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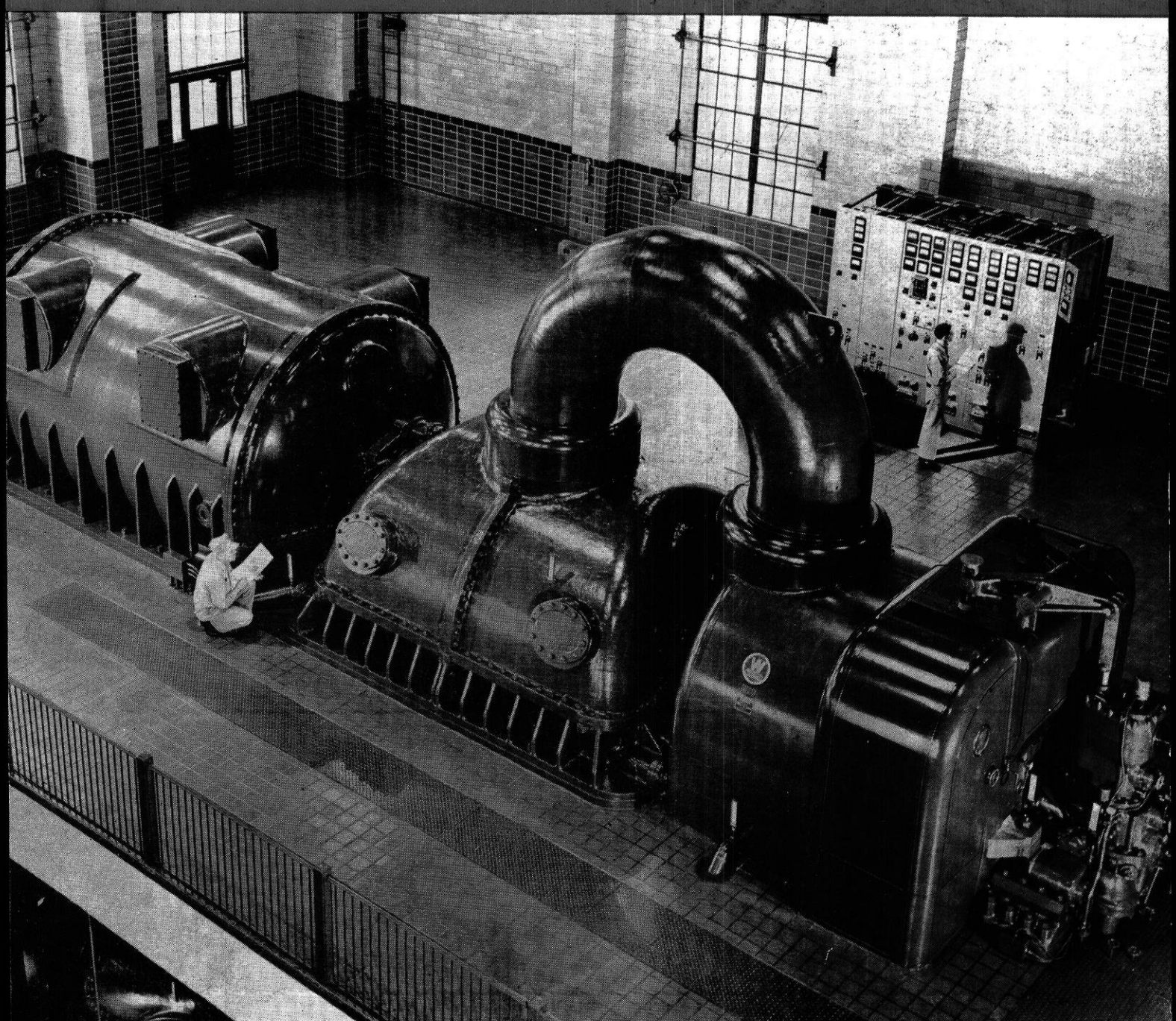
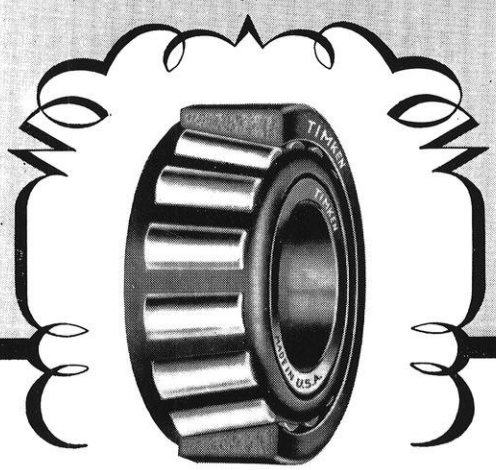
WISCONSIN ENGINEER

May, 1943



MEMBER ENGINEERING COLLEGE MAGAZINES ASSOCIATED

KNOWING YOUR BEARINGS GETS RESULTS



The war production program is a good example of the value of "knowing your bearings". For many years before the war, engineers were putting Timken Tapered Roller Bearings into industrial machinery of all kinds. They discovered long ago that these bearings possessed every quality needed to meet any type of service—friction elimination; radial, thrust and combined load capacity; and the ability to hold moving parts in correct and constant alignment.

Thus, when America was faced with the most tremendous production job ever known, industry had one big advantage —namely, production machines with the speed, precision and endurance to do it; machines that could out-produce any others in the world.

Now the results are beginning to tell on the world's battle fronts—where Timken Bearing Equipped fighting machines turned out by Timken Bearing Equipped production machines are steadily turning the tide of war in our favor.

When Victory has been won and industry calls you to help in the work of reconstruction, you'll find a thorough knowledge of Timken Bearings one of your most valuable assets. Begin to get it now.

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TAPERED ROLLER BEARINGS

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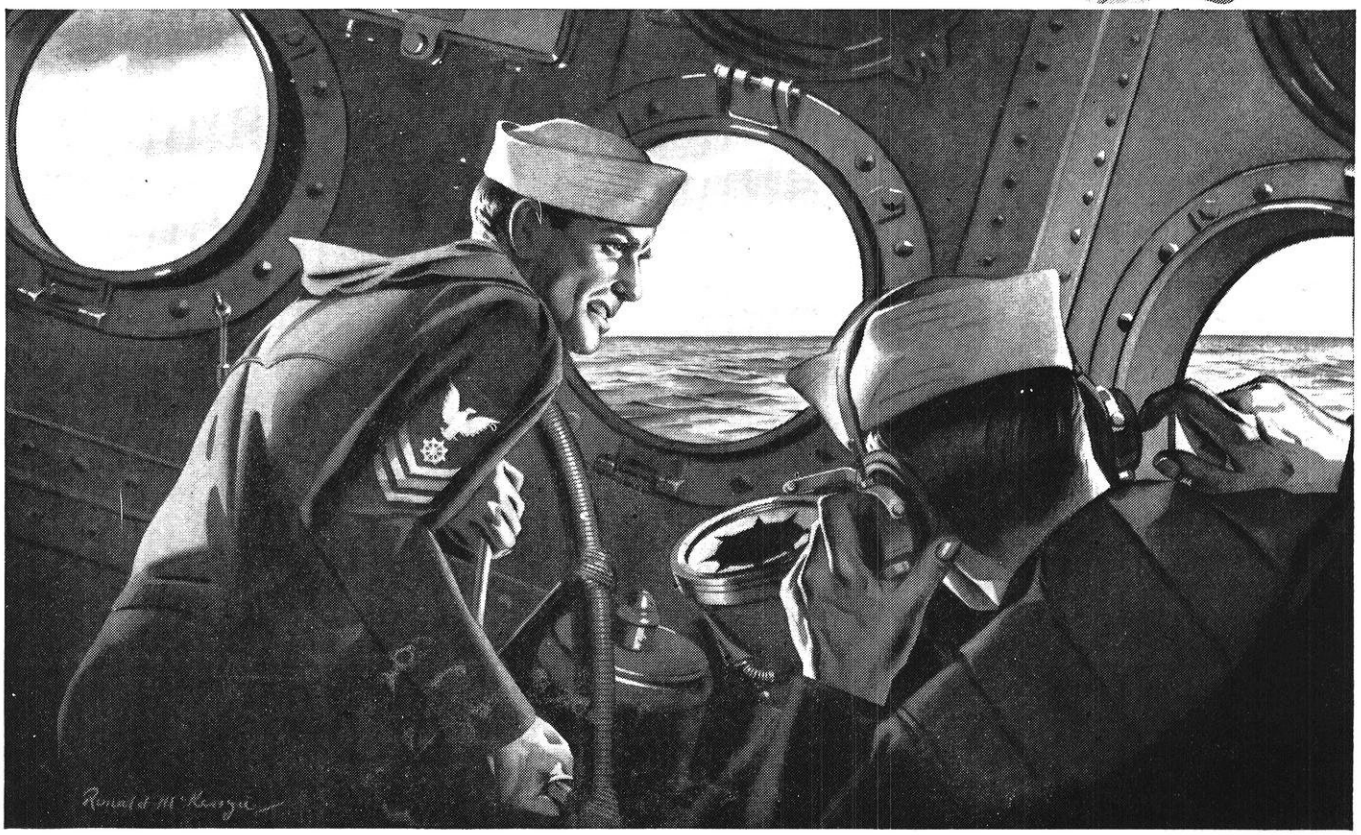


IN SUBMARINE-infested waters, a speeding destroyer must be able to change its course in a split-second—to drop its deadly ashcans on enemy U-boats.

The secret of the destroyer's great *speed* and *maneuverability* is the tremendous power of its turbines, operating at steam temperatures *high enough to make the turbine blades glow!*

This introduces a difficult problem in turbine construction. The highly heated metal parts "creep" under stress. The metallic grains slowly slide over each other. The metal tends to *flow* out of shape.

Excessive "creep" would quickly destroy the turbine — due to collision between the blades and other parts of the turbine, which are spaced only a *fraction of an inch apart* for maximum power.

Westinghouse first introduced the steam turbine in the United States and has built thousands during the past 45 years.

And much of the success of Westinghouse steam turbines is due to the intensive studies of "creep"— similar to those conducted by Dr. A. Nadai, P. G. McVetty, and M. J. Manjoine, in the Westinghouse Research Laboratories.

As a result of this research, the "creep" in some turbine metals has been reduced to 1/10,000th of an inch per inch per year—less than 1/64th inch per inch in 100 years.

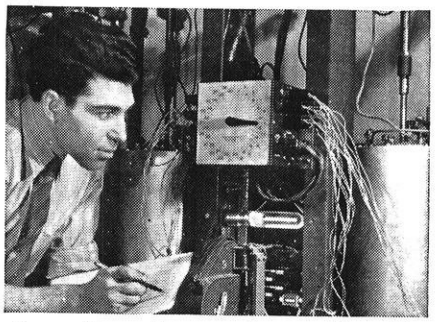
This has guided the development of metals capable of operating at greatly increased temperatures and speeds—and secured *more power per pound of turbine*, a vital necessity in a destroyer!

* * *

Research Engineer Manjoine, in collaboration with Dr. Nadai, is fighting a deadly battle against the submarine menace — by improving metals that make possible *faster, more maneuverable* ships for our Navy.

Manjoine is typical of the many young engineering graduates who are putting Westinghouse skill and "know how" to work for victory—and for a better kind of civilization when peace returns.

Westinghouse Electric & Manufacturing Company, Pittsburgh, Pennsylvania.



Slower "creep" means faster ships — Research Engineer Manjoine studies "creep" of test samples to develop turbine metals that will deliver more horsepower per pound—making our destroyers speedier and deadlier. Manjoine received his B. S. from Iowa State College, before joining Westinghouse in 1937.

Westinghouse

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WISCONSIN ENGINEER

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In This Issue . . .

A Message From the Dean

AMID the turmoil and confusion and the severity of war the academic year draws to its close. For many students it marks the end of their engineering education, at least for an indefinite period, and for others scarcely a pause before reviewing their studies in the new long summer term. But for all it may well mean a re-dedication of loyalty to fundamental American principles.

Of basic American concepts may I propose two that are essential to your personal poise and courage and worth fighting for in war and working for in the peace to come.

Our fathers—at cost they knew and we have not realized—won for us freedom to seek God as we choose. Moslem or Mormon, Jew or Gentile, Catholic or Protestant, we may bow or kneel or lift our faces in the faith that sustains us—in mutual respect and freedom. Only if you and I were to lose this freedom or deny it to each other could we learn how essential it is to the flowering of all the various freedoms of the individual.

Also stout-hearted men that they were whose blood flows in your veins and mine, they claimed for themselves and for you and me not "security from the cradle to the grave" but the privilege of adventure. They adventured from Europe to wild America; they adventured from the security of the seaboard through the dangerous mountains to the wilderness beyond—not in regimented security but in the joy of private enterprise. They gave us the heritage of the right to success or failure—the challenge of life that no young man would refuse.

Loyalty to these principles has given each of us Americans the greatest personal freedom and opportunities in the world. Let us then resolve to serve in the Army, Navy, or industry—or continue our study here with more intelligent attention to the preservation of these essential concepts. It will mean a broadening of our reading, our thought and our discussion, a lively interest in both local and national problems—all in preparation for participation by engineers on an entirely new scale in public affairs.

F. Ellis Johnson


Douglas SBD Dauntless

Engineering South of the Border

by Lyon L. Brinsmade, min'24

MEXICO is a land of complete contrast both in things natural and human. It is a land where the medieval and the ultramodern cannot be separated; where tropical heat and temperate comfort, and jungles and deserts, are but a few miles apart; where wealth and poverty, feudalism and communism, and knowledge and ignorance stand side by side.

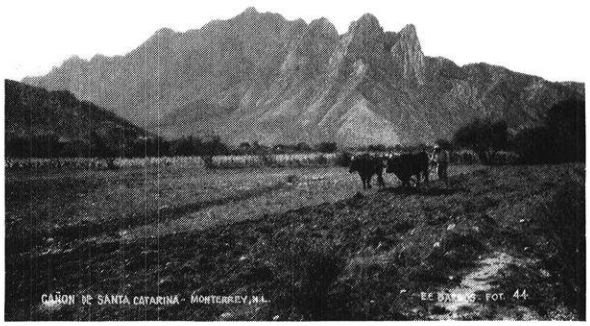
During my recent stay in Mexico, I had the opportunity to participate in mercury mining in the Guadalcazar district of the state of San Luis Potosi. Situated on the central plateau of Mexico, Guadalcazar occupies an arid, temperate region surounded by peaks of the Eastern Sierra Madre mountain chains. The vegetation is limited to yucca palms, mesquite trees, and a great variety of cacti; and game abounds in the form of deer, mountain lion, pheasants and quail. The region, however owes its importance to its numerous mineral deposits of mercury, lead, silver, gold, antimony, manganese, and strontium.

Guadalcazar is an old mining region dating to the time of the Spanish "antiguos" or groups of Spanish prospectors that explored Mexico during the sixteenth century. Incidentally, these "antiguos" certainly must have endured tremendous hardships to reach all the then inaccessible wilderness; and the proof that they did a very good job of prospecting is evidenced by the fact that most of the present-day workings were discovered by them. The exact record of most of its mines is lost to history. However, it is known that these mines are very old and they have been abandoned or worked accordingly as the prosperity of the period or of the mine has warranted.

The region is inhabited predominantly by Indian and Mestizo strains which still follow their primitive way of life. They wear stout pants, cheap cotton shirts, leather sandals or shoes, the well-known sombreros, and if the weather gets cold, they wrap a blanket around themselves to serve as an overcoat. Their homes are huts constructed with the materials at hand. Usually the walls are made of the soft, porous boards cut from the trunk of the desert palm, and the roofs are constructed with leaves from another one of the variety of palms found there. For food they rely on "tortillas"—pancake-like bread made of corn, beans, and the meat of many kinds of domesticated animals or game. Because water is scarce it is brought from far away springs in drums which they transport on burros or ox-carts.

From time immemorial, these natives have divided their time between agriculture, fibre production and haphazard mining. Their crops are cultivated when the season is favorable; "lechuguilla" leaves are gathered and treated so as to extract their hemp-like fibre, when the dry season prevails; and mining is engaged in when world conditions make it profitable for "gambusinos" to hunt for ore on their own, or work for a regular mining exploration company.

In accordance with the traditions of these Indians, the mines in Guadalcazar are naturally worked by very primitive methods. The drill holes (holes in which the explosive is placed), are made by hand with a chisel and hammer, and if the ore isn't rich enough to warrant its extraction, an opening only large enough for an average man to crawl through, is made. That is, nothing is extracted unless it is fairly rich ore. This leaves a winding, irregular, and extremely narrow passage-way in those sections of the mine where the vein narrows down to a few inches. The worker, then, literally crawls out of the mine with a sack of ore strapped to his back, and upon reaching the mine entrance, transfers his load to a burro. From there, the



Typical Countryside of the North Central Mexican Plateau

ore is taken on burro-back to the smelter. This kind of mining has commonly been given the name of "gopher mining," and it is in this way that much of the small-scale mining in Mexico is done.

Although the mining methods have changed but little since the time of the Conquest, the labor situation as far as its rights are concerned, is extremely advanced. Labor's efficiency has lagged far behind. Governmental laxity in mining law enforcement often leaves the mine owner, or company, with no rights but such as are connected with tax paying and labor coddling. It is this one-sided protection which enables only big business and extensive capital to do anything at all.

Therefore, the engineer planning to go "south of the border" can only expect a great surprise ahead of him. He will encounter situations the kind of which he never even imagined before, and chances are he will go to extremes in either liking or disliking the country. Mexico is fascinating in its strangeness and exotic beauty, but it can also be discouraging in its inefficiency and lack of law and justice.

