The Wisconsin engineer. Vol. 30, No. 8 May 1926

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

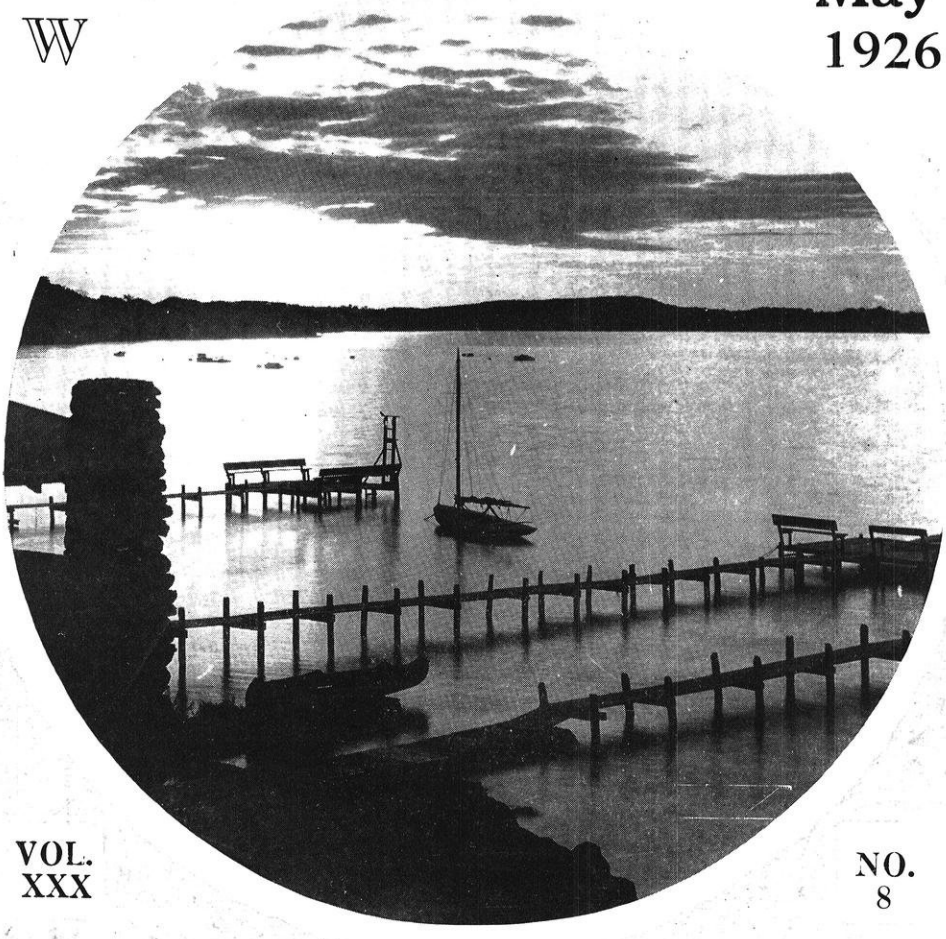
https://digital.library.wisc.edu/1711.dl/7P3DBZ6M5SIJV8I

The Wisconsin Engineer

MEMBER OF ENGINEERING COLLEGE MAGAZINES ASSOCIATED

May 1926

W



VOL. XXX

NO. 8

The College of Engineering
University of Wisconsin
Madison

The Wisconsin Engineer

25c A Copy

Published monthly from October to May, inclusive, by
THE WISCONSIN ENGINEERING JOURNAL ASSOCIATION
306a Engineering Building, Madison, Wis. — Telephone University 177

Founded 1896

$1.50 A Year

CONTENTS

VOLUME 30 MAY 1926 NO. 8

The Wisconsin Engineer
UNIVERSITY OF WISCONSIN
VOL. XXX, NO. 8 MADISON, WIS. MAY, 1926

MINING IN HONDURAS

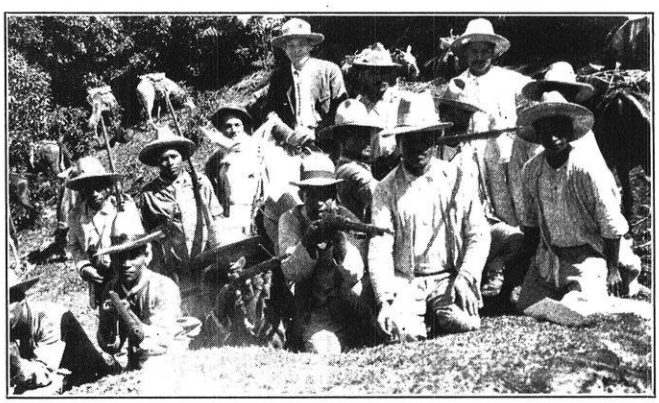
By JOHN V. MANGOLD, M. S. Min. '25

ALL of the large scale mining in Honduras can be seen by visiting the property of the New York and Honduras Rosario Mining Company at San Juancito, about twenty miles northeast of Tegucigalpa, the capital city. The concession, covering about twenty-five square miles of territory, was granted to the present company in 1882 for a twenty year period, in consideration of the construction of a school and a hospital in San Juancito, and a hydro-electric plant in Tegucigalpa. The contract was renewed occasionally in consideration of various public benefactions by the operators, the last contract having been closed in 1920 for another twenty year period.

The geology in the vicinity of the mine is simple. Slates were intruded by andesite, and later both were cut by the nearly vertical veins which are now being mined. The Rosario vein, the first main producer, is apparently a magmatic intrusion which later was subjected to secondary enrichment. The upper, or oxide zone, produced large amounts of silver and gold, but the lower portion is rich in copper only, and it cannot be mined profitably. The San Miguel system was the next big producer. It was developed just in time to relieve the nearly exhausted Rosario of the responsibility of supplying the mill, about five years ago. In its turn, the San Miguel vein gave way to the Salvador vein, and at the present time, it seems that the Independencia, the latest discovery will soon be called upon to furnish the bulk of the ore. It is not to be understood that only four veins have been developed. The names apply only to the main veins of various systems, — the entire list of which would fatigue all but connoisseurs in mining nomenclature.

Mining is done generally by the use of shrinkage-stopes. An adit is driven from the side of the hill to intersect the vein. When the vein is reached, it is opened by a longitudinal horizontal drift, and raises are put up at intervals of about one hundred feet. The top of the drift is timbered and covered with lagging, and ore is shot down onto the floor thus formed. Enough ore is drawn through the raises to make room to allow the drilling crew to work beneath the back. When the entire block of ore has been broken, it is drawn out, and the stope is left as an empty cavity two or more feet in width, which extends upward about one hundred feet. In case the country rock is not strong enough to be self-sustaining during mining, the vein material is shot down first onto canvas, and then thrown down a chute to cars below. Then the cavity is filled by shooting waste from the walls. The waste is covered anew with canvas, and the cycle is repeated.

The present mine is developed by fifteen different



The Bullion Guard

levels, at one hundred feet intervals, extending from the "Upper 900" to the "Lower 600," the numbering being referred to the zero level of the original mine. The upper 150 level, familiarly known as the Pena Blanca (White Rock) is the main haulage level, upon which the ore is collected by trains drawn by trolley locomotives. The terminal on this level is a large collecting chute, through which the ore is passed to the "Lower 600," seven hundred and fifty feet below. Trains on this level draw the ore from the chute and haul it to the mill bin, the top of which is just below the level of the track serving it. The ore above the upper 150 is passed to collecting points on this level through chutes and old stopes. The ore below the upper 150 is passed similarly to collecting points on the lower 600.

"The Good Old Days" still exist in Honduras

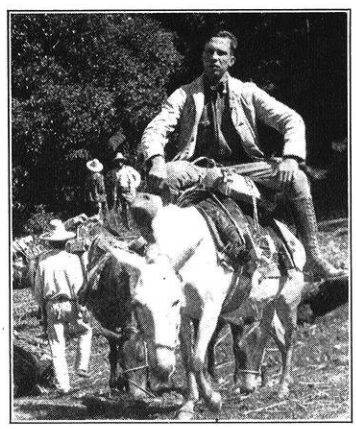
Drifting is done with large water Leyner drills, and stoping and raising is done with air stoppers. A considerable footage of holes is drilled by hand, with three-pound-single-jacks. Air for the drills and small hoists in the mine is furnished at the Pena Blanca portal by two Ingersoll-Rand compressors, each of which is driven by an A.C. 500 k.w. motor. A smaller unit was installed during the fall of 1924 to supplement the other two during peak loads.

The ore is treated in a 400-ton mill using the all-sliming-all-cyanide process. It is first crushed to four mesh in two batteries of five gravity stamps each. This four mesh product is ground to slime in two tube-mills, which discharge into Pachuca air agitators. After agitation has been continued long enough for all the gold and silver to be dissolved, the pulp is filtered in Merrill filter presses, and the pregnant solution run to the "refinery." This solution is mixed with zinc dust in order to precipitate the silver and gold, and pumped into a Kelly filter press which recovers the cyanides of the metals. When a press is full of precipitate it is taken apart and the cake is put into electrically heated pan driers. The next day the dried precipitate is melted with flux and the resulting metal is cast into bars which weigh approximately 115 pounds each. No further refining is done. The bars are stored until enough accumulate to burden a train of twenty to thirty mules, which carries it to Tegucigalpa, on the first leg of its journey to San Francisco.

