The Wisconsin engineer. Volume 49, Number 8 April 1945

Madison, Wisconsin: Wisconsin Engineering Journal Association, [s.d.]

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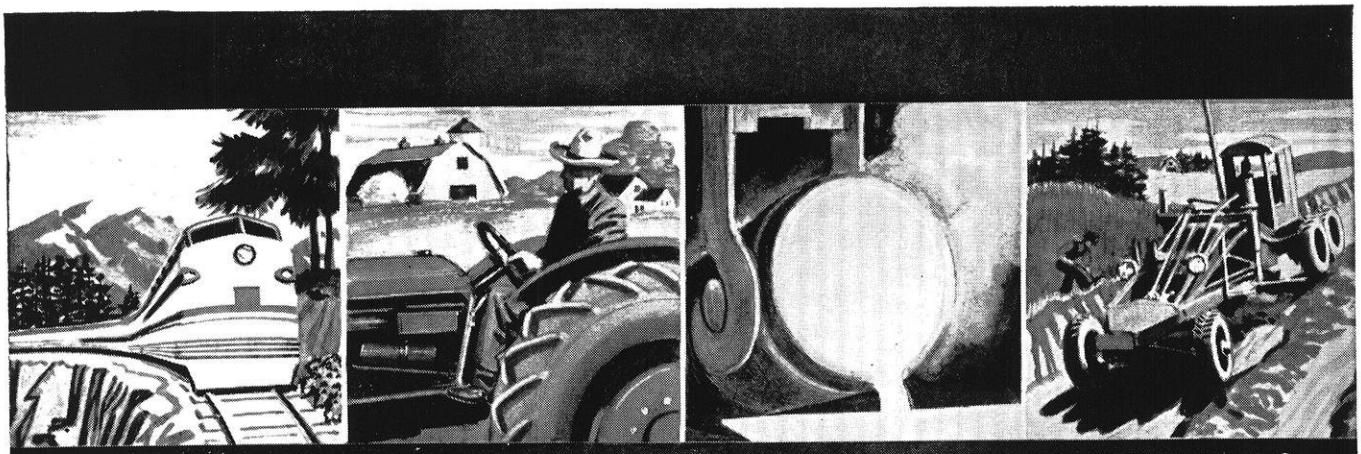
WISCONSIN ENGINEER

April, 1945

MEMBER ENGINEERING COLLEGE MAGAZINES ASSOCIATED



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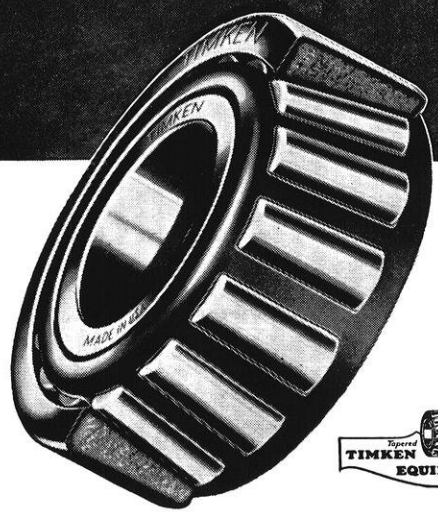

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SAFE!... Back from the hell of flak and fighters comes one of our aircraft—shot up but held together by the toughness of its construction still responding to the hand of the pilot.

Ball bearings are a vital element in the almost legendary performance of American planes—and the precision operation of our bombsights, gyroscopes, tanks, trucks, and other machines of war. And hundreds of thousands of these bearings must have a surface finish not varying more than one millionth of an inch. Moisture and dust are enemies of accuracy during assembly, and could cause rust or size variation, making bearings unusable.

Controlling temperature and humidity for the bearing industry is one of air conditioning's major home front tasks. Three great **SKF** plants alone use enough York equipment to produce 24,000,000 cooling units*. This immense figure, however, is but a small fraction of the five and one half billion cooling units York has contributed to the war effort to date.

Air Conditioning and Aircraft Tomorrow

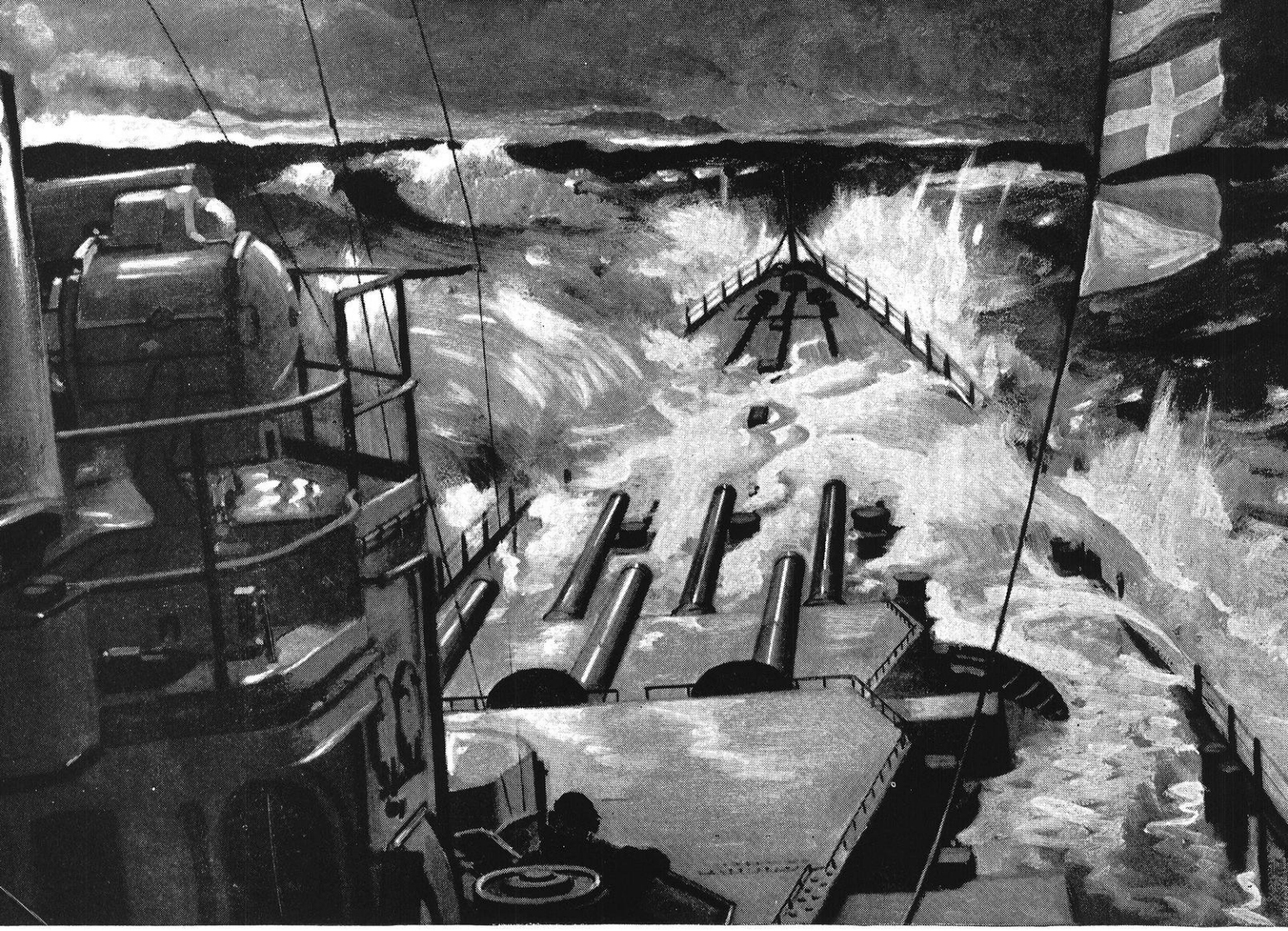
These wartime developments in air conditioning will bear fruit in the air age of tomorrow. As more and more of our transportation takes to the skies, faster and *safer* planes will come off the assembly lines—because air conditioning will make it possible to machine parts and instruments to the ever closer tolerances demanded by plane designers.

The science that now is working night and day to make better weapons of war will be an equally powerful force in forging the instruments of peace. York Corporation, York, Penna.

Cooling effect in B.T.U. per hour, American Society of Refrigerating Engineers Testing and Rating Code Number 14-41.

YORK REFRIGERATION AND AIR CONDITIONING

HEADQUARTERS FOR MECHANICAL COOLING SINCE 1885



WHY A BATTLE WAGON WEARS 4,000 SAPPHIRES

THE DELICATE PRECISION instruments so essential to the navigation of ships of the sea—and ships of the air—are dependent for accuracy on jewel bearings. There are 4,000 of them in a battleship.

Before the war, synthetic sapphire for these bearings came from abroad. Today, because of concentrated efforts over the past 36 months by THE LINDE AIR PRODUCTS COMPANY, a Unit of UCC, America need never again depend upon an outside source for this hard, smooth, wear-resistant material.

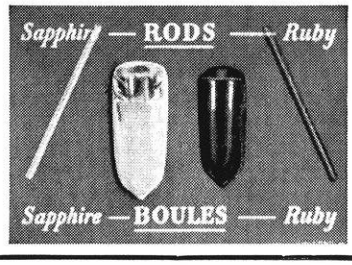
This unusual UCC research project led to the quantity production of Linde sapphire and Linde ruby. These are produced in the form of a single crystal shaped like a cylinder—known as a boule (pronounced "bool")—and also in the form of rods of varying sizes, for more efficient and economical fabrication.

In addition to its indispensability in bearings for military instruments, Linde sapphire already is being used by industry to combat wear in precision gauges, cutting tools, thread guides for textile mills, barometers, compasses, and watches. Phonograph needles that last indefinitely are another interesting use.

American synthetic sapphire production indeed is a tribute to American ingenuity, and promises much for the Nation's postwar progress.

▼

For additional information send for the folder P-4 "Synthetic Sapphire Production."



These objects are Linde sapphire and Linde ruby in boule and rod form—materials of vital importance in military and industrial use. Because they are single crystals that are second only to the diamond in hardness—and can be given a surface that is perfectly smooth—they are invaluable in bearings and in countless other parts where there is wear.

