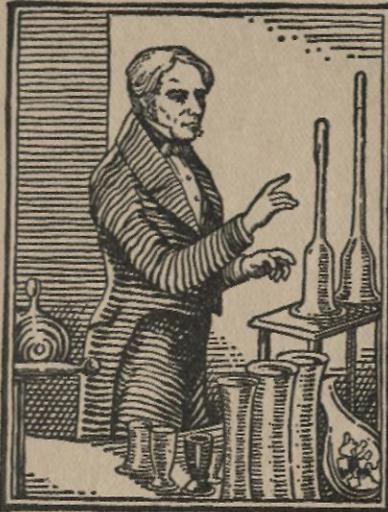
I shall annihilate wastefulness that there shall be plenty.

I shall be the burden bearer of humanity—that the rewards of life shall be greater and its labor less.

— B.K. Burns

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Michael Faraday saw the real beginning of the age of electricity nearly a century ago when he thrust a bar magnet into a coil of wire connected with a galvanometer and made the needle swing.

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