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ST. PATRICK'S DAY NUMBER

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The Wisconsin Engineer

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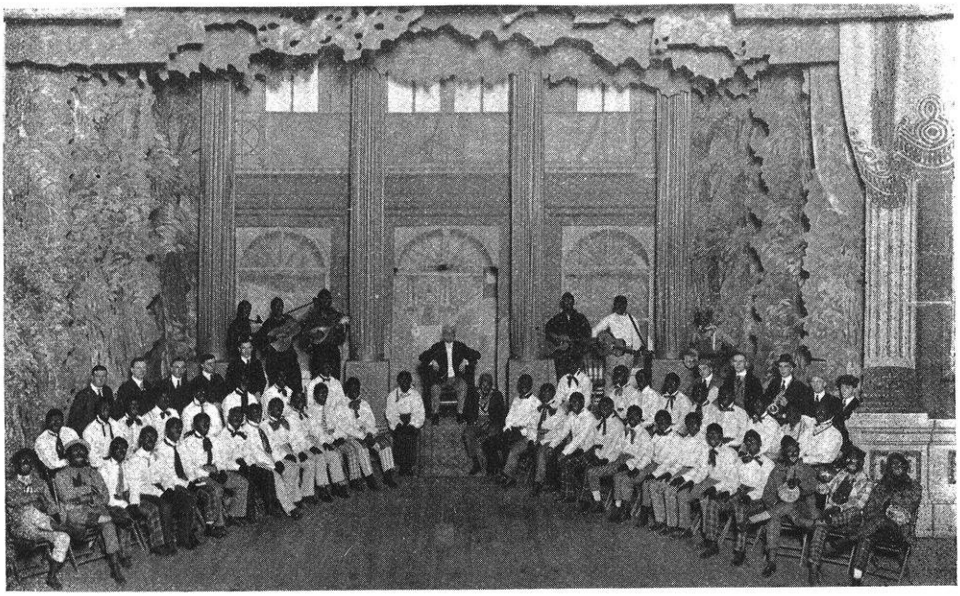
ST. PATRICK WAS AN ENGINEER

Sure now, 'twas like this. Many, many years ago, away back in 1903—in the golden days when Jimmie Watson was a dignified senior and Van, Ray Owen, and Bill Kinne were dapper juniors—in those ancient days two or three inspired students down at the University of Missouri had a revelation in which they were directed to a certain spot where they discovered a remarkable tablet of stone. Upon the surface of the tablet, which resembled concrete—sure, some there were who said the resemblance staggered their belief, bad cess to them,—were curious markings that, in spite of their crudeness and antiquity, were unmistakably intended to represent a transit, a compass, a slide rule, an' miny another engineering instrument. And across the face of the stone ran the mystic phrase, ''Erin go bragh'' which means, ''St. Patrick was an Engineer.'' This was the famous Blarney Stone and ever since that day St. Patrick has been recognized as the patron saint of all engineers, and March 17 is a day of rejoicing throughout the land.

* * *

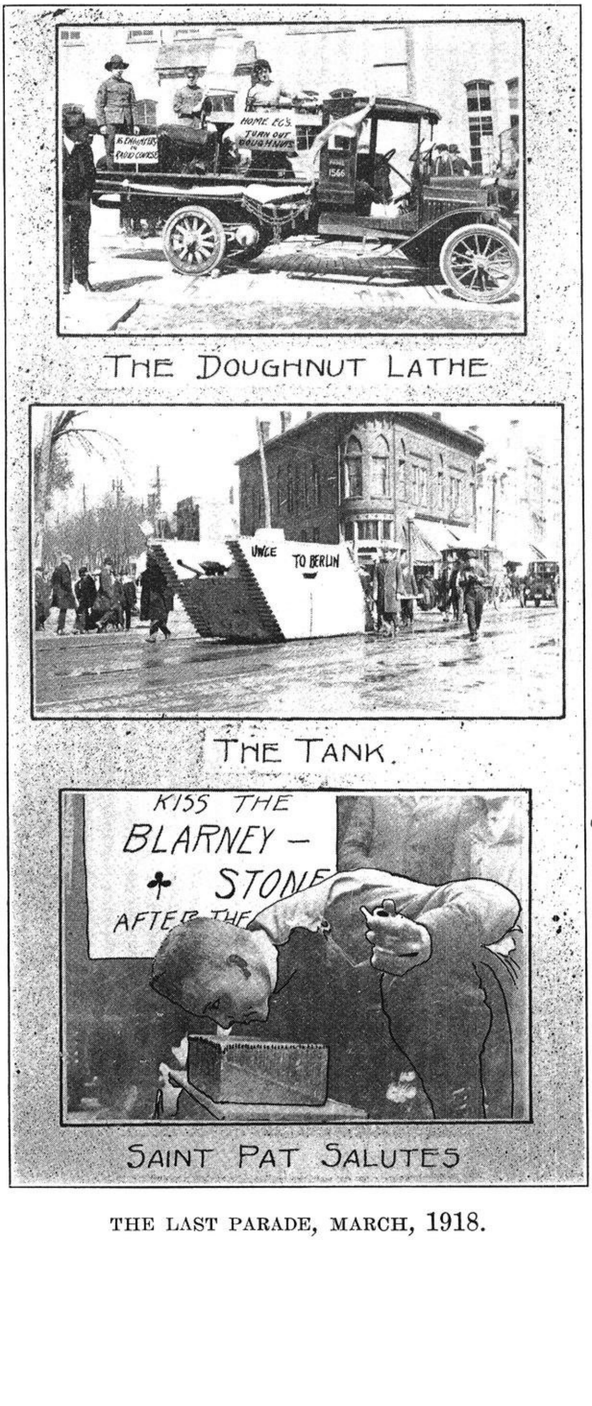
Missouri is recognized as the originator of this peculiar tradition; but it is a coincidence worthy of note that the first Engineers' minstrel show at Wisconsin took place on March 5, 1903, twelve days before the great discovery of the tablet. That first minstrel show was given in Music Hall. There was no admission fee and only engineers and their girls were privileged to attend. ''Billy'' Huels was stage manager, ''Horse Power'' Howland, now blast furnace superintendent for the Wisconsin Steel Co., at South Chicago, was Interlocutor, and in the cast were W. O. Hotchkiss, State Geologist, John Cadby, consulting engineer of Madison, Jack Friend, and ''Benny'' Lyons, vice-president and general manager of the Beloit Water, Gas & Electric Co. Van Hagan contributed some slides for an illustrated song.

The first minstrel show was a big success and so the idea was followed up with similar shows in 1904, 1905, and 1906. Then it was decided to make the minstrel a biennial affair. There should have been a show in 1908, but nothing was done about it until after the second semester was well started and by that time it was too late to do anything. The show fizzled out. The 1908 failure spurred the engineers to activity in 1909, in which year



THE LAST MINSTREL SHOW, MARCH, 1916.

an elaborate parade and minstrel show were staged. Billy Huels, stage manager for the original minstrel show, directed the 1909 affair to a successful issue. In 1912 there was another show preceded by a parade. The last minstrel show was given in 1916, at the Fuller. Many difficulties and disappointments were encountered in staging the production. It was only because of the untiring enthusiasm and energy of Bob Connelly, who was stage manager, interlocutor, and soloist, that the show was carried through successfully. The year 1918 found the nation at war, the college sadly depleted, and the attention of the students distracted. Nevertheless, a few energetic spirits were unwilling to see the occasion pass unnoticed. Due largely to the efforts of Bob Light a successful parade was staged. The feature of the parade was a tank. It was a warm spring day, just right



THE LAST PARADE, MARCH, 1918.

for snowballing and the tank was under constant fire in its trip around the square. One lucky shot entered a port hole and caught Bob behind the ear and he had to put himself through the wringer when he reached his room. The tank idea so fastened itself upon Bob that he hurried away as soon as school closed and enlisted in the tank corps.

Following the lead of Missouri, Rollo School of Mines began to celebrate St. Patrick's Day in 1907, Iowa State College at Ames and University of Iowa in 1910, Arkansas in 1913, Oklahoma in 1915, and Tennessee in 1919. At the University of Iowa some opposition was raised to the usurpation of St. Patrick by the Engineers and so a brand new saint was canonized,—St. Mecca who guards the interests of mechanicals, electricals, civils, chemicals, and architects. A number of institutions have some distinctive engineers' celebration. Nebraska has had an annual Engineers' Vaudeville; Purdue has a Mechanics' Cremation, and Illinois electrical engineers give an Electrical Show.

* * *

The engineers have made their celebrations distinctively technical in character by designing and carrying out some interesting and remarkable stunts. The parades are always spectacular. A well illustrated article in the WISCONSIN ENGINEER for June, 1910, describes a number of the parades that have been held at various schools. Missouri students have carried out some unusual feats. One year the civils built a 40-ft. truss bridge in the center of the quadrangle; the electricals built a full size trolley car; and the mechanicals constructed a 25-ft. monkey wrench and also a life-size paper mule which was suspended high above the heads of the audience gathered to witness the celebration. At the proper time the mule was exploded by dynamite and a cloud of paper shamrocks fluttered down upon the unsuspecting and startled audience.

To be successful, events of the kind here described must be spontaneous; they must be the product of an enthusiasm and energy more than ample to take care of routine school work. They are the manifestations of college spirit and technical ingenuity which have won for the engineers a high standing in the college community, and as such are warmly welcomed whenever they occur.

THE "WHY" AND "HOW" OF THE TEN INCH SLIDE RULE

JOHN G. D. MACK,
State Chief Engineer, Wisconsin.

The slide rule is a mechanical device, made in many forms, for performing the ordinary arithmetic operations, except addition and subtraction, by the graphic use of logarithms. The most common form is the 10-inch slide rule. In a computation properly made with this instrument, the accuracy of the result should be within the following limits:

(a) Result beginning with 1, as 1743. First three digits correct; right end digit within two units plus or minus.