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WISCONSIN ENGINEER

Founded 1896

Volume 49 APRIL, 1945 *Number 8*

Entered as second class matter September 26, 1910, at the Post Office at Madison, Wisconsin, under the Act of March 3, 1879. Acceptance for mailing at a special rate of postage provided for in Section 1103, Act of Oct. 3, 1917, authorized Oct. 21, 1918.

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Published monthly except July and October by the Wisconsin Engineering Journal Association, 356 Mechanical Engineering Building, Madison 6.

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Subscription Prices

$1.25 PER YEAR . SINGLE COPY 15c

In This Issue . . .

COVER . . .

SWINGING THE ICE TRAP--Icy weather can immobilize vital river and lake traffic. The new 5090-ton Coast Guard Ice Breaker *Mackinaw* helps free barges and other vessels from the clutch of the ice.

—*Courtesy Coast Guard*

FRONTISPIECE . . .

RADIO UNITES THE WORLD—Today radio provides instant communication between geographically distant points, thus uniting peoples of diverse races and nationalities.

—*Courtesy Westinghouse*

NARROWING WORLD HORIZONS

—Elizabeth Ann Lean

EVER in man's march from Java and Piltdown Common to the Empire State building in New York City, he has found a necessity for communicating his thoughts to his fellow men and for traveling from place to place. These two traits, more than all others, distinguish him from the rest of the organisms.

Yet modern inventions, wireless telegraphy, planes, and cars have barely scratched the surface of these two fields: — transportation and communication. The very needs created by this war are speeding up invention immensely. The enemy has high altitude planes, rapid systems of communication, unbreakable plastics; we must surpass him.

ELECTRONICS A KEY TO THE FUTURE—One of the many types of electronic devices required by a modern "war of communication," these high power radio transmitting tubes enable the U. S. Navy to communicate between ships and shore. In the period after the war, they will render easy, swift communication between all parts of the world.

But after this war, these planes will carry cargoes of goods, not bombs; wireless systems will send messages of goodwill and peace, not hate and war; and new plastics will protect persons from accidents, not bullets. It is unfortunate that wartime needs have provided the stimuli for these inventions, but ours will be the task to apply the discoveries to humane ends in the future.

One factor which makes man superior to all other animals is his power of communicating his discoveries to succeeding generations. Without this ability, man would live for himself and his age only.

Gutenberg's press marked the beginning of the age of democracy and discovery. Through efforts of the press, mankind came closer to a common level. No longer were books and education possessed by a wealthy few who could afford the hand-written products of the monastery; now the poor man had equal access to learning and he made use of it. Monarchs were overthrown and whole new systems of government came into being because Voltaire, Marx, Thomas Paine, and Hitler found the press a convenient way of reaching the people.

Now movies, radio and television make the spoken word more powerful, make personal appearance more effective and appealing. Movies have increased our desire for higher standards of living and have carried our ideals (albeit falsely in some instances) to all parts of the world. Television, the coming entertainment and method of communication, will make happenings more graphic and informative. Recent experiments in the field of colored television have been successful and after the war, when mass production again takes up peace-time manufacturing, this will be available to all homes.

Sometime in the near future, facsimile reproduction of news and pictures will become a part of every radio set. In this way each home will be supplied with latest news overnight. At present a device like this on a larger scale is used in some newspapers so that type can be set up by a key operator in New York for many smaller papers all over the country.

Telephone and telegraph systems will be so improved that Japan, England and Tibet will be a second or two apart. Even now, scientists are working on methods of communication so secret that their presence is officially denied. After the war the secrecy will be gone and all men

(next page, please)

may use these devices. No nation will be able to isolate itself from the rest of the world.

The wheel represents man's triumph over distance and time, for there are no wheels in nature. That nameless man who first placed a log under his burden must go down in history as one of the greatest inventors of all time. Without him man would still be living in the cave and burrow.

The forty-niners and their Conestoga wagons spent weeks, even months, crossing the United States; now fast trains speed along that same trail in 60 hours. Columbus crossed the ocean in 70 days; modern ships accomplish this feat in less than four days and planes in less than eight hours. Modern science with high powered Diesel engines, better fuel, and streamlined construction has quickened our lives and brought our lands closer together.

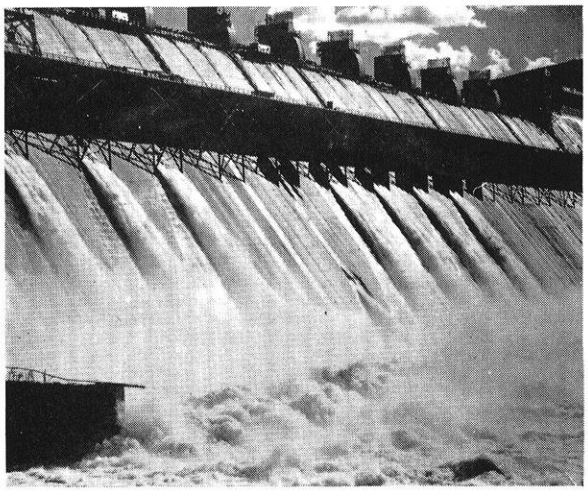
PLASTICS HAVE MANY USES—Use of the ceramic plastic, "Prestite," as bases for high frequency radio tubes manufactured by Heintz and Kaufman, Ltd., South San Francisco, California, side stepped possible material shortage. Prestite combines the electrical and mechanical strength of wet process porcelain with the moulding qualities of dry process porcelain. It is used in many products where intricate shapes must meet high insulation requirements.

The super bomber and giant transport planes are forerunners of great flights of peaceful birds carrying men and materials to all parts of the globe. No longer will one nation be deprived of certain "valuable raw materials." Speeds of 700 miles per hour will be commonly attained by supercharged air sealed sub-stratosphere planes that will fly above weather conditions to transport goods more efficiently. Markets will be filled with fresh fruits and vegetables, their nutritive values unimpaired by green picking or long storage. Thus essential vitamins and minerals will be available to everyone and the hidden hunger of humans will decrease. Major disasters will be alleviated more rapidly because serums and plasma will be readily obtained in any country.

Helicopters and convertaplanes will be taxicabs of the future and permit widening of city limits. There will still be a place for the motor car but mainly for intra-city travel. This car will be smaller, safer, more economical and more comfortable with a light but strong plastic body, polaroid glass, and better shock absorbers. Elevated streets or tunnels and more convenient parking facilities will reduce accidents and make automobile travel more efficient.

Atomic force of U-235, the powerful uranium isotope, will be utilized to provide heretofore unknown power to new engines. This engine will produce at least ten horsepower per pound instead of the one horsepower per pound now considered excellent by engineers. Great planes will fly farther because bulky fuel is gone and astronautics may become practicable. With atomic power, the speed of seven miles per second necessary for leaving the earth's gravitational field could be attained and interplanetary travel become a possibility.

Wars have always occurred — some claim they always will — but it is interesting to note that conflicts usually



HYDRO-ELECTRIC POWER—After the war, scientific and engineering achievement will again be directed to the service of mankind.

take place between factions which do not understand each other.

Our own country provides a good example. Early settlers knew only nearby neighbors, hence they mistrusted all strangers. County lines, state lines, national boundaries made inhabitants provincial in their outlook. Men put the rights of their section above the common good of the country. Today these sectional lines are very indistinct; we no longer speak of North or South, East or West, but THE United States, for when railroads crossed state boundaries, telegraph wires stretched from coast to coast, men could not ignore their country and fellow citizens. May that not be true of the whole world in the future?

(please turn to page 22)

CHURCH, STATE and SCIENCE

—Virginia Ellen March

When man first came on earth, a feeble flame of science was ignited; for the most primitive man recognized the needs of his body, and learned what natural phenomena harmed or benefited him. By the time of the New Stone Age, the flame begins to cast a real glow: the science of agriculture is born, plants are studied and domesticated, the embryonic stage of medicine is observed in the use of such drugs as quinine and ipecac. The flame burns quietly for centuries; then, fed by the fuel of the discoveries and wisdom of Pythagoras, Hippocrates, Aristotle, Euclid and Archimedes, science, in the Golden Age of Greece, emits a glow ever famous in history—a glow so bright that the great tyrants of the Middle Ages, fearful of its blaze sought to extinguish it by every method in their power. For science, in the glory of its discoveries, made two great enemies at this time: the state and the church. The former, in recent decades, has become inseparable from science because of science's countless gifts of destruction through munitions and war machinery, and **production** through new synthetic products and improved methods of agriculture and of manufacturing. Thus the state, at first linking science with anarchy, has been convinced of the value of science because of benefits to the government and the half-smothered flame begins to burn brightly with the discoveries of such great modern scientists as Newton, Darwin and Pasteur.

The church, however, has never united as wholeheartedly with science. To understand this, one must go back to the time when the light of science first flickered; for at this time another fire was born—a belief in the supernatural. This flame began with the worship of natural phenomena. It early showed its power through the bloody sacrifices of the mysterious Mayas to their gods. The Greeks and the Romans fed the fire with highly organized systems of deities; the Chinese added the wisdom of Confucius; the Jewish people caused the flame to burn with single brilliance through their belief in one god—Jehovah; a great blaze was caused by the fuel of Christianity. Side by side the flame of science and the flame of religion have burned; and the people, seeing the brightness of one, have sought to smother the conflicting light of the other, and vice versa. But both flames have survived, both are burning brightly today, but always separately. To be sure, the admirers of one fire no longer seek to destroy the flames of the other; religion and science have called a truce, each recognizing, if not approving of, the principles

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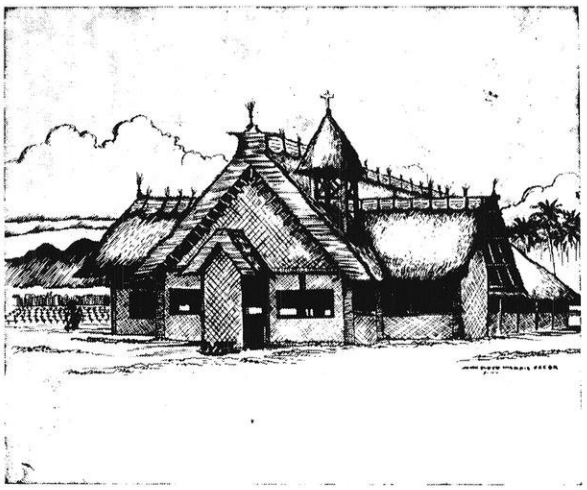
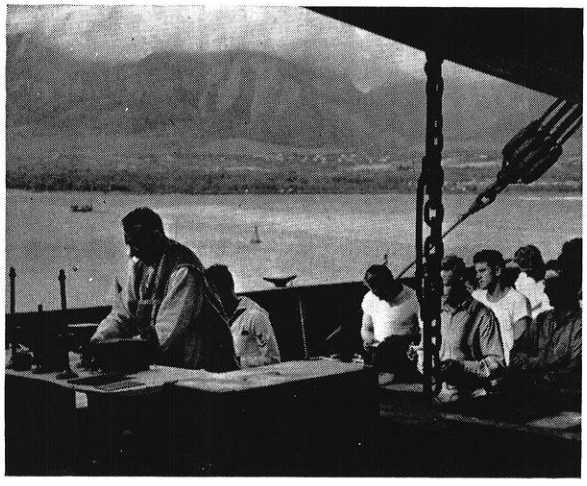


GUADALCANAL CHAPEL — Guadalcanal Memorial Chapel was built by the Solomon Island natives in honor of the fighting men of the United States who died driving out the Jap oppressors. The log and cocoanut leaf building, sketched by Coast Guard Artist John Floyd Morris, symbolizes the harmony between the natives and their deliverers.