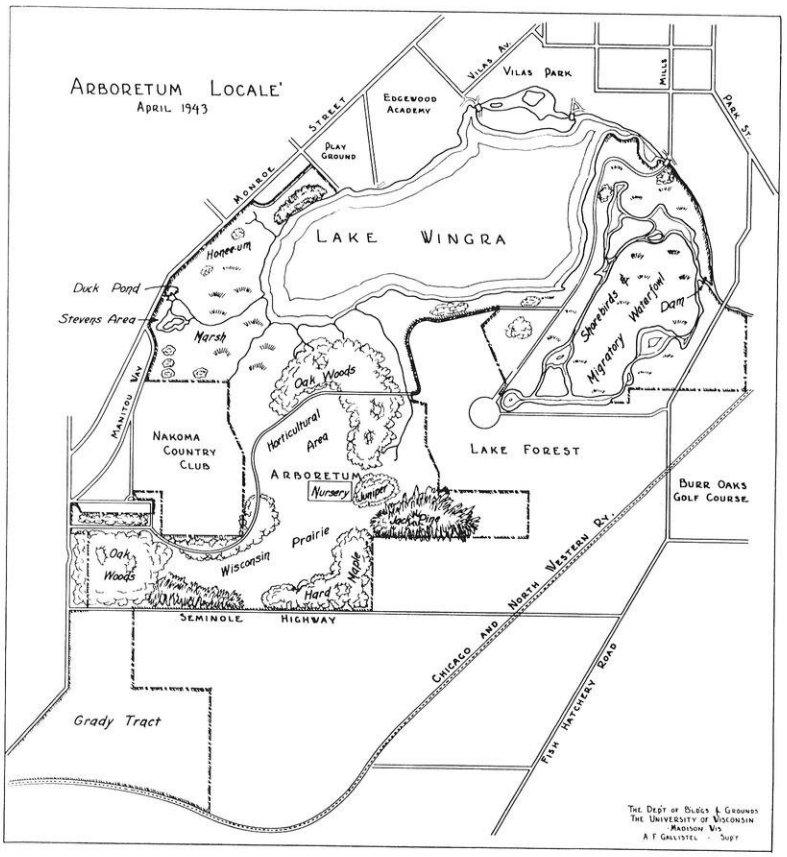
Conservation Laboratory . . .

The Arboretum

by Bill Haas, c'45

ACCORDING to Webster, an arboretum is "a place where trees and shrubs are cultivated for scientific or educational purposes." However, the University of Wisconsin Arboretum, Wildlife Refuge, and Forestry Preserve has an additional aim, that of being a place where people can come to love and appreciate the beautiful outdoors.

Nestling in the prairies, marshes, and rolling hills to the west and south of beautiful Lake Wingra, the Arboretum is truly one of Wisconsin's most beautiful places.



Map Showing Location and Important Features of Arboretum

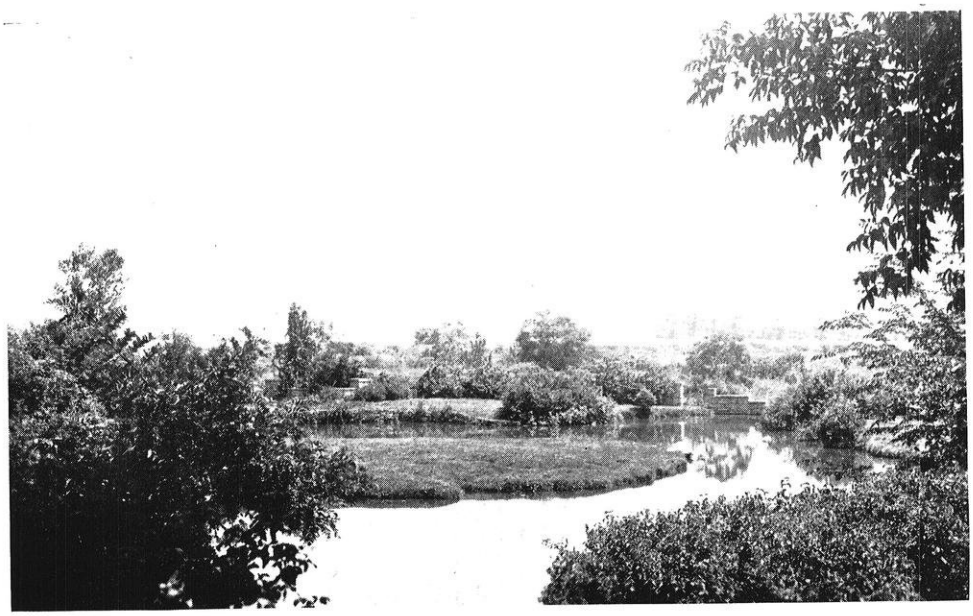
Courtesy Department of Buildings and Grounds

Though the project was started only about ten years ago, already considerable portions of the area have been developed, while plans have been made for developing the remainder.

Historical

The Arboretum and the surrounding region have considerable historical significance. The Arboretum now includes what the old settlers called the Vilas woods, because the property belonged to Senator Wm. F. Vilas, an early legislator. There are more Indian mounds about the shores of Lake Wingra than about any other lake of its size, some 150 having been counted. Early settlers called it Dead Lake, and refused to swim in it, as its waters were said to be poisonous. "Wingra" is Winnebago tongue for "duck," probably because of the abundance of the waterfowl. Large beds of wild rice in the marshes adjoining the lake furnished an abundant supply of food for the Indians as well as for the ducks, geese, swans, and even pelicans that abounded there. The fishing in the lake was superb, as many old pioneers could testify. The woods teemed with game, and even the early settlers shot many wolves, wildcats, and deer. The Winnebagos had camps where Vilas Park now is, out in the Nakoma region, and various other places. The many springs which feed Wingra provided them with water. As late as 1925 there were some Indians who regularly camped in the Vilas woods area on the south shore of the lake.

A number of important Indian trails traversed the region. One started at the foot of Lake Monona, crossed Dead Lake Ridge (between Lakes Monona and Wingra) to the south shore of Lake Wingra, then went to Nakoma,



Duck Pond Viewed from Nakoma Road

Courtesy
G. Wm. Longenecker

and thence west to the Mississippi River. Another originated at the same place, but followed the north shore, and went north toward the Wisconsin River. The Winnebago called the Nakoma campsite "Dogeerah"—summer village, according to Mr. Charles Brown, director of the State Museum of Wisconsin.

An interesting anecdote of the days when the Indians still roamed in this region was related by Mr. Brown. The story has its setting out in the pioneering village of Nakoma. Several dry summers had preceded this particular time, when Mr. Brown and a companion met "Indian John," a friendly old Vilas woods settler. Mr. Brown remarked jestingly, "You're a rainmaker, aren't you, John?" (It happened that John **was** an accomplished medicine man.) When the Indian replied that he was, Brown and his companion each put a half-dollar in the old Indian's hand, and told him that they would like some rain. Then they went on their way, and soon forgot the incident. But the very next day, it not only rained, but the whole Four Lakes area was shaken by a heavy thunderstorm. From that day on, Indian John was well established as a rainmaker.

At the State Historical Museum, there are on display stone, copper, and bone implements, basketry and beadwork, as well as a dugout canoe that was found in the marsh a few years ago.

The Indian mounds are all of the burial type. The Indians buried their dead in two ways. One way was the flexed manner, in which case the legs and arms of the

(continued on page 20)

View Showing Transition from Marsh to Prairie

Courtesy
G. Wm. Longenecker

Facts About Plastics . . .

Wooden Warplanes

by Reino Salmi, m'44

Cuts courtesy Aero Digest

THE WOODEN airplane has long been considered a thing of the past. The development of many new lightweight non-ferrous alloys seemed to seal its doom. The high strength volume ratio of steel seemed to make it ideal for fuselage and wing frame work structures in which space is at a premium, but high strength is desired.

The development of aluminum and duralumin was the answer to a designer's prayer as far as stress skin coverings and low stress structures were concerned.

In normal times it is very possible that construction would have continued to be strictly a metal proposition. Our friend, Schikelgruber, however, changed all that. A lot of planes were needed, and in a hurry! Douglas, Boeing, Vega and the others could not wait for the iron and steel industries to expand. They needed materials to build military planes. What would be more logical than to turn to consideration of wood as a structural material.

Wooden construction was not an entirely unexplored field as far as high speed aircraft was concerned. Back in 1935, the British De Haviland racer which won the London-Melbourne race was of plywood construction. Howard Hughes' plane which set speed records back before the war was also a mostly wooden plane, and it was later turned over to the government for further examination. The influence of the De Haviland racer can be seen in the design and construction of the De Haviland Mosquito twin-engined bomber. This is a light weight, extremely high speed bomber, powered by two Rolls-Royce liquid-cooled engines. This plane is recognized for being the first all plywood military plane to enter action in this war.

Advantages of the Wooden Airplane

Two of the major factors that determine the characteristics of any airplane are the parasite drag and the total weight of the airplane. Parasite drag is caused by poor streamlining and by the friction of the surface of the airplane.

The covering of a metal wing is quite thin, and when the plane is moving through the air at a high speed, the metal skin tends to form small ripples, thereby disturbing the smooth flow of air and increasing the parasite drag of the wing. A single row of rivets can be placed longitudinally along the surface of the wing about one third back of the leading edge to prevent rippling, but it will increase the parasite drag of the wing 27%.

A good deal of experimentation has been done along the lines of full monocoque construction of plywood wings. See Figure 1. Whether or not a wing of this type could be used in a modern, high speed fighter plane is known only to the engineers working on the problem.

The surface of the wooden wing is thick enough and has a high enough moment of inertia to prevent the ripples from forming, and there are no fastenings to mar the smooth surface of the wing.

The strength-weight ratio of the new plywoods is greater than that of any metal now being used in aircraft building. The weight-stiffness ratio of plywood is also greater than that of the metals. (Note: Although the plywoods are stronger in proportion to their weight, they are weak in proportion to volume.) Plywood construction is much simpler than the fabricating of a metal airplane which requires thousands of rivets and specially formed pieces to

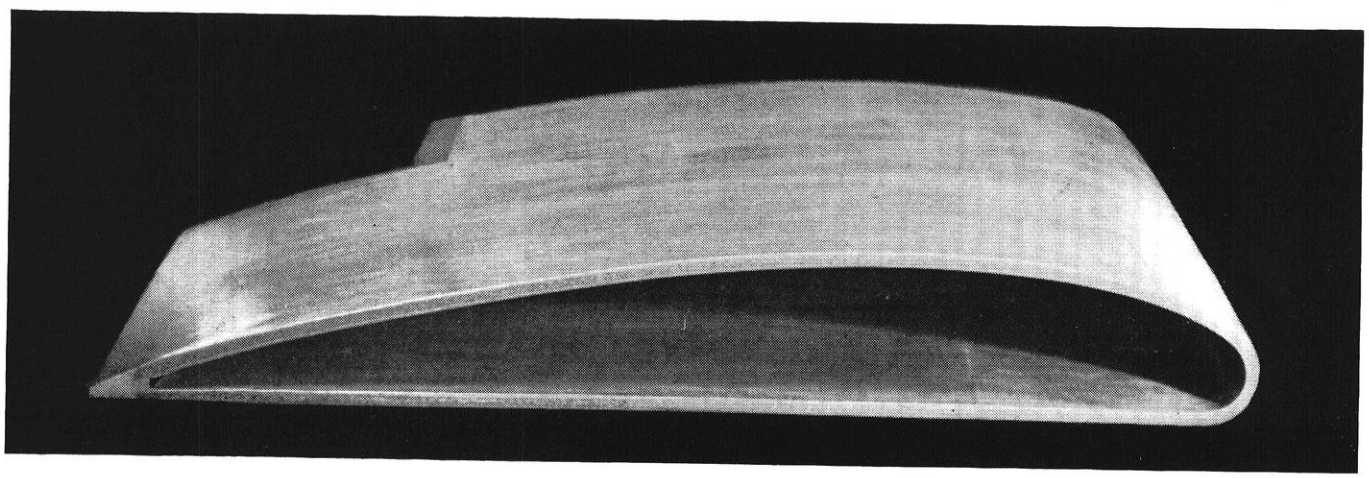


FIG. 1

hold the parts together. The wooden airplane is therefore lighter and can be built much faster.

Figure 2 is an example of the simplified construction in ailerons when the Skydyne plywood construction is used. The structure to the left is the conventional aluminum assembly. Note the large number of ribs, the rivets used to assemble them, the braces scattered liberally throughout, and consider the time and work consumed by punching out the holes in the formers in order to lighten them. Compare that with the plywood aileron on the right. Four ribs are sufficient, much less punching is done, and the whole part is assembled as a unit rather than having each rivet driven in separately.

much stronger than the wood itself and are not affected by moisture, heat or age. The glue permeates the layers of veneer when the plywood is being made and makes the wood fireproof. Termites do not attack the new plywood.

One of the leading methods of forming plywood shapes is the Vidal Process, invented by Eugene Vidal and Larry Marhoeffer. In the Vidal Process, the first thing that must be made is the mandrel or form, on which the plywood part is to be shaped. See Figure 3. This is made very carefully so that it will conform to a balanced stress diagram of the shape, i.e., the form must not yield in any part any more than it will in any other place. These forms may be of the male or female type. In the male type of

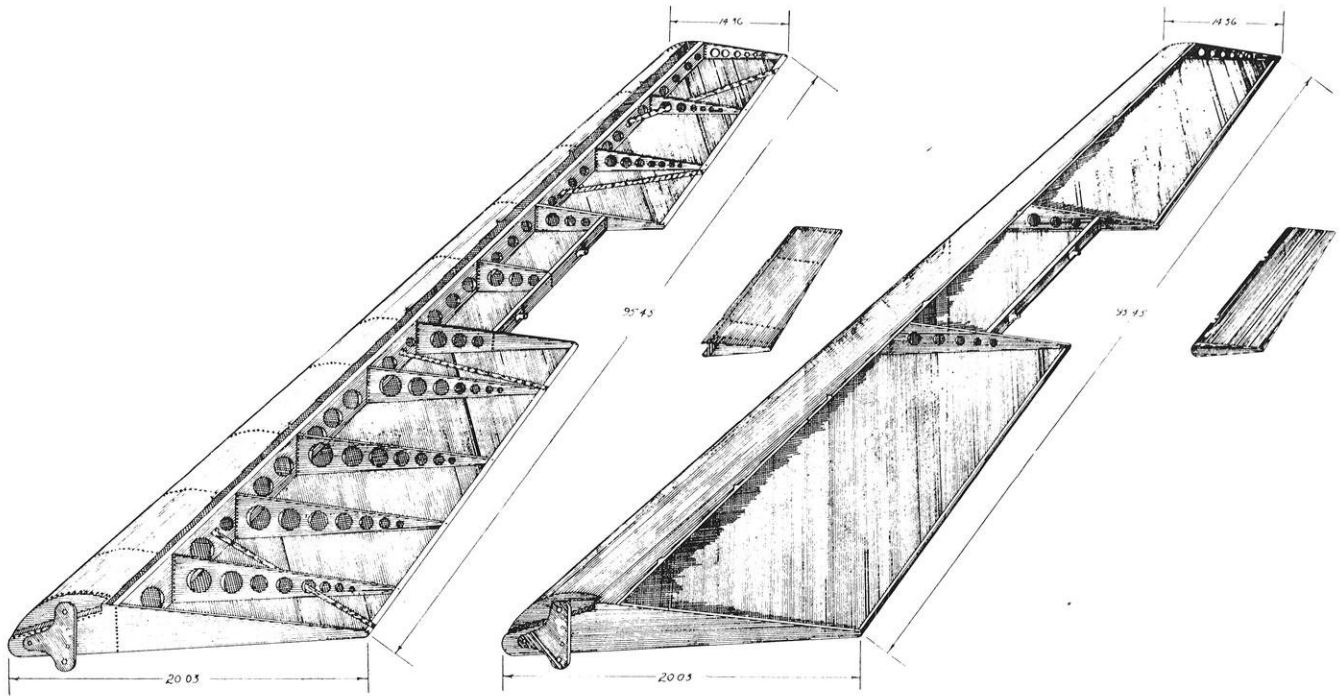


FIG. 2

Modern methods of molding plywood parts makes the forming of complex shapes relatively easy, and a mold or jig for a new design can be set up faster and with less expense than for a metal piece. Skilled woodworkers are easier to obtain and train than metal workers. There is no shortage of materials required in wooden construction and all of them are available in our own country.

Another excellent feature of plywood construction is that the assembly may be broken down into fine sub-assemblies, which may be put together into successively larger sub-assemblies until the shape is completed. See Figure 4. This is the Curtiss "Caravan," a new Army transport.

Development

The old wooden airplane was abandoned because there was no glue obtainable that would form a satisfactory adhesive. Plywood laminations would not stay together and termites seemed to like the combinations. The old-timers used to say that the plane would fly as long as the termites held hands. All these difficulties have been mostly overcome by the development of synthetic resin glues of the phenol and urea formaldehyde groups. These glues are

form, any rib or stiffener that is wanted on the formed wooden shape is inlaid in the mandrel, and when the part is finished, the rib has become an integral part of the plywood shape. On the female type of mandrel, the rib or stiffener is placed on after the layers of veneer are in the mandrel or mold. In placing the veneers on the fold, attention is paid to the direction of the grain of the wood. The direction of the grain depends on the type of stress on the part and the ease with which the part may be wrapped. On complex shapes the wrapping is begun at the most difficult spot. The pieces must fit in place without buckling or overlapping. The veneer is held in place with staples while it is being wrapped, but these are removed before the next layer is put on. Templates for the pieces are made mostly by the cut-and-try process. Before the pieces are cut and wrapped, the wood has been coated with a synthetic resin adhesive agent. See Figure 6.