(b) Result beginning with digit other than 1, as 473. First two digits correct; right end digit within one unit plus or minus.

In compound computations, involving several settings, the limits for right end digit will be wider in both cases. Other forms of the slide rule, having scales many times the length of the 10-inch instrument, will give a correct reading of one place additional, with possible narrower limits of error in the final place than given for right end digit in (a) and (b). The slide rule, therefore, cannot be used for certain types of computation, as financial calculations, which require absolute accuracy in numbers of many digits. It is to be noted, however, that the correctness of slide rule results is in the important digits beginning at the left of a number, thus making this instrument entirely satisfactory for those engineering computations in which the data cannot be exact to many places.

As an illustration of this point, consider the computation of the horse power of a steam engine, which involves the following data:

Diameter of cylinder..................	8.5″
Stroke of piston	12.5″
Revolution per minute	218.0
Average pressure in cylinder...........	41.3 lbs.
Diameter of piston rod	1.25″

All of these values are approximate, for an attempt to give the following digit would be an assumed accuracy to hundredths of an inch in diameter and stroke; to hundredths of a pound in average pressure; to tenths of a revolution in revolutions per minute; and to thousandths of an inch in diameter of piston rod,—an accuracy not possible to obtain in practice. Therefore, to use a highly refined method of computation, giving accuracy to five or six places on a steam engine horse power problem, would be comparable to the use of a micrometer caliper graduated to ten thousandths of an inch for the measurement of rough lumber or paving blocks. This horse power problem is illustrative of many engineering computations as regards the point under discussion. The result of a calculation can be no more accurate than the data used in making it, and the slide rule thus automatically prevents wasted energy due to attempted over-refinement in computations for which it is adapted.

In the discussion below, no knowledge of logarithms is assumed, although the logarithmic principle will be used. All engineering students have studied logarithms, but this plan of presenting the theory and use of the slide rule may possibly be used to advantage by them in the future, when they are called upon to teach its use to others who have not had the engineers' mathematical training.

Any positive number except 1 may be used in making the following table, but on account of the simple and easily grasped results, 2 is the most satisfactory. Beginning with 2, column A, write the following four lines in each of which 2 is taken as a factor one more time than in the preceding line. Write Col. B, showing the products of each group of factors in Col. A to 32, and, as the law of increase is apparent, Col. B may be continued to 1024, which is sufficient for the demonstration. Write Col. C, which shows the number of times 2 is taken as a factor in Col. A to produce the number in Col. B.

A	B		C
2 =	2	.	1
2 × 2 =	4	.	2
2 × 2 × 2 =	8	.	3
2 × 2 × 2 × 2 =	16	.	4
2 × 2 × 2 × 2 × 2 =	32	.	5
etc.	64	.	6
	128	.	7
	256	.	8
	512	.	9
	1024	.	10

This table has several interesting properties which are explained in the following paragraphs.

Multiplication by table: 4 × 8 = 32. Inspection of the table shows that 2 is contained as a factor twice in 4, three times in 8, and five times in 32. Thus the sum of the two factors of 2 in 4 and 8 is equal to the factors of 2 in 32. Therefore, to multiply one number in Col. B by another in the same column, as 8×64, add the corresponding numbers in Col. C, $3 + 6 = 9$, and from 9 in column C, find the corresponding number in Col. B, 512, which is the product of 8 and 64.

Division by table: $256 \div 64 = 4$. By a process, the reverse of that just given, the difference between the numbers in Col. C, corresponding to 256 and 64, or $8 - 6 = 2$, indicates 4 in Col. B as the quotient of 256 divided by 64. Two or three similar illustrations each of multiplication and division may be worked out from the table to illustrate the principle.

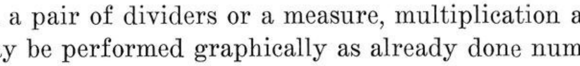
Powers by table: $4^3 = 4 \times 4 \times 4 = 64$. From the table it is evident that 64 contains three times as many factors of 2 as are contained in 4. Therefore to raise a number to a given power, find the number in Col. B, and the corresponding number in Col. C. Multiply the latter by the power and find the product in Col. C, opposite which in Col. B is the required result.

Roots by table: $\sqrt[3]{512} = 8$. This operation is the reverse of raising a number to a power. Opposite 512 in Col. B is 9 in Col. C. 9 divided by $3 = 3$, and opposite 3 in Col. C is 8 in Col. B, the required cube root. Other powers and roots may be derived in the same manner within the limits of the table. Whether the numbers in Col. C are divisible by 2 or 3, indicates whether the corresponding numbers in Col. B are perfect squares or cubes.

Graphical Computation.

From the table construct scale 2 in which the distances from the left end are proportional to the numbers in Col. C, and the figures are the corresponding numbers from Col. B. From the regular progression it is evident that the left end should be marked 1.

Scale 2.



With a pair of dividers or a measure, multiplication and division may be performed graphically as already done numerically.

Multiplication: $4 \times 8 = 32$. Take distance 1 to 4 and add to distance 1 to 8, which gives distance 1 to 32, the required result being 32.

Division: 256 ÷ 64 = 4. Take distance 1 to 64 and subtract it from distance 1 to 256, which gives distance 1 to 4, the required result being 4.

This was the principle of the "Gunter's Line," the first of the "slide rules", invented more than 300 years ago by Edmund Gunter, and used also in the present day Fuller slide rule.

THE SLIDE RULE PRINCIPLE.

On a strip of material, separate from scale 2, construct scale 1, which will be exactly like scale 2 except that the numbers will be above the line which forms the lower edge of the strip. When the two scales are brought together, with their ends in registration, each number on one scale will register with the same number on the other.

Multiplication by sliding scale: $4 \times 8 = 32$. Set 1, scale 1, on 4, scale 2. Under 8, scale 1, find the required result 32 on scale 2. This is the graphical addition of the distances represented by Col. C, corresponding to the numbers in Col. B.

Division by sliding scale: 256 ÷ 64 = 4. Over 256 on scale 2 set 64 on scale 1. Under 1 of scale 1 is the result 4 on scale 2. This is graphical subtraction of distances, the reverse of multiplication by the sliding scale.

Powers and roots by sliding scale: A whole number power may be obtained by successive multiplications so that the given number will be used as a factor equal to the required power. Square root may be determined by trial by locating the given number on scale 2, and so adjusting scale 1 that the value on scale 1, over the given number on scale 2, will be the same as the value on scale 2 under left end 1 of scale 1. This equalized value is the required square root. Fourth root may be found by extracting the square root twice, but cube root would be very tedious by this trial process.

This demonstration with scales 1 and 2 illustrates the principles involved in multiplication and division with the 10-inch and similar slide rules.

In the table, Col. B and Col. C are composed of whole numbers, and it is evident that if any number be placed in one of the gaps in Col. B, the corresponding number in Col. C will be fractional.

Logarithms: A logarithm (abbreviated log) is the power to which a fixed number, known as the base, must be raised to produce a given number. The numbers in Col. C are the logarithms, derived from base 2, of the corresponding numbers in Col. B, and the computations given above are therefore logarithmic. Base 2 has disadvantages in that logarithms derived from it are not readily adapted to our numerical system, and therefore the common logarithms in general use are computed with 10 as a base. With base 10, 1-2-3-4, etc., are logs, respectively, of the number 10-100-1000-10000, etc., and all numbers not in this series have logarithms which are fractional.

The 10-Inch Slide Rule.

The scales are designated A, B, C, D, S (sines), T (tangents), and L (logarithms). The runner has a fine line ruled on the glass, its functions being to read across from one scale to another, to hold a reading on one of the fixed scales while the slide is being moved, to locate a reading for starting a computation, and for the better interpolation of a reading between division lines. The back of the rule has notches cut in the ends, on the edges of which are gage lines used in S, T, and L readings in relation to A or D. These gage lines allow these reading to be taken without inverting the slide.

Logarithms.

In order to show the logarithmic dividing on the slide rule, invert slide (S L T face up) and register ends of L and D, the L scale so placed that the numbers on it increase from left to right, although the figures will be inverted. From a table of common logs read the logs of several numbers as 2, 4, 8, checking the number on D and its log on L with the runner. Read several logs from the table, find the corresponding numbers on D and check by the table. The L scale is a scale of equal parts and the distances from the left end of D to the various numbers thereon are equal to the actual values of the corresponding logarithms as measured on L.

Certain problems solved on the slide rule require the use of the L scale, such as fractional powers and roots, but the logarithmic operations are usually performed by the use of the end gage line. With a table of logarithms for a check, practice reading logarithms and corresponding numbers by means of gage line from D to L and L to D.

Practice in Reading.

The several scales have different rulings in various portions so designed that the spacing will be as nearly uniform as possible throughout their lengths for ease in reading. This varied dividing often causes trouble in the first use of the slide rule, but a careful study of the system of division with some practice will remove the difficulties. Referring to D, between left end 1 and the 2 about three inches to the right are ten large divisions, usually marked 1-2-3, etc., in small figures. The digit 1 is assumed before each of these small figures as in the teens, some rules being so marked. These ten major divisions are each divided into ten divisions, while in the middle of the rule each of the ten major divisions, as between 3 and 4 is divided into 5 divisions, and at the right end, as between 9 and 10, each of the ten major divisions is divided into 2 divisions.

At the left end, therefore, a direct reading is 164, the next digit as in 1643 being the estimate of tenths of the smallest division. In the middle of the rule, a direct reading is 264, but if the right digit is not even, as 5, it must be located by the eye at the middle of the small space which can be done with great accuracy. In trying to estimate 2653, however, it is quite impossible, as the 3 is 3/10 of a half of the smallest division. Toward the right end of the rule, 865 is a direct reading while 864 is an estimate, which should be quite accurate, although 8643 is impossible.

Readings such as 1111, 1011, 1005, 811, 801, 806, etc., often give trouble and should be practiced. After one has become proficient in readings on D, the different ruling on A will cause no trouble.

Multiplication and Division.