DEVOTION TO GOD AND COUNTRY—Cast by world turmoils in the role of warriors, these young Coast Guardsmen remain steadfast in their faith and bow in reverence to God before an improvised altar on the deck of a Coast Guard manned transport somewhere in the far Pacific. The chaplain reads the service to a devoted congregation of men fighting with all the weapons of science to preserve freedom in the world.

WIRE GAGES

—E. H. Dickenson, e'43

ORDERING WIRE was not always the simple matter that it is nowadays. Years ago the existence and usage of many types of gages caused great confusion in the determination of wire sizes. For instance, many wire manufacturers received orders for wires and didn't know whether the size referred to the Birmingham Wire Gage, the British Standard Gage, the American Wire Gage, or one of the 40 or more existing gages. And even if the manufacturer had known the gage desired, there often was such a difference between copies of gages of the same type that it was likely that the wrong size would be sent to the customer anyway.

This deplorable state of affairs was recognized by all concerned with the use and manufacture of wire and efforts were made to eliminate the confusion. In 1879, a committee of the Society of Telegraph Engineers in Great Britain investigated the wire gage question with the intention of deciding upon a standard gage. Many satisfactory gages had been developed, but difficulty arose because no gage was universally used.

The committee suggested that the gage to be adopted as a standard should not differ greatly from the gages then in use under the name of Birmingham Wire Gauges since these gages had been based on and experience were well adapted to the practical requirements of trade.

Though the B.W.G. (Birmingham Wire Gauge) was used extensively, it could not very well be adopted for a standard gage because there were variations in the B.W.G. gage itself as used by various agencies. The Board of Trade in Great Britain was seeking information on the gage question and in the 12th Annual Report to Parliament on Standard Weights and Measures for 1877-78, the Warden of the Standard stated that there was no standard of the B.W.G. gage or no agreement between parties as to sizes, as they were not geometrically or arithmetically progressive and bore no relation to each other. The origin of the B.W.G. was clouded, but it seemed that as new sizes were needed or some new plate introduced, several sizes would appear with no relation to each other, resulting of course in annoyance and pecuniary loss to contractors using such a gage.

Mr. Latimer Clark, Mem. Inst. C.E., had suggested that the sizes of the B.W.G. were first arrived at by taking a series of already drawn wires and constructing the gage directly from those since "at the time from which the Birmingham Wire Gauge probably dates, the manufacturers who then introduced and employed it were not, I think, of a class likely to call in the aid of either mathematical or physical science to supply them with the ground-work of a gauge."

Wire manufacturers probably provided themselves with a gage such that the largest wire they could draw would be termed No. 1, the next largest No. 2, etc. Thus a thoroughly practical gage was established. The fact that in the B.W.G. existing in 1879 there was a fairly constant relation between the weights of each size of wire (about a 20% difference) also indicates that this was the origin of the B.W.G. because the constant reduction in weight would have been most suitable in practice especially before the introduction of steam power.

On the basis of practicability then, the B.W.G. was the best suited for recommendation as a standard gage. Its big drawback, though, was that it was an empirical gage, one in which the graduations between respective sizes were formed by arbitrary differences. The geometric gage, would without a doubt, have the advantage of being formed by perfectly uniform increments or decrements of weight from size to size, the difference being the same in the smaller sizes as in the larger ones.

Investigation found two suitable geometric gages, the American or Brown & Sharpe Wire gage and the Clark gage. The American Wire Gage was rejected by the committee because its sizes differed widely from the Birmingham Wire Gage sizes. But the Clark gage conformed closely in sizes with the existing B.W.G. and consequently the committee recommended it to the Society of Telegraph Engineers for adoption as a standard gage. It was proposed that a distinctive name, such as the British Standard Gauge (B.S.G.) be given to the Clark gage. Since the existing gages differed only slightly from the one being introduced as a standard, it was felt that no great inconvenience would arise. "Tables of weight or wire and sheet for different metals would become possible and would enable any of the sizes to be bought and sold by weight, or by the thickness checked by their weight. Concurrently with this, the system of measurements by thousandths of an inch will be available as heretofore . . ."

This attempt of the Society of Telegraph Engineers

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CODE of ETHICS

by

T. R. Rollo

(Editor's Note: Recently, Mr. Rollo completed a research into the codes of ethics and of practice of the construction industry. His idea is to comment on the old codes with a view to contributing something worthwhile of such a nature as to help in understanding and in formulating code provisions for the immediate future.)

IN VIEW of the present post-war planning in industry and education various professional societies are going into the matter of post-war practice.

In 1914, the American Society of Civil Engineers adopted by a membership vote that was almost unanimous a Code of Ethics that was based on an assumption that all civil engineers were prone to resort to questionable if not criminal tactics in practice. It is too meagre to cover the situation today.

In 1927, A.S.C.E. adopted, through their Board of Direction, a Code of Practice "based on a Draft prepared by a Committee of the Northwestern Section" and revised twice before adoption by the "Standing Committee of the Board of Direction on Professional Conduct and the Committee of the Northwestern Section respectively."

The 1927 code dwells on five major divisions:

I. Relations of engineers among themselves.
II. Relations of the engineer with the owner.
III. Relations concerning contractors.
IV. Relations concerning sub-contractors and material men.
V. Relations with the public.

Both of the above mentioned codes were subjected to attacks by the legal profession. The second code (i. e. of 1927) contains an unconstitutional provision or assumption in the Preamble, to wit: "Any Code of Ethics is founded on the Golden Rule", precluding a Christian axiom in a nation of religious freedom of thought. It is, furthermore, drawn up so as to involve either a conflict with or a violation of the Code of Ethics of the legal profession.

The Code of 1927 was incorporated into the Code for Engineers in the Construction Industry in 1933, under the direction of A.S.C.E., under the National Recovery Act. It was "for the period of the emergency" following the "depression just prior to 1933."

By this time the code was so all-embracing that nothing much was left to fall outside the scope of "the engineer". The term engineer to mean the professional engineer or engineering assistant. Previously it had been ruled that the term "civil engineer" was to be used interchangeably with the term "the architect".

As former President Dykstra of the University of Wisconsin was heard to observe: "If you leave it to the civil engineers, they'll take the whole thing."

My thought is to formulate a code for your consideration to rescue the civil engineer from his present predicament as jack-of-all-trades and political football as at present described in the Codes.

Is the 1914 Code of Ethics in effect independently of the Code of Practice of 1927?

Does the post-war situation invalidate the Code of Industry of 1933?

Do we revert to both the codes of 1914 and 1927? In an endeavor to clarify this situation I propose the following provisions as essentially up to date and ethical as well as practicable.

I. The civil engineer shall at all times accept responsibility only within the limits of his special field.

II. He shall at all times cooperate with other civil engineers in an honest competitive manner and maintain a bearing consistent with the dignity of his profession.

III. He may advertise in any manner in accordance with the advice or instructions of his advertising counsel.

IV. The civil engineer shall be defined as one versed in (or practicing) the design, construction and maintenance of public works; as roads, railroads, tunnels, bridges, dams and river and harbor improvements, and associated structures.

V. Any issue concerning the wage scale of labor or unfair practices shall be considered as outside the province of the civil engineer and shall be referred by the client to legal counsel.

VI. The civil engineer must use his judgment in the matter of a fee, scaling the charge downward to suit steady employment. The fee of $100 per day as an expert witness, established by precedent has been modified as optional at $50 per day plus expenses. There is a movement under way to increase this $100 fee to $150 per day for a six hour day in consultation.

VII. In his relations with his employer the civil engineer shall be governed by the laws of the agency. Outside

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Looking for a Slide Rule?

—Gerald E. Brown, ph e'46

JUST forty years ago, a slide rule commanded awe, its owner being automatically classed as an engineer. It was rumored that he could find anything from the hourly change in energy on the sun to the difference in entropy of two consecutive dates.

Today that's all gone. An engineer has to have a slide rule to fit his work and he's got to be good with it. The more complicated the rule, the more work, in general, he can save.

The history of the slide rule began long ago—when Napoleon set out to conquer the world in the early 1800's. His artillery officers were using simple rules. So were the English.

Grandfather of the present slipsticks was the Mannheim rule, invented in 1859 by a young French artillery officer who was adding logs by wooden scales. Logarithms were not new, having been known since John Napier's discovery in 1614. With the addition of scales to find squares, square roots, logs and simple trig functions, the same rule has carried over.

Adding an inverted scale to allow easy, continuous multiplication and division and a scale for finding cubes and cube roots makes it a polyphase slide rule.

When radians came into their own, a folding scale, automatically multiplying every number on the D scale by pi, was added. Anther scale was to allow further multiplication and division before resetting the slide, and a trig scale made it possible to use the functions directly in the equation without evaluating them. The name—Polyphase Duplex Trig rule. A modification, with the trig scales graduated in degrees and decimals instead of degrees and minutes, substitutes decitrig for trig in its name.

With engineers interested in finding powers of numbers, as almost all are, a log log slide is absolutely necessary. Thus, the log log type is the most popular.