One of the chief difficulties in mining in Honduras is the high cost of transportation. The topography is mountainous and is especially rough from Tegucigalpa to San Juancito. All supplies must be carried by mules between these two points over a road impassable for vehicles other than ox-carts. From Tegucigalpa to Amapola, the Pacific port, motor trucks can be used except during the worst part of the rainy season. No railways exist in this part of the country, but would be most beneficial for the entire country were they built.

Labor is inefficient and consequently expensive in spite of low wages. The population in San Juancito consists of people who owe their origin mainly to the oldest Indian races, and partly to the old Spanish, negro, and other adventures. The principal drawbacks to these people as laborers are their low vitality—due to generations of suppression and unhygienic living, and their irresponsibility. As is generally true for all Central Americans, the Honduranian can carry excessive loads upon his back, and walk over the steepest hills with little effort. But he is very inefficient at tasks which require strength in arms and shoulders. Although many individuals become good craftsmen, it is almost impossible to educate the average laborer to use machinery effectively. In all tasks requiring sustained physical exertion and attention, the Honduranian quickly becomes fatigued. Many people believe that this is due in a large measure to poor food. With the wages received, the worker can buy only corn for "Tortillas" (a flat cake of corn baked upon a flat stone) and very little meat. It is now quite generally recognized that the human body requires a variety of food as well as a sufficient quantity and quality.

Besides the poor diet, the worker has seldom had time to reach maturity before beginning his "career of labor." Many boys scarcely sixteen years old are at work underground, and others scarcely eight or ten are employed at menial tasks such as caring for mules and running errands. Perhaps the evils of child labor in the surroundings of a mine in Honduras are not so pronounced as they are in a mill or factory town in a machine-ridden country like the United States but it would seem that if these boys were forced to attend school they would grow into better men and tend to raise the level of living in their community, which in turn would react to raise the efficiency of the labor. This is a phase of the labor situation which cannot be analyzed completely from any studies made in countries further advanced in the practice of social improvements. A more pitiful and perhaps the most important reason for the lack of physical stamina in the Honduranian laborer is the prevalence of disease. The social diseases spread unchecked, until their victims are more numerous than those who escape them. During the dry seasons, when rain is not abundant enough to wash away the filth in the cities, (which have no sewers), dysentery exacts a severe toll. Malaria and Yellow Fever are uncommon in the mountainous regions, and have little effect upon the laborer at San Juancito.



Rapid Transit in Honduras

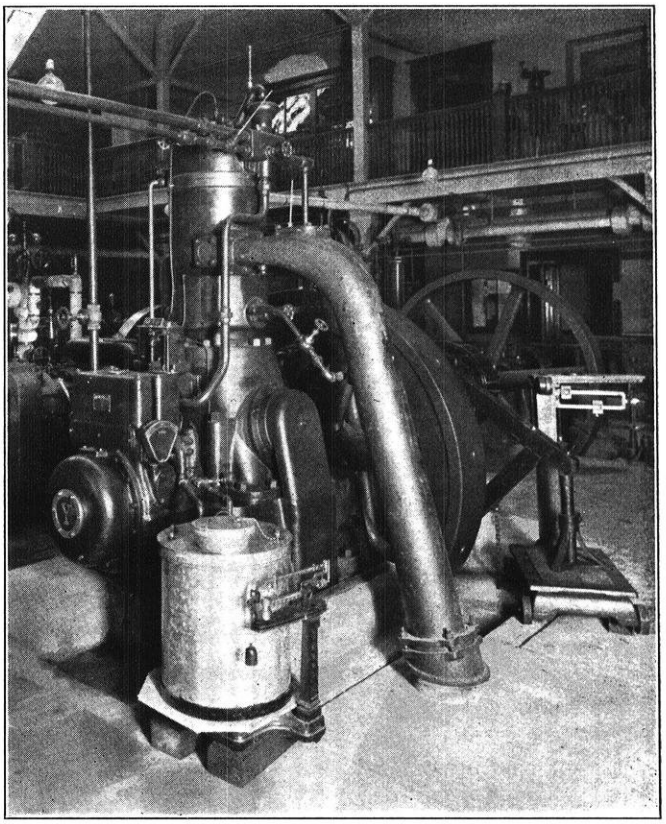
For the American colony social activities are necessarily restricted. Of the twenty-five men at the camp, in 1924, five were married and had their families with them. England, France, Germany, Italy, Sweden, Canada, Armenia and Australia, in addition to our own

(Continued on Page 282)

THE NEW DIESEL IN THE STEAM AND GAS LABORATORY

By G. C. Wilson

Assistant Professor in Steam and Gas



THE accompanying photograph taken from a position near the entrance to the laboratory from the rear of the building shows the location of the new forty horsepower Diesel Engine. The fly-wheel of the refrigeration compressor in the background also serves to show clearly the position of the Diesel with respect to other machinery in the Laboratory. This space was previously occupied by the sixty horsepower Weston Slide-Valve Engine.

The new unit was manufactured by Fairbanks, Morse and Company at their Beloit factory. The regular sale price on such units at the present time is about seventy dollars per horsepower. The price was reduced somewhat for this unit, on account of its being used for educational purposes. It has a fourteen inch diameter cylinder and a fifteen inch stroke. The speed is 300 revolutions per minute at full load. It operates on a two stroke cycle, and uses any grade of fuel from crude oil to kerosene. The engine is equipped with an especially heavy fly-wheel in order to furnish a satisfactory driving power for electric generating units. The two outstanding features in the design of this engine are simplicity and ruggedness.

The engine is easily started by an auxiliary supply of compressed air which is admitted to the cylinder by an automatically timed valve. At the same time, fuel is admitted, and after three or four revolutions of the engine, ignition takes place due to the high temperature of the air in the combustion space. Neither an ignition system nor external application of heat is required at any time. Air for the removal of waste gas and for combustion is taken directly from the room into the base of the engine. From the base it is taken through a grid valve into the crank case, where it is compressed to a pressure of eight pounds. From the crank-case it is taken into the cylinder where it is compressed to a pressure of 500 pounds per square inch. This requires a reduction in volume to about one-thirteenth the original volume. From adiabatic relations, it can be shown that, during this compression, the temperature rise of the air will be about 1000 degrees Fahrenheit. In actual operation, the temperature rise does not vary much from this value. The fuel is admitted to the combustion chamber at, or near the time that the piston reaches dead center. Incomplete combustion takes place in the spherical shaped combustion chamber. Combustion is completed in the cylinder after the partly burned fuel is discharged through the restricted opening between the combustion chamber and the cylinder. This scheme is one solution to the problem of maintaining constant pressure during the combustion period of the cycle.

The engine has a trunk-type piston which is connected directly to the crank without any cross-head. The piston also serves to cover and uncover the intake and exhaust ports at the lower end of the cylinder. The intake ports are on one side and the exhaust ports are on the opposite side. The exhaust is connected to an underground concrete conduit which leads to an outside pit. The pit is vented by sixty feet of fourteen inch diameter spiral riveted pipe.

The governing mechanism is all enclosed on the end of the shaft opposite the fly-wheel. It is mounted on a

(Continued on Page 298)

A RECENT GRAD'S WANDER YEAR

By WALTER PORTH, m'23

I WILL be indebted always to the College for the ease with which I managed to find free transportation across the seven seas during my recent journey. When I decided to satisfy my curiosity about some of the far corners and by-ways of the world, I anticipated a sailor's life on deck as the obvious way of getting across the seas without buying passage, a possibility which was out of the question as far as I was concerned. Through an unheard-of stroke of good fortune I was signed on the first time I applied for a job, and shipped out of New York as an "Ordinary" on deck on a liner bound for London returning with the same ship a month later. This was done merely by way of being initiated into the rank of merchant seaman, for by completing one voyage I was entitled to the papers necessary to identify me as a bona fide sailor. My profession was now seamanship. Immediately, however, I grew ambitious, and therein lay my downfall. I wanted to become, instead of an "ordinary seaman," an "able-bodied seaman" and went up for my examination which I managed to bluff through more or less successfully because of the great interest I always have had in amateur yachting. Then I went to the Customs House for a physical examination. They declared me color blind! I thought my lack of color sense never would go beyond an inability to pick out the right tie for the shirt I happened to have on, but they assured me that I could not be trusted to distinguish between port and starboard lights. So my career as a sailor was nipped in the bud. I could never become more than an ordinary seaman. The cold, cruel world had given me its first plow for being a "recent graduate." Then followed many unsuccessful attempts to get "signed on," and often while sitting on a bench in The Battery I watched my chosen ship glide out through The Narrows on its way to some distant port, perhaps Piraeus or Surabaya, and every time I would be a sadder and wiser man, for, if nothing else, I was at least learning geography. I soon became as familiar with the world's principal trade routes as a train dispatcher is with his trains, and my first discovery was that except for the purely trans-Atlantic trade the most important trade routes are in a westerly direction; hence, if one wants to work around the globe from ship to ship it is obviously better to follow the setting sun. And so I tried for jobs on ships bound for the Orient, of course acting the part of a true son of the sea at all times, and never intimating that I had ever been to college, except perhaps in the jesting way of the sailor who tells you he has been through Yale. "Yeah," he says, "and the damn guide soaked me a buck!"

After several more failures, and in growing desperation, I went to Philadelphia to get aboard a tramp freighter bound for Oriental ports.

"Nothing doing," the Captain said, "better go back to New York. We sign final papers there in a week. There may be a job."