When the wrapping is completed, the entire form is covered with a rubberized fabric called "Vidal Fabric." It is a heat resistant cloth made by the duPont Company. The covering is made to fit the form tightly by removing the

(continued on page 14)

ALASKA - BOUND

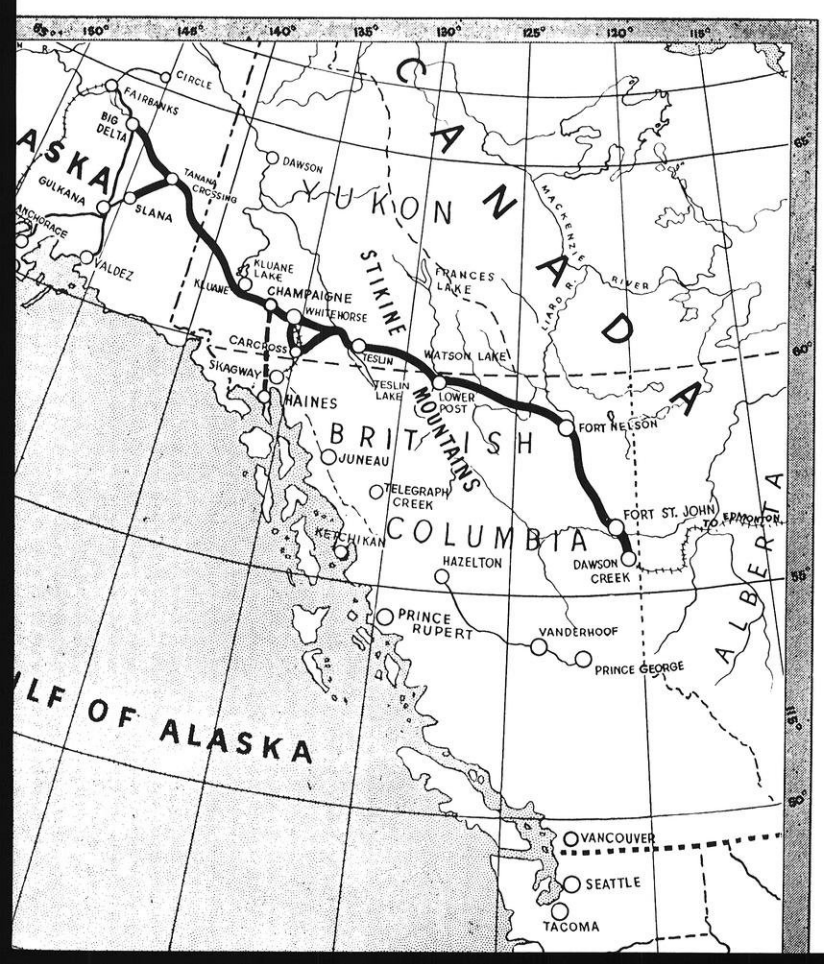
Via Truck and Tractor

by Fred Engler, c'45

Cuts courtesy Gillette Publishing Company

BACK in 1865 when Alaska was purchased from Russia for seven million dollars, the region was known as Sewards' Folly. The United States government never undertook the development of Alaska and as a result its population never exceeded one person per square mile. Immediately after the World War I a few people realized the importance of Alaska as a major fortification against the Yellow Peril. Milwaukee's own Billy Mitchell urged and pleaded with Congress to grant funds for fortifications, but his pleas fell on closed ears.

Back in 1939 when World War II engulfed the world, fortifications were started in Alaska, but the problem of transporting troops and supplies to these northern bases proved tremendous. As a result maximum strength could not be concentrated where it was needed most. After Pearl Harbor, on January 1, 1942, the War Department authorized the Corps of Engineers of the U. S. Army to build a road from Edminton to Fairbanks. At this date only one major road existed in Alaska. This was the Fairbanks-Valdez highway which was open only eight months of the year. Since the majority of the proposed roads passed through Canada, permission had to be obtained from the Canadian government. As a result of conferences, it was decided to let the United States build the road under these conditions: the United States would have complete control of the road for the duration, the United States would pay for the road, the United States would build the road.

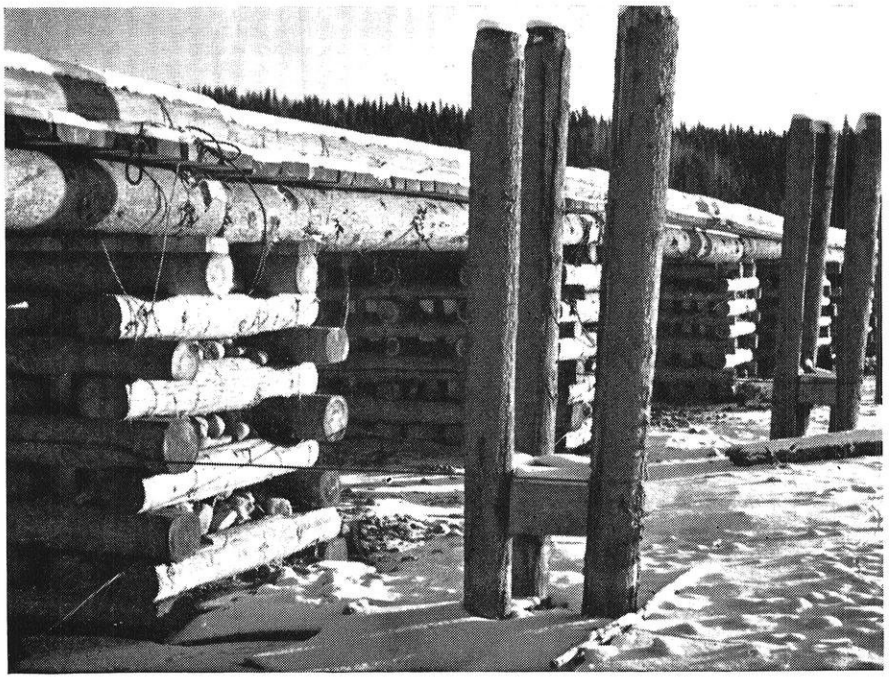


The question of the location of this projected road proved to be the most difficult problem ever faced by an engineer. A good road existed as far north as Edminton, the capital of the province of Alberta, but from there north no passable roads existed. The location of the Alcan Highway was further speeded by the fact that the Canadian government had constructed a chain of airports along her western coast soon after the outbreak of war. In view of these facts, it was decided to start from Edminton and work north paralleling the road with the chain of airports.

Work started in March, 1942. A boatload of Engineer troops were sent to Skagway, Alaska. From here, they forced their way to Whitehorse in the Yukon, about 300 miles due south of Dawson, and from Whitehorse, the Alcan Highway could be constructed at a rapid pace to Fairbanks. The last hundred miles could be constructed over the Fairbanks-Valdez Highway. The Whitehorse-Fairbanks link was easily located because of the mountain ranges in this area for in this type of land the roads must follow the rivers or cut through passes in the valley. Also in this region, there are few muskegs to contend with and the profile of this region is fairly level, once past the White River.

The real problem came in building north from Edminton to Fort Nelson. It was decided to get some men north to St. John from where the work could proceed from both ends. Out of Edminton, the area is fairly settled and wooded, with a few passable roads existing. Rather than locate and build new roads, it was decided to improve these roads to fit army specifications. These specifications called for a 24 foot road bed with two foot shoulders on each side. Bridges were to be one-way and of a minimum twelve foot width.

The highway progressed northwest at a rapid rate until the Peace River was reached. This river, 1,200 feet wide, is used for navigation, in spite of its 10-mile an hour current. Between the spring thaws and the fall season its variations in depth are 18 feet. When this river was



Temporary Bridges
of
Stone and Timber

Note Icebreakers of Vertical Logs Driven Deeply Into Bed of River

reached by the construction gangs, it was fortunately frozen over. At once, a plank roadway was thrown across to permit the passage of heavy trucks. At places the ice sagged and pitched at an angle, but by sheer skill and strength the Engineers got every truck through safely. When the ice melted, a ferry was used for crossing while a pontoon bridge was being constructed. Because of ice jams large blocks of ice might injure the bridge; however, with a great deal of foresight, the engineers created log jams which forced the ice to expend itself on the shore line. It is estimated that a permanent bridge will cost upwards of one and a half million dollars.

From the Peace River to Fort St. John the highway penetrated through unsurveyed land. The location parties went back to hand locating. Often they had to take the words of guides whose advice caused nothing but headaches for the locating engineers. Progress was so slow that in 25 days only 40 miles of road had been constructed, instead of the proposed 70 miles. At times, the locating parties went to work in the morning through brush and undergrowth and returned over a graded road. It was at this critical moment that the Ontario Road Department stepped in.

Why not locate the road by air as they had done in the Hudson Bay Region? From the air an experienced man can distinguish between the different growths of trees. From this information, the type of land ahead can be determined. For example: Jackpines and poplar indicate gravel or firm soil; spruce indicates wet ground, and underbrush and evergreen indicate muskeg.

A Word About These Muskegs

Although soundings taken on the muskegs proved some of them to be bottomless, the majority were proven to be only two to six feet in depth. These were quickly dredged and filled in with gravel from one of the gravel pits that abound everywhere in this region. The muskegs are formed by a combination of poor drainage and decaying vegetable matter.

The air method of location produced great results and soon the location parties were way ahead of the construction gang. As more and more experience and equipment were secured, work production shot up until it finally hit the Army standard of three miles per day. Between Fort Nelson and Whitehorse, location was a simple problem due to the drainage being parallel to the road, while between St. John and Fort Nelson the drainage was at right angles to the roadway.

Methods of Construction

When the construction parties started north from Edminton, they cleared the light growth by axe because most of their clearing bulldozers had failed to arrive from the

(continued on page 22)

Loading a Dump Truck

Are We

YES, some of us are. I know I am. I study at least an hour a day, or a week it really doesn't make much difference. However, some of the engineers are not grinds as is witnessed by many of the activities and outside interests which they find time to pursue while in school. In the concocting of the following piece of phraseology I endeavored to contact fellows with as widely different interests as possible. I talked to most of the boys on the telephone, and after the proper introductions I shot the sixty four dollar question about the outside interests. I soon found it necessary to say: Have you any hobbies, that is, besides women? The usual answer, "There are others?" However, you who are foolish enough to read the remainder will find that there are several fellows that did know there were others. I have purposely left out the major hobbies that are practiced by so many. Namely, model airplanes, photography, and those of our number that are classed as athletes. It was impossible to see all of the engineers, so few are mentioned herein. My apologies to those missed.

How many of you have heard about PETER KOZUSZEK. I said heard about, I should have said heard, for Pete wields a mighty mean bow. No, he's not an archer, but a violinist. The only reason that the engineering school got the chance at his talents rather than the music school is that Pete has a definite and well grounded dislike for working for nothing.

If I was the type I could mention about that sharp ARNE LARSON having an edge over the rest of us. His hobby is making knives. I guess about the only thing he's rather do than make a knife is————oh well, that's another story.

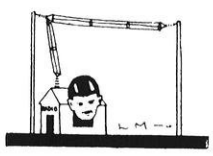
Most engineers either shudder or beam when the word drawing is mentioned in their presence. It all depends on the grade they received during that freshman year. If you say the word to DICK KOHRT he'll flash you a big smile, and taking a pencil from behind his good ear, draw you a caricature or just about anything your little heart might desire.

About the time I started to write that last paragraph the clock said five forty five. Now as anyone that is familiar with my habits can testify, this is my "start to wish you could afford dinner" time. When thinking of dinner, what could be more convenient than imagining that you were some place eating. So I did. This time I went to the Catholic eating co-op, which is not owned, but is operated by a couple of engineers, namely, CHUCK ANDERSON, and JIM SVOBODA. Between buying food by the new point system, and keeping a place open on the mopping crew for JOHN (STEAM) LANDRY they keep pretty busy.

The other day I just happened to drop in at court, and after paying my fine, I noticed that DONALD KLANG had been called. He had been arraigned on a sanity charge. It was all O.K., though, just a misunderstanding. The people out by the Nakoma golf course just couldn't imagine that anyone would want to indulge in their hobby in mid-January, especially since said hobby was golfing.

Speaking of girls, that reminds me of dancing. Big BILL ZUMACH, the Chem Engineers' T. Dorsey, has served quite a term with several of the campus bands. Perhaps you've swayed with your own little outside interest to the smooth tones and tunes of Bill's trombone. Bill had the extreme good fortune to accompany last year's Haresfoot production on that organization's tour of the state. Ask him about it sometime.

Under the what-do-you-know section we find the following juicy little item. ART LYTLE has been a licensed ham since the tender age of fourteen. To you uninitiated the word ham as used this instance is not to be confused with the twenty points a pound variety, nor is it to be connected with acting. Ham has something to do with amateur radio transmitting. Art didn't say so but I imagine that the government has kind of cracked down on his activities along this line, but he still has his music which entitles him to call himself a member of both the university orchestra and band.



If you ever drop in on DICK SOLBOE you will prob

Grinds?

by Maru Woerpel, ch'44

bly find that he has gone to keep the city of Madison ealthy. I doubt if the sanitation department could get ong without Dick. You might note while there that vell model plane carved by his room mate LEON KAS-AUM. His study table only has three legs now, but even e landlady had to admit that it made a darn nice air-ane.

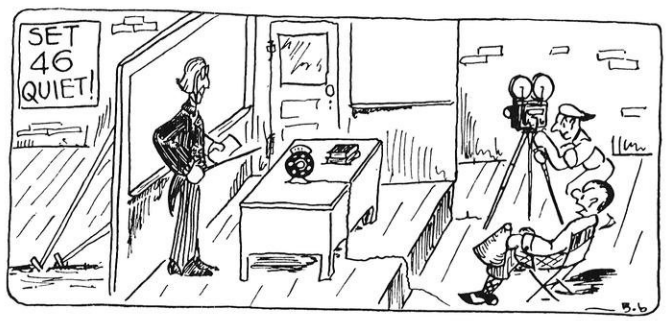
Way back in the days of St. Pat, 1943, I met a fellow ell equipped with beard, who introduced himself as OHN CREMER. In answer to my queries he answered nd I quote, "Oh, I do some engraving . . . I have made me watches, in fact, I've taken a course in watch mak-g, and I like to make jewelry, brooches, rings, etc. As r outdoor sports I do a little trout fishing." I happened mention having talked to Arne Larson about making ives, and John said, "Yes, I've made a few knives, too." decided not to mention my knitting for fear he would y that he had knit sweaters since he was in high school. hat boy has done a little of everything.

ABE HOLDEN used to do quite a little fly tying. It arted way back when he used to pick them off the sticky per and tie a thread around their necks, but as time nt on he graduated to the variety used by every good fisherman. The manufacture of these colorful lures re-ires a good deal of imagination and handiwork. Right w, however, Abe is putting most of his extra time into eaming about the Marines.

RUSS JOHNSON is active in the Luther Memorial hurch. I believe I am quoting him when I say he is the ogram chairman in charge of the Sunday night meeting ey hold there. Russ really has them over the proverbial rrel for if they don't like the programs . . . well, they ould have known better than to start anything. He's t for wrestling.

THORVALD THORESON is greatly interested in otography, but if it is all the same to you I will picture n doing his well liked hunting and fishing in Canada. In ct, if it wasn't for the ever present press of things to me, and I mean immediately, he would be one of the ongest advocates of the five year plan right here on the mpus. This is not that plan familiarized by the hammer d sickle, but the arrangement whereby the young engi-er would have more time to pursue these outside inter-s. To quote those "standers out in front of Bascom okers," the engineer might even have a chance to pick culture. At least once in a while on week night, even if e did have to be in by ten thirty. But we digress.

Perhaps you are already acquainted with GERMAINE JACKY, but do not know him by that name. If you attended "Saint Joan" you knew him as "Courcelles." Both he and FRED GARBER enjoy losing their true identity in that intriguing field called drama. Fred was in this year's Haresfoot cast, and made as pleasing a dowager as has graced this engineering school in some time.



DAVE FISCHER is also a musician, and I do mean musician. In case you find an opening for a piccolo in your activities, and who can't find room for a piccolo, you might call on Dave. If he isn't too busy playing that popular sounding board commonly called the piano he will probably bat you off a couple of bars in the upper register.

Members of the Hoofers and all top notch skiers, although not by their own admission, are DOUG BAINBRIDGE, ED BOSLEY, and BOB WICEN. Doug built himself a nice ice boat besides doing an enormous quantity of work on the College of Engineering's ———— magazine, namely, the Wisconsin Engineer. Fill in the blank with any four letter word spelled Best.

HOWIE STOCK enjoys a pleasant sail about as much as anything, I guess. This rather a hazardous guess, however, for the interests of Howie are all inclusive. In fact, he has become quite a fixture in the Union workshop. You probably have had your eyes dazzled several times by his colorful posters.

That bell you just heard wasn't the typewriter announcing the end of the line. It was the Dean. He and my advisor think it best that I drop all outside activities for the remainder of the semester. However, I think I'll stick to my railroading. I like to whistle every time I come to the crossing of State and Lake.

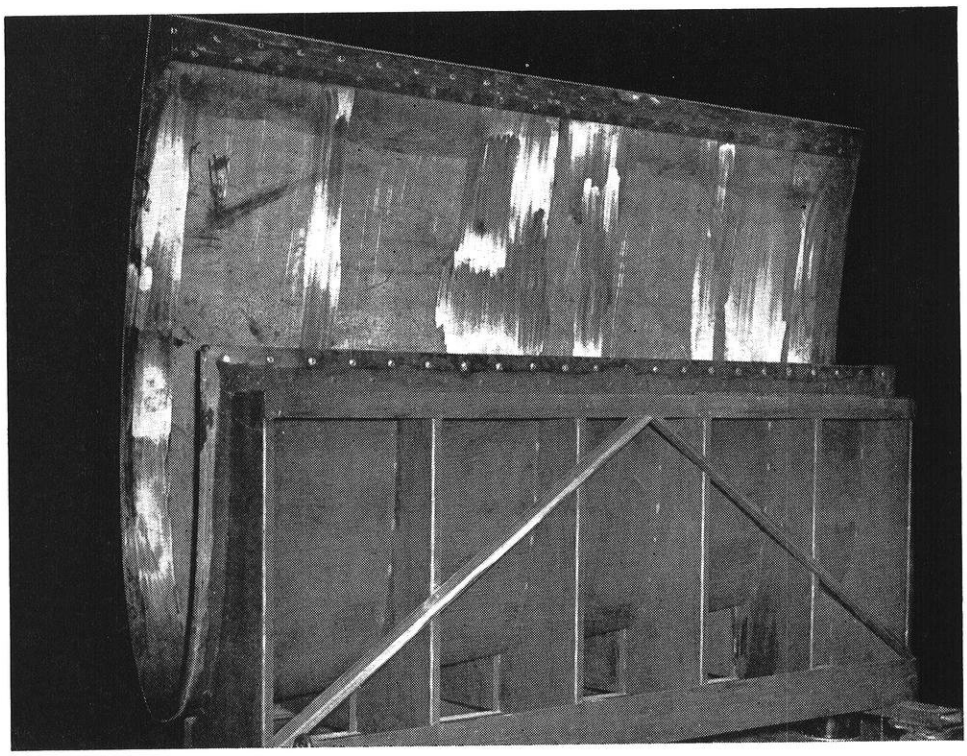


FIG. 3

air from it with a vacuum pump. The form is now placed in a large pressure tank. The rubberized covering is vented to the atmosphere by a metal tube so that any entrapped gases will be removed as the pressure in the tank is increased. The pressure within the tank is first raised to 50 psi with compressed air and then to 75 psi by steam. This produces an equal pressure on all parts of the wood covering on the mold.