Delight of advanced EE's is the log log duplex vector which answers questions for utilities engineers and goes to the extent of employing scales of hyperbolic functions referring back to the original scales. Ordinary vector problems may be cut to pieces.

Undoubtedly, as new scientific developments come through, new, more complicated scales will be invented. The time has passed when the slide rule was a novelty. It's a necessity.

CAMPUS NOTES

—Mae E. Zimmerman, ch'46

Ah Sprig—

That's what they tell me. Today, I wonder, it's code out again. And incidentally, yours truly has got one, just in case you hadn't noticed.

St. Pat's Day

Gone by and quiet and calm reigns again—that is, on the surface. Engineers claiming revenge after publication of the "Sliderule" by the shysters, and the shysters viewing that beautiful paint job. By the way, green paint can leave traces in cars, too. In a rush job, it might get on the upholstery.

Spring brings them out—

Surveying has started "en masse" again. I heard one L. & S. ask why the woods next to "The Rock" had to be surveyed so many times each year. Might be more than one reason! Another one asked why "that V-12 needed a telescope to see the Capitol when it was perfectly obvious from the top of the Hill." Again there might be more to it than appears on the surface.

Spring cleaning—

And what is spring without the annual house-cleaning? With it comes the cleaning up of the Wisconsin Engineer office. Any parties interested in working without reparation, please inquire. Even lawyers will be accepted—there are the small menial tasks that even they might be able to do if coached for an hour or so first on how to scrub the floor.

Have you noticed?

The popularity of Picnic Point already? V-12's laden with books under one arm (a girl under the other) heading for ye spot? (Yes, the books stay under one arm, too)

Report from the V-12's

Seems to indicate a great deal of confusion in moving. One still can't seem to find his watch cap. But that's all right, white hats came out the 1st. And incidentally, if you haven't noticed before, the 2nd brought colder weather. It always happens!

Alumni Notes

—Ralph Watson, m&m'46

Civils

DAVIS, LOUIS S., '10, died on January 20 in Denver, where he was an engineer with the Bureau of Reclamation. He served in World War I as a lieutenant colonel. Following the war he was for some years assistant city engineer in Madison.

OLSON, ARTHUR O., '21, died at his home in Madison on March 3, following a long illness. He had been with the Wisconsin Highway Commission for many years as assistant bridge engineer. During World War I he was in service from June, 1918, to January, 1919.

CHASE, LEON E., '22, is a civil engineer in the Post Engineer's Office at the army airfield at Bruning, Nebr.

WHEATON, HERBERT H., '22, is research associate, Radiation Lab., at M.I.T.

RABUCK, ARTHUR J., '23, is site planner, Federal Works Agency, 7th & D. Sts., SW, Washington, D. C.

VAN HAGAN, ROBERT L., '32, former editor of the Wisconsin Engineer, who has been with the Kimberly-Clark Corp. at Neenah for several years, has accepted the position of chief engineer with the Lehon Co. of Wilmington, Ill.

KAYSEN, JAMES P., '33, announces the arrival of a second daughter on March 19. He is in the signal department of the Milwaukee Road.

VILLEMONTE, JAMES R., '35, Lt. USNR, after nine months of service in Africa and Sicily, has been assigned to the staff of the David Taylor Model Basin at Card Rock, Md. He visited this college on March 10.

CANNON, HAROLD E., '37, is with Joslyn-Ryan, naval architects and marine engineers at San Francisco, Calif.

POLK, WILLIAM H., '37, announces the arrival of a daughter, Elizabeth Lorena, on March 20. He is an engineer with the Milwaukee Road.

HUPPLER, JOHN J., '39, has been appointed superintendent of a new Kimberly-Clark paper mill in Ontario, Canada.

DETMANN, LT. HAROLD H., '40, has been missing in action on Leyte since October 25, 1944. Prior to entering the service, he was with the Illinois Highway Commission.

BROKAW, MAX P., '42, has accepted a position with the Consolidated Paper Co., Wisconsin Rapids.

KLOMAN, EDWARD J., '44, Ensign USNR, reported March 18 to the 13th Naval District at Seattle, Wash.

KIEWEG, HOMER E., '29, chief engineer of Commercial Solvents, Terre Haute, Ind., has devoted much of his time recently to the design, construction and operation of a penicillin plant.

SCHEAK, DONALD E., '33, assistant superintendent of the Celon Co., Madison, entered politics with the announcement of his candidacy for the aldermanic position of the 7th ward.

HALAMKA, CHARLES J., M.S. '37, is with the California Research Corp. studying solvent refining processes.

RASSMUSSEN, LESLIE E., '41, development engineer with Du Pont, has been assigned to research in the field of synthetic resins.

MARTEN, LESTER, '42, formerly with National Aniline Corp., has entered the army and is now attached to the army engineer group at the Clinton Engineering Works, Oak Ridge, Tenn. We're somewhat late with this item but since it has not been previously reported in this column we want Lester's friends to know that he was married in October, 1942, to Janice Johnson of Beaver Dam, Wis.

FALLON, JEROME F., '43, is a navy radar officer, stationed at the Norfolk navy yard.

LOEHNING, GERALD, '43, is an engineer officer on a destroyer on escort duty in the Pacific.

OPITZ, PAUL F., '43, radar specialist, has received his ensign's commission and expects to be assigned to an LST. He is now at the Norfolk navy yard.

WEICHMAN, SIDNEY L., '43, navy radar officer, is stationed at Pearl Harbor.

YONK, JAMES S., '43, navy radar officer, recently stopped in Madison while on a brief furlough. He has been assigned to a new cruiser leaving soon on a shakedown cruise. He married Miss Evelyn Walker of East Orange, N. J., March 17, 1945.

KEATING, JAMES C., '44, has received his ensign's commission and has been assigned to destroyer duty in the Pacific.

MORMAN, ENSIGN FRANK C., '44, has been assigned to a new heavy cruiser soon to be commissioned. Before enlisting in the navy, he was a member of the staff of the Phillips Petroleum Company.

TABBERT, THOMAS D., '44, now has a position with the Fluor Corp., of Kansas City. He is a process engineer in the petroleum industry.

•

Electricals

KATES, WILLARD A., '21, has resigned his position with Corning Glass as general manager of their consumer products division and has established an engineering office in Chicago at 221 N. LaSalle St. During his college days he was editor of the Wisconsin Engineer.

KAPLAN, MARTIN N., '42, Ensign USNR, has been assigned to the Electronic Field Service Group at Washington, D. C.

•

Mechanicals

ROSE, COMMANDER R. A., '25, M.S. '27, Asst. Prof. of Mechanical Engineering at this university, now on leave with the Navy, has been transferred to the engineering field at Norfolk navy yard.

HEISE, LORENZ W., '26, visited this university March 2. He announced the birth of a daughter, Hedwig Elaine, on January 22. He was formerly in charge of local advertising for the Wisconsin Engineer during his student days. At present he is director of the production laboratory at the A. O. Smith Corp., of Milwaukee.

BENFER, M. F., '27, has obtained a position with the Microswitch Corp., Freeport, Ill.

NOVOTNY, CHARLES H., '32, has been promoted to lieutenant colonel, U. S. Army. He is commander of the First Ordnance Training Camp at Camp Flora, Miss. His father is John Novotny of the University heating plant.

DETTMAN, CAPT. CHARLES, '40, is now convalescing in the Truax Field Regional hospital from wounds received in Italy. He has also seen service in Africa.

MATHER, ENSIGN GEORGE L., '41, was killed in a plane crash over Chesapeake Bay, Jan. 10.

TORKELSON, IVAN J., '41, recently became engaged to Miss Lucile Julka, Milwaukee. He has a position with Bendix Aviation Corporation, South Bend, Ind.

BELGEN, MILO, '42, is stationed at the navy's Amphibious Training Base at Little Creek, Va.

REUSCHLEIN, CLIFFORD, '42, was graduated from basic engineering school at Great Lakes, as honor student of his class.

VIVIAN, FRANCIS J., '43, was graduated as an ensign from a midshipman course at the University of Notre Dame, Ind.

FINK, JAMES E., '44, of West Allis and Miss Betty Jean Frey were married February 10 at Boscobel.

HAGEN, HOBART, '44, has been promoted to first lieutenant. He is with an engineer company in the South Pacific.

LARSON, ARLEIGH, '44, who has been with the N.A.C.A. labs in Washington, D. C., reports that he is well pleased with his position.

LOVELL, JOHN C., '44, also at Lang-

(please turn to page 32)

Plywood Tubes

—Ralph Watson, m&m'46

IN FEBRUARY we noted in this column some of the possibilities of the resin-faced plywoods recently developed by a Wisconsin firm. Since then an even more versatile plywood product has been marketed. Plywood tubing bonded with synthetic resin glues!

Its physical and chemical properties of toughness, light weight, strength, hardness and corrosion resistance make it an ideal material for many severe uses. It has been used for ladders, army radio masts, motor shafts and containers. It is non-magnetic, an electrical and thermal insulator and is not affected by heat as are many resin products. The manufacturer expects to find a ready market for plywood conduits and instrument covers. It can be threaded easily but is hard and not easily damaged.

Plywood tubing could be used to advantage for pipelines for gas, petroleum and chemicals where its resistance to corrosion, mildew, rot, insects and fire would result in appreciable savings over conventional steel piping. Since it retains much of the heat insulating properties of wood the problem of moisture condensation is negligible compared to metal conduits. This same property is utilized in low temperature installations in which metal sticks to the skin.

Plywood's lightness is without a doubt its most desirable property. The tubing as produced for radio masts has a strength weight ratio such that the entire unit weighs only 318 pounds; 20% lighter than the heat treated aluminum previously used. This is a distinct cost factor in any installation requiring expensive supporting structures. One designer has estimated that plywood tubing replacing aluminum alloy tubing in planes might reduce weight by as much as 25% with attendant increase in range and performance.

The paper industry is speculating on its use in piping to replace wooden stave-lined steel pipes now in use. The staves warp and crack, allowing corrosive solutions to attack the steel. The plywood tube, it is though, would avoid this difficulty, be lighter in weight and require no protecting paint to prevent rust.

One of the non-industrial uses which promises extensive markets is that of containers for drugs, cosmetics and other household articles. The plywood retains the grain markings and texture of the original wood. Beautifully grained woods have been used and are being well received.