I was aboard that ship in New York as soon as the gang-plank was lowered over the side hunting up the first assistant Engineer who is in charge of the men "down below." My previous attempts to get on deck having failed so completely, I changed my tactics entirely and went directly to the first assistant, admitted being an engineering graduate, and exaggerted my interest in marine-engineering. I may as well confess that I lied into the bargain, for I told him that I actually intended to become a marine engineer after several years of practical experience in the engine room. Whether or not he believed me, he gave me the only vacancy there was, — that of fireman, — doubtless thinking that I knew something about a ship's engines and boilers, which I did not.

Be Yourself!

Finally I had a job! After hiding the fact that I had ever been to college in order to be more certain of getting a job, I finally got one of the very strength of the fact. What a paradox! But true, nevertheless, and the moral obviously is: "Be yourself."

The next day, when I went to work, the first assistant merely sent me below to relieve the man on watch, and I climbed down the ladders with many, many misgivings and in total ignorance of what lay before me. What were my duties? Was the ship coal or oil burning? To my great joy I found that the fuel was oil; at least there would be no four-hour stretch of coal shoveling to be done. My ship-mate explained the mysteries of the job which were really quite simple, and promptly left me with my thoughts and the roaring flames of oil — oil heated by steam coils to 180° and sprayed through a nozzle under a pressure of about 100 pounds — and my responsibility was to keep up a constant steam pressure. In the firehold of a modern ship that responsibility is easily discharged by the manipulation of a few valves controlling the heating coils and the pressure pumps. Only in port is there much work to be done; and then there are boilers to be torn down and cleaned, tubes to be blown and replaced if necessary, and valves to be packed.

We were soon loaded for the Oriental ports with everything from chewing gum to turbo-generators, and I had the pleasure of having the tables reversed, — I was now on the stern of a ship gliding through The Narrows and watching New York's magnificent skyline

fade into mist, Yokohama-bound! In a few days I learned to discharge my duties very expeditiously only to pace the deck of the firehold for what seemed an interminable length of time until relieved for the next watch. When steaming through the tropics under a hot sun an oiler fell ill with a fever. We had to put him ashore at Colon in the Canal Zone, and the first assistant called me to take his place. I jumped at the chance to get into the engine room, the liveliest place on a ship. Besides it was a promotion, and I now received the magnificent salary of $72.50 per month!

The engine room pulsated with energy and action. It is the vital part of the modern ship, now that the seas are charted and navigation is quite safe, and unless some trouble arises which the engineer on watch must remedy, the oiler has direct charge of operation. To him falls the duty of keeping all propeller shaft, crank shaft, connecting rod bearings, and piston rods under constant lubrication, as well as lubricating and inspecting the operation of condensers and auxiliary pumps. All the service machinery in the engine room is also under his supervision — the refrigerator, the generator, and the fan blowers. Of course, on the big liners this work is divided between many assistant engineers and oilers, but on the "tramp" I was on, which was typical of the ships carrying the bulk of the world's cargo, one man did the work. It was no lady's job, but a strenuous four hours in what amounted to a turkish bath, the steam laden atmosphere in the engine room never being below 100° F. and more usually about 110° F.

A Breakdown to Boot

We were not without the breakdown which every sailor expects at least once during a voyage. At high noon of a scorchingly hot day, the second after leaving the Canal, the high pressure piston ring broke. Not a moment after the main line valve was shut off every available engineer, oiler, fireman and wiper was on the job. The ship tossed aimlessly about on smooth rolling seas while we repaired the damage. Wet door mats on the cylinder heads kept our shoes and feet from burning while we struggled, practically naked, with long-handled wrenches and sledge hammers removing the cap screws in the head. It was fiendishly hot up there. I chanced to look at a thermometer; it read 135° F! Small wonder that we worked in ten minute shifts, then went on deck for a breath of fresh air; for to stay there longer would have been disastrous. Even with such precautions one man was overcome, and never have I seen such strained faces and sweating bodies struggling with wrenches, crowbars, and chain hoists to replace the broken piston ring, shattered into a hundred bits, with a new one. The sun was setting when we finished, and no sooner had we made fast the last cap screw when "full ahead" was rung on the telegraph. We were under way again, but only after superhuman effort had been expended to repair the damage quickly. It was wonderful to see the response of the men in the "black gang" as the engine crew is usually nicknamed. Most of them were of the riff-raff of the world, but in the emergency they responded with real unselfishness.

We deserved and enjoyed the next two weeks of "sailor's paradise," which is spring on the Pacific, with its balmy breezes, sunlit skies, and smooth seas — equally enjoyable as late spring on Mendota and with the added assurance that there are no "finals" on the horizon.

Late one afternoon, just as the sun transformed the distant Mt. Fugi into a veritable jewel atop the mountainous coastline of Japan we dropped the hook in Yokohama's spacious harbor. Several score of ocean-going ships, varying from coasting vessels to big 'Empress' liners, were in port; I stopped counting at forty-five. Not a dock for discharging cargo directly was available, however, for the disastrous earthquake had destroyed the waterfront entirely. Hundreds of crafts from huge barges down to tiny sampans transferring cargo ashore made the spectacle one of feverish activity. It was the busiest port I have ever seen. We were not concerned about such things, however, so much as we were about the arrival on board of the company's man with our pay. That was the event of supreme importance, the crew being anxious to go ashore to visit their old haunts and to find their pleasures in the manner peculiar to all sailors, and I being anxious, too, but for another reason. I was leaving the ship here to make my way overland to Peking.

Third-class on the Japanese railroads is not so bad as may be imagined and by no means as bad as on most European railroads. No matter how crowded they were I never suffered unnecessary discomfort. Above all the Japanese are polite and clean; there is no jostling and no dirt and always good ventilation on their trains. When I recall the filth and discarded food and the jabbering, dirty passengers in the third class on the trains of China, Malaysia, an parts of southern Europe the Japanese trains seem idyllic, but at the time I thought I was undergoing something of a hardship. The sport of vagabonding, however, is in mingling with the rabble of every country, and I thoroughly enjoyed it. I drifted aimlessly about Tokio, more or less entranced by the picturesqueness which Japanese life presents on first glance to the Westerner. I never tired of watching the kimonoed Japanese, the men usually bare-headed, the women in gorgeous headdresses. They went about their business with a gaiety and lightheartedness that was new to me. There was even something buoyant in the atmosphere. There was nothing here to remind me of the States where we take ourselves and our struggles for goodness only knows what so very seriously.

The language difficulty was not so serious as I had anticipated. I was astounded to find how effective is the language of gesture; it was quite possible and a great deal of fun to live in small Japanese inns and eat in their own restaurants. Usually I found some

(Continued on Page 295)

1925-26 THESIS WORK IN THE HYDRAULIC LABORATORY

By Charles I. Corp

Professor of Hydraulic and Sanitary Engineering

THERE has recently been installed equipment for a sanitary laboratory on the upper floor of the Hydraulic Laboratory building. The added facilities have made possible increased activity in investigative work along this line with the result that the thesis and research work for the year has been of unusual interest.

In the sanitary field E. H. Thwaites (scholar in hydraulics) and H. L. Chase have just completed a very interesting study on the present Madison Sewage Disposal Plant to determine the efficiency of treatment at the various points through the plant. Their comparison of the performance of the Madison Plant with fifteen other important plants in the United States indicates very satisfactory results are being accomplished by the Madison plant.

Don E. Bloodgood completed a thesis study in February on the effects of temperature and sealing methods on the result of the biochemical oxygen demand test. His study was for the purpose of developing satisfactory field sealing methods and to determine correction factors where the temperature of field samples in transit is not standard.

Judson P. Smith and John C. Wisner are testing the efficiency of operation of a small aeration sewage disposal plant installed at the Mendota State Hospital. their study has particularly to do with the degree of purification accomplished at different rates of compressed air supply.

George F. Liddle is making a study of the degree of purification needed for the sewage of Muskegon, Michigan, his home town, in order that it may be safely discharged into the Muskegon Lake. Muskegon Lake is a popular summer resort with many bathing beaches.

George W. Martin and Clarence M. Moe studied the effects of a pre-aeration device which was installed in the Madison Sewage Disposal Plant between the colloidal chambers and contact beds. The device consisted of an artificial riffle which their tests showed improved the effluent from the contact bed to an appreciable extent.

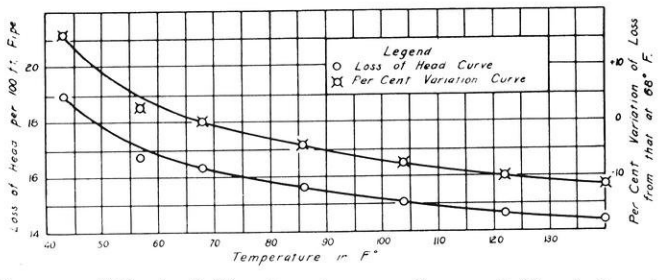
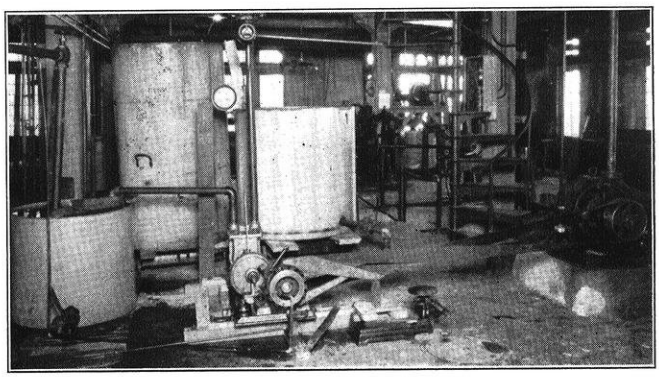


FIG. 1. *Effect of Temperature on Loss of Head due to flow in 2-inch pipe. Velocity 10 ft. per second.*



Rotary Pump Testing Aparatus. The pump is driven by the variable speed motor at the right.