The temperature maintained is from 190°F to 300°F depending on the type of adhesive being used. The time may be from two minutes to two hours. The heat polymerizes or sets the glue and also makes it permeate the fibers of the veneers. The part may be cooled slowly in the tank or it may be cooled in the air. This also depends on the adhesive being used. The completed plywood form is finished by smoothing off the surface with sandpaper and other abrasives. Figure 5 shows a stabilizer being removed from the mold.

The first airplane to be built by the Vidal process was the "Summit," a small low-wing sportplane. It had unusual speed for its horsepower and excellent aerodynamic efficiency. Quantity production of this airplane was halted by the war. The Vidal Research Company is now producing the Ansom bomber for Canada which they use in training.

Plywood planes can be built just as large as metal planes. Figure 4 shows a nearly completed Curtiss 'Caravan" which has a wing span of 108 feet. Compare that to the twin engined training plane below the port wing. No details of the large plane's performance or cargo carrying capacity have been released.

The Ryan PT-25 is a two-place primary trainer of the low-wing type. The only strategic metals used on the plane are in the engine cowl. This plane has been designed so

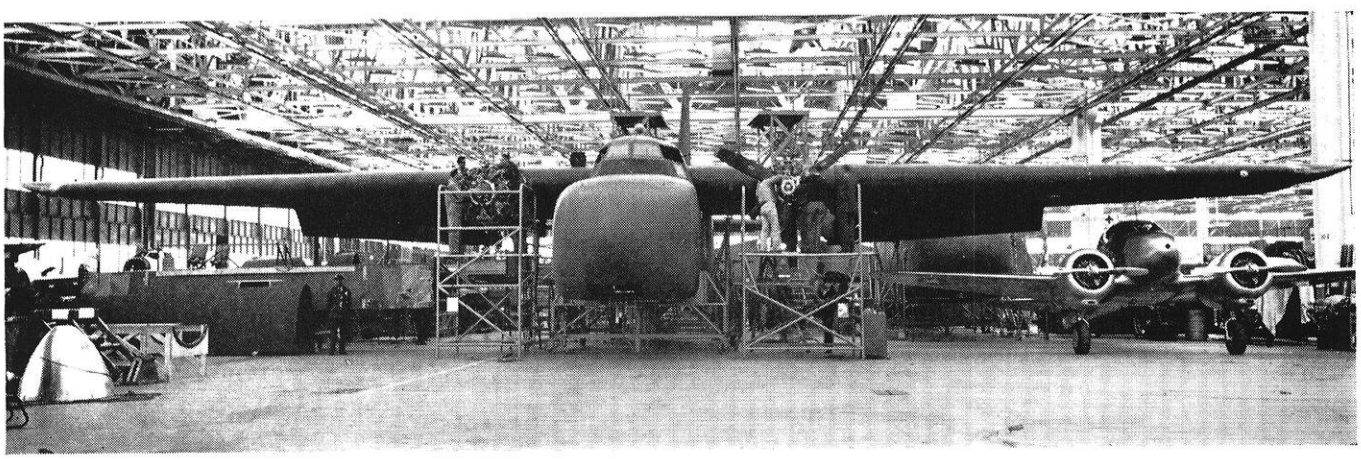


FIG. 4

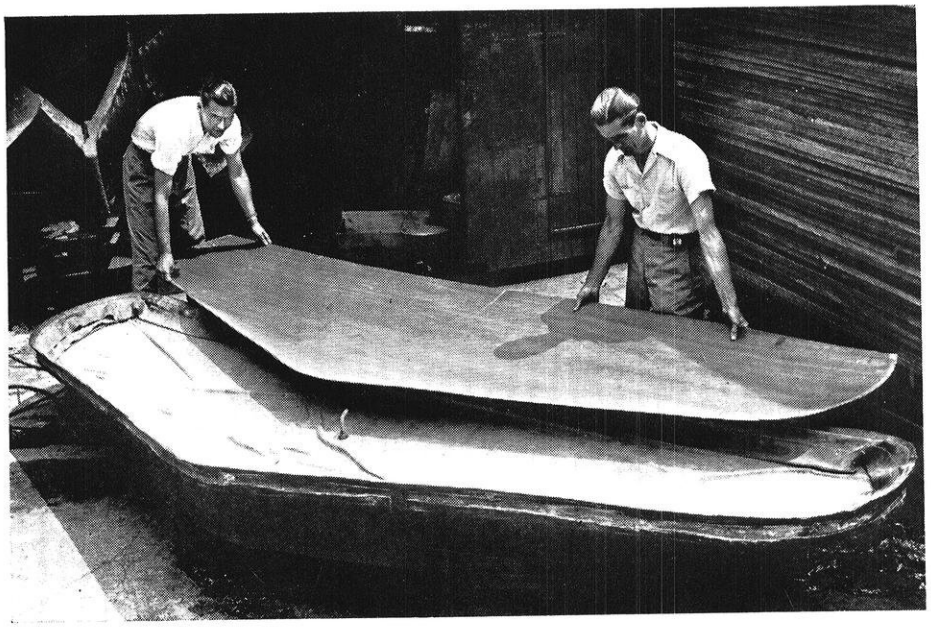


FIG. 5

as to eliminate all compound curves and it can be made from standard flat plywood sheets. The only molded parts are the leading edges of the other wing panels. Fairchild's twin engine bomber training planes are of all-wood construction made by the Duramold process. These planes also have superior all-around performance.

A recent innovation in the manufacture of resin bonded plywood is the use of high frequency electric currents in heating the glue and making it set. The plywood is placed between two metal plates and a high frequency reversal of the electric field between them makes the wood and the glue heat up rapidly and uniformly throughout. The resin can be made to set in only a few minutes, and the surface of the plywood does not have burns, checks or cracks due to heating because the metal plates themselves do not get any hotter than the wood.

When aeronautical engineers try to get the last few mph's from their newest warplane designs, they are no doubt beginning to use plywood construction. We now have satisfactory adhesives even though research in this field is still continuing. Even paper made from pulpwood has been tried in the layer molding method of aircraft building. Wing tip panels and other small parts have already been made equal to their metal counterparts in strength.

It has been predicted by many prominent aeronautical engineers that there will be a boom in small plane building after we win this war. It seems quite plausible that plywood construction could be the answer to the cheap construction problem which has been retarding the growth of popular flying. If plywood reaches up to its expectations, it will make mass production of sport planes possible.

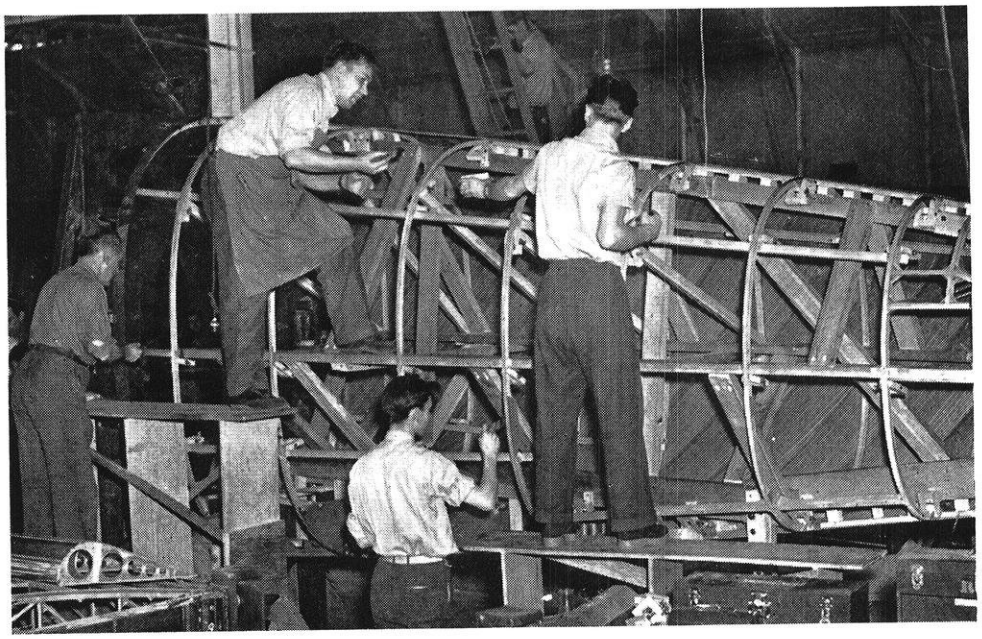


FIG. 6

To the Maintenance Engineer . . .

A CHALLENGE WITHOUT GLORY

by Arnold Ericsen, ch'44

MUCH has been said about the war and most of the heroes have been cited, but it is very seldom that one reads of the exploits of the merchant marine. Yet, he is just as valuable to the war effort as the soldier or sailor in the midst of battle. Perhaps, we may compare the maintenance engineer as his counterpart in the winning of the war.

When awards for manufacturing are issued, one immediately thinks of production or research, but little thought is ever given to the man who keeps research and production in high gear. Machines are running night and day, seven days a week, tools grow dull or are broken; someone has to be responsible for their welfare. A new product is developed; someone is needed to bring it from the test-tube stage to actual manufacturing conditions. More people are hired; someone is necessarily needed to see that they are working under the right conditions for the highest rate of production. These jobs and many more come under the supervision of the maintenance, or plant engineer.

Keeping the Machines Running

A foreman of a section of the assembly line might come with the problem that many of his crew are excessively absent from work due to colds. He believes that this condition is caused by a draught of air blowing along are floor. This problem is easily remedied, and is only one of many that the plant engineer encounters during the course of the day. More complicated problems arise, sometimes requiring much thought and knowledge which can hardly be acquired in a comparatively short college curriculum. This is the reason that the maintenance engineer is the original "Handbook Engineer." "Handbook engineer," groans the theoretical man with disgust. But, to illustrate further; as an example of his varied schedule, an engineer trained in mechanical engineering and at present working in the maintenance field is called upon to design and construct some vats for electroplating. The only places that he could possibly find information, which his curriculum did not cover, pertaining to the desired composition of lining and fittings for the vat are in chemical handbooks, or by consulting an authority who would charge for his services—services that the maintenance man is paid to render at his own expense.

The vocation of maintenance engineering is not mastered in a single year, or even in five years, after graduation from school, but is a continuous process of learning that extends throughout a lifetime. In a number of ways the plant engineer can be compared to a doctor. As was just stated, the doctor also learns more in actual experience than he could possibly have in the classroom. The plant engineer, as the doctor, has to keep his charges in repair, adding and removing parts now and then, and prescribing remedies for the betterment of their welfare. He also has to keep a constant vigil when things go wrong and trouble threatens. He never knows when a machine might break down or a section of pipe may burst. On the average of once a month (and even more now, while the factories are operating at their peaks) he is wakened in the middle of the night by an urgent telephone call from a member of his crew who desires information, or permission to go ahead with a job that needs immediate attention.

Maintenance work was not always taken care of as it is now. It has been only in recent years that large plants have had centralized maintenance departments. This centralization under one leader and in a department of its own prevents many conflicts and speeds up research and production which would otherwise only get in each other's way. By this I mean, that if each department had its own tool and diemaker, carpenter, or tinsmith, there would be times that these men would not have enough work, and other times when they would be rushed. One centralized maintenance crew under a capable plant engineer can plan and regulate work and repairs to be done. This brings to mind a form of rivalry that frequently breaks out between individual departments; production, research, or anyone that needs the maintenance engineer's ability. Several orders will be sent down from the various departments with demands of urgent attention. These will all be sent nearly at the same time and will be expected to be completed at about the same time. The plant engineer with his limited crew tries hard to see that the really vital jobs are attended to as soon as possible. Everybody thinks, of course, that his own job is the most important and there soon begins a squabble which ultimately results in one general blame placed upon the maintenance department. A capable plant engineer will usually sense these jobs before they are actually needed and will regulate his work so that any friction is kept at a minimum.

With this comparatively short resume of the plant engineer's activities I hope that it can be readily seen that the maintenance field is one of many good openings, developments, a chance to see one's self, and a real challenge to the young engineer—a challenge without glory.

Concocting Knives

by Arne V. Larson, mech'43

KNIFE-MAKING is, to me, one of the most fascinating and enjoyable hobbies that I have yet undertaken. It is a great satisfaction, indeed, to design and construct a knife that is pleasing to look at as well as serviceable. The type of knife that I have been making is that commonly known as a "hunting-knife" or "camping-knife." Other types could be made by following the same general principles.

A knife is made up of three distinctly separate parts. The blade or tang is the part of the knife that does the actual cutting. Next comes the guard which may or may not be used, but which is generally used to prevent one's fingers from being slashed. Lastly is the handle. Any of these parts may be varied as to shape, size and material.

Good Materials for a Knife

The desirable qualities of a knife as regards materials should be considered. The blade should be made of a material which is sufficiently hard to hold an edge, yet which is tough enough to prevent chipping or cracking. Material should be selected which is rust and discolor resistant.

The guard is almost always made of brass due to the resistance of this metal to oxidation. The handle can be made of anything that can be shaped easily and which has a good appearance. It should not be affected by blood or other materials which may come into contact with the knife. Lightness is also desirable. Wood, plastic, fiber, leather, horn, and aluminum are commonly used for this purpose.

Method of Construction

The method of constructing a knife is, in general, as follows. For the blade, select a piece of carbon steel or alloy steel and bring it to the desired shape by either forging or grinding, or both. Blades can be conveniently made from old flat files, cross-cut saws, or hack saw blades.

The thickness of the blade when finished may be from 1/16 to 1/8 inch depending on the materials used and the purpose for which the knife is intended. The blade should be thick enough to withstand any tendency to bend or buckle when being used. A fairly rigid blade is desirable. Blades made from files or ordinary carbon steel saws have a tendency to rust if left wet, but this disadvantage is counterbalanced by the other advantages; i.e., ease of shaping or forging, ease of sharpening, and ability to be heat-treated and tempered. High-speed steel hack saw blades, while quite brittle and hard to shape, do not rust and may be used on acid fruits without serious discoloration. These blades hold a very good edge also and are quite desirable excepting that they are difficult to forge and hence must be shaped entirely by grinding.

The length of the cutting edge of the blade is entirely up to the tastes of the individual, a convenient length being a 4-inch blade for a general purpose knife. Some hunting knives have blades up to 8 or 10 inches long, but a shorter blade is much more convenient for a camp-knife or for the hunting that is done in this region.

The guard is made from a piece of sheet brass through which a rectangular hole has been punched. This guard is slipped on the blade from the handle end before the handle is put on. Then, when the handle is in place, it holds the guard from coming off.

The handle is perhaps the most difficult part of the knife to make. More time will be consumed and more varied results will be gotten than with any other portion of the knife. Attaching the handle to the blade presents probably the greatest problem to be encountered. A few simple, but effective, methods of attaching handles to blades will be discussed.

The simplest method is to rivet the handle directly to the blade. The handle is composed of two flat pieces of wood, fiber, or horn, which are placed one on each side of the blade with rivets put through both the handles and the blade. This is the most standard means of connecting the handle to the blade.

Another very suitable method is to rivet an ordinary bolt (say 3/8 inch diameter) to the blade and then place layers of materials (much the shape of washers) on the bolt, the layers being drawn tight by means of a nut or bolster on the end of the bolt. A slot is cut into the bolt before being riveted to the blade, thus giving a much smoother job. With this arrangement, washers made from wood, plastic, fiber, or leather, and with the different arrangements, very many combinations of color and shape may be had. This type of handle is the nicest appearing of any, but is also the hardest to construct and requires the most time as well.

One very satisfactory combination is to have a handle made of layers of fiber of different colors and fastened with an aluminum or brass bolster. Fiber is not affected by oil, water, or blood and is very serviceable as well as very attractive.

One other method of fastening handles to blades is to bronze-weld a piece of a bolt directly to the blade, leaving the threaded end free. Then make the handle from a solid bar of aluminum or plastic material. It is fastened

(continued on page 34)

RETIRING

Six of the WISCONSIN ENGINEER'S best contributors are graduating this year. Jerry Baird, the retiring editor, Doug Bainbridge, Rog. Lescohier, Arne Larson, Bob Daane and Dick Roth.

These are the boys that have kept the magazine running and who have contributed a large share of the articles for the last few years.

Bob Daane was interviewed as a Phi Kappa Phi initiate last month. Bob has been official cartoonist for the WISCONSIN ENGINEER for the last year and you all have seen his work. He has also been responsible for some of those jokes appearing in "Static."

Arne Larson was written up in the January issue, as being one of the more active students. Arne was the fellow who took over "Alumni Notes" last year and won an honorable mention at the E.C.M.A. national convention. He stopped at nothing for information about graduates, even threatening to date Pat Hyland's daughter if he wouldn't give Arne some items.

DICK ROTH

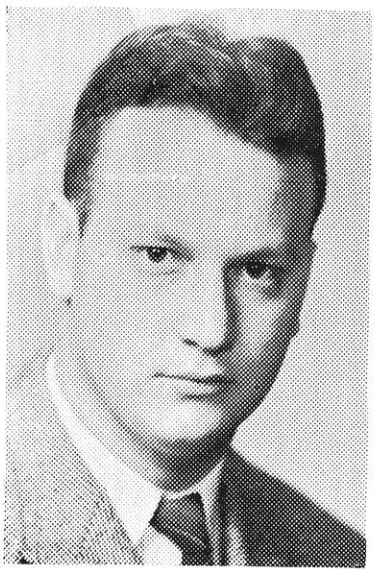
Born in Beloit, high school in Phoenix, Arizona, and college in Madison—that's the essence of the education of Dick Roth, senior mechanical.

Dick hails from America. That's about the only limit that can be put on his origin. Although he was born in Beloit, Wisconsin, he spent seven semesters of high school education at Phoenix and ended up back in Beloit. In the fall of 1939, he entered the University of Wisconsin College of Engineering, and decided to concentrate on mechanical engineering.

He engaged in various activities while in high school, having played football and baseball and worked in the Spanish Club. He claims most of his Spanish has been forgotten.

Here at the University he boxed for one year, engaged in intramural sports and for the past year has edited the "Static." The jokes which can't be pinned on Bob Daane are probably responsible to Dick.

Summers have been busy for Dick. His first summer, he and a friend took a 1913 Model T Ford to Canada, and spent the summer fishing, hunting, swimming, etc. The Ford was a bit spasmodic at times, but it got them there and back and one couldn't ask more of a Cadillac.