Manufacturing processes are nearly identical with former methods of plywood processing, except that heat and pressure are required to cure the resins. Practically any type of wood may be used; birch, maple, poplar and gum being in common use. The thin sheet of veneer is wound on a suitable mandrel, the resin being applied as the sheet is wound. The spiral method of winding permits tubes of any length to be made while the convolute method in which the sheets are fed in at right angles limits the tube length to the width of the original sheet.

The heat resistance of the tube depends on the resin used; urea formaldehydes being used up to 170° F. Phenolic resins are more costly but permit higher temperatures. Strength is dependent on the type of wood used, the wood grain, the thickness of veneer, and the number of plies. The bonding agent has considerable control of strength, also.

The tubes are manufactured for market in a variety of sizes from two to ten inches in diameter. Laboratory specimens have been produced as small as ¼ inch and as large as 24 inches in diameter, and even larger sizes are anticipated. Shapes of tubing are somewhat restricted, though tapered tubes and tubes of irregular cross-section can be made. Due to methods of fabrication, however, sections containing corners, loops or junctions are probably not feasible.

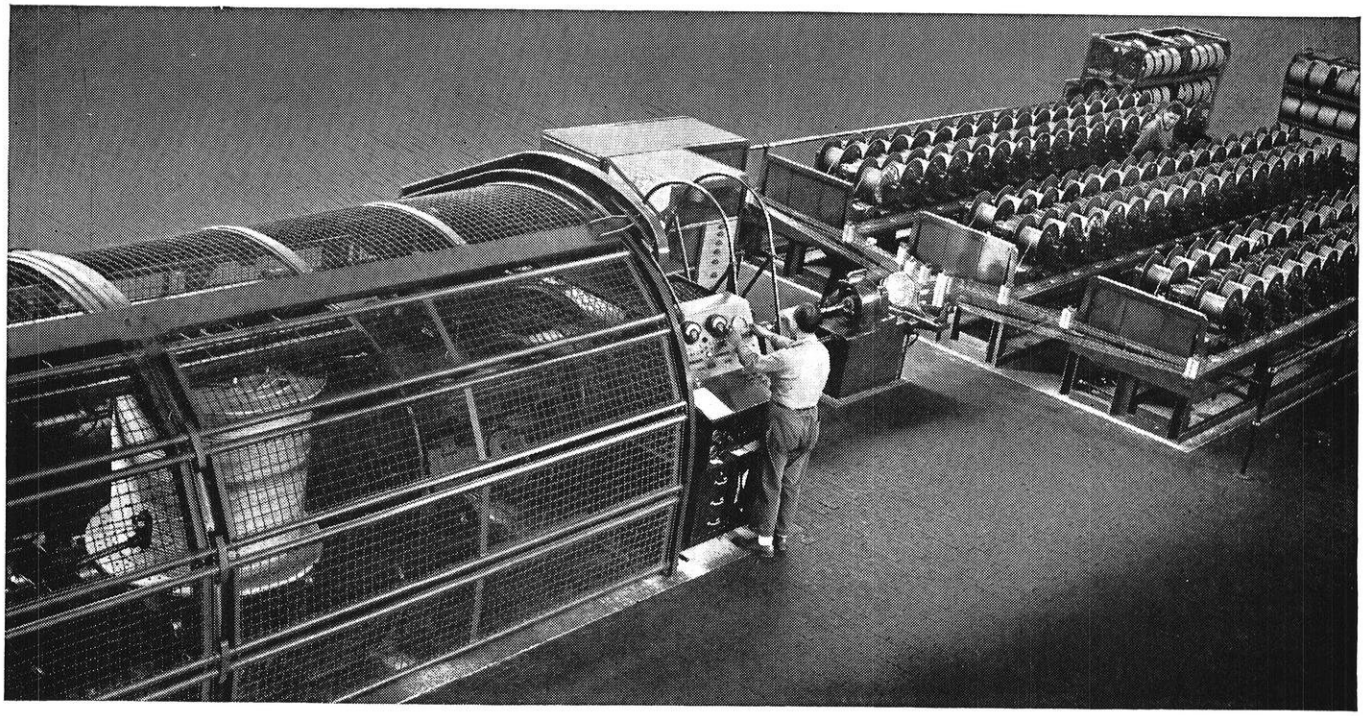
With The Societies —

AIEE

The Madison section and the U. W. student section of AIEE held a joint meeting on Friday evening, April 13. Guest speaker for the evening was Professor M. S. Coover, vice president of Section 5, AIEE. His subject was "The Engineer and the Community." Two student speakers also presented short, interesting talks. Warren Smith spoke on "The Principles of the Mass Spectrometer" and Gerald Keppert on "Testing Standard Watthour Meters."

POLYGON

Polygon Board has announced a picnic on the 6th of May to be held in Owen Park. There will be additional information posted and can be gotten through your societies.



It's SOME machine!

It's a high speed flier-strander which forms unit cores for telephone cable.

One-hundred-and-one pairs of paper pulp insulated copper wire from the supply reels are assembled and bound with cotton, then are taken into a unique revolving flier which twists them into a unit cable core—all at the rate of 600 linear feet per minute, or twice as fast as machines previously used. Several of these unit cores are later combined and sheathed in lead to make the familiar telephone cable.

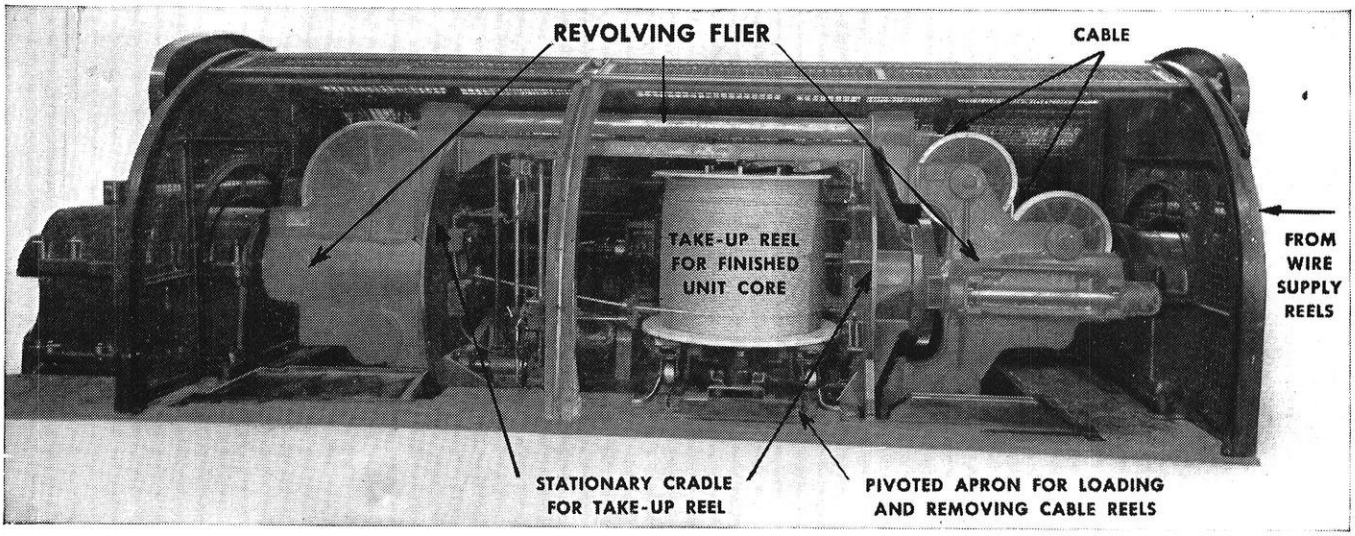
Each of the 101 supply reels holds up to eight miles of paired wire and has an individual motor drive with sensitive control to insure uniform tension on the wire.

This is but one of many interesting and unusual machines designed by Western Electric engineers to advance the art of manufacture in the field of telephone equipment.

Buy all the War Bonds you can . . . and keep them!

Western Electric

IN PEACE...SOURCE OF SUPPLY FOR THE BELL SYSTEM.
IN WAR ..ARSENAL OF COMMUNICATIONS EQUIPMENT.



HOW THE FLIER-STRANDER WORKS. The assembled and cotton-bound bundle of wires enters the machine at the right and passes into the revolving flier (shown in a lighter tone). In the flier, the wires pass over two pulleys, travel through a tube to the left end of the machine, pass around another pulley and enter the stationary cradle where the finished unit core is wound in smooth, even layers on the motor driven take-up reel. The flier revolves 200 times per minute and imparts two complete twists to the core each revolution, while an ingenious gear arrangement holds the cradle stationary within the revolving flier.

Short Circuits

—Bob Clayton and Fran Tennis

He had stolen a hurried kiss.

"Don't you know any better than that?", she asked indignantly.

"Sure," he replied, "but they take more time."

•

I once knew a fellow named Guesser
Whose knowledge got lesser and lesser.
It at last grew so small,
He knew nothing at all —
And now he's a college professor.

•

A Scotchman was taking his small son for a walk. Suddenly he said thoughtfully, "Sandy, have you got your Sunday boots on?"

"Aye, father," was the reply.

"Well then, take longer steps."

•

A middle aged woman lost her balance and fell out of the window into a garbage can. A passing Chinese looked at her and remarked, "Melican's velly wasteful. That woman good for ten more years."

•

Pat: "How did Brother K. die?"

Mike: "He fell through some scaffolding."

Pat: "What was he doing up there?"

Mike: "Being hanged."

•

The girl met an old flame who had turned her down, and decided to high-hat him.

"Sorry," she murmured when the hostess introduced them, "I didn't get your name."

"I know you didn't," replied the guy, "But you sure tried like hell."

•

A pullman porter, reporting for a night run, found the trip had been canceled. Returning home unexpectedly, he took a look around the house — then got out his razor and began to hone it vigorously.

"What all you doin', Sam?" inquired his wife.

"If dem shoes stickin' out from undah the bed ain't got no feet in 'em, I'se going to shave."

•

"I hear you act over the radio."

"Yeah, I shriek in the spooky stories."

"Make very much?"

"Oh, I manage to eek out a living."

She's a pretty little wench
Sitting there upon the bench
Looking very coy and shy
At every passing college guy
Such thrilling eyes,
Concentric thighs,
It's too darn bad
She's bald. •

Rastus: "What was the worstest you ever been scared?"