Paul W. Bishop and C. T. Mickle have been investigating methods for the chemical treatment of pea cannery wastes. This is in co-operation with the State Board of Health in the state's program of stream conservation work. L. F. Warrick, assistant to the state sanitary engineer, has general charge of this investigation and is working jointly with Mr. Bishop and Mr. Mickle in the development of chemical treatment methods to be applied this summer in an experimental plant that is being installed at the Poynette, Wisconsin pea cannery.

In the field of hydraulics, C. J. Francis and I. A. Phelps have determined the effect of temperature on the flow of water through 2-inch wrought iron pipe. The diagram in Fig. 1 gives their results for a velocity of flow of ten feet per second in the pipe line. As may be seen from the curve, temperature, while ordinarily neglected, has a marked effect on the loss due to flow through pipe lines.

V. M. Lathers and W. L. Radke investigated the loss due to flow through a 2-inch pipe having U and S turns in it. This is a part of a series of experiments described below in connection with the research work.

John Piltz and Roland R. Schraeder are comparing the coefficients of discharge for triangular wiers in brass and in steel plates. The coefficient for the brass plate seems to be probably 2% less than that for the steel plate. The series includes angles from 10 to 100°. Results so far obtained indicate some angle other than

(Continued on Page 282)

JUNIOR CIVIL'S INSPECTION TRIP

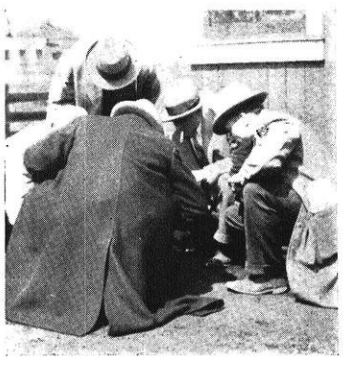
By EDWARD BIRKENWALD

Junior Civil

THE annual inspection trip of the junior civil engineers was ushered into being the day following the spring recess, April 14, and was relegated to the land of forgotten things at 5:00 p. m. on April 15. With the exception of "Bill" Chadwick, who could not be bothered to arise in time to leave Madison with the rest of the fellows, we all met at the Union Depot in Chicago promptly on Wednesday morning. As is true with most parties composed of as many members as ours (about 50 students and 4 members of the faculty), the old rule held that "he saves time who is not on time." Notwithstanding a late start, we managed to see what there was to see of the new Union Station. Some of the more aggressive engineers, maintaining that "God helps those who help themselves," enjoyed fragments of delicious French pastry. Unfortunately for Chellman, the pan containing the pastry was hastily removed just as he was about to smuggle a delicious morsel into his mouth.

Wednesday afternoon was spent in looking over several of the larger building projects in and around the Loop district of Chicago. We began by trying to discern human beings at the bottom of the 90-foot, open caissons which are part of the foundation work for a new 25-story office building to be erected at the corner of South Clark and Monroe streets; and ended by climbing twelve of the 25 stories of the new Stevens Hotel building on Michigan Avenue and Seventh Street. Not satisfied with the jaunt of 12 stories of the super-structure, the boys had to gratify their instinct of play by descending 60 feet below the street level to one of the basements where they could wade ankle deep in Chicago's famous blue clay soup.

With the sky becoming a shade darker, we were permitted to hike a mile up the boulevard to see the newly projected Waker Drive, an enormous venture in city improvement. Huddled behind one building were half the group wondering whether roll would be taken or if they could quietly disappear from the scene. Just before the latter action was to have been taken, with its subsequent inglorious aftermath, the group was called together and dismissed.



A secret session between trains.

The occurences and adventures of the evening in themselves might fill a respectable tome. None of the boys could be found, but most of them were willing afterward to divulge the profound secret that they had spent the evening exploring the jungles of Chicago — that they had been "out."

The "gang" at the Brick Yard.

Thursday was spent on the trains. We visited Purington and its brick factory, and the mills of the Universal Portland Cement Company at Buffington. Some amount of self-expression became manifest in the boys when the discarded bricks at Purington were utilized for playing "duck on the rock." Levin caught his man, but forgot to replace his "herbie." While some of the fellows were breaking their backs tossing bricks, the others were gradually but surely being relieved of their excess cash at the royal and ancient game of "African golf." Buffington, having left its temporarily dusty mark on our persons, witnessed the establishing of a new broadjumping record by Jay Reader. The latest reports indicated that the record, as noted by "Parky" Shafer, was gradually approaching infinity as a limit. Reader has announced his plans for retiring from further participations.

The climax of the trip was inspection of the works of the Indiana Steel Company at Gary. We started at an unearthly hour and finished the sleep and boudoir on the train. At Gary we were received with open arms, — the police force turned out en masse to greet us. We were assured that it was for our protection only; we began to wonder, however, whether it was for their protection as well as for our own. It is rumored that "Spike" Carlson was much oppressed by the presence of those lynx-eyed guardians of safety, for he had originally intended to enter the scrap-iron business.

The day was ended, or rather, the formal inspection trip was ended a few minutes before the arrival of the train which was to take us back to the Windy City. The group was disbanded when it arrived in Chicago. With the hurry and bustle it remained only to check out and leave Chicago to mark the close of a trip which allowed us the privilege of viewing actual engineering processes in operation.

GRADUATE TRAINING SCHOOLS IN THE TELEPHONE INDUSTRY

By H. S. Day, e'20 and E. J. Mohr, e'22

Wisconsin Telephone Company

WE have all been told repeatedly that a college man's training is by no means complete when he receives his sheepskin, and that 'commencement" is a much more significant word than "graduation." The young engineer entering industry finds that it has many things to teach him in addition to those found in text books. He must learn the functions of the various parts of the organization he has joined. He must come to understand the policies of his company and its methods of doing business. He must learn to cooperate with all the people with whom he comes in contact. In addition to this general knowledge, he must learn the specific application of his technical training to the work he is to do. Most important of all, he must develop the sound judgment so essential to success in any position of responsibility.

Industry is finding more and more that universities develop in their students the habit of study and the ability to correlate ideas. With these assets the industry can use various types of formal training to advantage in providing the young graduate with some of the courses in the School of Experience, in developing and making the best use of the abilities the embryo engineer possesses.

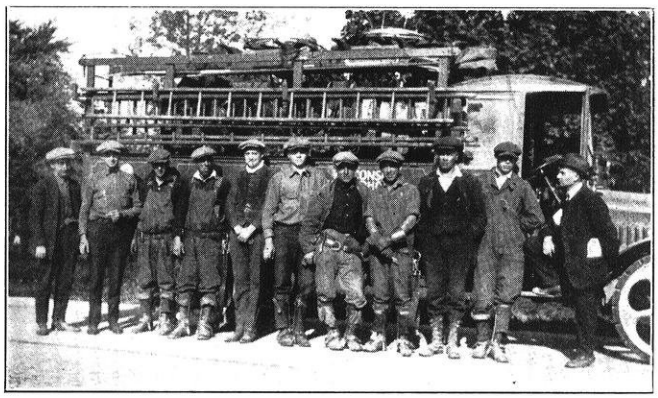
It is the purpose of this article to indicate how the Wisconsin Telephone Company is using training schools for its engineering graduate employees.

Threshold School

College graduates coming into this company attend an eight weeks school designed to provide:

1. A picture of the geographical and functional organization of the company.
2. A general survey of the physical plant and of the methods employed in its engineering, construction, maintenance and operation.
3. An acquaintance with the supervisory people and general personnel of the various departments.
4. An opportunity for each student to determine the type of work which seems of most interest to him.
5. An opportunity for a careful analysis of the individual student by his instructors, with a view to the best location for his subsequent training.

The method of instruction used in the threshold school depends upon the nature of the information to be provided. A speaking acquaintance with plant construction and maintenance is obtained by work and observation in the field, coupled with Saturday morning lectures on the underlying principles involved. The handling of telephone calls at the switchboard is covered by class room instruction and actual practice at a school switchboard. Business and accounting methods are discussed in a course of lectures.



Students with light Construction Crew.

An hour is spent every Saturday morning in a discussion of the work of the past week, and a written report of the weeks activities is required.

A number of non-college-graduate employees, who can use to advantage the general knowledge of the company's activities provided by such a course, have been enrolled in the threshold school, with very satisfactory results.

A course of "general training," in the present-day type of large and diversified organization, is part of a liberal education for any employee, and has been found of special value in the induction of the young engineering graduate.