Set rule with C adjacent to D and use these scales for straight multiplication and division.

Multiplication: $2 \times 4 = 8$. Set left end 1 of C on 2 of D. Under 4 of C find 8 on D, the required product.

$2 \times 7 = 14$. With setting just given, 7 on C is off D at right. D, however, is one of an infinite series of like scales joined end to end, the similar scales immediately to the right and left being designated D-right and D-left, respectively. With the given setting, 7 on C would be over 14 on D-right. To avoid this multiplicity of scales for readings of this type, shift C its length to the left, bringing right 1 of C over 2 of D. It is evident that left end 1 of C would be over 2 of D-left. Under 7 of C find required result 14 on D. A glance at the data will show whether C is to project right or left for a given multiplication or division.

Division: $8 \div 4 = 2$. Locate 8 on D and over it set 4 on C. Under left end 1 of C find quotient 2 on D.

$2 \div 4 = 0.5$. Locate 2 on D and over it set 4 on C. The quotient 5 would be under left end 1 of C on D-left, but this is the same value found under right end 1 of C on D. A quotient therefore is read under the end 1 of C which falls on D.

Compound Computations: The result of a compound computation involving several factors in multiplication and division is readily solved as follows: Make the settings in order, but instead of reading each, locate it by runner, using runner for start of the next, and so on until the reading of the final result.

The A and B scales are used by some for multiplication and division, but the C and D scales are recommended for these operations on account of giving more accurate readings due to their greater length.

DECIMAL POINTS.

The result of a slide rule computation is a series of digits, to which the actual value must be assigned by the location of the decimal point, as the 3, for example, on D may be 3, or it may be 3 followed or preceded by any number of ciphers. A very large proportion of slide rule results may be pointed instantly by inspection of data or reasonableness of result, but the writer believes that the decimal point rule should be learned, as there are cases where it has value.

By applying it for a time in the ordinary problems which can be pointed by inspection, its use soon becomes automatic when needed.

An index system, as follows, is used in pointing:

Number	Index
32.7	+2
3.27	+1
0.327	0
0.0327	—1
0.00327	—2

The plus index is the number of places to left of point. The minus index is the number of ciphers between point and first digit to right. The index is equal to the common logarithmic characteristic increased algebraically by 1.

(a) When slide projects left after one operation, add indices for multiplication and subtract for division.

(b) When slide projects right after one operation, index found as for (a) must be decreased 1 for multiplication and increased 1 for division. The above refers to algebraic addition and subtraction. Increasing —9 by 1 is —8; decreasing —4 by 1 is —5.

In a compound problem, an R or L, indicating the projection of slide, should be set by the numbers as the work proceeds. After final result is obtained, the various indices may be determined and the final index calculated. The following problem, which has no other purpose, shows an extreme case of the application of the pointing rule:

$$\frac{\overset{+8}{37000000.} \times \overset{L-9}{0.00000000042} \times \overset{R-10}{0.000000000054}}{\underset{R-14}{0.0000000000000019} \times \underset{L+13}{9100000000000}} = \overset{-10}{0.0000000000483}$$

The writer, somewhat out of practice with the slide rule, worked this in the following time:

Numerical result, including setting of letters and repeating for check, results 485 and 487, 2½ minutes.

Determining and writing indices, finding final index, writing result and repeating for check, 3 minutes 7 seconds.

In pointing these compound problems, cancellation of letters and indices may be used, but the involved complex problems occur so rarely that it is not worth while to burden one's self with the method.

Powers and Roots

It was shown from the table calculated from base 2, that if the log of a number be multiplied by 2 or 3, the product will be the log of the square or cube of the number.

Squares and Square Roots: The A scale is composed of two equal scales, A-right and A-left, each one half the size of D, but divided in the same proportion, although with fewer lines for ease in reading. A given distance on D, as 1 to 2, transferred to A is 1 to 4, the half size of A multiplying the value of logarithmic distance on A by 2, thus indicating a number on A which is the square of the opposite number on D. Square roots are read on D by runner or end line on slide, from number located on A. If the square root of 25 is required, the 25 on A-right must be used, while if the square root of 250 is required the 25 on A-left must be used. The rule in taking square root of a number is as follows: If the number has an even number of places to left of point, locate it on A-right; if an odd number locate it on A-left. If the number is a fraction with an even number of ciphers between point and first digit to right, locate the number on A-right; if an odd number of ciphers, locate the number on A-left. These rules are given in part to show the kind of rules which need not be memorized, as they can be determined in a moment when needed, by trial on simple problems.

Cubes and Cube Roots: The cube of a number may be taken by (a) straight multiplication twice on C and D, or by (b) one multiplication on C and D and with this setting a reading from the number on B to its cube on A. The reverse of (b) will give cube roots. Set the number as 42 on A. (Either A-right or A-left, but corresponding B scale must be used). It is convenient to set runner on the number in starting. Adjust slide by trial so that same reading on B will be under 42 on A as on D under left or right 1 of C, depending on which 1 falls on D. This value, 3.48, found by adjustment, is the cube root. A preliminary setting should be obtained with a perfect cube near the given number, as 27 or 64 in this case, after which the direction in which to move the slide is evident. Some slide rules have a cube scale, namely a scale one-third the size of D, on one of the edges of the instrument, which is read in relation to D with a gage line on frame of runner. This gives direct reading cubes and cube roots.

Other whole number powers and roots may be obtained, such as the fourth root, by twice extracting the square root. In raising to large powers the pointing may be troublesome, and for this reason the writer prefers successive multiplication, with the use of decimal point rule, for this type of problem which is of rare occurrence.

Fractional powers and roots may be solved on the slide rule by the use of the L scale on the same principle that these problems are solved by logarithms.

Illustration: To raise a number to the 2.3 power, locate the number on D and find its log on L. Locate the log on D and multiply it by 2.3. Move slide until this product on L appears in register with L gage line. Under the end of C which falls on D will be found the required 2.3 power of the given number. Fractional roots may be solved by a similar process, substituting division of logarithm for multiplication.

Excellent practice in multiplication, division, powers, and roots may be had by checking values in the tables of properties of circles and powers and roots to be found in engineers' handbooks. The writer recalls an instance where several errors were found in a table of circles in a handbook, when he was illustrating this practice method to students.

Proportion

Proportion on the slide rule, though often neglected, is convenient in many problems, for when properly set, C and D furnish a complete table of values for the given ratio.

Illustration: Ratio of knots to miles is 33:38. Set 33 on C over 38 on D and all adjacent readings on these scales are in the given ratio; for example, 25 knots = 28.8 miles, 40 knots = 46 miles, etc. If the ratio wanted is not in contact, as 89 knots, shift C its length and read 102.3 miles on D.

Proportional values are given on the back face of many slide rules.

The Trigonometric Scales

The use of the trigonometric scales is also often neglected, while if learned thoroughly they will be found to be most convenient. The sine (S) scale and the tangent (T) scale are read with A and D, respectively, either by the gage lines in notches at end of rule, or by inverting the slide and reading by contact. The values read on A and D are the natural sines and tangents of the angles given in angular measure on S and T.

Reading by gage line: Required sine of 25°. Set 25 on S under gage line in notch at end of back face of rule. In register with right end 1 of A-right read 422 on B. A thought as to the relative proportion of a sine of 25° in comparison with the unit radius of the "trigonometric circle" indicates the sine is 0.422. A tangent may be read in the same manner from T to C by the use of the gage line and the right end 1 of D. (On some rules tangent is read on C from left end 1 of D and gage line in notch at left end of rule.) The reverse process may be used to read the angles on S and T corresponding to sines and tangents on B and C respectively.

Reading by contact: Invert slide placing ends of S and T in register with ends of A and D, respectively. A and S form a complete table of natural sines while T and D form a complete table of natural tangents. Multiplication and division of sines and tangents may be performed exactly as in the case of ordinary multiplication and division, for example, 2.6 times sin 15°. Set left end line of S under 2.6 of A-left and over 15° on S find 0.673 on A-right, the required result. A-left and A-right form a single scale in relation to S and the increase in value in passing fromA-left to A-right must be noted.

The best practice to learn the use of the S and T scales is to compare scale readings with values given in a table of natural functions and solve problems with the slide rule, checking by table solutions.

Special Settings

There are many special settings for making short cuts in certain kinds of slide rule computations, but unless one has a large number of similar computations to perform it is not best to use these special settings, for if employed only occasionally one is likely to be uncertain as to the result. It is far more satisfactory to concentrate efforts on the standard operations and master them so thoroughly that they become automatic and reliable. The following, however, are illustrations of special settings which are of rather general use:

Reciprocals: Reverse slide and set end in register with A and D. C with figures inverted, is reciprocal to D and the values may be read by runner from one to the other. Some rules have a reciprocal scale as a third scale between B and C, which may be read from D by runner without reversing slide. For the very limited use of reciprocals it is entirely satisfactory to obtain the value by direct division.

Areas of Circles: Set 3.14 of B under 4 of A-left. From diameter on D, area may be read directly on B by runner, and conversely area located on B gives diameter on D. In the latter process care must be used as to whether the area is located on B-left or B-right but a rough mental calculation of an area near the given one and its corresponding diameter will indicate which B to use.

* * *

When one becomes proficient in the use of the slide rule, he realizes that it is a wonderful instrument. It is an invaluable tool for the engineer and can do much of his "mechanical thinking" for him, being at the other end of the scale from the "guessing stick," as it is derisively designated by those who so name it in accord with their own qualifications in its use.

A COURSE IN ARCHITECTURE FOR WISCONSIN

Owing to the full program of the Annual Meeting of the Engineering Society on February 20 and 21, the report of the Architectural Committee was not presented at that time. The substance of the report, however, is of so much interest to engineers as well as architects that the report is presented herewith. It does not assume to cover all the advantages of a Course in Architecture at the University, but touches only upon important aspects, leaving something to the imagination.