Sambo: "Once when I was raiding a hen house an de farmer came out and k e t c h e d me. Boy, was ah ever scared!"

Rastus: "How am you suah that was the worstest you evah been scared?"

Sambo: "'Cause de farmer grab me by the shoulder and he say to me, 'White boy, what is you doin' here'?"

•

"What brand is that cigarette?"

"Baseball Special."

"There ain't no such brand."

"Sure there is. It was a grounder and I picked it up."

•

"What are you putting in your vest pocket there, Murphy?"

"That's a stick of dynamite. Every time Riley sees me he slaps me on the chest and breaks all my cigars. The next time he does it, he's going to blow his hand off."

•

Question of the week:

What would you call a guy who makes a living sticking his right arm down a lion's throat?

We'd call him "Lefty."

•

To the boys—

If you smile at one he thinks you're flirting with him.

If you don't he thinks you're an ice-berg.

If you let him kiss you, he wishes you were m o r e reserved.

If you don't he seeks consolation some place else.

If you flatter him he thinks you're silly.

If you don't he's sure you don't understand or appreciate him.

If you go out with other fellows he thinks you are fickle.

If you don't he thinks no one wants you.

So help us they don't know what they want.

—From the gals

(please turn to page 24)

NITROGEN takes Betsy's Best to the Fighting Front

Milk, too, is styled for modern war... streamlined by dehydration to save weight... armored by nitrogen to avoid deterioration. In fact, dehydrated foods of infinite variety are protected by Nitrogen and Carbon Dioxide, two of the many gases produced by Air Reduction.

In the food field these Air Reduction products are helping to build a new industry.

In other fields Airco products and processes are revolutionizing war production — providing faster manufacturing methods that will help build a better world after V day.

★ BUY UNITED STATES WAR BONDS ★

AIR REDUCTION SALES COMPANY
MAGNOLIA AIRCO GAS PRODUCTS CO.
NATIONAL CARBIDE CORPORATION
PURE CARBONIC, INCORPORATED
THE OHIO CHEMICAL & MFG. CO.
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OXYGEN, ACETYLENE AND OTHER ATMOSPHERIC GASES • GAS WELDING AND CUTTING APPARATUS • CALCIUM CARBIDE
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WIRE GAGES . . .

(continued from page 10)

was just one example of the effort put forth to secure a standard wire gage.

After the French and Germans had settled on a standard wire gage based on the millimeter, even more agitation was raised in Britain for the establishment of a standard gage. Finally after much discussion, deliberation, and argumentation among the various manufacturers and the Board of Trade, in March, 1884, the long sought standard gage became legal. But the Clark gage which had been suggested by the Society of Telegraph Engineers was not the gage adopted. The legalized gage was defined in fractions of an inch and was named the "Standard Wire Gage." It was really the B.W.G. modified so that each size was an even number of thousandths of an inch. Even though the Standard Wire Gage had become the only legally recognized scale in the United Kingdom, many engineers and manufacturers continued to refer to the old gages, and the confusion went on.

America experienced much the same difficulty as did England with regard to wire gages. In a report of the Committee on Standard Wire Gage presented to the Master Mechanics Association in 1882, R. H. Briggs stated a standard gage was an actual necessity and the sooner one was adopted, the better it would be for both manufacturers and consumers. One opinion suggested that the easiest and simplest way out of the snarl was to abandon fixed gages and numbers altogether and use the micrometer sheet metal gages, which measured thousandths of an inch very accurately.

In 1885, the National Telephone Exchange Association added to the confusion of the gage question in the United States by adopting the Standard Wire Gage (S.W.G.) of Great Britain. Other societies throughout the United States discussed the subject and the National Electric Light Association also adopted the English Standard Wire Gage (S.W.G.), but subject to enlargement so as to include the heaviest wires that might be needed for safe carrying of high currents. Later in the same year, the American Institute of Electrical Engineers at their annual meeting appointed a committee to investigate the advisability of adopting the English Standard Wire Gage.

To secure fuller information on the wire gage question in this country, the editors of the ELECTRIC WORLD in 1886 sent letters to the leading manufacturers and users of wire throughout the United States, inquiring what their practice was in manufacturing or ordering wire and if they would recommend Federal or State legislation enforcing a standard gage in contracts. The general consensus of opinion voiced in the replies to the inquiry revealed that a standard gage was desired by both manufacturers and consumers of wire. But whether government legislation should enforce a standard gage and what gage it should enforce could not be determined. Some companies were using the new British Standard Wire Gage. Some had not even heard of the new British gage, others still ordered by the B.W.G., others expressed preference for the B & S or American Wire Gage (A.W.G.). Greatest preference was indicated for the A.W.G. Mr. Goodyear, replying for the E. G. Greeley & Co., recommended that all English gauges be tabooed in this country, and that all wires be drawn by the American wire gauge, which he stated seemed to be the most sensible gauge yet put forward.

However, in Germany and England, supplying practically all the wire on the continent, the only gage in use, unless for some special object, was the British Standard. This observation by the Canadian Providence Telephone Company was debated by the Bell Telephone Mfg. Co., of Antwerp, Belgium, when they stated that French and Germans were not using the British wire gage, and that inquiry failed to discover that even the English generally adopted the new gage.

One of the salient points in the argument for the adoption of the English S.W.G. had been its universal use abroad. If this were not true, as the conflict of opinion would seem to indicate, then its main basis for adoption was lost. Also, the survey by the ELECTRIC WORLD, previously referred to, seemed to indicate that wire users were beginning to designate wire sizes in thousandths of an inch.

The confusion over wire gages continued, not because there wasn't a suitable gage existing, but because many investigators proposed new gages rather than to agree on an existing one which was designed on a scientific principle and also adapted to practical use. Britain Telegraph Engineers had found a retrogressive, geometrical gage was to be desired since it was practical, fitting the wire drawer's need, and scientific, having a fixed relation in the size between wires which made it easy to duplicate and eliminated variations between copies of the gage. And there was a gage in the United States, fitting these same specifications—the American Wire Gage. It was deemed a perfect parabolic curve, with a uniform reduction of 11 per cent between consecutive sizes. The British recognized its virtues, but disregarded it because its wire sizes varied appreciably from the B.W.G.

However, when the Congress of the United States sanctioned a sheet metal gage in March, 1893, they legalized a gage that did not fit the needs of the wire industry at all. The new gage differed at every point from every other practical gage in common use. The dimensions on which the numbers of the gage were based were the weight per square foot in ounces, and the thicknesses corresponding to the various numbers were calculated approximately only. This gage adopted by Congress fell down pitifully when applied to copper, brass, zinc, etc., the ordinary commercial metals for which a gage is required, and the gage

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CODE OF ETHICS . . .

(continued from page 11)

of office hours he may use his own time in any legitimate commercial venture whatsoever.

VIII. Insofar as possible he shall arrange in advance for the inclusion of all charges over and above his fee.

IX. All issues (including the interpretation of trade terms or slang) arising out of any contract shall be referred by the civil engineer to his client with a recommendation that the dispute be referred to the legal counsel for the client.

X. All civil engineering problems shall be considered to be within the province of the civil engineer rather than of the contractor. This shall include professional service to prospective bidders at the expense of the client. In general the client should be committed to a program of awarding contracts, i. e. he should decide in advance whether to let a contract of the form or type of lump-sum, cost-plus fee, unit-price, etc.

XI. All problems arising outside the civil engineering or legal fields shall be referred back by the civil engineer to the client in order to be handled by the proper specialist in his proper field.

XII. The civil engineer shall never act as agent for more than one party to any contract, but shall devote his time and loyalty to his client only in matters pertaining to such a contract.

XIII. Public relations of the civil engineer shall be maintained with a view to the advancement of worthy public enterprises such as community welfare; economic and technical understanding; law enforcement; professional responsibility, civil engineering education, public safety, health and comfort, etc.

XIV. The civil engineer shall be recognized in time of war as Brigadier-general in the United States Army Corps of Engineers or as a Rear-Admiral in the United States Navy Civil Engineers Corps.

XV. The civil engineer shall at all times be vigilant to dissolve the public mind in the matter of loose or incorrect usage of such terms as engineer, locomotive driver, stationary engineer, janitor, mechanic or surveyor, etc.

Thomas Rice Rollo, Nat. Inc. Architect and Engineer, Consultant in Private Practice and Laboratory, Mendota, Wis.

Mem.: Rod & Bob Society of Civil Engineers
Cornell "Civil Engineer" Editorial Board
Cornell Soc. of Civil Engineers, Chicago
Cornell Soc. of Engineers, N. Y.

Honorary Doctor in Civil Engineering.
Winner Lincoln Arc Weld Award, Bridges.
U.S.A. Corps of Engineers, Great Lakes Division, Reserves.

These are the opinions and suggestions set forth by Mr. Rollo. They are not necessarily held by members of this University.

Top Freshmen

The following freshmen are working at the top of their class:

Rate: High Honor List, 2¾ points per credit
Honor List, 2½ points per credit

SECOND TERM STUDENTS

(At Close of 2 Terms)

HIGH HONOR RATE

Slater, J. G.	3.000
Wentorf, P. H.	2.944
Carter, W. W.	2.750
Tausche, P. E.	2.750

HONOR RATE

Ullmann, W. A.	2.724
Bump, L. D.	2.722
Finkon, W. E.	2.694
Gower, C. H.	2,694
Pahnke, A. J.	2.666
Fay, C. W.	2.638
Scofield, H. W.	2.638
Scott, J. E.	2.618
Dalby, T. G.	2.583
Neitzel, R. E.	2.555
Wick, J. F.	2.555
Bligard, E. J.	2.444
Price, J. R.	2.416
Webster, T. C.	2.416
Ulevich, H. N.	2.388
Griswold, H. S.	2.361
Johnson, D. M.	2.345
Rose, G. R.	2.333
DuVall, R. C.	2.305
Montie, L. A.	2.294
Marshall, W. E.	2.250

•

The following students, although not working at the honor rate, are in the high fifteen per cent of the class:

Rowlinson, D. W.	2.242
Hawks, C. H.	2.222
Brugger, T. C.	2.194
Cox, H. C.	2.194

•

FIRST TERM STUDENTS

(In Attendance 1 Term Only)

HIGH HONOR RATE

Severson, T. V.	3.000
Chipman, W. K.	2.889
Feiereisen, J. C.	2.889
Zwicker, E. F.	2.778

HONOR RATE

Dierauer, R. U.	2.722
Anderson, R. H.	2.500
Bruning, R. F.	2.333

IN HIGH 15%

Sabroff, R. R.	2.222
Buchholz, D. C.	2.169
Leney, G. W.	2.167

WIRE GAGES . . .