DICK ROTH

His second summer was spent in the pattern shop of the Gardner Machine Company of Beloit. During his third summer, he operated a planer all night, 6 p. m. to 6 a. m., at the same company. What a relief to get back to school and rest.

Dick will get his degree in September so that if the ENGINEER is published during the summer (as seems probable) humor by Roth will still be there.

His main hobbies are hunting, fishing and working on old cars. His favorite subject at the University was Mechanics 3, determinate and indeterminate structures.

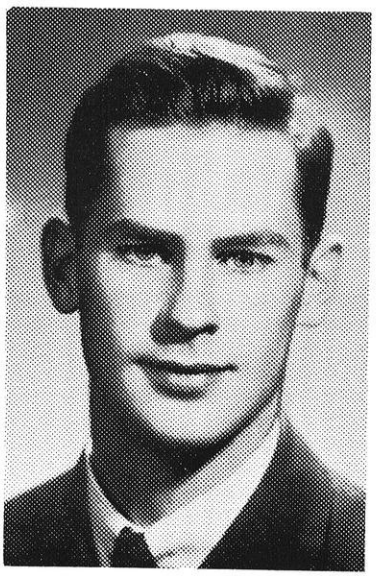
After graduation, he hopes to enter the Army Corps of Engineers, and he would like to stay in the Army, or at least in the Reserves, after the war.

ROGER LESCOHIER

Rog Lescohier is another offspring of Madison West High. While there he played tennis, was in the orchestra, worked on the stage crew, and was active in the chemistry club. ("Active" does not necessarily mean that he was a reagent.)

When he came to the University, he wasn't satisfied with membership in just the A.I.Ch.E., so he bravely marched into the midst of the S.A.E.'s mechanicals and joined up there. The members forgot he was a chemical long enough to elect him vice-chairman.

Rog has had some profitable summers. The first summer was spent with Research Products Corporation, working on rubber research.



ROG LESCOHIER

He enjoyed the work so much that he decided to stay out of school for a while and didn't return until February.

His second summer was with International Harvester, first of Milwaukee and then with the St. Paul plant. Again forgetting he was a chemical, he worked on tool design drafting.

His third summer was spent with

STAFF

the Standard Oil Company of California in San Francisco. The work must have been good, as he is going back there after graduation. He will stay here at Madison for a while and will work for several weeks with Professor Hougen on WPB thermodynamics research.

His honors here include Phi Eta Sigma, Sophomore High Honors, A.I.Ch.E. Junior Scholarship award, Phi Lambda Upsilon and Tau Beta Pi. All this in spite of a mere 2.96 grade point average.

Hobbies for Rog include building model boats with gas engines. His pride and joy is a 30-inch plywood job, powered with a one-third horsepower Forrester engine. He would build gas model airplanes but feels they would crack up too easily, so he confines his airplane work to rubber power.

Rog doesn't believe in being narrow-minded, as his brother is a recently graduated lawyer, and his dad is head of the economics department. Imagine the arguments he had with his brother.

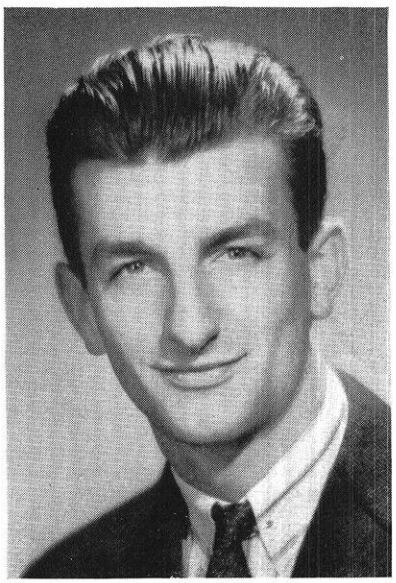
Easter was a momentous occasion to him for he was engaged to Ruth Wutke of Milwaukee, a pharmacy major. Now he's wondering what to do about his 1930 model A, "Daisy."

DOUGLAS BAINBRIDGE

Doug Bainbridge, senior metallurgist, has been an excellent feature writer on the staff for the past three years. His accomplishments vary from articles on patents and spectroscopy to interviews of students and campus notes. His efforts were rewarded with a service key last January.

Doug came to Wisconsin from Scotia, New York, (a suburb of Schenectady) playing on his piccolo and joined the University band on his arrival.

Bainbridge is an outdoor man. He is proficient at all outdoor winter sports, but enjoys skiing and ice boating the most. During Christmas vacation two years ago Doug and several of his friends drove out to Sun Valley, Idaho. After enjoying the skiing and the scenery for a week they headed back for Wisconsin. When they hit a blizzard and a cold snap, the car stalled from ice crystals in the gas line as the



DOUG BAINBRIDGE

mercury dipped to 50 degrees below zero. They coaxed the car into the nearest town where they were comfortably lodged in the local jail as they only had enough money left to buy gas back to Madison.

Each winter Doug has built an iceboat on Lake Mendota and has spent many hours enjoying the wintery gales that sweep across the lake and chill Langdon Street. He is also pretty active in summer. He says he has climbed all of the important mountain peaks in the New England area and has spent weeks in the desolate wilds of northern Canada on canoe trips. Photography and sailboating are also numbered among his hobbies.

He is a member of Triangle fraternity and has been chapter editor and vice-president. The Mining Club elected him secretary as a sophomore and vice-president as a junior. A good share of his time is devoted to Ruth Jaeger, his assistant, who is managing editor of the Daily Cardinal.

Doug spent his last two summers with the General Electric Company, one doing physical testing in the Schenectady plant, and the other as a trouble shooter and investigator in the metallurgical lab at Lynn, Massachusetts. He will be going back to G. E. after graduation this month to do research in the metallurgical laboratories in Schenectady.

JEROME E. BAIRD

Jerome Emmet Joseph Baird, that little red-headed met running around in the track meets, is the retiring editor of the WISCONSIN ENGINEER. For one whole year Jerry planned and produced the magazine, the last semester without an associate editor after Herb Blocki was inducted.

Madison is his home town. He went to Madison West High, where so many of our more brilliant students started. Cross-country running began to take up a good deal of time even in high school. He also did a class assignment or two.

Jerry cannot stand waiting for

(continued on page 31)

JERRY BAIRD

ARBORETUM . . .

(continued from page 7)

deceased were pulled up under his chin. With the alternative style, only the bones were buried, the flesh having left them previously due to a previous temporary burial. The mounds are linear, round, and oval, as well as shaped to represent birds and animals.

Conception and Development

In 1910, John Nolen, a city planner, published a report entitled "Madison, a Model City." This report suggested that the University recognize the scientific, practical, and esthetic values of the open-air horticultural laboratories that had elsewhere proven themselves useful. However, this suggestion was practically forgotten until 1925, when Michael Olbrich, a prominent Madison attorney, became a member of the Board of Regents. Mr. Olbrich had previously organized the Madison Parks Foundation. When the city bought the present Michael B. Olbrich park from this organization, the money was used by the Foundation to begin the Arboretum. Mr. Olbrich was very enthusiastic about this project. He was interested in the out-of-doors, and in making it possible for everybody to appreciate its natural beauty. In 1927, the Board of Regents appropriated a considerable sum of money to be used to purchase "land adjoining Lake Wingra and the Nakoma Golf Course for a forest preserve, arboretum, and wildlife refuge, when and as available . . . ." But Michael Olbrich, champion of conservation, passed on in 1929 before any land was actually bought. It may be that this untimely event further delayed the actual beginning, but Col. J. W. Jackson soon was pushing the project with the same fervor of his late predecessor. Thus on July 23, 1932, the first tract of nearly 150 acres was acquired, and before the close of that year, leftovers of real estate ventures were acquired which brought the total up to about 240 acres. The means by which the University came into possession of the present acreage are varied. In 1933, 190 acres were purchased, as were 72 more in 1934. In 1935, 12 acres of Nakoma "outlots" were taken over. In 1936 saw the Arboretum grow considerably, when 90 acres were deeded to the University, 190 acres were presented as a gift, and another four and one-half acres of outlots added. In 1937, the 35 acre strip along Monroe Street, connecting the Conklin Park playground, as well as some 55 acres of marsh in the Lake Forest area. A 20 acre tract, including a heavily wooded knoll, east of the Fish Hatchery Road, was added in 1938 to establish the present eastern limits of the area. The 200 acre Grady farm was added in 1940, bringing the total area of the Arboretum to the nearly 1140 acres which it now embraces. Actual work was started on the area in 1933 by relief crews, and it was officially dedicated on June 14, 1934, when it was less than half its present size.

A Civilian Conservation Corps camp was established on the area in 1935. An old barn on the area was remodeled into a mess hall for the boys, and the accompanying farm house was converted into an office. The CCC did a great deal of the planting and heavier construction, such as grading, building roads, ponds, and dams, and erecting the Olbrich entrance. An average of 150 boys worked on the area until November of 1941, when the camp was disbanded. Thus the development was a great deal better than would otherwise be possible. The CCC camp was under two administrations; the National Parks Service provided the equipment, and the Army provided food, housing, and clothing for the personnel.

The Arboretum is being developed from the ecological standpoint. That is, the associations of various types of trees are placed on soils most adapted to them, and also in such a position that they will blend into the adjacent associations. Each of these associations must be large enough to be truly representative, therefore a considerable area is needed for the entire Arboretum. A considerable portion is an oak-hickory woodland, the type most common to southern Wisconsin. But other types of associations are also being developed. These include an area of jack-pine, a tamarack bog, a hard maple woodland, a juniper hillside, a ravine of hemlock, marsh areas, an area of Southern hardwoods, prairie areas, and associations of red and white pine, white spruce, black spruce and balsam, and many others.

A Wisconsin prairie area is being developed as a unifying open mat between several of the other associations. Progress on this 80 acre area has been necessarily slow, because little was known about prairie restoration, but after several planting methods have been tried, a satisfactory technique is being worked out. When the University acquired this area, it was badly infested with quack grass and ragweed. However, as development proceeded, these weeds became less, and on the better soils, Kentucky blue grass made its appearance, while Canada blue grass came in on the more depleted soils. Here it was proven that certain types of weeds flourish when they are disturbed, although they tend to die out if left alone. Also, it was discovered that periodic burning actually improves certain grasses.

A large part of the marsh in the eastern part of the Arboretum was under water at the time of the government survey in 1834. Lake Wingra was largely filled in at the time of the Ice Age, but nevertheless has been filling in since that time as a result of the erosion of the surrounding hills. This action was partly responsible for the raising of the marsh above water-level. Also, a real estate company lowered the level of the lake to improve the land it has platted in the Lake Forest ("Lost City") area, and dredged the creek draining the lake. The marl was piled upon the marsh. When the University took over, the creeks were again dammed, thus restoring the lake level, and the marsh improved by further dredging. This area has been developed into a region for the waterfowl, as numerous lagoons and beaches of various types of material, such as sand, gravel, peat, and clay have been developed. It is here that studies are made of their influence on natural bird foods and bird use.

(continued on page 29)

Saved! Tons of tin!

For years telephone cables have been spliced in a very satisfactory way. But the solder joint contained 40 per cent war-vital tin.

So Bell System men devised a new type of joint which saves up to 80 per cent of the solder. A "Victory Joint" they called it.

The new technique has been adopted throughout the System with the result that 600,000 pounds of tin and an even greater amount of lead can be saved in a normal year's construction.

This is another example of the nation-wide cooperation of Bell System people in fulfilling their ideal —service to the nation in peace or war.

ALASKA-BOUND . . .

(continued from page 11)

states. By April 1, however, the bulldozers had arrived. Now let us watch the different work gangs in action.

Directly behind the locating parties that blazed the centerline of the roadway with red flags, came the clearing party. One 15 ton bulldozer followed this centerline and pushed over trees thirty inches and up in diameter. The soil of this region is mostly of clay with a thin layer of black soil. The trees are shallow rooted and offer little resistance to these charging tanks. The clearing tool on the bulldozer first cuts the surface roots and then the full might of the machine reels over the tree which may be as high as 100 feet. Following on each side of this first machine, are two similar machines. Together they clear a path 60 to 70 feet wide through the wilderness.

Behind the bulldozers comes the construction gang. These men construct the culverts, which are creosoted pine, and put up the smaller bridges. Attached to this gang is one heavy pontoon company whose troops can throw bridges across wide rivers until permanent bridges can be created.

Following the construction gang comes the crew engaging in ditchdigging, rough grading and corduroying. Corduroying is very important as a foundation in passing over muskeg swamps or wet areas. In extremely wet places, corduroys eight logs in depth and twelve miles in length have been constructed. Because of the small trees that grow in swampy places, it is very hard to obtain wood at times. In some areas, the logs have been carried sixteen miles. The rough grading is usually performed by tractor-graders and the cuts and fills are scraped by 12 cubic yard carryalls.

The remainder of the four companies are scattered along some thirty to forty miles behind, engaging in widening narrow places, and placing gravel to form a level road bed. Far in the rear come the civilians under the direction of the Public Roads Administration. These civilians widen the road to twenty-four feet, put in steel and trestle bridges, and relocate the road in some sectors. These men also clean up the debris that is usually piled high on the sides of the highway.

The equipment that one such Engineering Regiment has, is listed below:

20—D-8 Diesel bulldozers
24—D-4 and R-4 tractors and trailers for their transportation
90—Dump trucks
20—Jeeps
2—One-half cubic yard shovels
1—Truck crane
6—12 cubic yard carryalls
6—Graders
1—Portable sawmill
2—Pile drivers
Water purifiers and one electric light plant

Maintenance of the Alcan Highway

Few people realize that the Alcan Highway has a speed-

Loading Gravel, Which Is Plentiful Along the Highway Route

cop. The speed limit on this defense link is 25 miles per hour and 10 miles per hour over the bridges. Every mile on this road has its milepost. This permits the exact locations of working crews and accidents.

One of the factors that made the maintenance department breathe more easily was the lack of snow in this part of Canada. The region is known as the Light Snow Belt, for no heavy winds prevail here. The men are on guard, however, for any freak storms.

Along the Alcan Highway are many springs. In winter these springs do not freeze, but rather they throw their water onto the roadbed where it freezes and slows up the traffic for miles. There is no way of preventing these floods or seepages, but the iced roads can be cleared by several means. One way is to blast the ice loose, but this method also destroys some of the road. One can also lay a corduroy road down over the ice permitting the passage of vehicles. In some regions, heavy and thick ruts are made into the wood. Through these ruts the big trucks crawl, avoiding the icy inclines and curves.

In a region of much water, bridge maintenance is considered very important. Each spring, every wooden bridge will be washed out, so crews are kept at all river crossings cutting duplicate parts. This is because the earth is at a temperature of 50° F. below zero, and serves as an icebox. Gradually the two ice shelves approach each other from top and bottom. The water between them is forced out and may destroy a bridge.

Never before had man depended on machines as much as on the Alcan Highway work. As in Russia, our lubricants froze up and parts got brittle and broke when strained under heavy loads. When these machine parts broke, the machines had to be left idle since no repair or duplicate parts were carried along. All repair shops were located at a quartermaster supply depot, hence broken machines had to be towed many miles.

A large majority of headaches for the maintenance men

(continued on page 26)

STATIC...

by Dick Roth, and Bob Daane

These are excerpts from letters actually received at one of the offices of a government relief organization:

Sirs: I am forwarding my marriage certificate and my two children.

I am writing to say that my baby was born two years old. When do I get my money?

Unless I get my husband's money soon I will be forced to live an immortal life.

I am sending my marriage certificate and six children. I have seven. One dies which was baptised on ½ sheet of paper by Rev. Thomas.

My husband has been in charge of spitoon (platoon) so now do I get my money?

Please find out for certain if my husband is dead. The man I am living with now won't eat anything or do anything until he knows for certain.

Oh, I am very annoyed to find out that you have branded my oldest son as illiterate. This is a dirty sham as I married his father a week before he was born.

In answer to your letter I have given birth to a boy weighing ten pounds. I hope this is satisfactory.

The night the marines landed in the Solomons, a marine sergeant was praising his corps to the skies. An army captain finally interrupted. "Don't forget," he said, "that when a marine goes into battle there are ten soldiers on one side of him and ten sailors on the other."

The marine raised himself to his full six feet one and came to attention.

"Sir," he retorted, "that's the proper proportion."

(continued on page 26)

ARBORETUM . . .

(continued from page 20)

Soil Studies and Planning

A research fellow made a soil study of the entire area so as to determine the plants best suited to each part of it. This study disclosed that there are twenty-four soil types on the area. The methods of making soil studies are very ingenious and interesting. To obtain what are known to the horticulturist as "soil profiles," pits large enough for a man to work in are dug to a considerable depth, usually about six feet. Then on one face that has been trimmed smooth and perfectly vertical, the thicknesses of the various types of topsoil and mantle are measured. This data, along with the co-ordinates of the pits and the soil types (which are determined by analysis of samples) are carefully recorded and interpreted on a soil map. To complete the map, thousands of earth borings are made, thus keeping a check on the profiles and furnishing a means of establishing the boundaries between the various types. A carefully made soil map, when used in conjunction with a contour map, is an indispensable aid to the planning of the plantings, as well as in studying the possibilities of "conditioning" the soil. The latter is done by adding limestone fragments, litter, leaf mold, or various other materials as the circumstances may require.

The study of soil changes presents an interesting research problem. The fundamental concepts are that the flora will adapt itself to the conditions of soil type, topography, disturbance, changes in light and air, and other factors, and also that the soil itself will change due to the effect of the flora. Thus it can be seen that soil changes and flora changes are interdependent in a very complex manner, and that the Arboretum, over a period of years and even generations, will be the site of a continual research project that will some day yield conclusive evidence on many questions of soil and flora changes. It might be noted in passing that the general conditions existing in Wisconsin favor woods. Thus if the soil were left undisturbed for any period of years, it would tend to go to trees. Some examples of the interdependency of flora and soil changes which are being checked upon follow here. It seems quite well established that pine trees tend to build up an acid soil as a result of the decaying of their needles on the ground. Black walnut has an extremely toxic effect upon the soil. It must therefore be planted sparingly among other trees, or the soil will eventually not grow anything, not even black walnut. The red maple has a beneficial effect upon the soil. It brings up potash to its leaves from the subsoil, and when the leaves fall on the ground and decompose, they add the potash to the topsoil.