One thought will occur to the architects who were instrumental in securing passage of the architects' registration law which requires everyone to be registered who intends to make architecture his profession. There is no place in the state where a young man may qualify for the title "Architect." To obtain the necessary instruction he must go elsewhere and, once affiliated with another University and acquainted in another state, he is likely to be lost to Wisconsin.

As regards engineers, especially those making a specialty of structural engineering and hydro-electric work, architectural training to some extent is of great advantage in the successful treatment of the incidental architectural problems. City Planning, a course now in process of development at the University, is not altogether an engineering problem. In fact from some angles it looks almost preponderantly architectural. It occupies a middle ground common to both lines of thought. This is one of the accessory studies which the University is prepared to co-ordinate with a Course in Architecture.

To bring the project to a success there are two things necessary: Money and the man. Architecture is an art, but one that is too firmly attached to the realities to be available for the trifler. On the other hand, it is not a branch of engineering with lovely scollops around the edge. For the course in architecture there will be needed a man who has the qualifications of a teacher and a leader, together with the temperament of a designer and the sane view of the business man. Such a man may be more difficult to find than the rather moderate amount of money required for the work.

The wisdom of placing the course at the University is touched upon in the report. To affiliate it with this splendid organization is to take advantage at once of the contributory courses now in existence, as well as of the excellent library of architectural books, photographs, and other material, which the University possesses. This evidently simplifies the problem of creating an architectural school.

REPORT OF THE COMMITTEE ON ARCHITECTURE TO THE ENGINEERING SOCIETY OF WISCONSIN

February 20, 1920.

The Committee wishes to bring to the attention of the Engineering Society, the desirability of providing adequate facilities for the education of architects. No College of Architecture. comparable with the College of Engineering of the University of Wisconsin exists in the state. It is necessary, therefore, for anyone intending to graduate in architecture to go elsewhere for his education. The architectural business of the state is carried on by men graduated from colleges of other states, or by men of more or less inadequate training derived chiefly from experience. A considerable proportion of the better class of architectural work within the state is done by architects resident in Chicago, New York and other places out of the state.

A questionnaire as to the earning power of draftsmen graduated from architectural schools as well as those whose education is obtained wholly in offices was sent to architects practicing in Wisconsin. The replies show that men graduated from architectural schools are the most desired, and that they command the best salaries. This alone would seem to warrant the establishment of a Course in Architecture in Wisconsin. These draftsmen will be the architects of the next decade. The same values which recommend school-trained men to the architects of today will be the means of bettering the class of work done in the near future by these men as practicing architects.

Full Architectural Courses, resulting in a diploma of graduation, are now offered by Universities in other states, such as Illinois, Michigan, California, New York, Pennsylvania, etc. These states draw students away from Wisconsin, and in a good number of cases there is a permanent loss from the state of talented men in this way.

It is the opinion of the Committee that a full Course in Architecture should be given by the University of Wisconsin. The University would be able to do this to advantage. Branches incidental to a full course in architecture are already given, in the Colleges of Letters and Science and Engineering, such as language, literature, history, mathematics, physics, geology, geometrical drawings, graphic statics, strength of materials and such other knowledge of engineering as the architect must obtain. To these must be added subjects necessary to purely architectural training, such as free-hand drawing and coloring, architectural design, study of the orders and architectural style, theory of design, history of architecture, sculpture, painting and decoration. For this work a new department should be created, to be known as the Course in Architecture. This would consist of subjects of purely achitectural character to which the accessory studies above mentioned should be contributed by the two colleges to which reference is made. It should be directed by a man of thorough architectural education and experience, and who shall have sufficient executive ability to create a school of architecture of the first grade.

The Committee presents this matter to the Engineering Society with the request that the Society give its support to the project of establishing a Course in Architecture at the University of Wisconsin in the near future.

Respectfully submitted,

HENRY A. FOELLER,
ARTHUR PEABODY,
ELLIS J. POTTER,
Committee.

THE DEAN'S ANNUAL LETTER IN THE APRIL ENGINEER.

WHAT IS CONSERVATION?

HERMAN A. BLAU,
Senior Civil

Ten years ago President Taft, in his annual message to Congress, put the question of water-power conservation in these words: "There has developed in recent years a deep concern in the public mind respecting the preservation and proper use of our natural resources. This has been particularly directed toward the conservation of the resources of our public domain. The problem is how to save and how to utilize; how to conserve and still develop; and no sane person can contend that it is for the common good that Nature's blessings are only for the future generations." This is the conception of the conservation of our vast resources that every engineer should have.

The power of falling water was utilized for ages before the invention of the steam engine,—an invention that has caused a decided decline in the use of water power. One may see, along the streams all over this country, the old water wheels going to decay after many years of useful operation.

We have at hand in the United States an energy that is so tremendous that it is difficult to comprehend it,—an energy that is inexhaustible. Every cubic foot of water that drops over the falls and rapids of our streams has power in it proportional to the height through which it falls. It is possible to take this energy from the waterfall without diminishing the volume of water. Coal, once consumed, is lost forever; but water returns again and again to do its duty. Every hydro-electric horsepower saves the consumption of about twelve tons of coal per year. By the development and use of less than 25 per cent of California's available water power, all of the wood, oil, and coal used in that state for power purposes can be conserved. The same condition exists in nearly all of the other Western states and in a great many of the Eastern and Southern states. The use of water power means, therefore, the conservation of other valuable resources.

Conservation when applied to resources such as coal, means a careful and restricted use; when applied to our inexhaustible water power, conservation means the fullest and most immediate use.

CIPHERS AND CODES

William J. Rheingans,
Senior Civil

That there is no code system in existence that cannot be deciphered was the statement made to the Civil Engineering Society on January 22 by Professor Ray Owen in his talk on Army Intelligence. During the war plenty of opportunity was afforded to prove Edgar Allen Poe's contention that all ciphers can be "busted." Naturally both the Germans and the Allies tried to invent some means of sending wireless messages that would be unreadable by the enemy, but, according to reliable information from the Army, they were unsuccessful.

The British spent large sums of money perfecting a machine that would receive messages at one end and discharge a cipher at the other. After its completion, an American lieutenant, who was a past master in the art of deciphering codes, was called in, and he had the cipher within half an hour. The machine was scrapped.

At the beginning of the war the Germans intercepted and read a message sent by a British naval commander to some of his ships, ordering them into battle. The Germans sent another message to the same ships ordering them to stand off and let two of the German vessels pass unmolested. Since the message was in code it was accepted as genuine and the two German vessels got through the blockade.

In order to allay suspicion whenever it was found necessary to send a large number of messages, all the German wireless operators were required to send a certain number of messages each day. Having little imagination the Germans would send the same messages every day. One operator sent the German axiom of "Early hours have gold in their mouths." After much hard work this code was deciphered. Then the Germans changed their code but the Allies, knowing what some of the operators were sending "busted" it immediately.

At another time the Germans, suspecting that the enemy knew the code, changed it suddenly. A message was sent but the receiver could not read it and asked to have it sent in the old code. Thus the Allies knew the new code at once. Many such illustrations can be given showing that no code is air-tight.

INDUSTRIAL HEATING—A FIELD FOR ELECTRICAL ENGINEERS

George H. J. Andrae, e '16
10 High Street, Boston, Mass.

The electrical seniors will undoubtedly be thinking from now on about the exact nature of the work they should take up next summer. While some, I presume, have already decided to take up work of a purely technical nature, others, who lean less toward the technical side of engineering and more toward the business side, will find that commercial or sales engineering, at the present time, offers unusual opportunities. One of the newest fields for commercial engineering in electrical work, and the one with unquestionably the greatest prospects for rapid development, is industrial heating.

There is hardly a single product you can think of during whose manufacture the use of some form of heat is not necessary at least one or more times, and it is the displacing by electric heat, wherever practical, of all steam, gas, or oil-fired equipment, that we have already begun in our industrial (electric) heating work. Men of foresight in the industrial and electrical game have surveyed and carefully analyzed the field which is almost unlimited and are of the opinion that within not more than ten years, and probably only five years' time, the industrial heating load will be at least equal to the present motor load. Think of the sudden and large expansion that must occur in electric heating applications and of the opportunities for the young electrical engineer to develop with the game and to capitalize on its growth.

I am writing this letter as a Wisconsin man of 1916 to the varsity engineer of 1920, with the sole and sincere object, so to speak, of "tipping him off" to something he should know. For two years I have been specializing on industrial heating with the Westinghouse Company, and for the past year have been responsible for this work in New England. Based upon actual observation during that period, I unreservedly recommend this new electrical field to the serious consideration of the senior engineers, and will be glad to answer personal inquiries from those desiring further information about Industrial Heating.

SELLING PERSONAL SERVICES—PERSONAL INTERVIEW

In most cases, the early steps toward a new position are conducted by letter, particularly when the contract is made through the Service Department, and the points brought out in the previous article should be kept in mind. However, before an employer reaches a decision, a personal interview is almost always necessary, and in some cases, all negotiation can be made in person, which should always be done if possible. When a personal interview follows correspondence, it can be assumed that the employer is already more or less interested, or he would not have granted the interview, and it only remains to convince him that you are the right man for the position. The ice is broken, he knows something of you and is favorable; you must crystallize that interest into a definite offer of a position. In the other case, when no correspondence precedes the interview, he knows nothing of you, but is open to suggestions, because he has a certain position to fill. In that case, everything depends on the impression you make.

First impressions often result in quick judgment; unless the employer's first impression of you, gained in the first thirty seconds, is favorable, the interview is apt to be short and unsatisfactory. Therefore, it is essential to consider all the factors that influence him, and to make sure that you do not overlook any of them. Possibly the most important of such factors is personal appearance. A tramp could not get past the office boy, while at the other extreme a Beau Brummel is equally out of place in an engineering organization. An applicant should wear good clothes, well cut, and of good materials. They should be neat, clean and well pressed. A soiled collar, frayed necktie, baggy trousers, or a grease-spotted vest gives an impression of carelessness, as do also an unshaven face, dirty finger nails, or dusty shoes.