(continued from page 18)

had no system whatsoever when applied to wire, not even iron wire.

Fortunately, however, this needless confusion diminished as many of the useless gages were eliminated from practice. Also, more and more wire sizes were being specified by directly indicating the diameter. Of the wire gages that survived the 1800's, the American Wire Gage and the Steel Wire Gage are used extensively in this country today. In England the Standard Wire Gage is used widely while in Germany, France, Austria, Italy and other continental countries, practically no wire gage is used; size of wires is specified directly by diameters in millimeters.

While the American Wire Gage has been practically standardized for wire used in electrical work through practice, it is not the standard gage for all metals in the United States and it is not a legalized gage. The Steel Wire Gage is in general use for steel wire. These two gages cover the field adequately.

Practice indicates that materials are being ordered more and more by direct specification of the dimensions in fractions of an inch. The American Wire Gage fits in well with this trend, and many large companies and societies which have adopted the direct use of diameters, have taken as a standard the American Wire Gage sizes to the nearest mil for the larger diameters and to a tenth of a mil for the smaller.

Since the American Wire Gage is practically the only gage now used for copper wire in the United States, it might be well to review its characteristics. The A.W.G. sizes correspond approximately with the successive steps in the process of wire drawing. Therefore its numbers are retrogressive, a larger number denoting a smaller wire which corresponds in turn to the operations of drawing. The numbers extend from 0000 (largest size) through 40 (smallest). The diameter of 0000 is 460 mils and that of No. 36 is 5 mils. There are 38 sizes between these two. Therefore the ratio of any diameter to the diameter of the next greatest number is $460 \div 5 = 92 = 1.122$. Thus a constant ratio exists between the cross-sectional area of one size and that of an adjacent size.

By using a number of approximations, it is possible to reproduce the American Wire Gage table by remembering a few simple formulas and data. The resistance, mass, and cross-section vary with the square of the diameters, i. e., $(1.1220)^2 = 1.26$, it is possible to deduce the resistance, mass, or cross-section of any size from the next.

The cube of the ratio between areas $(1.26)^3$ is nearly 2, actually 2.005. Therefore, for a change of three sizes, area and weight per 1000 ft. would be multiplied or divided by 2; the resistance will be changed inversely in the same ratio; and the diameter will vary as the square root of the area. By means of these relations, the constants of any size in the A.W.G. may be calculated if the constants of one size are known. The constants of the No. 10 size are the most convenient to remember. The diameter is approximately 100 mils; approximate cross-sectional area is 10,000 circular mils; the resistance per thousand feet is 1 ohm (at 20° C.) and the weight per thousand feet is (by chance) 10 pounds. In calculating from No. 10 to any other size, it is possible to jump by steps of three sizes and factors of 2. For any change of 10 sizes, the area and resistance change by a factor of 10.16.

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NARROWING WORLD HORIZONS . . .

(continued from page 8)

Scientists hold in their hands and minds inventions terrible in war and beneficial in peace. Nobel though nitroglycerine would make wars too terrible to be fought; the airplane and submarine gave similar promise, but unprincipled leaders have made them into instruments for a new and destructive warfare. Science provides the machinery but mankind is unable to use it wisely. Rather than declaring a moratorium on scientific research, science must now turn to uniting the world and setting forth principles of love and understanding for all men.

Men of the future will live in peace if discoveries are used scientifically for universal benefit.

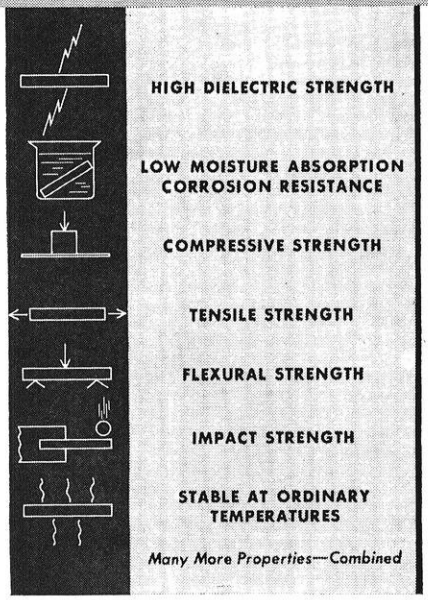
This is the challenge of tomorrow.

—Cuts courtesy Westinghouse

—Essay courtesy Science Service

A Scene From the Metro-Goldwyn-Mayer Picture—EDISON, THE MAN

The Birth of the "Little Sun" Every Home Welcomed



OF ALL man's inventions, one of the greatest, universally, was Edison's incandescent filament . . . a fine thread from which a whole new pattern of life was woven.

Edison simply experimented with known substances until he found one that met his singular requirements. You may have material problems, too. However, knowing your requirements, you may find your special answer in technical plastics.

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CHURCH . . .

(continued from page 9)

of the other. Each glows and is admired, yet each glows separately. There is a chasm between the high ideals and the dream of a more perfect world emitted by religion, and the **ways** and **means** offered by science. There is a senseless aloofness between spiritualism and materialism. Yet does one not wonder what a great light might shine throughout the world if these two powerful and necessary flames burned together?

This, then, is science's next great step ahead—to join hands with religion and complete a mighty triumvirate: church, state, and science. For the important question is not whether the fundamental ideas on the origin of man are conflicting or the same, but rather what is to be done about the state of man today. But, you say, there is no g r e a t conflict between religion and science now. True enough, but neither is there great cooperation; and it is cooperation we must have to make this a more perfect world, which is, after all, a great aim of both science and religion.

What can religion offer to the triumvirate? The greatest offering is perhaps the desire for equality of man, the desire to help the underprivileged. Religion can also direct the river of newly found powers of science into channels of construction and improvement; it can dam the channels of destruction and hate into which war directs the power of science. Religion would be a committee offering high ideals and desires.

What can science offer? It can offer the **method** of making men equal, the **method** of helping the underprivileged. It can do this by assuring the world of a plenty of necessities through new discoveries of synthetics and substitutes. It can do this by offering the world improved health for everyone through the application of the new medical and surgical discoveries. It can construct roads, control rivers, make unfertile land fertile, and perhaps, through the use of atomic energy, procure an unlimited supply of power so that all nations shall have equal resources with which to work. It can insure peace by making it possible for every person to be comfortable and healthy. Here, then, is the ways and means committee of the triumvirate. It can carry out the desires and ideals of religion, however, only through the direction of government.

What can government do? It can take the great plenty of materials and power offered by science, and see that each continent, each nation, each **individual** has the opportunity to share this wealth. It can serve as a bond between religion and science, carrying out the ideals of one through the methods of the other. The state is, then, the executive committee. The government also can contribute great assistance in the realm of education, for this triumvirate can be successful only through the work of an enlightened people.

In the United States this union appears to have been **partially** attained; but the United States is only a small portion of the world, and the union must be global. Because it must be global, the initiative lies with science. The scientists of the different nations are much more in accord than the political and religious leaders. The gulfs between the various theories in science are minute when compared with the gulfs between Nazism, Communism, and Democracy; or to the gulfs b e t w e e n Buddhism, Islam, and Christianity.

Will this union, this next great step ahead, be undertaken? We cannot foresee the future, but it is up to you and me to work for this great joining of forces, to bring the two flames together in one brilliant blaze. Let us, then, strive on for this real purpose; and perhaps Sir Thomas More's picture of Utopia will sometime be more than a dream, more than a mere product of the mind.

—Courtesy Science Service

Cuts courtesy Coast Guard

SHORT CIRCUITS . . .

(continued from page 16)

The class was doing arithmetic:

Teacher (to one student): "How much would your father give you if he wanted to send you to the store to buy 4 pounds of coffee?"

Student (objecting): "He'd never buy that much at once."

Teacher: "Never mind that. How much would he give you?"

Student: "But teacher, he doesn't like coffee. He'd not give me anything."

Teacher (sternly): "Now, no evasion. What would he give you to buy that coffee?"

Student (protesting): "Nothing, I tell you, if he did like coffee, which he doesn't, and if he would buy that much, which he wouldn't, and if he would send me to the store, which he wouldn't—he'd use the telephone—he'd have the store charge it."

Teacher: "But supposing he did do it anyhow?"

Student: "O, teacher, you wouldn't ask such questions if you knew my father."

Well?

Is it true what they say about Chinese women—Do they really eat rice all the time?

•

Junior: "Dad, what are untouchables?"

Dad: "Well, a good example of an untouchable is the guest towel in the bathroom."

•

Burglar: "Please let me go, lady. I've never done any thing wrong."

Old Maid: "Well, it's not too late to learn."

Before the sliderule.

RANDOM THOUGHTS

On an Engineer's Specifications for Rating Dates

Relative Humidity—zero
Integral dv÷dt—very high
Integral ds÷dt—even higher
Moment of Inertia—negligible
Center of Percussion—ht. of lips
Center of Gravity—a matter of taste
Radius of Curvature—ditto
Personality—slight corona discharge
Permittivity—normal
Capacitance—at least 5 beers
Temperature Coefficient of Resistance—low

Extra Important

1. Must not worship men who look like a page from Esquire.
2. **Must** be able to type reports.

•

Sign in library—"Only low talk permitted."

•

"Doctor, what can you say to a girl that jumps into the nearest man's arms each time she gets frightened?"

"BOO."

NEWS

Spaghetti—uncooked but otherwise the same spaghetti you eat—has been put to work to speed the manufacture of electronic tubes used for war communications.

A stick of spaghetti placed inside a tiny wire coil supports the coil while it is being welded, according to D. D. Knowles, manager of electronics engineering. A piece of steel formerly was used as the support but it was difficult to remove. Spaghetti can be burned out in a flash.