Not only must the soil type be studied in determining plantings, but the topography must be taken into consideration. Red pine will grow on the drier summits of hills, but white pine must be situated on the slopes where there is more water available in the soil. A jack-pine must have a light sandy soil, while a white spruce should have a clay to grow on. Planting is used also to exaggerate the topography. This is a trick of landscaping in which the low spots are planted with low growing trees or even left bare, while the hills are planted with trees that will grow tall, thus accentuating the heights, giving the most desirable effect.

Maps and Co-ordinate System

In planning the Arboretum and in controlling the experiments going on there, a great number and variety of maps are required. A master plan shows the Arboretum as it will appear at some time in the future, when all desirable land has been acquired and all the planting and construction completed. All areas and plant associations are designated on this map. An interesting system of co-ordinates has been developed to make it possible to accurately keep records on all the plants that are being studied. Each government section is divided into the usual quarters and quarter-quarters (160 and 40 acres respectively). Then the "forties" are in turn divided into ten-acre plots, with these in turn being divided into four parts of two and one-half acres each. The corners of each of these small plots is marked by a concrete monument with the proper co-ordinate numbers marked on it. When an observer wishes to make a report on a certain planting, he can indicate its location on a specially prepared report-sheet map which shows all the land subdivisions.

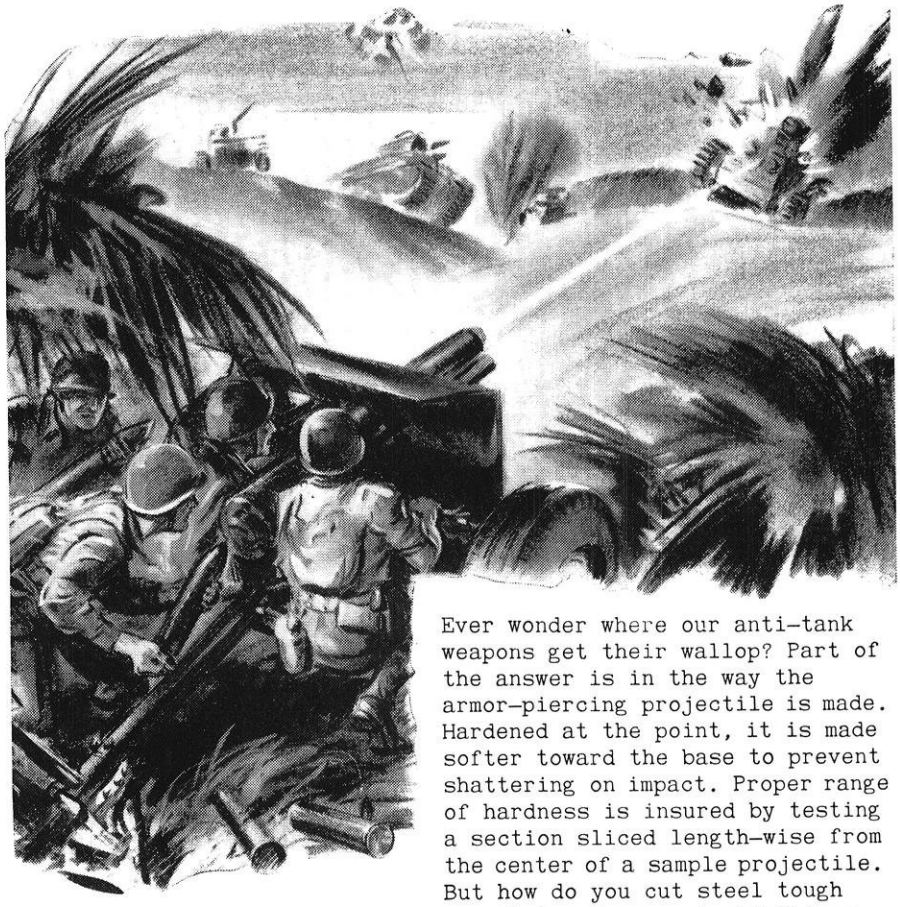
Planting maps are made to the scale of $1''=20'$. By using a map of such scale, it is possible to accurately locate each tree, and thus keep a check on it. The stadia method is generally utilized to lay out these planting areas. The planting maps are generally tied in to the co-ordinate system. Maps are also used to locate the bounds of grass and wildflower planting. It is very important to be able to locate these areas accurately both on maps and on the ground, so that the observers can be sure of getting the right plantings when making their rounds. An example of this situation is locating the experimental plots and the corresponding control areas when making the grass burning tests. It is obvious that if mistakes were made in such locations, the conclusions of the experiment would be in error.

When some grading work is to be done, a contour map of one-foot intervals is prepared, showing the original contours as broken lines, and the proposed finish contours as solid lines. In another case, a map was prepared of the marsh area at the eastern end of Lake Wingra to determine how proposed dredging operations would disturb existing plants and trees. From this map, it was possible to work out the design of the lagoons and beaches for the shorebirds and migratory waterfowl without wasting plants that could be used in the design. Maps and plans were necessary for the CCC camp when it was established. In preparing all these maps, the stadia method of survey is often used, although the plane table has been used in some instances.

At the present time the class in Topographic Surveying, under the direction of Professor Ray S. Owen, is surveying and mapping the 200 acre Grady tract. Each student

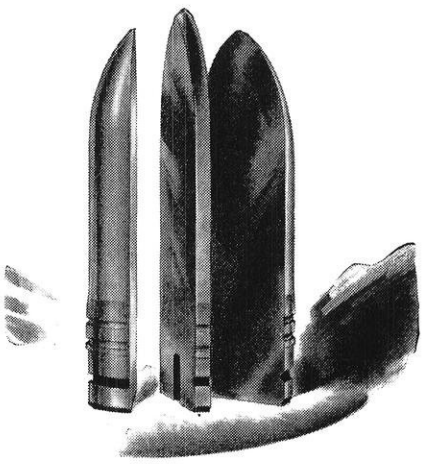
(continued on page 36)

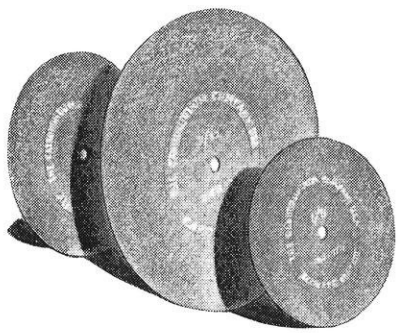
Set 'em up in the other alley!



Ever wonder where our anti-tank weapons get their wallop? Part of the answer is in the way the armor-piercing projectile is made. Hardened at the point, it is made softer toward the base to prevent shattering on impact. Proper range of hardness is insured by testing a section sliced length-wise from the center of a sample projectile. But how do you cut steel tough enough to pierce a tank? With a cutting off wheel such as made by Carborundum!

Cutting off wheels are abrasive discs that are amazingly tough and often extremely thin. They do the work in a fraction of the time required by ordinary methods. Their high precision adapts them to the most delicate operations such as slotting pen points. Such wheels are now used to cut plastics, glass, brick, tile, steel and non-ferrous metals in plate and bar stock. Frequently further finishing is unnecessary.





When you take your place in the war industries, keep Carborundum in mind. We will always be ready to help you with problems where the use of abrasive products is involved. The Carborundum Company, Niagara Falls, New York.

CARBORUNDUM
REG. U.S. PAT. OFF.
ABRASIVE PRODUCTS

Carborundum is a registered trade-mark of and indicates manufacture by The Carborundum Company.

Live Trucks Are Useful When the Mud Gets Deep

ALCAN HIGHWAY . . .

(continued from page 22)

came from the Chinooks. They are warm winds which sweep over Alaska from the shores of Japan. Overnight they can melt a snow-drift ten feet high and thaw the ground so fast that the roads become a sea of soft mud.

Perhaps not known to very many people are the permanent ice lenses of this region. They are called lenses because they form on the side of a hill in the form of a convex mirror. They were formed many years ago by the glaciers on their passage over this region. These lenses must be avoided in road work for, if the moss or other vegetable insulation is removed, the melted water might play havoc with the road. Great care was taken in building the Alcan on the higher side of these lenses.

As Canada has many streams and swamps, the drainage problem was a major one in the selection of the roadbed. Because steel could not be transported with ease, a new type of culvert was used. It was made of creosoted Jackpine produced in Canada. These culverts were braced on the inside and they performed the yeoman service in carrying away the drainage water.

Expense of the Alcan Highway

This 1,650 miles of highway will cost the United States government approximately $65,000,000—the price of a 35,000 ton battleship.

Enough credit cannot be given to the Corps of Engineers for their great work. For war, we have a great defensive highway; for peace, a road through the wilderness which should increase the tourist trade to Alaska. Perhaps if we had let the P. R. A. build the road, it would have taken them years, for money did not build this road. It was men toiling every day for fourteen hours.

Yes, let the Engineers do it. They did, in seven months, 20 days.

STATIC . . .

(continued from page 23)

A Negro accused of making moonshine was asked if he pleaded guilty, "Yes, I pleads guilty and waives de hearin'."

"What do you mean, waive the hearing?"

"I mean I don' wan' to hear no more about it!"

o o o

After the fall of their homeland, a lot of Polish sailors were assigned to British destroyers before they were given ships of their own. One of these destroyers came upon a Nazi submarine on the surface, rammed it, and sank it. The captain ordered the Nazis who were floating about in the heavy sea hauled abroad the destroyer. He said he never saw so many Nazi seamen. His crew kept pulling them out of the water at an incredible rate. The mystery was solved when the captain chanced to look over at the opposite rail. Just as quickly as the English sailors were pulling the Nazis out of the water on one side, the Poles were dumping them overboard again on the other.

o o o

Army intelligence officers on Guadalcanal offered a bounty of $100 each for live Japanese prisoners. Soon the soldiers began streaming in with so many prisoners that army funds neared exhaustion, and a colonel questioned a sergeant to find out how the Nipponese had been so easily captured. "Oh," said the sergeant, "that's easy. Those marines out in the bush haven't heard about this offer so we buy Japs from them for $5 apiece."

o o o

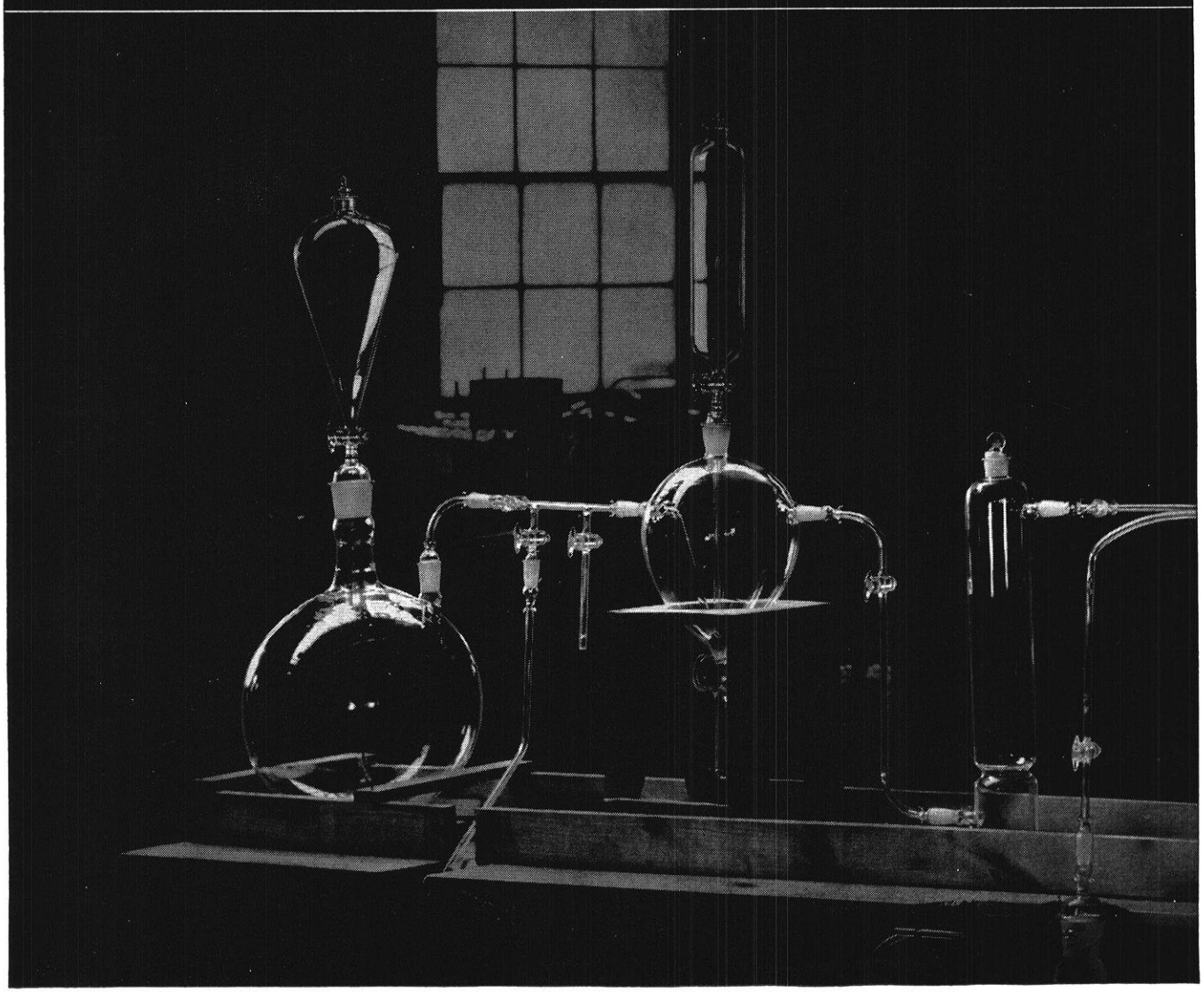
The old Negro laundress came one day with a tale of woe. "Cheer up, Mandy," said her mistress consolingly. "There's no use worrying."

"How come dere's no use in worryin'?" she demanded. "When de good Lawd send me tribulation He 'spect me to tribulate, ain't He?"

o o o

This one's about a little chap of eight who recently went to Boston to visit Grandmother, making the train journey all alone in a day coach. When he arrived, he reported that the trip had been uneventful, except for a strange encounter with a sailor. It seems that Mother had put him on the train and then a nice lady had sat down beside him. He and the lady talked for a long time, and then the train stopped and lots and lots of sailors got on. Then they rode for a long time and pretty soon the train stopped and the nice lady got off. "And then," the child told his Grandmother, bewilderment in his voice, "one of the sailors acted real mad. He came over and said to me, 'Listen you little weasel, you might have told us that babe wasn't your mother'."

Neither too little nor too late, Dr. Goebbels!



IT'S fashionable in some quarters to talk of America as a nation that lets clever people like the Germans run circles around it in technical skill. We have a hunch the idea comes from Dr. Goebbels' propaganda factory in Berlin. Anyway, it's not true.

In the glass field, for example, America was surprisingly well prepared for war. Take Laboratory glassware, vital in the manufacture of dyes, explosives, foods, and many war supplies, as well as to health. In 1914 we depended upon Germany for this material. But in 1915 Corning developed Pyrex brand laboratory ware and now this country needs German glass no more than it needs German wheat!

Despite war's demand, Corning is keeping pace with laboratory ware, insulators, communication equipment, and signal glassware required for planes and ships. Chemical industries are getting necessary quantities of glass piping, acid pumps, and glass mechanical parts that replace scarce metal alloys. Even glass precision gauges (ring, plug and others) are now being produced that are in many ways superior to ones made of steel.

These are just a few of the war-important items flowing out of Corning today. The main point is that when the national need arose, Corning research had already explored the things that non-critical glass could do to replace materials vital to war effort and was ready to help. Yes, to the engineer glass is really important today, and promises to be more so after the war is over. That's why the best advice we can think of for you is this: Keep up-to-date on glass! Corning Glass Works, Corning, New York.

"YOU HAVE DONE A GOOD JOB OF SENDING GLASS TO WAR"

CORNING
means
Research in Glass

Societies Elect Officers . . .

ON THE CAMPUS

Edited by Bill Haas, c'45

POLYGON ACTIVITIES

Polygon Board, prevented by the war from sponsoring the Engineering Exposition scheduled for this year, has undertaken other projects to promote extra-curricular activities and to raise money for the engineers.

The Board began its 1942-43 program with the opening of school last fall when it sponsored a joint membership drive for the six professional societies. An all-engineering smoker was held on September 30 to acquaint the engineers with the activities and officers of the societies and supply the societies with a list of prospective members. The Polygon Ball was held November 28 with Virginia Healy ruling as "Slide Rule Queen." Arrangements for special financial aid to societies without sufficient funds to carry on their year's program was also made last winter. The program of the board was concluded with the Beard Growing contest, St. Pat's election and the Engineers' Dance.

A final accounting of the buttons and tickets sold shows that the engineers have put on a campaign this year that has smashed all previous records for St. Pat elections during non-exposition years. A total of 350 tickets and 4,700 buttons were sold. The profits of the campaign were divided among the societies according to the ticket and buttons sales of each one.

Polygon Board this year intends to continue its program through the summer session and will welcome any suggestions for summer activities. Such suggestions may be left in the WISCONSIN ENGINEER office. Last spring the Board initiated the policy of placing their reserve funds in investments that will aid the war effort by buying a $500 war bond. This year the Board intends to invest its remaining funds in keeping with this policy.

—JOHN MEIGS,
Secretary, Polygon Board

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MINING CLUB

Baked ham, the election of new officers, and colored movies highlighted the April session of the Mining Club, which met in the M&ME library on Tuesday the fourteenth. The ham, perfectly seasoned by the addition of cloves, brown sugar, and a ginger ale-raisin sauce, and baked in one of our electric furnaces, was prepared under the direction of George Pazik whose finesse in culinary art cannot be denied. When served with baked potatoes and salad, it made a delicious meal, in honor of which George received a rousing sky-rocket from the members.

Election of officers occupied the business portion of the meeting and the following were elected: Wally Wollering, president; Jim Hall, vice-president; Harvey Zielke, secretary; Gordon Benson, treasurer.

The movies shown were "The Story of Sand" and "Coal and Its Uses." The former depicted the geological deposition of sand and its modern uses in industry. The latter concerned the manufacture of metallurgical coke and its by-product, sulfate of ammonia. Emphasis was placed on the uses and advantages of the sulfate of ammonia as a fertilizer in agriculture.