But appearance is not confined simply to clothes and neatness; there are many physical qualities that are important factors: carriage, alertness, self-confidence, and straightforwardness. We all admire a man that is well set up, erect, shoulders thrown back, stomach drawn in, who habitually stands and walks in the "position of the soldier" as they say in the Army. We instinctively feel that such a man has proper self respect and proper respect for others. On the contrary, we all rather look down on a man whose carriage is slouchy, who has a cigarette drooping from a corner of his mouth, or whose hat remains tilted on the back of his head.

Be courteous, not only to your possible employer, but also to his assistants and employees. Don't let a fresh office boy or an impertinent clerk rile you. Keep your poise and be courteous to all. Above all, don't argue with your man. Even if his opinions irritate you, accept them good naturedly and make him think that you value them. If he expresses a poor opinion of your qualifications, don't get indignant, he may be testing you: assume that he misunderstands and present your best points. Even if he decides not to employ you, take the news calmly and leave him thinking well of you. You may want to approach him later on another proposition.

In most interviews, a certain amount of general talk precedes the definite discussion. Follow his leads. If he wants to talk baseball, discuss it with him; he is trying to get acquainted with you and sound you out. But when he gets ready to talk business, don't bore him with your experiences in France, but talk business. Present your qualifications clearly; don't exaggerate. If there are weak points, admit them; every man has his faults, and frankness will often offset them. Don't boast; let him infer your achievements. It is better to grow in his estimation than to start big and then diminish.

If you do not know enough of the position to be sure that you want it, ask for further information, but do so carefully. Do not let the employer think that you are investigating him or his proposition, because he likes to think that the reverse is true. It is often best not to ask questions about the position; the information will probably be given voluntarily during the interview, in which case you can withdraw gracefully if the position is not attractive. Early questions regarding duties, working hours, vacations, privileges, etc., are apt to re-act unfavorably on the employer. In general those things are best discussed "after the contract is signed." Salary is always the last matter to be settled, and if you have convinced the prospective employer that you are the man he wants before salary is mentioned, the final settlement is apt to be better than otherwise.

The more important a position is, the longer the negotiations before it is filled. A chief draftsman will employ a tracer after a ten-minute interview, but a railroad president may take months to select a chief engineer. Frequently several interviews are necessary, and it may be fatal to try and force quick action. In trout fishing, it is often necessary to pay out line and play the fish for half an hour. Similarly in negotiating for a desirable position, the time element is important, and matters should not be rushed. It takes time for a student to absorb a lesson in bridge design: similarly it takes time for an employer to become convinced that you are the right man. Each case is individual and thought and judgment must be used in each move. Study your man, learn all you can about him and his firm. If his son at college is on the football team talk to him of it and congratulate him. Eventually he becomes convinced that you are the man he wants, or in other words he "is sold" on your abilities, and in a few days you will be on the payroll."

The Monad, July, 1919.

PRESENT STATUS OF COMMERCIAL AVIATION

By Arthur O. Olson,
Junior Civil

Payton McGilvary, son of Professor and Mrs. E. B. McGilvary, delivered an address Tuesday morning at 10 o'clock in the auditorium of the engineering building at the university on the Present Status of the Commercial Airplane. Mr. McGilvary, who graduated from the university in 1916 saw active service upon the Italian front during the world war as a combat flyer and won several decorations. He is at present employed by the Curtis Airplane Co. as a salesman in the New England district.

The speaker pointed out that the commercial airplane as developed from the war plane will be used in three distinct fields during the coming years, namely for pleasure purposes, for commercial uses and as an adjunct to a business. The pleasure machine will be constructed elaborately at a high price and will be used only by the richer class of sportsmen. The commercial planes will be constructed for large carrying capacities, with large horsepower and high speeds. This type of machine will be used by large business concerns to carry merchandise between factories and cities. A modified type of commercial plane will be used for advertising, quick conveyance between points and for similar purposes. Taken as a whole, Mr. McGilvary stated, the future airplane will not tend to rival or replace the railways, the steam boats, etc., but will fill a gap where transportation is now inadequate. He also stated that the factors holding back the advancement of aviation were many, such as public opinion regarding their safety, newspaper writeups laying great emphasis upon accidents, lack of proper landing fields and the fact that the public expects too much of the present airplane. Mr. McGilvary concluded his address by having a general discussion on points of doubt in regard to aviation as a commercial project.

RECLAMATION OF LAND IN THE MISSISSIPPI BASIN

KARL C. MILLER,
Junior Civil

On Friday, February 20th, at 10:00 A. M., Mr. John A. Fox, Director of the National Drainage Congress and Manager of the Wisner Estate, Inc., spoke to the junior and senior engineering students on the drainage of the alluvial basins bordering the Mississippi River.

Mr. Fox said that at the present time there are 80,000,000 acres of land to be reclaimed by irrigation and drainage. Along the Mississippi River there is a tract of land averaging fifty miles in width and five hundred miles long. Some of this, in the upper valley, has already been drained. At the southern end of the river there are 5,000,000 acres of alluvial basin and at the present time but 300,000 to 400,000 acres have been made available for use. Until lately all of the work done has been paid for locally but the United States government has just appropriated $60,000,000 to help in the reclamation of this land.

The plan by which the work is now being done is to build dikes around tracts ranging from 5,000 to 10,000 acres and to pump the water into canals until the water table lies about five feet below the surface. The plan has proven feasible and practical. The land is very rich and can support a variety of crops. One prominent soil expert has said that unless the farmer gets one hundred bushels of corn to the acre it indicates lazyness or shiftless methods. A series of lantern slides illustrated the work at various stages.

RECENT RESEARCHES IN AERONAUTICS

An adjustable airplane propeller—one that can be so shifted that it makes the angle best suited to conditions of speed and air pressure, and that can even be reversed and used for a brake in landing, was one of the many interesting novelties described by Mr. Elisha N. Fales, research engineer at McCook Field, Dayton, Ohio, who addressed the engineering students, Monday, January 26, at 9 a. m. in the auditorium.

Before the war Mr. Fales was a member of the faculty of the University of Illinois. During the war he entered the air service in which he has remained. McCook Field, where he is located, is the principal center of aeronautic development for the U. S. Army.

The lecture was illustrated with a motion picture of a model propeller in a wind tunnel. By regulating the moisture content of the air so that the drop in temperature caused by the passage of the air through the tunnel at high velocity—400 miles per hour—will cause condensation, it is possible to make the air currents visible. The picture revealed the vortices at the tips of the propeller which had previously been predicted from analytical deductions.

Mr. Fales expressed the opinion that aeronautic design, which at present is largely a cut and try affair, will sooner or later be reduced to an exact science.

ARE YOU WEARING THAT GREEN BUTTON TODAY?

The Birth of St. Patrick

By Samuel Lover

ON the eighth day of March it was, some people say,
That Saint Patrick at midnight he first saw the day;
While others declare 't was the ninth he was born,
And 't was all a mistake, between midnight and morn;
For mistakes will occur in a hurry and shock,
And some blamed the baby—and some blamed the clock—
Till with all their cross-questions sure no one could know
If the child was too fast, or the clock was too slow.

Now the first faction-fight in owld Ireland, they say,
Was all on account of Saint Patrick's birthday;
Some fought for the eighth—for the ninth more would die,
And who wouldn't see right, sure they blacken'd his eye!
At last, both the factions so positive grew,
That each kept a birthday, so Pat then had two,
Till Father Mulcany, who show'd them their sins,
Said, "No one could have two birthdays, but a twins."

Says he, "Boys, don't be fightn' for eight or for nine,
Don't be always dividin'—but sometimes combine;
Combine eight with nine, and seventeen is the mark,
So let that be his birthday,"—"Amen," says the clerk.
"If he wasn't a twins, sure our hist'ry will show
That, at least, he's worthy any two saints that we know!"
Then they all got blind drunk—which complated their bliss,
And we keep up the practice from that day to this.

From The Philistine.

EDITORIALS

ARE YOU AN AVERAGE PERFORMER?

Too many people try to excuse their poor grade of work by saying: "Well, I'm better than the average at that; I guess I'm good enough." Students use that kind of philosophy when they get their grades from the adviser and find that their record shows a predominance of "fairs". Repeatedly we hear some fellow console himself, after receiving a mark of 75 on a quiz paper, by the fact that the class average was only 70. Certainly that kind of thinking does not lead a man to make a reasonable success of his school life or of any other career. One of the weakest excuses that can be found is the kind that says: "I'm not as bad as the other man."

Success is any career comes to the man who is just a bit better than the other candidates. It is not achieved by doing just the minimum or average amount of work. The men who will do a thing just to "get by" do not count for much. The men who refuse to do a job after working hours or who will work only eight hours a day are never leaders. A man's success depends upon what he does after working hours—upon the labors that he is willing to perform after his fellows have locked their desks—upon the margin of his performance over the average. Successful men are the men who willingly sacrifice their private time in order to do more than the average amount of work. In practical life a man's position with his employer depends upon the quality of his work during regular hours, and his position among his fellow men depends upon whatever additional service he performs for the public good. In school the student's rating with the faculty depends upon the excellence of his scholastic work, and his position in the student body is governed by his outside activities. In all cases it is the margin over average performance that brings success. C. A. W.

ENGINEERING SALESMANSHIP

The field for men with engineering training and sales ability is daily growing larger. The demand for salesmen for engineering products is a demand for men of good engineering training who possess the ability to sell. Probably many of the seniors will soon be entering this field, and we hope they will enter it with an idea that salesmanship is something other than the ability to sell a man something he does not want. The future good will of the customer depends upon the value he receives for his money. The salesman, therefore, must study the conditions under which his product is to be used and sell the customer what he wants, not something he does not want. This insures the good will of the customer after the sale, and is the only policy possible if the sale is to be a complete success. W. A. K.