Field Assignment

Most of the work done by engineering graduates in a telephone company requires a knowledge of field conditions, and it is general practice, at the conclusion of the threshold school training, to assign the student engineer to some phase of construction or maintenance work. For example, a man may be assigned to a construction crew working on pole lines, aerial wire and cable. He may start in a telephone office, making routine tests and inspections, locating and clearing trouble. He may work with a crew installing telephone switchboards and associated equipment. Such field experience is valuable: First; in that it gives the individual actual contact with the things he may deal with as an engineer later on; and, secondly, in that it brings

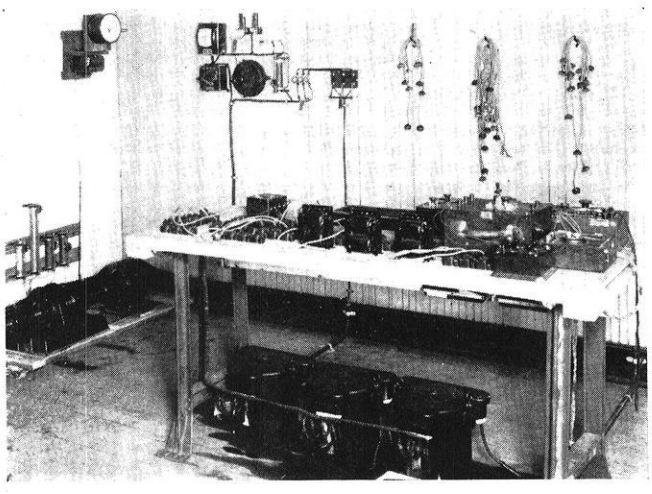
out his strong points and his weaknesses, provides for a upgrading process with the aid of his supervisors.

Technical Schools

Every engineering graduate realizes that the technical knowledge he possesses is a very small portion of the total field of knowledge concerning his subject of specialization, so he is not surprised to find that any industry he enters demands additional study on his part. Nowhere is additional study more required than in the communication field. Our young engineer finds in many cases that he must go back to his fundamentals of mathematics, physics and electrical theory to find the first divergence between power and communication problems.

As an example, take the matter of maximum energy transfer in an electric circuit. The sophomore is shown, by an easy calculus proof, that a generator will transfer the maximum amount of energy to its load when generator and load resistance are equal. This condition is laid side as of little practical value in any power circuit, since it entails a loss used in heating the generator conductors of fifty per cent of the total energy produced. However, in a telephone circuit where the energy used in transmitting a "voice wave" is of the order of 10^{-3} to 10^{-6} watts, and the cost of power is accordingly negligible, the major consideration is that of transferring the maximum amount of energy from transmitter to receiver. A one-way telephone circuit, then, would be designed for maximum energy transfer, and 50% power efficiency. In an actual telephone circuit however, we must talk and listen at both ends, — in other words, transmit power in either direction — and as a result, a power efficiency of 25% is the best that could be obtained, even with no loss due to intervening lines and apparatus. As a matter of fact, satisfactory telephone conversation can be provided when 95% of the power output from the transmitter is lost before reaching the receiver.

In order to provide the young engineer-employee engaged on transmission work with an extended knowledge of electrical theory as applied to practical communications problems, schools are conducted by the company from time to time. These schools require all the time of the students (including some judicious use of midnight oil) for a period of from four to six weeks, and are conducted in a similar manner to a regular college course. Lecture in the morning, quiz section, problems, laboratory period in the afternoon, in an entirely orthodox manner. An outline of a transmission school course would include a brief review of trigonometry, vector algebra, d.c. and a.c. theory, a study of the solution of circuit networks, characteristic impedance, attenuation, measurement of transmission losses and the theory of loaded circuits. About thirty men have completed Transmission courses given by the Wisconsin Telephone Company.



Inductive Co-ordination School Laboratory.

Closely related to the transmission schools are other courses dealing with vacuum tube telephone repeaters and their application in the telephone plant. These courses, provided as the need arises, are attended by men who will be responsible for the engineering, testing and maintenance of telephone repeaters and their associated equipment.

A third type of course deals with the inductive co-ordination problems involved in the satisfactory operation, from the telephone engineers standpoint, of high voltage power lines and long distance telephone lines, carried along a roadway at highway separation. This type of course considers such subjects as the sources of voice frequency harmonics in power machinery, coefficients of induction, theory of telephone transpositions and telephone plant conditions affecting noise and crosstalk.

The preparation of laboratory equipment for those special technical schools often provides some interesting problems. One transmission school required a hundred miles of artificial telephone cable equipped with load coils. A school on inductive co-ordination necessitated the construction of a three-phase-four-wire generator, using a Y-ground connection.

Experience Training

It is not our intention to convey the idea that a speaking acquaintance with a pole line and a thorough knowledge of transmission theory determine success for a telephone engineer. Both are valuable in their proper place, but any real engineering work requires much more than practical knowledge and abstract theory.

Telephone engineering involves the careful standardization of proper construction and maintenance practices. It includes the detailed planning of a construction and building program which will take care of both our present and future needs in the best and most economical way. It means proper organization and supervision of the forces engaged in constructing, maintaining, and operating the plant. It necessitates a thorough analysis of the results obtained in every phase of our activities, and the development of new methods to provide improvement or to meet changing conditions.

The develpment of an engineer is a continuous process, in which formal school training on the part of industry plays an interesting and valuable part.

SPIRIT OF ST. PAT BRAVES WIND AND RAIN

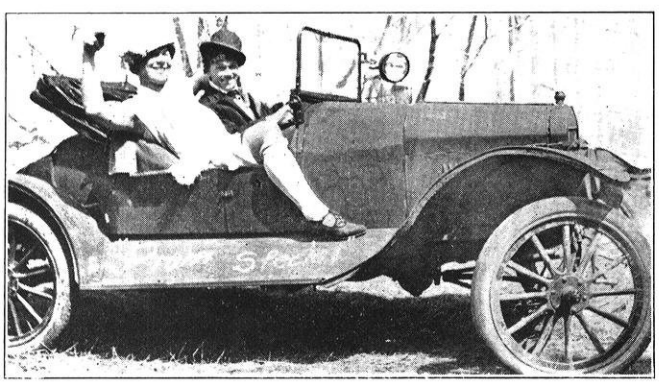
By N. B. Thayer.

Junior Electrical

IN spite of a roaring wind accompanied by a driving rain, several loyal sons of St. Pat assembled, some in the steam and Gas Lab. and some in the Randall Shops, on Saturday, April 24, preparatory to the St. Pat's parade. Bob Zinn was running about, trying to be at both places at the same time, and assembling his crew of hellians. Nevertheless, at one-thirty the parade of several floats, band, individuals, and armed engineers proceeded down the hill from the engineering building to State Street and thence on their traditional journey.

The Engineers monopolized State Street, the square, Wisconsin Avenue, and Langdon, with nary a sign of a shyster until they reached the P.A.D. house, where several lawyers were seen peaking from behind closed windows in their dry, cosy, and warm little home. The Engineers had won a complete voctory.

A twelve piece band directed by Splees, the "wrestling engineer" led the triumphant engineers. The band played "St. Patrick Was an Engineer" with zeal that would rival Sousa's. Next in line came the carriage drawn by a steed of iron that carried St. Pat, alias, William Taylor. His coach was well surrounded by yellow slickered followers armed with the weapon of the clan — the Shillalah. Behind the carriage was the treasured blarney stone carried by four men. Vallee, Cowan, Anderson, Collins, Zabrowski, Harr, Anton, and Thompson took turns four at a time as bearers of the emerald stone. The first float was the one sponsored by A. S. C. E. On it were the only bars lawyers should be admitted to; the bars of a cage and the bar on which sat the keg of would-be 4.4. At the corner of Gilman and State Street, Stueber offered a traffic cop a stein of said 4.4 but was graciously refused. Behind the truck of bars came the A. S. M. E. float on which were instruments and equipment that made noises similar to those made by seventeen boiler factories and forty riveting machines. On a large sign they told what mechanicals make — "hell for lawyers." The mechanicals were followed by Beuchner and Beeman in a custom-built Ford. On the radiator was a basket in which calmly reposed a chicken, (some say it was a rooster). By means of a sign the boys informed the world that engineers don't have to buy eggs. Beuchner and Beeman preceeded the Triangle's float. This float disclosed the secret of why co-eds need engineers. The fact is that co-eds must have electricity to heat their curling irons, and a gas engine driving a generator, connected to a mammoth soldering iron by a switch that would carry all the the current for lighting the entire city of Madison proved this fact. The Triangle's float was followel by Bambary's "Engineers Just Married." This float consisted of a gravel cart on which was the body of a 1900 model Ford, and was drawn by a ring-boned mare. The newlyweds peacefully reposed in the ancient seats. The next fraternity float was the one that Phi Mu Delta entered. It typified an engineers hot date. The date was Ballard, and he sure was hot but Taylor says his date should shave. The Ford that they rode in gave no signs of having any bearing babbit in its make-up. Behind followed several cars loaded with engineers



The Prom Special

(Continued on Page 288)

Engineering Review

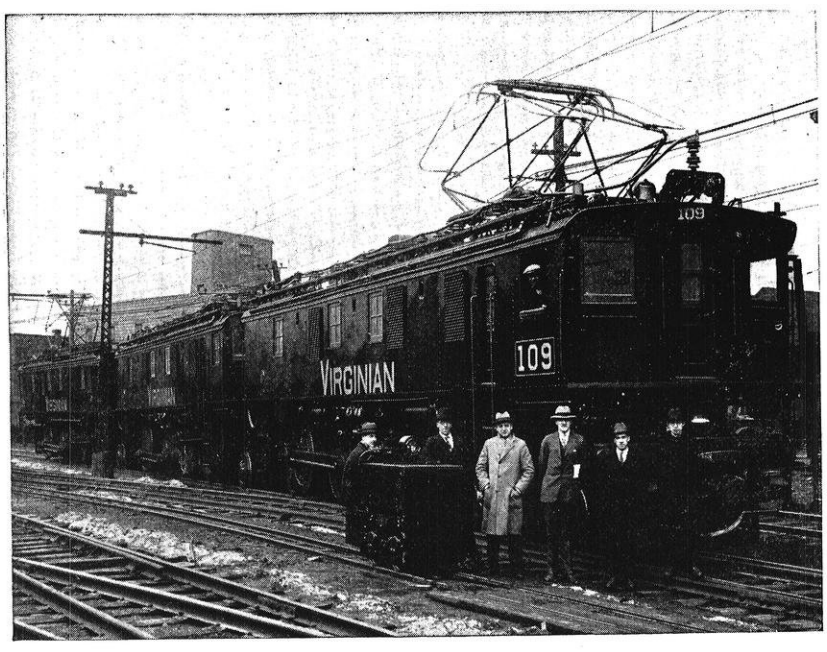
LARGEST AND SMALLEST LOCOMOTIVES IN THE WORLD.