The next meeting of the club will be on May 5, and although nobody knows what the dinner is to consist of, those members who have a definite liking for Polish sausage and sauerkraut (or should this be called liberty cabbage?), will be in for a real treat.

—WARREN FRISKE

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A.S.M.E. CONFERENCE

On April 12 and 13, Group XI of the A.S.M.E. held its eleventh annual student conference on the campus of Northwestern University at Evanston, Illinois. The headquarters of the meetings was Northwestern's new technological institute, a college devoted to scientific research and education.

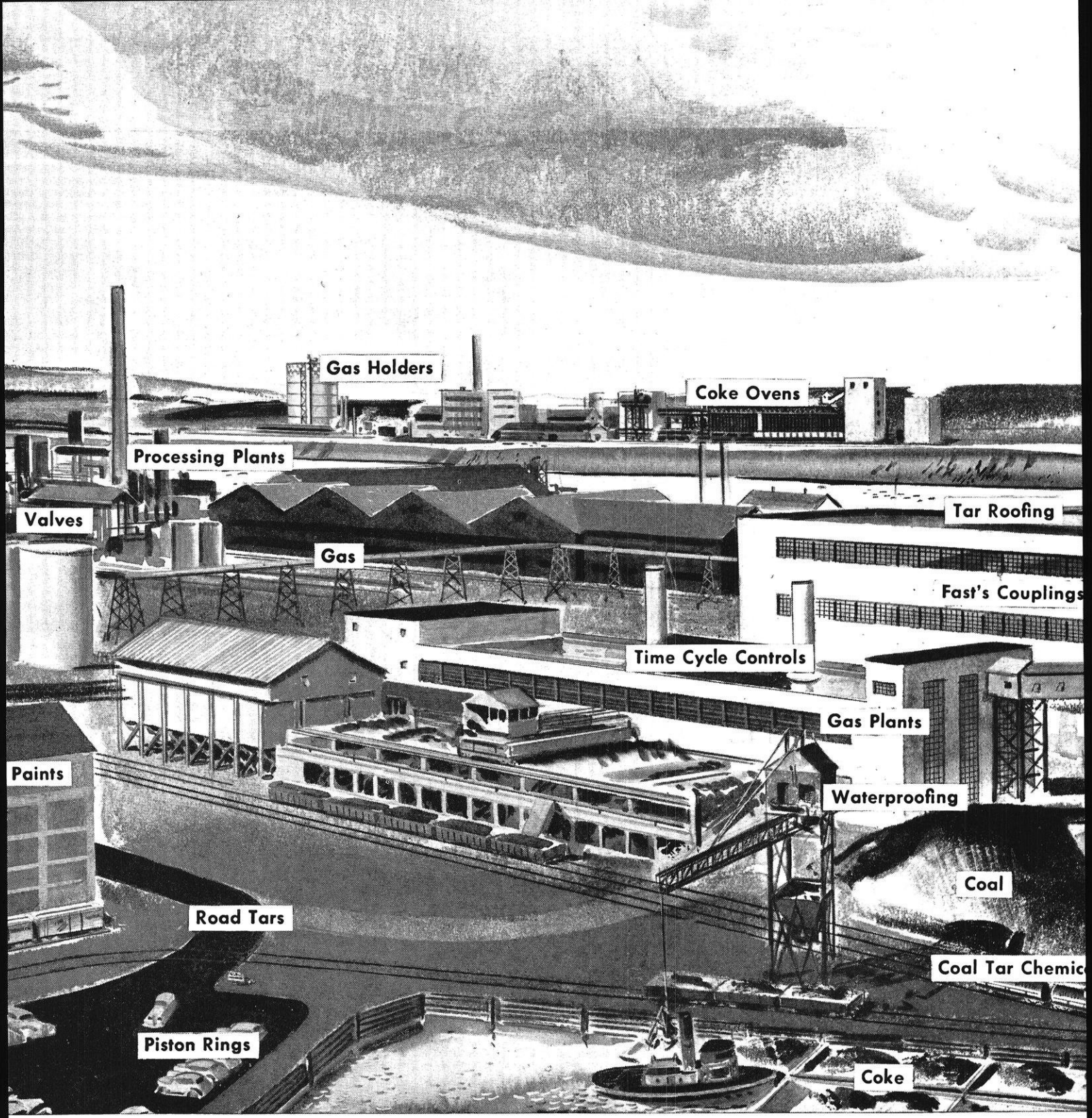
The morning of April 21 was spent in registering and in inspection tours of the campus. The technical sessions opened in the afternoon with five speakers from five different schools speaking on subjects of an engineering nature. The annual banquet was held in the Georgian Hotel at which Dean Kenneth Olson of the Northwestern School of Journalism spoke on "Propaganda and War News."

The technical sessions were continued on the morning of April 13. Five more students spoke and our own Bob Lanz was chairman. Luncheon was served at the Georgian Hotel, after which prizes were awarded to the winning contestants.

Karl Pennau of our engineering school, who spoke on "Domestic Stoker Installations," was awarded fourth prize.

The conference closed on the aft-

(continued on page 32)



"The most fascinating business in America"

The unlocking of the treasure house that lies sealed in a lump of coal has been called the most fascinating business in America. It touches every industry. That is why Koppers has been called the industry that serves all industry. Here are some materials which Koppers supplies to the chemical industry . . . . which is only one of dozens of industries it serves in comparable manner. Koppers Company and Affiliates, Pittsburgh, Pa.

KOPPERS

THE INDUSTRY THAT SERVES ALL INDUSTRY

ALUMNI NOTES

by Glenn Jacobson, ch'46
and Charles Tomlinson ch'44

Chemicals

KIEWEG, HOMER, MS'33, is in charge of plant projects and developments for the Commercial Solvents Corp, Terre Haute, Ind.

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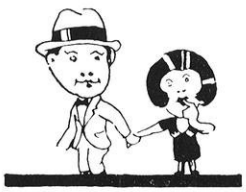
Mechanicals

SLEZAK, LIEUT. COL. JOHN, '23, District Deputy Chief of the Chicago Ordnance District, recently presented the Army-Navy Production award to the employees and management of the Walworth Company's Kewanee Works.

NOVOTNY, CAPT. CHARLES H., MS'33, has been transferred from battalion commander to assistant chief of the unit training branch at the ordnance center, Camp Santa Anita, Arcadia, California.

GROSS, EDWARD W., '36, was married on March 27 to Miss Ann Taylor of Schenectady, N. Y.



PEASE, LIEUT. RICHARD H., '39, was recently killed in a plane wreck at Gowen Field, Boise, Idaho, where he was assistant operations officer and flight instructor with the army air corps. Pease had recently been recommended for a captaincy.

ADAMOWICZ, CHARLES M., '41, a lieutenant (jg) in the Navy, is stationed at Norfolk Navy Yard, Portsmouth, Virginia. He is doing ordnance installation aboard naval vessels.

DURZO, ENSIGN FRANK V., '42, is attending Ordnance School at the Navy Yard at Washington, D. C.

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Civils

HOGENSEN, ROBERT C., '41, is an apprentice seaman in the U.S.N.R. in training at Bainbridge, Maryland. The draft caught up with him before his application for a commission received action.

CARPENTER, WILLIS A, '41, has been commissioned a second lieutenant in the Engineer Battalion of the Marines. He was sent to Camp Le Jeune at New River, N. C., for further training. He writes: "As student officers we watch the organization and procedures of various jobs so that we will be able to go out with our own units and direct and supervise engineering work. It gets a bit tiring at times just watching and learning, but our instructors are generally free enough of the time to explain and answer questions. Even vertical and horizontal curves, which I had feared were lost to my knowledge, came back to me after a ten-minute discussion with the instructor. It sure felt good to suddenly have those curves come back."

HANSON, WILLIAM, '42, reported missing in action after the February fighting in North Africa, was officially reported on April 17 to be a prisoner of the Germans.

MILEAGER, RALPH E., '42, ensign in the Sea Bees, is on an island in the South Pacific, not far from the hot spots. He writes, via V-mail, "I have been made hydraulic and water supply engineer for this southern part of the island, which contains only large city and most service camps. At present have three large designs in fire and am getting world of experience in long pipe line design, plus small dam design, plus a good deal of hydraulic investigation. I ruin the French language, but speak it to a degree." His address is '37th U.S.N. CB —FPO, San Francisco."

NERO, MILTON A., '42, left Dravo Corporation on April 15 to accept a commission as ensign in the Sea Bees. He will be stationed at Camp Peary, Williamsburg, Virginia, for training.

ANDRAE, RICHARD W., ex'43, who was taken out of school for air service, reached the cadet center at San Antonio on March 16 and was successful in passing the tests for pilot training. He will receive nine weeks of pre-flight training and then 27 weeks of flying. His address is Av/c Andrae, R. W., Squadron 113, Flight C, AAFCC-SAACC, San Antonio, Texas.

CHRISTESEN, RUSSELL J., ex'43, who was one of the men taken from school for air service, arrived in San Antonio, Texas, on March 18, and is reported to be in Flight H of Squadron 110, SAACC.

DENT, ARLIE R., '43, at present with the Dravo Corporation at Pittsburgh, announces the arrival of a daughter, Karen Ann, on March 29.

VOGEL, MERTEN M., '43, is junior engineer with the Curtis-Wright Corporation at the St. Louis plant.

READ, ROBERT B., '43, is an ensign in the U.S.N.R., in training at Fort Schuyler, the Bronx, New York.

FORD, HENRY M., '21, has been commissioned a lieutenant in the Sea Bees.

CHRISTENSEN, N. A., '28, dean of engineering at Colorado State College of Agriculture and Mechanic Arts, is at present in government employment on research work in arms and armament.

SCHNEIBLE, DOUGLAS E., '38, has left the National Bureau of Standards and is with the Public Roads Administration in the office at Kansas City, Missouri. He announces the arrival of a daughter, Judith, on March 18.

LENZ, ARNO, MS'30, Assistant Professor of Civil Engineering at the University of Wisconsin, announces the birth of a daughter, Martha Jean, on January 31, 1943.

DOUGLAS, MALCOLM S., '22, Associate Professor of Civil Engineering at Case School of Applied Science in Cleveland, was chairman of an independent board of investigators which determined that the disintegration of the million-dollar Mayfield Road and Bulkley Boulevard freeways in Cleveland could have been prevented by proper methods of construction.

(continued on page 32)

STAFF . . .

(continued from page 19)

busses. Consequently, one frequently sees him with coat-tails flapping and hair flying, astride his home-built "bicycle built for two." With the aid of a welding torch, he converted two normal bikes into one tandem. The rear passenger has nothing to hang on to but the pilot, so Jerry often takes his co-ed friends on bike rides. He prefers red-heads, especially if her name is Sylvia.

The chief athletic interest of this perpetually smiling lad is cross-country. He has won both a minor and major letter in this event. Whereas many people run but slightly faster than they walk, Jerry walks only slightly slower than he runs. In spite of being short, he has been known to walk the legs off six-footers. (Just ask me!)

Physical metallurgy was his favorite course. Next to that, perhaps, was a course in speech. Speech was not so popular with his family, however, so he was finally badgered into going to the basement and waxing eloquent with the stoker as a noisy, but attentive listener.

Twice an uncle (to Tommy, alias Hector, and Judy), he has a brother-in-law who is a first rate amateur magician. One of Jerry's favorite hobbies is to dismantle his brother-in-law's equipment (engineer fashion) and then attempt to reconstruct it (not so engineer fashion). Another hobby is studying out engineering problems with the aid of his nephew's tinker toys, mechanical train, and the ENGINEER'S editor and associate editor. When he's very good, his sister allows him to hold skeins of yarn while she rolls the yarn into balls.

During the summer before his sophomore year, he learned to fly, per C.P.T., and regrets that he has allowed his time to lapse since then. The next summer he worked in Chicago as a blast furnace laborer. He and some friends set up light housekeeping in an apartment and ate so many steaks that he was glad to get a bite of hamburger for a change.

Last summer he worked for the Dow Chemical Company in their physical testing department. He had an interesting experience with a new hydraulic machine on his last day there. He ran the head down too far, causing it to stick. When he left, the last he heard was that Dow was wiring the manufacturer of the tester, in hopes of being able to get the machine back into operation.

While at school, Jerry has won an Alumni Research Foundation Scholarship, was secretary of the President's council and is now treasurer of Theta Chi fraternity. He capped off his activities by being initiated into Phi Kappa Phi, all university activities honorary.

After graduation in May, he will report for work for the Aluminum Company of America. This in spite of his recent articles on magnesium production.

CAMPUS NOTES . . .

(continued from page 28)

ernoon of the 13th, with two inspection trips, one through the Merchandise Mart, and the other through the Lakeside Press.

The men who represented Wisconsin at the conference were Professor D. W. Nelson, Karl Pennau, Bob Lanz, Stan Puidokas, and Rene Gehl.

—RENE GEHL
Publicity Chairman

•

MECHANICAL ENGINEERS' SOCIETY OF WISCONSIN

A new engineering society known as the Mechanical Engineers' Society of Wisconsin, was formed Wednesday, April 21, in the Memorial Lounge of the Memorial Union.

At a joint meeting of the S.A.E. and A.S.M.E. the constitution of the new organization was read, criticized, and approved. The two older societies will continue in existence with optional membership. The new body will act in conjunction with the other two and in addition will integrate more closely the campus activities affecting mechanical engineers.

An election of officers was held with the following results: Fred Graper, president; Roy Anderson, vice president; Leonard Velander, secretary; and Darrel Engel, treasurer.

Refreshments were served after the business meeting concluded.

—RENE GEHL
Publicity Chairman

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A.S.C.E.

Plans for the annual picnic were discussed at the meeting of April 7, 1943. Charles Naeser was appointed general chairman for the event. At the meeting of April 21, the following men were elected as new officers: Ed Kloman, president; Roy Erichsen, vice-president; Wilbur M. Haas, secretary; and Gordon Robeck, treasurer.

Mr. LeRoy W. Empey, c'26, contact man with the Wisconsin Section of A.S.C.E., was present at the meeting, and discussed the transition in the period between the last World War and the present conflict in the light of its effect upon engineers. Mr. Empey was formerly the Assistant Division Engineer for the Wisconsin Highway Commission at Green Bay, and is now doing research work at the Forest Products Laboratory here in Madison.

—BILL HAAS

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A.I.Ch.E.

The following new officers were elected at the April meeting of the A.I.Ch.E. Richard Soit, president; Albert Oman, vice-president-treasurer; Marvin Woerpel, secretary. Ground plans were laid for the annual picnic, and a report on the St. Pat campaign was given. Following the business meeting Larry Pagel, a chemical engineer from the Badger Ordnance Works, presented some of the problems and techniques confronted in the powder industry. Following his very interesting talk refreshments were drunk.

—MARV WOERPEL

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PI TAU SIGMA

Alpha Chapter of Pi Tau Sigma held its annual picnic on May 8 at the Tent Colony. Highlight of the afternoon was the baseball game in which the seniors were beaten by the other members, 6-4. Refreshments consisting of beer, pretzels, hot dogs and coke kept up the members' energy, and everyone had a swell time.

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Several engineers have been helping the editor of this page by writing on their own societies. Rene Gehl has been doing a magnificent job of reporting for the past several months on A.S.M.E. and, more recently, the new Mechanical Engineering Society. Warren Friske has kept the Mining Club in the ink, and Marv Woerpel has been doing the A.I.Ch.E. write-ups. Other men have been turning in articles from time to time, including Joseph Klien, Pi Tau Sigma, and Karl Pennau, Tau Beta Pi. The efforts of all engineers who help to fill this page are greatly appreciated.

—BILL HAAS
—C. N. EDITOR

ALUMNI NOTES . . .

(continued from page 30)

McGUIRE, LIEUT. FRANCIS, '30, of the U. S. N., was married March 16 to Miss Emily Sneed. Their present home is at Williamsburg, Virginia.

ERICHSEN, MAJOR FRANK, '31, stationed at Escanaba, Michigan, was recently promoted from Captain to Major.

JOINER, LIEUT. ROBERT, '42, on the fighting front in North Africa, was recently promoted from Second to First Lieutenant.

DONOHUE, JERRY, '07, died on April 13 in a Sheboygan hospital, following a minor operation. He was among the leaders of his profession in Wisconsin. In 1921 he incorporated the Jerry Donohue Engineering Company, which served many Wisconsin municipalities as a consultant on water and sewerage matters. The sewerage treatment plant that he built for Antigo is said to have been the first plant in the United States to collect and utilize the gases of decomposition. The issue of the Wisconsin Engineer for May, 1931, carried an account of his achievements as one of Wisconsin's successful engineers. His geniality won him many friends and many honors.

CRANDALL, LEE W., '36, left the Bureau of Reclamation last August and is at present a stress engineer for the Hoosier Aircraft Company of Elkhart, Indiana, assigned to Fairchild Aircraft at Hagerstown, Maryland.

VOELKER, RAY F., '37, ensign in the Sea Bees, finished training early in April and was able to return to Milwaukee to see his new daughter, Kathryn Louise, born March 28, before he had to leave for parts unknown in active service.

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Electricals

REED, PHILIP D., '21, recently resigned his positon as Chairman of the Board of Directors of General Electric in order to continue his work as Deputy Chief of the Harriman Mission in London.

BJORNSON, B. G., '22, is broadcasting for NBC from Reykjavik, Iceland.

HENRY, EDISON E., '22, is with a public utility at Ardmore, Oklahoma.

LONGENECKER, ERNST, '22, is president of the Lauson Co., New Holstein, Wisconsin, which builds industrial and marine gasoline engines.