IN DEFENSE OF OUR CLUBS

Since the Student Senate has seen fit to limit the number of clubs on the campus and to require the registration of those in existence in order to be recognized, it is up to all Engineering clubs to show their strength and usefulness on the campus in order that they be allowed to continue. That the clubs have a real purpose and value, in that they get the student members on their feet to speak before an audience, cannot be disputed. Good form and presentation in speaking before people can be obtained only through practice. An engineer must needs have the ability to present his ideas to the world clearly and forcefully; it is a part of the profession that engineers will be called upon to convince the public of the truth of some engineering problem. If the man cannot face his audience and speak with ease, much of the force of his argument is lost. By gaining the ability to speak before classmates while still in school, facing audiences later in life will become a matter of course and a thing not to be feared. Engineering clubs can and do give members a good opportunity to become proficient in the English language and to overcome any bashfulness or self-consciousness they may have, and should be allowed to exist. F. W. N.

THE CELEBRATION THAT MIGHT HAVE BEEN

According to a custom of long standing, 1920 should have been glorified by an Engineers' Minstrels. But there will be no minstrels. Today, St. Patrick's Day, should have dawned upon the preparations for a grand and stupendous pageant designed to the honor and glory of the engineers and their patron saint. But it didn't. Instead we plod as usual to our classes with nary a thrill to chase itself up and down our spines. Well, never mind. There are plenty of reasons why the celebration that might have been, isn't. The flu, with its accompanying ban, has discouraged attempts at public entertainment. Small use to plan a show and find half the cast in the infirmary and the theatre closed when the time comes for the performance. This year must pass without its minstrels. But next year, oh boy! The sophs are full of pep and talent, and raring to go. With an early start and the hearty support of the whole school, they promise us "a show as is a show."

HAVE THE ENGINEERS LOST THEIR PEP?

A student in one of the other colleges recently expressed the opinion that the engineers have lost the pep that made them marked men on the campus in olden days,—that they have fallen into the he-vampire class that shakes the shimmy at the tea dances. His dissertation had us worried, if not quite convinced, and so we consulted Old Timer who knew the engineers of many generations back. He reassures us. Sayes Old Timer: "The engineers have just as much zingo in their systems as ever. To be sure they haven't done much to advertise the College recently but you will notice that they are right there when it comes to working for the good of the University as a whole. They are into everything from athletics to joint debate. They probably could attract more attention to themselves and their college if they would confine their efforts to strictly engineering events, but they have no intention of doing any such thing. In spite of their clannishness and solidarity as a college, they are Wisconsin men in the best and broadest sense." Hearing which we straightened our tie, threw out our chest and sallied forth to help the Armenians.

DON'T PASS THE BUCK

Many students lay the blame for their scholastic shortcomings upon their instructors, nourishing the false notion that "all the instructor wants is the opportunity to run me down". It is human to blame others for our shortcomings, but it obviously is unjust to load all the responsibility for poor grades upon the faculty. Students have been heard to complain that their instructor gave them no opportunity to succeed, that he criticised every effort on their part, that he would not give them a good grade even if their work should be perfect. An antagonistic attitude of this kind is wrong; it can only be the result of narrow and distorted ideas.

The men of our faculty know that they are here to help us educate ourselves; they have refused better salaries because they are interested in us. They cannot help us unless we exert our energies to educate ourselves. C. A. W.

THE MONTH'S ACTIVITIES

Although the plans for the production of the Engineers' Minstrels failed to materialize, our traditional annual St. Patrick's Day celebration will be duly observed. A group of engineers has edited a special St. Patrick's Day edition of The Daily Cardinal which presents feature articles concerning the significance of St. Patrick's Day to the engineers, the history of the College of Engineering, the campus activities of the engineering student body, and other articles and humorous material contributed by engineering students. St. Patrick's Day is also observed by the timely issue of this magazine.

The events of this season are not confined to the publishing of these special editions. Every engineer should play his part in the celebration by grasping the spirit of the occasion by lending his voice to increase the "pep" of the songs, by wearing the animated and friendly expression that indicates good fellowship, and by giving substantial assistance to such engineering projects as the Engineers' Parade. Other events that are truly a part of the St. Patrick celebration are the annual Engineers' Dance, to be given on Saturday evening, March 27, at Lathrop Hall, and the publication of a comprehensive and complete "Engineers' Song Book." C. A. W.

ALUMNI NOTES

By WILLARD A. KATES

WALTER ALEXANDER, m '97, M. E. '98, who has had charge of the transportation department of the Highway Commission of this state, has resigned to accept the position of vice-president and general manager of the Union Refrigerator and Transit Co. of Milwaukee. He assumed his new duties on March 1.

M. C. BEEBE, e '97, has left the Western Electric Co., to accept the position of chief engineer of the Wadsworth Watchcase Company, at Dayton, Ky.

ELLIS R. BRANDT, m '17, was married to Norma Brown, a sister of Stacy Brown, at Beloit, at Thanksgiving time. Brandt is now in the experimental division of Fairbanks Morse Co.

A. E. CHRISTENSON, c '13, is an engineer and contractor at 1101 Belmont Ave., Salt Lake City, Utah.

BERNARD M. CONATY, c '18, is with the Federal Engineering Company of Milwaukee. His address is 1526 Prairie St.

E. L. COLE, e '18, is still in the Navy on submarine service. He was recently promoted to Lieutenant, junior grade.

H. J. COWIE, c '03, who has been with the Niagara Falls Power Company for many years, has been made Planning Engineer for the Carborundum Company, Niagara Falls, N. Y.

W. D. CUMMINS, ex-c '21, has accepted a position with the Thompson Sterret Co., Insurance Exchange Bldg., Chicago, Ill.

COURTNEY C. DOUGLAS, m '03, Commercial Engineer, Steam Turbine Dept., General Electric Co., at Chicago, visited the college on February 19, for the purpose of interviewing men who were interested getting into the G. E. organization.

JACK H. FRIEND, c '03, who served as Major in the 114th Engineers, is with the Bogalusa Lumber Co., at Bogalusa, La.

A. D. FULTON, m '16, may now be addressed at 3910 Dewall Ave., Baltimore, Md.

HERBERT GLAETTLI, c '19, has gone to Kansas to work for the Prairie Pipe Line Company. His address is 206 North Sixth St., Independence, Kansas.

R. H. GRAMBSCH, e '15, is located at the Boys' Technical High School, Milwaukee, Wisconsin. His address is 628 24th Ave.

O. E. HAGEN, m '17, who returned from overseas in July, 1919, is now employed at Allis Chalmers in the centrifugal pump department.

PAUL HUNTZICKER, c '19, received his B. A. at the University of Colorado last June and is now instructing in engineering mathematics at that school. Last spring he was one of the pair that won the Rocky Mountain conference championship in doubles in tennis. His address is 994 14th St., Boulder, Colo.

W. S. JOHNSON, c '17, has left the employ of the City of Janesville.

WM. A. KLINGER, c '10, is engaged in the desgin and construction of buildings, at Sioux City, Iowa. He may be addressed, care the Warnock Building Co. He has written, inquiring for a graduate civil engineer to act as general assistant.

BEN LAMPERT, c '13, is with his father, Congressman Lampert, in the Lampert Construction Co., at Oshkosh. Ben was married last fall.

C. N. MAURER, m '16, discharged from service as first lieutenant, U. S. Engineers, is employed as chief engineer of the department of locomotive and shop lubrication of the Sinclair Refining Co., Chicago.

J. P. MERTES, ch '19, is now superintendent of the city gas plant at Oshkosh.

A. W. MEISELWITZ, c '18, is in the City Engineer's office of Mitchell, South Dakota.

L. F. NELSON, c '16, is a designer for the General Fireproofing Co., 1205 First National Bank Bldg., Milwaukee.

VICTOR OLSON, ch '18, is in charge of the computing department of the General Electric Co. in Chicago.

ROSWELL P. ORR, e '16, died of the flu last January, leaving a wife and a small baby. He had been working with the A. T. & T. Co., at Chicago, up to the time of his death.

RAY A. PHELPS, c '16, visited the office on March 1. He was married to Hazel Dobson of Beloit on December 3.

H. V. PLATE, m '16, is superintendent for the Oklahoma Power and Transmission Co., Byng, Okla.

R. E. PORTER, m '17, is now with the Falls Motors Corporation, manufacturers of automobile, truck, and tractor motors, at Sheboygan Falls, Wis.

W. A. REINERT, c '11, 605 Eggleston Ave., Chicago, is assistant professor of civil engineering in charge of agricultural engineering at the Armour Institute of Technology.

L. E. ROWELL, e '01, 111 Lutz Ave., West Lafayette, Ind., is professor of electrical engineering at Purdue University.

JAMES A. SCHAD, c '16, who has been with P. J. Kalman Co., of Milwaukee, engaged in concrete design since last summer, joined the technical staff of the Building Products Co., of Toledo, Ohio, on March 8. He will be engaged in designing, estimating, and selling reinforcing steel and other building products. He will be located at Dayton, Ohio.

EARL SHNABLE, m ex '18, who is with the Wis. Highway Commission, attended the Good Roads School held in the Capitol.

E. A. SIPP, e' 15, is with the Dayton Fan and Motor Co., Dayton, Ohio.

ALLARD SMITH, e '98, for five years general manager of the Cleveland Telephone Co., Celevland, O., was recently elected vice-president of the Citizens Savings and Trust Co., Cleveland.

J. W. TANGHE, c '16, is sales engineer for the General Fireproofing Co., 1205 First National Bank Bldg., Milwaukee.

F. C. THIESSEN, 1124 W. Johnson St., Madison, is a structural engineer with the Railroad Commission, State Capitol.

H. D. VALENTINE, formerly an instructor in Fuel and Gas Analysis and until recently with the Ozone Co. of America, has entered the employ of the Cutler-Hammer Co. of Milwaukee.

LOUIS W. VAN SLYCK, ex-e '20, is teaching mathematics in the high school at Ironwood, Mich.