There were some striking contrasts when the Midget and the Giant of the electric locomotive world were compared at the East Pittsburgh Works of the Westinghouse Electric and Manufacturing Company, recently.

With a capacity of 4½ horsepower the Midget serves the purpose of a mechanical mule in various mining operations.

The Giant of the rails designed for the Virginian Railway, with a capacity of 10,000 horsepower, is the world's largest and most powerful locomotive. It will be used to haul a loaded train nearly two miles long over one of the heaviest grades in the country.

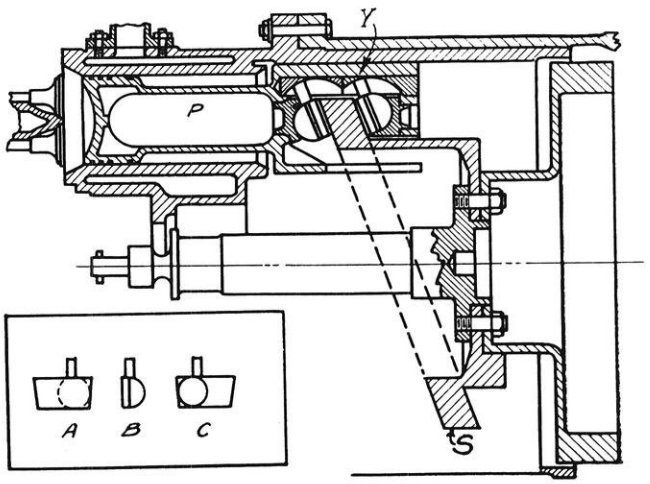
The contrast between the Virginian electric locomotive and its smaller prototype of the industrial field is indicated by the following figures: midget, 41½ inches long; its larger brother, 152 feet in length; weight of midget—one and one-half tons; weight of Giant,—637.5 tons. Midget's drawbar pull—400 pounds—Virginian locomotive's drawbar pull—270,300. The smaller one derives its power from a 60 volt storage battery; the larger one from a 11,000 or 22,000 volts trolley.



World's Largest Electric Locomotive

THE MITCHELL CRANKLESS AUTOMOTIVE ENGINE

It is believed that the orthodox, internal combustion, high speed engine, in spite of continually achieving new records of performance, has reached a stage where it is steadily becoming more difficult to effect any considerable improvements in it, and that in most directions the limits of its development appear to be nearly reached. Almost all possible varieties of the piston, connecting-rod, crankshaft and valve-gear mechanisms which can be usefully employed, appear to have been worked out and the most advantageous varieties selected by trial and elimination.



Michell Crankless Automotive Engine.

In the following notes, a new form of high-speed, multiple-cylinder engine is described, which, by the radical novelty of its design, evades several of the most serious difficulties confronting designers of the conventional type of engine. The designer contends that lubrication is the crucial problem of present type high-speed engine design, and holds the view that the usual type of reciprocating engine is essentially defective in this respect.

The general form of the engine is an example of the so-called "revolver" type. Its cylinders are arranged in a series surrounding the shaft and the pistons reciprocate in a direction parallel to the shaft axis. The cylinders are stationery, the engine-shaft revolving and driving the gear mechanism of the vehicle in the ordinary way, thru clutch and transmission. The characteristic feature of this engine is the means by which the power is transmitted from the pistons to the shaft. The accompanying sketch shows the uppermost of the cylinders in section. The corresponding piston, P, consists of a piston head of usual form having a tubular extension which is rigidly attached to a yoke

(Continued on Page 282)

Campus Notes

TAU BETA PI ELECTS JUNIORS

The following juniors were elected to Tau Beta Pi, national honorary engineering fraternity, at the Spring elections: Civils: E. A. Landwehr, W. Z. Lidicker, A. G. Oettmeier; Electricals: R. A. Millermaster, E. F. Carpenter, R. J. Davis, V. N. Murray, A. E. Lillquist, B. R. Teare, and S. D. Post; Mechanical: L. F. Jaseph; Chemical: D. J. McFarlane.

A certain little Frosh thinks Kappa Eta Kappa refers to a cannibal story.

ETA KAPPA NU INITIATES EIGHT

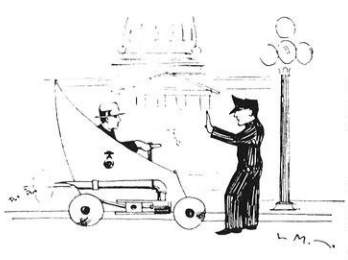
Eta Kappa Nu, national honorary electrical engineering fraternity, announces the initiation, on April 22, of the following junior men:

J. R. Erickson, S. D. Post, N. B. Thayer, R. A. Millermaster, E. F. Carpenter, Y. M. Murray, A. E. Lillquist, and R. J. Davis.

FOUR CHEMICALS ELECTED TO HONOR SOCIETY

Phi Lambda Upsilon, honorary chemical fraternity, held its initiation banquet for 16 new members, April 23. The following chemical engineers were among those initiated:

Wesley Martin '26, Arne Asplund '27, Robert Zinn '27, and Richard Neller '28. The latter, who is only a sophomore, was elected to the society by reason of his brilliant scholastic record to date.



OUR MONTHLY PLAY

Dramatic Personae: Officer of the Law; An inebriated Mechanical.

The I. M. is driving his Carnot cycle around the Square in a clock-wise direction.

The Law: "D—n you; don't you know this is one-way traffic!"

The I.M.: "Sh-a-y — I'm going only one way, Offisher."

"Jimmie" Watson, in E.E. 143a: "Merely as a matter of interest, does anyone know the smallest alternator made?"

Tau Bete: "Yah, the dynamo of the lightning bug."

THAT WILL BE ALL, YOUR HONOR

The engineer witness was being cross-examined by a lawyer who was determined to discredit him.

"You are an engineer, I believe," said the lawyer.

"Yes," was the reply.

"Is not that rather a low calling?"

"I don't know but what it is, sir," replied the witness, "but it is so much better than my father's that I am rather proud of it."

"What was your father's calling?" asked the lawyer, falling into the trap.

"He was a lawyer," gently answered the witness.

ENGINEERING FACULTY MEMBERS MEET PAPER MILL REPRESENTATIVES

The first step in working out a plan of co-operation between the paper industry of Wisconsin and the College of Engineering was taken on Friday evening, April 23, when a party of nine members of the college faculty headed by Dean Turneaure met in conference with sixteen representatives of the paper industry at the Conway Hotel in Appleton. The discussion was largely devoted to the training of technical men for the industry and led to the appointment of a committee to formulate a definite scheme. The faculty men present were Dean Turneaure, and Professors Maurer, Corp, Jansky, Kowalke, Van Hagan, Rood, Larson, and Elliott. Mr. Edwards of the Forest Products Laboratory accompanied the party. Representatives of the paper industry included: D. B. Davis, Hoberg Paper Co., Green Bay; N. S. Stone, Wausau Sulphate Fiber Co.; Boyer, Consolidated Water Power and Paper Co.; Kimberly Stuart, Neenah Paper Co.; Jack Stevens, Patton Paper Co., Appleton; Paul Scallon, Riverside Fiber and Paper Co., Appleton; Dr. Otto Kress, Thilmany Pulp and Paper Co., Kaukauna; E. P. Gleason, Nekoosa-Edwards Paper Co., Port Edwards; John Alexander, Nekoosa-Edwards Paper Co.; McArthur, Kimberly-Clark Co.; Fourness, Kimberly-Clark Co.; Helfast, Riverside Fiber and Paper Co.

THINGS THAT NEVER HAPPEN

A perfectly rational E.E. is sitting on the davenport with the answer of his dreams. The lights blink and then go out. Afore-mentioned E.E. reaches into his pocket for the fuse plug that he always carries for such emergencies, and replaces the burned out one.

AFTER GRADUATION The Class of 1926 will soon be graduated; and its members will begin their work in many parts of the United States, and in some foreign countries. New friendships will be formed, and new fields of activity encountered. But every alumnus of Wisconsin will want to keep in touch with his Alma Mater and activities, and with the friends made during during the college years. Perhaps the best way to do this is to take an active part in the nearest Wisconsin Alumni club — there are many of them spread over the country. Another way is to attend Homecoming and the class reunions whenever possible. Every graduate should join the Alumni Association and receive with his membership the Alumni Magazine, which contains news of the alumni and the University. And all Engineers should see to it that The Wisconsin Engineer is received regularly every month of the school year. The Wisconsin Engineer offers these suggestions to our graduates, believing that the cost of carrying them out will be far less than the benefit received.