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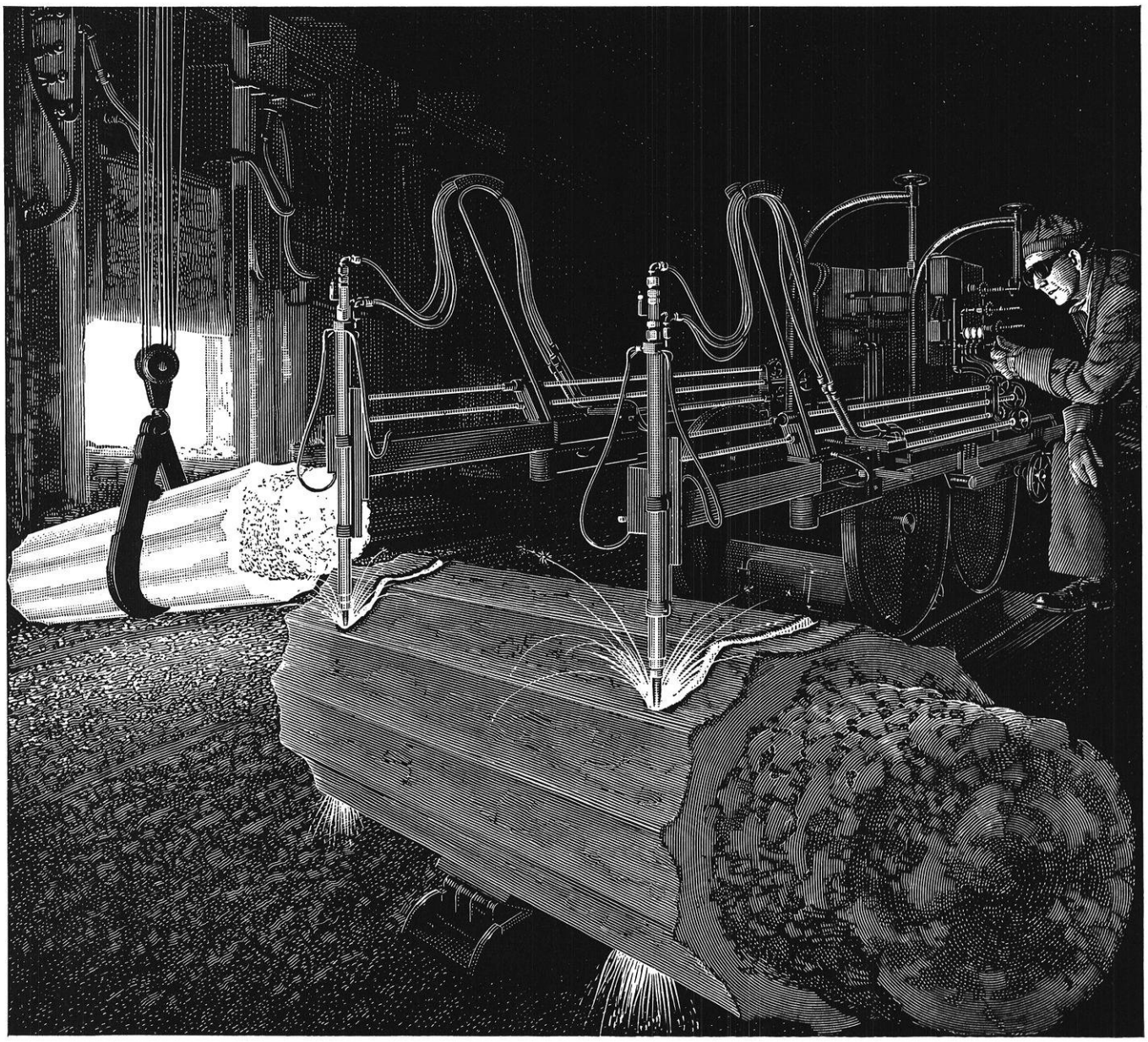
Miners and Metallurgists

SCHULTZ, JACK M., '42, who is with the Aluminum Company of America at New Kensington, Pennsylvania, was married on April 10 to Miss Dorothy Elisabeth Weaver of New Kensington.



A quick trim for a metal giant

MAMMOTH ingots of steel for war weapons must be "cropped" or trimmed at the ends before forging. Formerly this job was done slowly and laboriously on a heavy press, but today the huge ingots are sliced neatly and quickly by the oxyacetylene flame.

Using a new heavy cutting technique developed by Airco Research Engineers and cutting through metal as thick as 36", the oxyacetylene flame trims off both ends of this ingot at once in approximately 11 minutes, compared to several hours required by other methods. The new ingot cutting machine designed and built by Airco engineers especially for this job guides the movement of the oxyacetylene cutting torches in an arc corresponding to the ingot contour.

This new flame cutting application typifies the ever-expanding usefulness of the oxyacetylene flame in American industry. Spurred by the need for swifter war production, industries are finding more and more ways to accelerate manufacturing with oxyacetylene flame and electric arc processes.

If you want to keep posted on some of the most recent developments and applications of oxyacetylene flame and electric arc processes, write for a free copy of the illustrated booklet, "Airco in the News." Please address your requests to Air Reduction, Room 1656, 60 East 42nd Street, New York.

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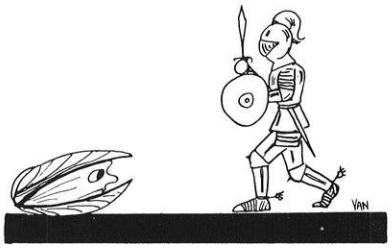
KNIVES . . .

(continued from page 17)

by drilling and tapping a hole in one end into which is screwed the bolt which has the blade welded to it. This method provides a simple, readily-made arrangement having the advantage of interchangeable handles. However, this type of handle cannot be made with the variety of colors and materials that is possible with the previous arrangement.

The Worth of Knife-Making

As was previously stated, many types of knives may be made by following the same general procedure. Sticking



One Must Exercise Caution in the Use of Homemade Knives

knives, throwing knives, carving knives, hunting knives, skinning knives, and numerous others may all be made by altering some of the methods and materials used. Personally, I enjoy making hunting knives the most, as that is the type of knife for which I have some use.

You may ask, "Is this hobby worthwhile?" I think it depends on the individual. I get sufficient enjoyment and satisfaction out of making knives to consider it worthwhile. Others might not feel this way about it. However, knives are very useful and if one uses good materials as well as care in the construction, it is possible to make knives that are better than what one can get on the market. Moreover, individual designs may be worked out which one would never find in "store-knives."

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Engineers' Creed

We go first: you others—you come after us.
It's our bones that mark the trail.
We die of fevers and of arrows and of gunshot
and of gross accidents and earth catastrophes;
but that doesn't matter because always our younger brothers
come after us to carry on the job till it's done.
And it's always done.
For sweatshop wages we create civilization;
yet every time we finish a job—build a road or a bridge
or cut through a mountain or what-have-you,
we're thanked by having the job fold up under us;
and we have to hunt another. That's our pay-day.
What do you think we're trying to do?
Do you suppose this shoveling, hammering, blasting, sweating,
means nothing to us but something to eat and a place to sleep?
Listen! We're building the world.
Give us a chance and we'll tame the universe.

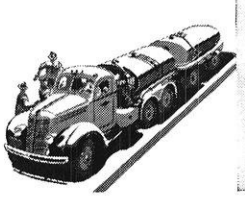
Ability to produce for ourselves and our allies is completely dependent on the generation of power—the energy that turns the wheels of industry. The common enemy of power is water-deposited scale. It must be removed, if boilers are to deliver their full quota of B.T.U.'s. The conventional practice for scale removal is a manual operation consuming much time. Chemistry has stepped in and now provides an efficient method that removes the scale in a few hours.

This is an industrial service developed by Dowell Incorporated, subsidiary of The Dow Chemical Company, with eleven years' experience in the chemical treatment of oil and gas wells. Dowell service uses chemical solutions for the disintegration and removal of deposits coating heat exchange surfaces. Precious time, manpower, equipment are saved. Thus chemistry is assisting industry in maintaining its "balance of power."

THE DOW CHEMICAL COMPANY, MIDLAND, MICHIGAN

New York—St. Louis—Chicago—Houston—San Francisco—Los Angeles—Seattle

DOWELL



DOW

CHEMICALS INDISPENSABLE TO INDUSTRY AND VICTORY

ARBORETUM . . .

(continued from page 24)

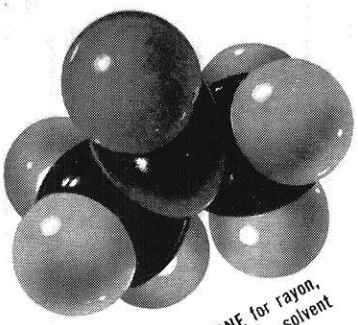
has been assigned to an area for which he is responsible. Professor Owen ran a control traverse about the central portion of the farm. The individual students use the bearings, elevations, and coordinates of the traverse points as a control for their own stadia traverses. They are obtaining data that will enable them to draw a contour map of five-foot interval, and also to plot on their maps the fences, wooded areas, and other pertinent features that would affect planning of the area. The maps are being drawn to a scale of 1″=30′, a scale that will show a great deal of detail. This sort of help from a student body is not new on the Arboretum, as much of the preliminary mapping of the rest of the area was done by the civil engineers. These maps have been used in preliminary studies of the areas by the persons concerned with the planning, design, and development of the Arboretum.

Administration

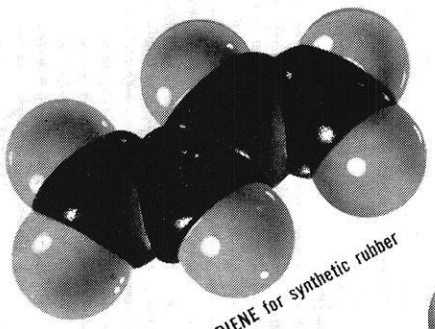
The University Board of Regents holds the title of the Arboretum property. The adminstration of the program has been vested in a committee composed of faculty members from the various departments interested in land use and the accompanying scientific studies. A. F. Gallistel, Superintendent of Buildings and Grounds, is the chairman of the committee. G. Wm. Longenecker, Professor of Horticulture, is the Executive Director of the Arboretum. John T. Curtis, Professor of Botany, (now on leave for vital work) is director of plant research, and Aldo Leopold, Professor of Game Management, is in charge of animal research. The animal research includes checking the ages and life span of game birds by banding them. Studies also are made on fish population and habits. The work of the Arboretum is financed by an appropriation from the University funds.

Olbrich Memorial Entrance

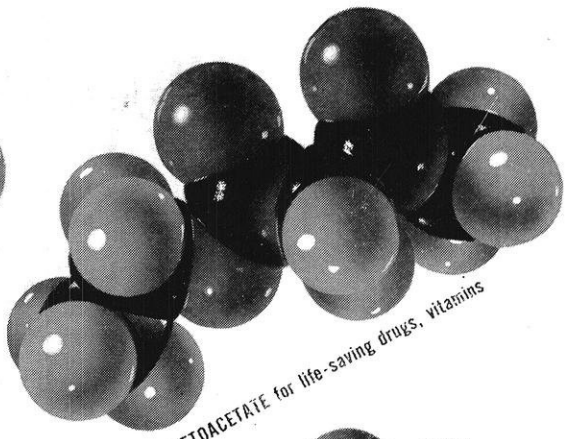
Out in Nakoma, just off Manitou Way, the west entrance to the Arboretum has been named the "Michael Olbrich Memorial Entrance." Built of native Madison sandstone, it was dedicated June 18, 1939. Its design is simple and straightforward, for Michael Olbrich, largely responsible for the conception of the Arboretum, preferred the simplicity of the out-of-doors. An oak opening is being developed as the planting scheme. Such large trees as oaks, hickory, black cherry, walnut, and red maple are to be found here. The small trees include prairie crab, wild sweet crab, plums, and hawthorns. There are many varieties of shrubs, but the gray dogwood predominates. When the trees are developed sufficiently to provide shade, wildflowers will be planted to complete the opening. When fully matured, this entrance will surely be a fitting tribute to the man who championed the cause of the University of Wisconsin Arboretum so faithfully, just as the Arboretum itself stands as a living monument to those men who even now are laboring so diligently on one of Wisconsin's greatest treasures.



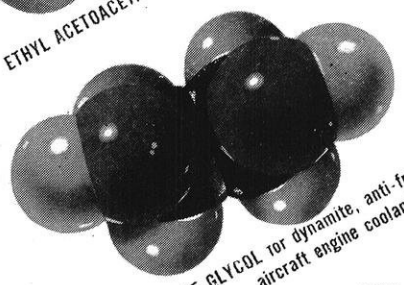
ACETONE for rayon, photo film, solvent



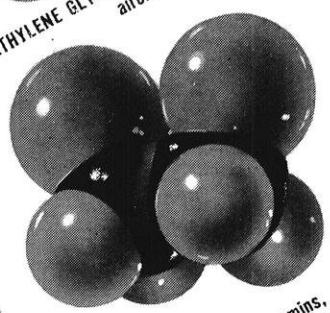
BUTADIENE for synthetic rubber



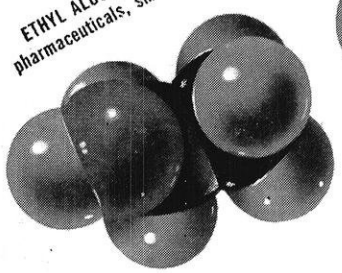
ETHYL ACETOACETATE for life-saving drugs, vitamins



ETHYLENE GLYCOL for dynamite, anti-freeze, aircraft engine coolant



ETHYLENE DICHLORIDE for vitamins, anti-knock fluid, plastics, insecticides



ETHYL ALCOHOL for lacquers, pharmaceuticals, smokeless powder

Molecular Keys To A New World

VAST NEW SOURCES of raw materials . . . the equivalent of those which might be found in a great new continent . . . opened to America when CARBIDE AND CARBON CHEMICALS CORPORATION, a Unit of UCC, started building synthetic chemicals from water, salt, air, and hydrocarbons.

These chemicals are usually water-white liquids, although some are gases or solids. Basically, they are compounds of carbon and hydrogen—united with oxygen or with chlorine to build up an endless series of chemicals. The models of those molecules of chemicals shown here are many millions of times actual size.

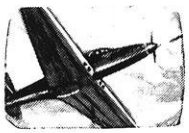
These chemicals are the raw materials for fabulous plastics . . . amazing textile fibers . . . life-saving drugs . . . vitamins by the carload . . . synthetic rubber . . . more things and better things than were possible before their existence.

Since these chemical wonders are obtained from abundant domestic sources, their use has contributed materially to the nation's self-sufficiency. Through research, American ingenuity, and patient development, scarce natural products have been duplicated or improved upon. Great new industries and great new materials that contribute to the nation's strength have come into being. And America has become a leader in a field as native as its own soil.

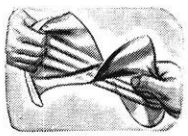
Broadly speaking, the uses of many of the synthetic organic chemicals developed by CARBIDE AND CARBON CHEMICALS CORPORATION are just beginning. The already established uses are indicative of their vast future values to mankind.

BUY UNITED STATES WAR BONDS AND STAMPS

BETTER MEDICINES! Amazing medicines like the sulfa drugs, synthetic vitamins, powerful insect repellents, and anti-malarial drugs depend upon synthetic organic chemistry.



COLD PROOF! Coolant for liquid-cooled aircraft engines and base for anti-freeze in military cars and trucks is ethylene glycol, an important synthetic chemical.



MAGIC PLASTICS! Wonderful plastics that look like glass, stretch like rubber, and which are proof against water, sunlight, oils, and many chemicals are made from VINYLITE synthetic resins.

MAN-MADE! All types of synthetic rubber require synthetic organic chemicals for their manufacture. Here's hope for tires for you in the future.

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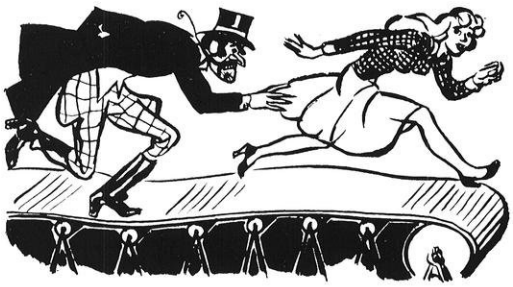
G-E Campus News

RESEARCH AND ENGINEERING KEEP GENERAL ELECTRIC YEARS AHEAD

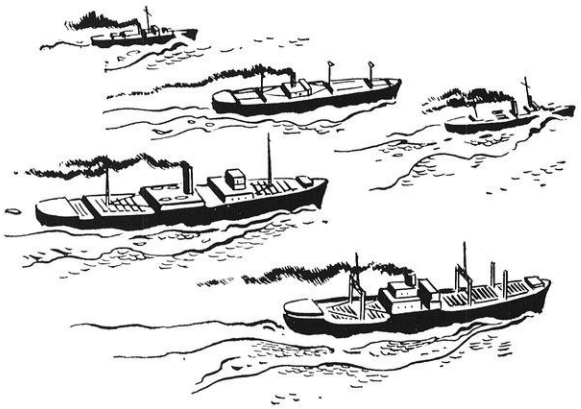


FOILED!

WHEN in a movie "the villain pursues and pursues her," he's not really getting anywhere at all.

To keep the players within camera range while they are constantly on the move—going nowhere—the Metro-Goldwyn-Mayer studios are now using a sound-insulated treadmill, powered by General Electric.

An even motion was required through all the action shots, from a slow walk to a race. Now, in 30 seconds, the treadmill can be accelerated smoothly from zero to full speed in either direction, by means of a G-E motor-generator set.



LEND-LEASE IN REVERSE

USUALLY we think of the United States as the arsenal and machine shop of democracy, but actually the Atlantic is a two-way ocean. And General Electric recently announced that since early in 1942 the Company has been using five giant English metal-working machines in the production of vital ship-propulsion equipment.

The machines were sent from England in separate ships on different dates, to forestall their destruction by German submarines. One of the ships was attacked during the crossing and was damaged but made its American port safely.

The arrival of the machines was really *two* strikes against the Nazis, for had they remained over there they might not now be producing for the United Nations. One of them had been installed in a plant in Sheffield, and another was destined to go there—and that city was later bombed by the Axis.

"PAPER DOLLS"

RIGHT out of the kindergarten is the latest metal-saving technique in General Electric. Many thousands of complexly designed parts are required for intricate electric apparatus—and all must be cut from flat sections of scarce metals.

So, just like patterns for paper dolls, the planners draw the parts to scale on paper, cut them out, and shift them around till they mesh together in a manner very similar to a jigsaw puzzle.

Frequently it is possible to redesign the parts when it is found that slight changes in the length, width, or thickness will allow more parts to be cut from the same layout.

Photographs of this technique may be obtained free by writing Campus News, General Electric Company, Schenectady, N. Y.

Listen to the "Hour of Charm" at 10:00 p. m. EWT, Sundays, on the NBC network, and the G-E news program with Frazier Hunt at 6:00 p. m. EWT, Tuesdays, Thursdays, and Saturdays on the CBS and American (FM) networks.

GENERAL ELECTRIC

953-60-211