We have received an interesting letter from the former editor of the ENGINEER, GLENN B. WARREN, m '19, in the Turbine Engineering Department of the General Electric Co., Schenectady, N. Y. He writes in part, "Work is coming along pretty good here for me. Have been in the Turbine Engineering Department for almost six months now. My official job according to the new organization outline is 'Experimental Development,' which, of course, just suits me."

EDWARD R. WIGGINS, m '08, Technical Editor of the Chilton Tractor Journal sends in a subscription and kindly remarks, "When the dollar runs out I'll send another. In the mean time send on the magazine. It is a dandy magazine and I can judge because I am an editor myself. You fellows are to be congratulated, because I know it takes a lot of time. Yours for the U. W. engineers." All of which doesn't make us downhearted.

S. D. WONDERS, c '13, has been promoted to office manager for the Firestone Tire and Rubber Co., of Akron, O.

JOHN B. WILKINSON, m '16, M. E. '17, is now engineer for the Union Dye and Chemical Works, in Tennessee.

C. W. ZACHOW, m '15, shop engineer for the Soo Line, Chicago division, is located at Fond du Lac, Wis. He visited the engineering college last month to find men interested in the mechanical engineering branch of railroad work.

MARK TAYNTON, min ex '21, is located at Burke, Idaho, being employed in the Hecla Mine.

The April issue of THE WISCONSIN ENGINEER will be an ALUMNI NUMBER, and will be sent to all of the Old Timers that we can reach. It will contain the Dean's Annual Letter and other material that will be sure to interest the men of Wisconsin.

CAMPUS NOTES

By WILSON D. TRUEBLOOD

Greetings, St. Pat, old boy!

Things have changed since you were around last.

Blame it on the Tea Hounds and their infernal Jazz.

Anyway, let's be patriotic and wear a green tie.

Good time to wear the vicious green one that Aunt Molly sent us for Christmas.

Pat Hyland said he talked to the Saint himself on the Ouija board last night. No chance, though, says St. Pat, prohibition is here to stay. Better luck next time.

The Guy Around the Corner says: The granting of more elective space to senior civils seems to be a step in the right direction. Many engineers have an education regrettably limited, in some respects, at least. Witness, definitions given in Senior Engineering Seminar:

''Anathema—the feeler on a bug''.
''Utopian—a native of Africa''.
''Ispo facto—a secret pass word''.

Wisconsin is one of a few large universities to have its own glass blower for the apparatus needed in all departments of research. J. B. Davis, one of the few native American glass blowers of worth, has a shop in the P. P. E. building where he makes X-Ray bulbs, thermometers, hydrometers, gas analysis appliances, burettes, and other apparatus used in the different departments.

The co-ed came, saw, and conquered. In her honor we scrapped the dust of 20 years from our walls and put on a layer of the latest mural complexion cream. Aren't we pretty now?

As evidence that the educational bonus act is being fully made use of, 300 more former soldiers, sailors, and others have entered the university for the second semester. About 1,500 bonus students attended the university last semester, with high records scholastically.

THE ENGINEERS DANCE
(*Insanity Version.*)

Slip sticks will be Forgotten and Everybody will be on Hand and Arm, unless so Fortunate as to be TRUN OUT by the Samson at the Door. Notice is hereby served that any-one Honored by a Breath Blessed with the Essence of Flu Preventative will bee Ejected on the Coffee (Pardon Me, *Grounds*) that there is already Sufficient Joy in His or Her Life. An enclosure will be roped off for those Suffering with Charlie Horse or Rheumatics of the Shoulder Blades. Thompson's Madmen will Distribute Har Mony. Dancers afflicted with Poor Hearing will be Supplied with Eardrums. Refreshments will be Plentiful and will be Piped Direct to Consumer through Venturi Meters, Consumption of the same to be a la Funnel. Dancers will be both Surprised and Pleased to dance Fourteen dances, as Fourteen dances are Scheduled.

Mike Knapp, Dodge Em Dames, and Toothpick Timm will Pour!

ADVANCE NOTICE
Copyrotten by *The Guy Around The Corner.*

HERBERT O. LORD has completed the requirements for his degree in civil engineering and is inspecting some construction work in Monticello, Indiana, for the firm of Mead and Seastone. He may be addressed in care of that firm at Madison.

IMPROMPTU LECTURE IN MATHEMATICS 52
(*Commerce Mag please copy*)

"If you fellows don't intend to buckle down to your mathematics, I advise you to switch to the Commerce Course where all that is required for graduation is four years' residence in Madison. There also you will meet many girls, most of whom came here for a good social time, but primarily to hunt a good husband."

AND THEY DID

Said an Irish leader: "Min, ye are on the verge of battle. Will yez fight or will yez run?"

"We will!" came a chorus of eager replies.

"Which will yez do?" says he.

"We will not," says they.

"Thank ye, me min," says he; "I thought ye would."

THE "CHEEK" OF HER

From Both: (Silence).

From Him: "Is it all over?"

From Her: "No, just a little bit on your shoulder."

RIPE CHESTNUTS

"What did Io die of?"

"Why iodide of potassium!"

SUMMER IS COMING!

'After College, What?' takes on a new meaning when viewed by ''Bill'' Mantonya, m '19, famous poet of last year's Campus Notes. Bill has certainly retained his old facility at making words rhyme, and we are grateful to him for the following contribution:

AFTER COLLEGE, WHAT?

They gave me my degree last June
  And started me in life,
My motto was "excelsior"
  To lead me in the strife.
And while I buckled on the sword
  With which to make things hot
The question which confronted me
  Was, "After college, what?"

I started out to get a job,
  "Oh, this is soft," said I,
"My little old B. S. Degree
  Will surely get their eye.
And when it comes to picking jobs
  It sure will help a lot,
In answering that little quiz
  Of "After college, what?"

I filled out application blanks
  I filled 'em by the score,
And then, just for variety
  I filled a dozen more.
They gave me much publicity
  But cash they brought me not,
I still was groping in the dark
  For "After college, what?"

"Excelsior" was slipping fast,
  My sword was on the ground,
In fact, the battle was a bum,
  When, lo, I got a job.
The working hours were long and hard
  The shop was awful hot,
This could not be the answer true,
  To "After college, what?"

But better things loomed up ahead
  Which always is the rule,
And now I rate a tilting chair
  And not a big high stool.
The working hours are very good
  And quit, I sure will not.
I guess I've settled chapter one
  Of "After college, what?"

Prof. O. L. Kowalke, head of the Chemical Engineering Department, was ill with the flu for several weeks during February.

SIGNS OF SPRING—The Laws come out on their steps—to freeze.

In one of the hardest fought basketball games ever played on the gym floor, Wisconsin won over Illinois on Feb. 21 by a score of 33 to 29. The following Tuesday evening the team took a game from Ohio by a score of 31 to 27. Mike Knapp, senior chemical, made 10 baskets, duplicating his record made in the Michigan game. This is the largest number of baskets made by one player in a conference game.

L. A. Kirst, welterweight, and T. G. Nienaber, featherweight, won their falls in a wrestling match between the University and Ripon. Kirst is a junior chemical, and Nienaber a sophomore electrical. Nienaber's opponent was a former army champion.

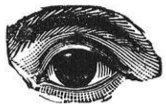
THE ENGINEERS' DANCE
(*Official Version*)

After having suffered several postponements, due to such causes as the lengthening of the Christmas vacation and the flu ban, the Engineers' Dance has finally been dated for the evening of March 27. The party will be given at Lathrop Hall, both the gymnasium and concert room having been leased to insure plenty of room for the dancing. The music will be furnished by Thompson's best orchestra; special dance numbers featuring appropriate engineers' songs will be given, and special stunts are being arranged for the entertainment of the guests. The programs will be in the St. Patrick colors, and will consist of a pair of gears so mounted that the dance numbers and names come into view by rotating the upper gear. Appropriate refreshments will be served.

The committee in charge of the dance invites all students to participate, and extends a special invitation to all College of Engineering faculty members.

Tau Beta Pi entertained with a dancing party at Lathrop Hall, January 20th.

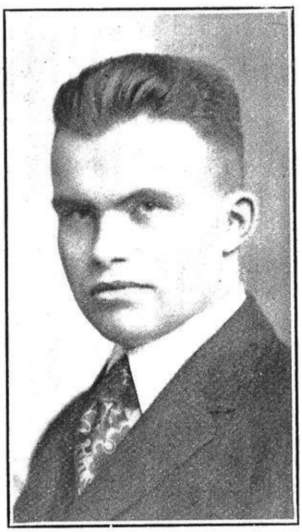
Dean Phillips reports that his department is now turning out "pen-wielders" at a lively rate. The new semester finds 444 enrolled in mechanical drawing. Last semester there were 560. Hush! boys. Watch your step, for 30 of this number were Co-Ediths.



MR. BENJAMIN SPIETH, assistant professor of mechanical engineering at Oklahoma A. & M. College, has been appointed instructor in steam and gas engineering. He was graduated from the University of Nebraska in 1916. After leaving school he spent some time with the Westinghouse Machine Co., at Pittsburgh, in charge of experimental work on torpedo boat engines. Later he entered the Army and did some experimental work on search lights. At the close of the war he was a lieutenant of engineers. After his discharge from the army he was superintendent of the Bayard (Neb.) Plant of the Intermountain RR. L. & P. Co.

The Mining Department is planning a Western trip to be taken by the juniors and seniors under the supervision of Prof. McCaffery. The important mines in the West will be visited, and notice will be taken of the mining methods and operating methods employed. Sixteen Miners have already signified their intention of taking the trip. The party will start immediately after Commencement, returning within a month.

MAX E. WONDERS, junior mechanical, has transferred to Penn State College for the second semester. He intends to take up the study of medicine.



W. L. MILLAR

W. L. MILLAR has been appointed instructor in steam and gas laboratory. He is a 1919 graduate from the mechanical course at the University of Nebraska. He has had considerable experience in automotive engineering and comes to Wisconsin from the sales department of the Four Wheel Drive Truck Co.