AND WHY THE ADS? A student critic of the WISCONSIN ENGINEER recently inveighed against the number of advertisements, his argument being that the space should be filled with editorial matter rather than with ads. We didn't suppose that there was anyone in the college whose knowledge of business was so limited as to permit him to express such an idea; but, we reason, if there is one, there may be more of the same opinion, and perhaps it would be well to explain a bit.

Last year, our earnings from all sources except advertising were $1,512.46; our expenses were $3,845.20. Advertising paid the difference and left us an operating profit for the year. Could we publish without advertising? Yes, probably; but the magazines with a small amount of advertising are decidedly aenemic. This college would be dissatisfied with the sort of a magazine that we could publish for $200 a month.

There is another and perhaps a more important gain from advertising of the kind we carry: New products are introduced to the public through advertisements. The engineer who tries to keep abreast of developments in his field cannot afford to wait until mention of the new products filters into the editorial matter; he must study the advertising pages of his magazine. Many engineers turn to the advertising sections before they turn to reading matter. Student engineers should realize the value of studying the ads.

VISION To say of a man "He has vision" is to pay him a compliment which cannot be paid to many. Through vision the world has progressed to its present great civilization. Vision is an ability — yes more than an ability — it is a courage to look through the portals of thought, to see what is going on, and to devise new applications for the benefit of ourselves and of our fellows.

The inventors of the air plane decided that there must be a reason why kites flew in the air; they investigated, and the result has benefited mankind. Columbus believed that the earth was round — he investigated and the result need not be questioned. Bell played with two tin cans at either end of a string and noted that sound traveled from one to the other — he investigated. Everybody knew that when water boiled steam was formed, but James Watt had vision enough to discover its power and harness it.

Down through the ages the use of vision backed by determination and sufficient courage has brought about the progress of civilization, and has enabled each succeeding generation to live better and enjoy life more.

A little individual thinking, a little imagination, some investigation, and enough courage to go through with what they believed to be right has enabled the men of vision to stand out as individuals — to be distinct from the masses, to obtain successful achievement, and to benefit mankind.

ENGINEERING TEACHERS OVERLOADED? That the average teaching load of engineering teachers, which is 18 hours of attendance in class room or laboratory a week, is too heavy and that it should not exceed 15 hours, is the finding of the committee that has been investigating engineering education for the Society for the Promotion of Engineering Education.

Perhaps because of this overloading, says the report, the engineering teachers are not active in research, nor do they engage in any large amount of professional work, "but we fear that * * * there is not that degree of intellectual activity and vitality among our engineering teachers as a class which promises a transmission to the student of that enthusiasm and love for independent thinking and investigation which is so necessary to real progress."

About 60 per cent of the teaching in engineering colleges is done by men of professional rank, 35 per cent is done by instructors, and the remainder by assistants and others. This disproves the statement

sometimes made that a large part of the teaching is done by student assistants and graduate students.

The academic salaries of engineering teachers, according to the report, are low compared to the earnings of engineering graduates. The median of the teachers' salaries coincides with the upper limit of the lower 10 per cent of the graduates.

ENGINEERING REVIEW

(Continued from Page 277)

or bridge-piece, Y. This member carries two slippers whose form can be more clearly seen from views A, B, and C. These slippers are the elements by which the reciprocating motion of the piston is transformed into the rotary motion of the shaft. They are universally jointed to the pistons, being formed with hemispherical surfaces fitting in spherical cups attached to the outer edges of the piston tubes referred to above. On their opposite faces, which are truly plane, they engage with the equally plane surfaces of the swash-plate S, which is rigidly attached to the engine shaft. The inventor calls this plate, for the sake of brevity, the "slant."

The ball pivot is provided to enable the slipper to perform its two essential functions: First, to change continuously the direction of its inclination as the slant revolves, the amount of this inclination, depending on that of the slant, being considerable and usually 22½ degrees. Second, to enable the slipper to adjust, to a very small extent, the amount of its inclination, and so admit a wedge-shaped film of lubricating oil of extreme thinness between its surface and that of the slant. In the second of these functions the slipper is analagous to the blocks of a Mitchell pivoted thrust-bearing, and their well-known durability and reliability under the most severe working conditions is sufficient guarantee of similar characteristics in the crankless-engine slipper. No separate fly-wheel is used, the slant and clutch members having sufficient angular momentum to ensure steady running.

—*The Automotive Engineer.*

MINING IN HONDURAS

(Continued from Page 268)

country, were represented. About twice a year, notable people in the country, including governmental officials and business men from Tegucigalpa are entertained royally, and a "good time is had by all." Less formal entertainments are indulged in at much shorter intervals throughout the year, with an excess of spirits making up for the scarcity of population.

The scenery of the country is unsurpassed in the estimation of many travelers. From the high mountains, the terrain can be seen for miles, blending with the sky and clouds so that it is impossible to tell where the earth stops and the sky begins. Each day, at sunrise, one is greeted with a sight beyond description, as the eastern sky becomes colored with all the colors of the spectrum, which gradually brightens to the full light of day, dispelling the silver clouds and lighting up the deep dark valleys below. During the day the sun is hot, but not oppressive at the high elevations. Although snow is unknown in the country, the rainy seasons are cool enough to necessitate artificial heating in dwellings.

Considering all, a sojourn in Honduras is a profitable experience regardless of the material losses entailed. The intimate contact with a people whose ideals and standards of living differ so greatly from our own brings home certain facts of life never really appreciated otherwise.

HYDRAULIC THESIS WORK

(Continued from Page 272)

the 90°, the one commonly used, will probably have the most constant coefficient of discharge over the ordinary range of head.

R. N. Morris assisted by P. H. Schultz and H. L. Clark is testing the performance of a "Hydrol" rotary pump at various speeds and discharge heads. The pump has been loaned to the laboratory for testing purposes by the Schmid Manufacturing Company of Dubuque, Iowa.

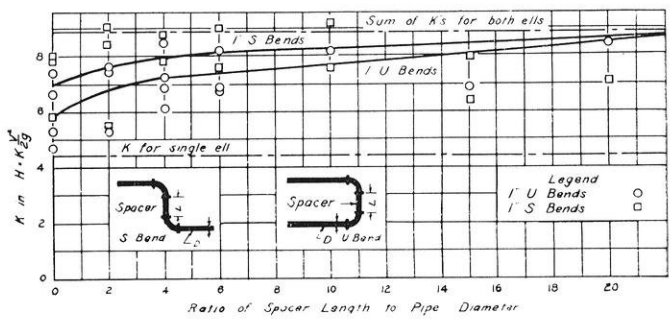


FIG. 2. *Variation in head loss in U and S pipe bends with different spacers.*

In addition to the above undergraduate and graduate studies, each of the instructors in the department is carrying on some investigative study. C. I. Corp and H. T. Hartwell, instructor in hydraulics, have a bulletin practically completed describing the results of some 4,000 tests to determine the effect of U and S bends in pipe lines from 1-inch to 8 inches in diameter. The studies indicate that when two standard pipe ells are joined together to form either a U or S bend, that the loss is apparently less than the loss in the two ells installed independently. Figure 2 shows the results for the 1-inch U and S bends and it will be noted that it is not until a spacer of from 20 to 30 diameters length has been inserted between the ells, that a loss is obtained from the U and S equal to the sum of the two independent ell losses.

In actual installations it is therefore desirable to group pipe fittings rather than separate them by lengths of straight pipe.

Alumni Notes

CHEMICAL ENGINEERING

H. R. Broker, ch'21, is the father of Robert Harvey, who arrived on March 29. Mr. Harvey is Superintendent of the Wisconsin Gas and Electric Company. of Racine, Wis.

Edwin E. Meisekothen, ch'22, announces the birth of a daughter, Helen Mary, on February 19. Mr. Meisekothen is a chemical engineer with French Battery Company in Madison. His address is 1234 E. Dayton St.

Cleveland F. Nixon, ch'23, has changed his address to 757 Bucklin St., La Salle, Illinois.

CIVIL ENGINEERING

George W. Chamberlain, c'10, has changed his residence from Chisholm, Minn., to 3130 Hibbing Ave., Hibbing, Minnesota. Mr. Chamberlain has been transferred to the Scranton Mine office of the Pickards Mather and Company.

F. C. Christopherson, c'23, Junior Engineer with the U. S. G. S. Water Resources Branch, who was recently in Madison, states that he has been transferred to the office at Charlottesville, Virginia.

Gordon F. Daggett, c'14, formerly materials engineer of the Wisconsin highway commission has been appointed Executive Secretary of the Wisconsin Mineral Aggregate Association. His address is 6098 Plankinton Building, Milwaukee, Wis.

Clark A. Dunn, c'23, writes Professor Owen that he would like to have a copy of the law for the settling of old disputed land corners, according to the laws of the state of Wisconsin. The things we learned in T. E. 3 are, without a doubt, very useful. Mr. Dunn is still with Bridge Department of the State Highway Commission.

Fabian C. McIntosh, c'13, is manager of the Pittsburg office of the Johnson Service Company. In a letter to the editor Mr. McIntosh compliments the excellence of the publication.

G. R. Olson, c'22, has changed his address to 133 So. W. Temple — Room 201, Salt Lake City, Utah.

Willard J. Seder, c'21, has changed his address to 229 South Fairmount Ave., Pittsburg, Pennsylvania.

Robert J. Trier, c'13, has accepted a position on the Engineering Staff of the City of Fond du Lac. Mr. Trier is also proud to announce the birth of a son, James Robert, born on March 14. They are now living at 32 N. Sibley St., Fond du Lac, Wis.