—*Westinghouse*

•

Maybe the College's Iron Fences Will Be Scrapped

In spite of the Office of Production Management priorities on certain uses of iron and steel, there will be a shortage of steel for the next few years to meet the great demands of national defense, Dr. Matthew A. Hunter, professor of metallurgy at Rensselaer Polytechnic Institute, declared in a recent address at Schenectady, N. Y.

Speaking on the General Electric Science Forum, Dr. Hunter also said that the scrap iron bins of the nation are practically empty. Scrap iron is an essential in present practice in the open-hearth process for making steel.

"With production around 99 per cent of present capacity, the steel industry is producing about 90 million short tons of steel," he pointed out. "But this was eight million tons short of our requirements for 1941.

"In 1942 it will fall short by 27 million tons. During the year, direct military needs will jump to 27 million tons, and industrial and civilian needs to 100 million—a total of 127 million tons. Most of this industrial increase is due to plant expansion for military needs."

The steel industry has agreed to study ways in which it might increase its capacity by 10 million tons, according to Dr. Hunter.

—*General Electric*

•

Coloring of Metals

Steel, copper, brass, bronze, zinc, nickel, tin, gold, silver, aluminum, magnesium and other metals and alloys may be colored, by simple processes of chemical immersion.

A long range of colors is possible in iridescent and matte effects. Many of the coloring baths also increase the corrosion resistance of the metal being treated.

Coloring salts or solutions are furnished with instructions for their use. Metal preparation and cleaning instructions are also given.

For those interested it is suggested that samples of the metal-to-be-colored be submitted, together with a sample or description of color desired. A description of the end-use of the product is also desirable (outdoor or indoor use, type of service, etc.).

Instead of sending samples of salts or solutions for test, customers' metal specimens will be colored and returned for evaluation.

—*Colonial Alloys Co.*

•

Westinghouse Builds Reflector Lamp in Miniature

The outstanding achievement in automobile lighting in the years just before the war was the sealed-beam headlight, which was a precision lamp and reflector incorporated in a single-glass envelope. The basic idea was to locate the filament precisely at the focal point of the parabolic reflector formed by the inside of the rear half of the bulb itself, which was given a mirror-bright coating of vaporized aluminum. It proved to be so good an idea that it spread quickly into a variety of forms for diverse functions such as airplane landing lights, reflector-type floodlights, and spotlights. The idea now shows up in a form so different that all physical resemblance to the original sealed-beam lamp has disappeared.

Morning after

He: "My gosh, are you that beautiful creature I married last night?"

She: "Yassuh, Boss, I sho is."

•

Billy: "Mamma, where did you meet daddy?"
Mamma: "At a dance, darling."
Billy: "Was I there?"
Mamma: "Run out and play, darling."

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Among the prominent men who have contributed to the Course and Service are: Thomas J. Watson, President, International Business Machines Corp.; Frederick W. Pickard, Vice President and Director, E. I. du Pont de Nemours & Co.; Clifton Slusser, Vice President, Goodyear Tire & Rubber Co.

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How many of these "profs" can you recognize?

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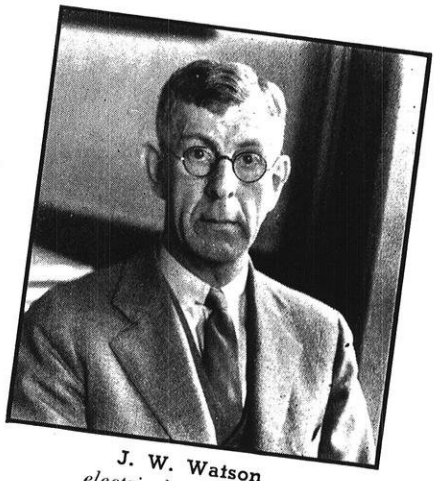
mechanical engineering

G. L. Larson
mechanical engineering

W. O. Withey
mechanics

W. K. Neill
chemical engineering

Dean Johnson

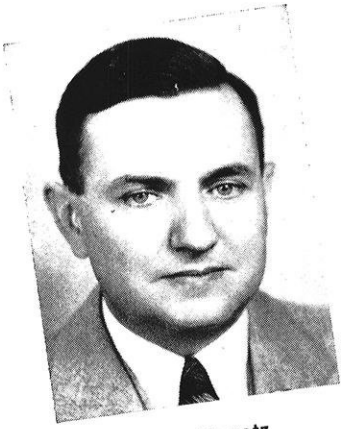


J. W. Watson
electrical engineering

K. G. Shiels
drawing

H. P. Orth
drawing

J. B. Kommers
mechanics



R. A. Ragatz
chemical engineering

E. Bennett
electrical engineering

E. R. Shorey
mining and metallurgy

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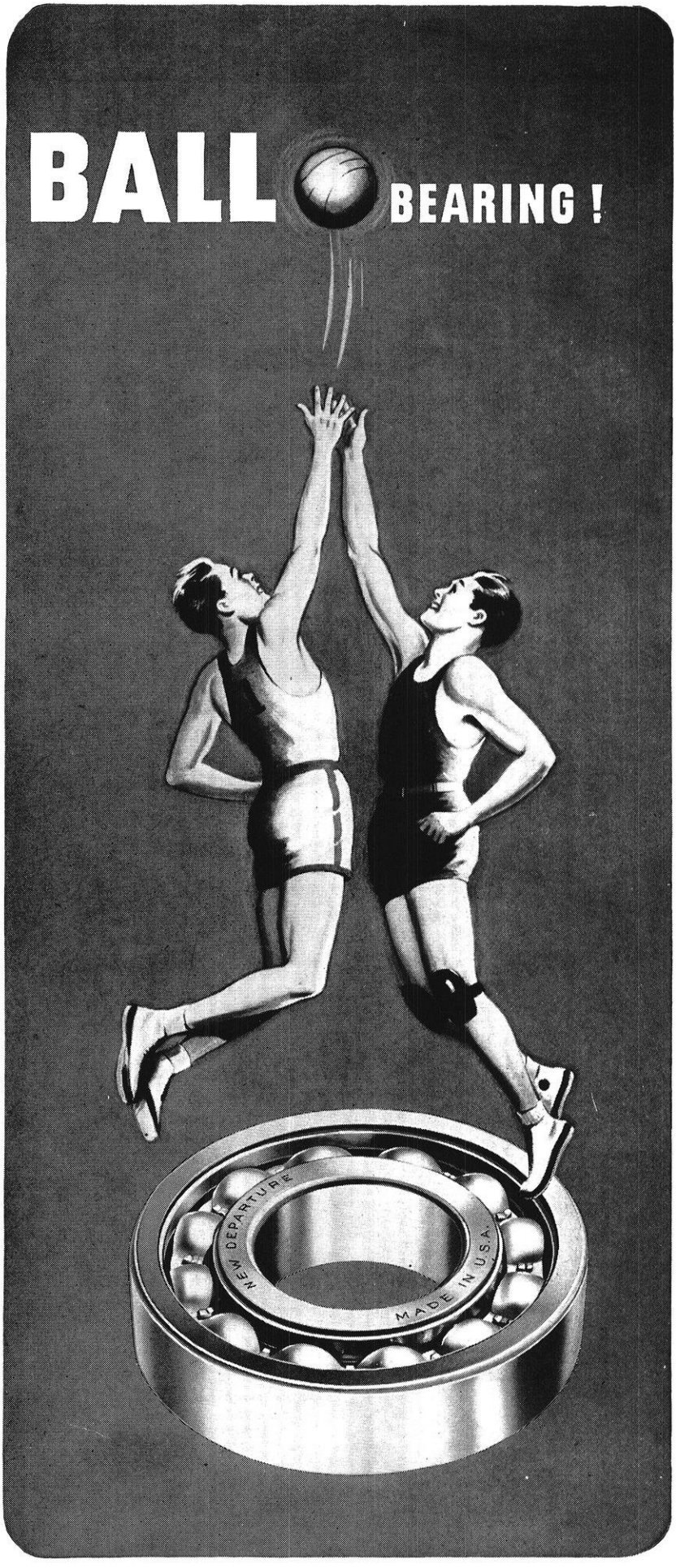

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ALUMNI NOTES . . .

(continued from page 13)

ley Field, is doing research in connection with the full-scale wind tunnel.

MANN, DICK, '44, is in the instrument research division of the N.A.C.A. labs.

NILES, DONALD E., '44, former editor of the Wisconsin Engineer, is at the N.A.C.A. lab at Langley Field, Va.

NOTBOHM, WILLARD C., '44, became engaged to Miss Delores Derricks, Kaukauna.

REHR, HENRY, '44, is stationed at the navy's Amphibious Training Base at Little Creek, Va.

TRAUTMAN, PAUL, '44, is also stationed at the navy's Amphibious Training Base at Little Creek, Va.

ANDERSON, CHARLES E., '45, received his degree last month while in service. He is stationed at Fort Lewis, Wash., with the 93rd Engineers, but expects overseas orders soon.

ROWLANDS, MORRIS J., '45, recently received an ensign's commission after graduation from the midshipman's school at Cornell University, Ithaca, N. Y. He also received his Bachelor of Science, Mechanical Engineering, from the University of Wisconsin this spring.

GRIFFITH, LT. ROBERT L., while in a base hospital in Italy had the unique experience of broadcasting his experiences as a B-17 pilot to other hospital patients. He entered the air force in January, 1943, before receiving his degree.

HELFREUCHT, 2nd LT. KENNETH G., has had a hand in destroying Nazi transports. He is with a P-51 Mustang group in Germany.

PANCOE, WALTER, entered the U. S. Merchant Marine before completion of his course here, and is now a cadet midshipman serving in the Pacific area.

STACK, DONALD A., now at the Naval Training School, Navy Pier, has applied for commission in the Navy Construction Battalion.

•

Mining & Metallurgicals

DU MONTE, CHARLES, '40, who is doing work with metal alloys at a Niagara Falls plant, recently applied for a professional engineering degree in the state of New York.

BROOKS, ALLEN, '42, Lt. (j. g.) USNR, who is stationed at the navy air station at Corpus Christi, Texas, is in charge of a dance orchestra of sailors and WAVES which entertains at neighboring war plants during rest periods. He says war bond sales have increased immensely.

PUHL, JOHN M., '44, Ensign USNR, is stationed at a navy training school at Brimerton, Va. While visiting Madison recently on leave he became engaged to Miss Helen Finnegan of Madison.