Soon someone will be selling advance tickets to our future destination, Heaven or Hell. The game has advanced to the stage where plans are being made to send a man to one of the planets of this good old solar system on a rocket. What that man will do there and how he will let us know that he did get there is a problem they apparently are not figuring on. Prof. R. H. Goddard of Clark College, Worcester, Mass., is the man to see for your tickets. He is of the opinion that, by a system of multiple-explosive rockets, communication can be established between the earth and other planets. Another man is willing to let the rocket carry him from this worldly vale of tears to the land of what-nots. What co-ed jilted him?

Mr. H. W. Tabor has recently been appointed to the staff of the mechanics department. Mr. Tabor is a graduate of Wisconsin of the class of '16 in civil engineering and has served on the Geological Survey in Montana and Washington for the past eight or ten summers. During the war he saw army service receiving the rank of 1st Lieutenant. Previous to his appointment on the Mechanics Staff, Mr. Tabor was a fellow in Hydraulics.

Professor Mead, addressing his class: "A man who has had experience in only one line thinks his line is the best in the world, just as a man who has had only one wife deems that wife to be the best in the world. A man needs extended experience to judge—of course I don't—." The expression of appreciation temporarily prevented his continuing.

The U. W. Mining Club entertained Gov. Philipp at its last banquet, Feb. 18. The Governor was much pleased with the excellent dishes prepared by the culinary experts of the Club, and expressed his pleasure after the dinner in a talk on "The Requirements for a Successful Business Career."

Will the coed invaders have the same respect for the engineers after they have read some of the epitaphs carved on the seats in the auditorium,—memories of some harassed alumni in the midst of a final?

The Civil Enginering society held its first regular meeting for the semester on Feb. 26. Mr. Volk, the librarian of the Engineering library, talked on "Our Technical Magazines."

What's the use of going to a big university and enjoying S. G. A. privileges, when we can go to Ripon and entertain the fair sex until way past 10 o'clock on Friday and Saturday nights? There, too, on week nights, seniors have 10 o'clock curfew privileges. What a joy to be in these small colleges! Think of the lack of "tea-hounds." "The place you wish you were in."

The invasion of the coed in the Engineering Building has its advantages. The building, following the example of the engineers, is discarding its drab color, and is adorning its walls with a coat of white paint to match the more numerous white collars seen around the building. Don't say the engineers aren't appreciative.

Prof. Withey was in attendance at a national conference of Highway Testing Engineers held in Washington, D. C., as the representative of Wisconsin. The conference was the first of a series of annual meetings to be held for the purpose of developing and standardizing methods of testing road materials. About twenty-five engineers from all parts of the United States were present.

ECHOES OF VERDUN!

An instructor in Math. 54 put a difficult equation on the board and was explaining to the class the fact that one of the members of the Examination Committee had suggested the question for the semester finals, when a voice from the rear of the room broke in with,—

"Say, is his motto, 'They shall not pass?' "

The versatility of the Engineers was again brought to notice when the cast for Mary's Lamb, the 1920 Haresfoot Production, was announced. Wm. R. Kellett, and A. D. Marvin, both '22, were selected for leading parts, with Phillip D. Reed, C. E. Spring, Elton K. Morice, and H. K. Dean were chosen for the chorus.

S. E. T. H.—what is it? No, girls, it isn't the name of that dear old hick who used to take you to the Sunday school picnic. One more guess! That's it—Society for the Extermination of Tea Hounds. Get your badge at the office.

L. M. Miller, supervisor of industrial education at the Mooseheart Industrial School, has been appointed assistant professor of machine design and assumed his new duties at the beginning of the second semester. Mr. Miller is a graduate of Highland Park College and took post graduate work at Massachusetts Institute. He is an old football player and for several seasons past has been a regular official at games of the Little 19 Conference.

In the Fourteenth Annual Relay Carnival held February 28, A. J. Knollin, c '22, lowered the record for the low hurdles from 6:01 to 6:00, while T. D. Jones, '22, Ralph Spetz, '22, and E. E. Fourness, '21, overcoming their proverbial engineers' shyness, ran in the Inter-Sorority Relays. Jones and Spetz helped to carry Barnard's flying colors across the line for first place.

Notorious Engineers

(From the Seminar Waste Basket)

Erwin W. Dames, Chicago, author of the famous book on "How to Avoid Designing Women" recently said in an interview, "Any fool can get married, but it takes a real man to stay single." He will give instruction on Friday and Saturday evenings. The only fee he asks is a box of "Humps".

C. A. Wiepking, Milwaukee, consulting engineer for all men planning to become engaged, is at home every Wednesday evening from 6:45 to 7:00. Call B. 2172. His section in physics lab is said to be popular with the co-eds.

Little Irv Greenslade has just returned from the infirmary with the new and quite appropriate title of "baby elephant." Each word of the title, you know, has a meaning all its own.

We open the second semester with 34 new freshmen in our midst. Greetings, brothers! For your own good, we suggest that you dig up the November number of the Engineer and read "Wisdom for the Green", ere the time of the green is upon us.

Haresfoot is holding tryouts for *Mary's Lamb*. We think we will go them one better and hold tryouts for *Mary's Calf*. Wonder who'll win?

Westinghouse Success Is Based Upon Its Pioneer Work and Development in Electrical and Mechanical Engineering.

1887

A PIONEER IN THE STOKER FIELD

Westinghouse was one of the first among the pioneers in the stoker field.

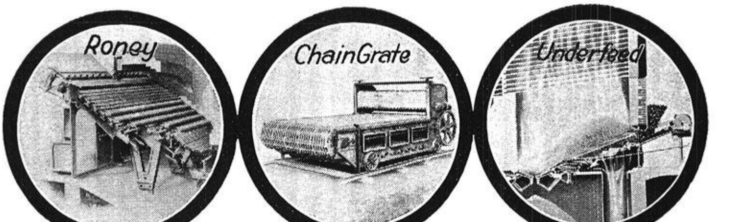
Although power stations have grown to enormous size with sudden peak loads in some distances reaching as high as 300 and 400% normal rating, the remarkable fact remains that the design of the Westinghouse Roney Stoker remains today practically the same as it was thirty-three years ago and that it still retains its firm position in the combustion field. This speaks for the accuracy of the original design. The Roney stoker is particularly suitable for steady power demands with moderate overloads of 25 to 50% and it burns a wide range of fuels satisfactorily. Simple design, low first cost and ease of installation, strongly recommend it for plants of moderate size. Over three million horsepower have been installed.

Industrial expansion, however, has wrought many changes in power plant practice since 1887. Today mechanical stokers are called upon to burn everything from high-grade coals down to refuse. They are also called upon to meet the sudden and enormous steaming capacities. Hence, two additional stokers were added, and our line now includes the Chain Grate Stoker, particularly adapted to the burning of low-grade, high-ash fuels; and the Underfeed stoker, which is unequalled in its ability to handle the sudden and enormous overload demands of central station service with the highest degree of efficiency.

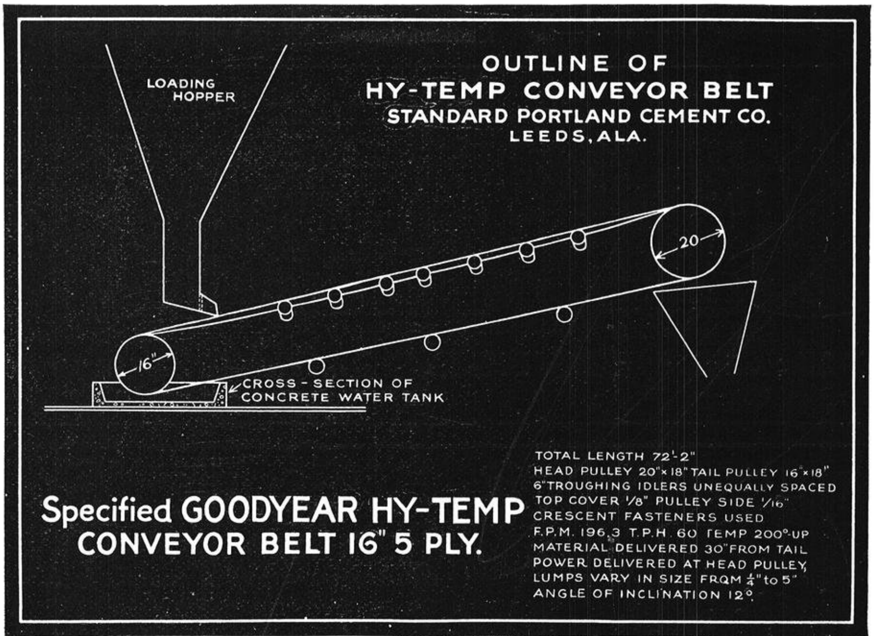
It is a fact of vital importance to the stoker buyer that we manufacture the three general types, because stoker application should be approached with an open mind and the stoker manufacturer should be guided in his recommendations purely by the facts that develop from a study of fuel and load requirements.

1920

WESTINGHOUSE ELECTRIC & MANUFACTURING CO.
East Pittsburgh, Pa.



Westinghouse


LOADING HOPPER
OUTLINE OF
HY-TEMP CONVEYOR BELT
STANDARD PORTLAND CEMENT CO.
LEEDS, ALA.
20"
16"
CROSS - SECTION OF CONCRETE WATER TANK
TOTAL LENGTH 72'-2"
HEAD PULLEY 20"×18" TAIL PULLEY 16"×18"
6" TROUGHING IDLERS UNEQUALLY SPACED
TOP COVER 1/8" PULLEY SIDE 1/16"
CRESCENT FASTENERS USED
F.P.M. 196.3 T.P.H. 60 TEMP 200°-UP
MATERIAL DELIVERED 30" FROM TAIL
POWER DELIVERED AT HEAD PULLEY,
LUMPS VARY IN SIZE FROM 1/4" to 5"
ANGLE OF INCLINATION 12°.
Specified GOODYEAR HY-TEMP
CONVEYOR BELT 16" 5 PLY.