Harold W. Jensen, c'25, in a letter to Professor Van Hagen writes that he is still in the employ of the Northwestern Railway Company at Chicago. Mr. Jensen states in his letter, "I think I am getting some valuable experience right now. There certainly is a pile of work to be done in the next few months. They are the busiest right now that they have been for years.

"I was looking for the regular spring inspection 'bunch' this year, but I missed them. Did you go thru the Union Station instead? I haven't seen any of the class of '25 since last fall and only one of them — Wally Fluek. I have been coming up to pay a visit to the old haunts but I have postponed it so often that I don't dare set a date.

I never know when I'll get back when I leave the house in the morning. Such is a railroadman's life.

"My wife and I began housekeeping a couple of weeks ago and I am very conveniently as far as transportation goes. I can see my train from the kitchen and still make the grade."

ELECTRICAL ENGINEERING

Clarence E. Hocking, e'26, has announced his engagement to Miss Margaret Hill of Menomonie, Wisconsin.

George G. Post, e'04, who is with the Milwaukee Railway and Light Company attended the regional meeting of the American Institute of Electrical Engineers held at Cleveland, Ohio on March 18 and 19. Professor Edward Bennet and Assistant Professor L. J. Peters of Electrical Engineering at Wisconsin also attended this meeting. A three day regional meeting on the Northeastern Districts will be held at Niagara Falls on May 26, 27, and 28 where the technical subjects to be discussed will include dielectric power factor measurements, insulation, transmission, power plant tests, machinery, rectifiers, and speed measurements.

Robert E. Steele, ex e'28, is now living at 185—10th St. Apt. 3, Milwaukee Wisconsin.

MINING ENGINEERING

Chester Allen, min'10, has changed his address to 228 W. College Ave., Appleton, Wisconsin.

C. C. Gladson, min'24, has been transferred from Detroit to the home office of the Ladisch Drop Forge Company, Mr. Gladson's new address is c/o Ladisch Drop Forge Campany, Cudahy, Wisconsin.

Lawrence H. Hahn, min'22, reports his new address as 2806 Cedar St., Milwaukee, Wisconsin. Mr. Hahn is Sales Engineer for the Sivyer Steel Casting Company.

Milner H. Hawkins, min'25, was married to Miss Vivian Lansworth on January 2, at Ironwood, Michigan. Mr. and Mrs. Hawkins will be at home after May 1 at Caspian, Michigan where Mr. Hawkins is doing mining engineering work.

John F. Linden, min'24, employed by the Arthur Iron Mining Company at Hibbing, Minn. was married to Miss Martha Ruth Phelps at the home of the bride's Mother several weeks ago.

H. Gratton Lynch, min'24, who has been in a hospital in Montenery is now feeling all right and is employed by the South American Gulf Oil Company as an Oil Geologist. Mr. Lynch, who was recently married, is rather unlucky as his wife is in Texas and he is in South America. In his letter to Professor Shorey Mr. Lynch states: " I am up the Mogdeliva River on from a place called Puesta Welchis but at a nice camp. Here we have ice machine, lights, showers, etc., but at times we are out for weeks at a time in the jungle so in that case it is rather tough. Tell Mr. McCafferey that I applied for a membership to the A. S. M. E. and used his name as a reference. He may be asked to write on me. I am to be here for eighteen months and maybe longer.

MECHANICAL ENGINEERING

Alfred R. Ganther, m'23, has announced his engagement to Miss Edith A. Porter. Mr. Ganther is employed in business at Oshkosh, Wisconsin.

Edison E. Henry, m'22, has changed his address to 2107 Jones St., Wichita Falls, Texas.

Halsey F. Owen, m'20, who was in Madison on April 1st, is with the Merchants Power and Heating Company of Rockford, Illinois. His work consists mainly of designing and installing heating plants.

Clarence W. Peterson, m'21, has changed his place of residence to 913 — 2nd Ave., Kenosha, Wisconsin.

Homer J. Steel, m'23, is with the Southern Engineering Co., Dowd Road, Charlotte, N. C. He writes: "Since graduation I changed from technical computing on steam turbines to power plant operation to architectural supervision in Miami to structural drafting here. Architectual work and the allied building arts have turned out to be my natural bent."

Walter Porth, m'23, has just recently been transfered to the Bucyrus Company of South Milwaukee in their foreign sales engineering department.

ST. PAT'S PARADE

(Contined from Page 276)

aching for a fight, and still farther back came Jones and Lallier's "Prom Special." They were somewhat delayed because Lallier, the Prom Queen had to have his hair marcelled. They rode in an alligator colored racing Ford.

Joe Schulien showed the true spirit of St. Pat when he accompanied the parade, very scantily garbed, in a manner that would typify the shyster of 1950. He was eating a stick of candy and acted in a way quite fitting to a lawyer. On the square he offered a beautiful co-ed a bite of his candy and it was accepted, (one consolation for the Lawyers of 1950). Hugh Mackin, wearing a necklace of monkey wrenches, a derby hat, side burns, and other equipment, was a Jewish peddler. Everett, and Williams played the part of mounted police on Williams' motorcycle. Everett tried for thirty minutes to light a cigarette and gave it up as a bad job.

Several prizes were awarded. Triangle won the first place fraternity cup, and Phi Mu Delta the second place up. The A. S. C. E. took first place among the society floats and A. S. M. E., second. Cigarettes and candy were the prizes. Joe Schulien was rewarded for his exposure to Pneumonia by a slide rule, and Mackin earned a $5.00 Pantorium ticket. Buechner and Beeman took first place in the two-man group, and Jones and Lallier, second. First prize was two sweat shirts, and second was two fountain pens. James Bambary and group won six month's passes to the Strand theatre.

All and all the parade was a success in spite of the weather, and the victory was complete for the Engineers. The blarney stone has been stowed away and will remain until next year, when there may be a Lawyer-Engineer squabble about the time of St. Pat's Day, if it doesn't rain.

Athletics

CREW PREPARES FOR POUGHKEEPSIE

After pulling faithfully at the machines all winter, Dad Vail's crew candidates have finally been given a chance to work out on the lake. Placed under the handicap of a long winter — and the ice was unusually slow in breaking up this year — the Cardinal squad must practice doubly hard to get into shape to meet the other crews. Five of the men from last year's Poughkeepsie eight are back on the squad, including the 1925 captain, Oscar Teckemeyer, senior mechanical; and these with the likely new men from last year's junior varsity make the prospects for 1926 look pretty good. Kiewig and Basset, sophomore electricals from the old frosh squad, are doing pretty well on the varsity, and it looks as if they would be slated for regular berths on the eight. Kesting, sophomore civil, is also making a strong bid for the varsity eight, and Baillies, soph electrical, is a promising candidate for coxwain.

Teckmeyer
Senior
Mechanical

About four weeks are left before the annual regatta at Poughkeepsie, where the strongest crews in the country are entered. Nothwithstanding the shorter practice period, and the length of the course, four miles, Wisconsin has rated very high there, with a second and a third in the last two years. Three western schools and five eastern schools will probably be entered this year, including Washington, California, Wisconsin, Navy, Columbia, Cornell, Pennsylvania, and Syracuse. Perhaps also the frosh squad will be sent there to compete with similar crews from the other schools. Since the lake opened there has been a good chance to practice, and with the excellent training from Coach Vail, the Wisconsin crew should get into good shape to meet all competitors at the big regatta.

TENNIS

This year's tennis squad finds at least two engineers competing for positions on the team, which is to comprise five men. Lawrence Groenert, junior civil, and Leo Boldenweck, sophomore mechanical, should escape the first cut of the present number of hopefuls, and very probably the latter should qualify for a regular berth on the varsity. Despite the combined handicaps of bad weather and poor courts, the Badger net-men have one of the most promising seasons ahead of them in years, which may sound trite but remains to be seen. With the expert handling of Coach Bill Winterble, who, incidentally, is an old timer at the game and verily breathes tennis, Capt. Sam Durand and his merry men should bring Wisconsin its first honors in this sport and perchance give the game a reviving boost in this vicinity.

EDITORIAL.

It may be a revelation to some people, inasmuch as it is an absolute fact, that tennis and golf are the most practical sports to the student in the college curiculum of athletics. It is doubtful whether another sport could be added to these two and still satisfy such conditions of value and use in the many years that follow the close of college activities. A man may as well hang up his track shoes, or put away his basket-ball or base-ball outfit, or discard his football clothes and ambitions, after he receives his degree, unless, of course, he is going to become attached and concerned principally with athletics.

The obvious questions of time and condition are the prohibitive restrictions that definitely debar the young business man, as well as the old, from seriously renewing or considering activity in any of these major sports. On the other hand, both golf and tennis afford all of the necessary exercise that is needed and, in addition, provide a most excellent advantage of combining the recreation with a social-business intercourse. Unfortunately, this university, with many of the other mid-west colleges, does not encourage either of these sports by extending suitable facilities for their promotion and expansion. It is a pity that the vision of the athletic-governing bodies does not reach beyond the present good derived by the active student.

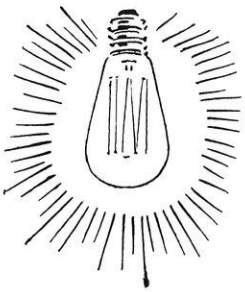
SPRING FOOTBALL PRACTICE

Answering Coach George Little's call for spring practice, almost a hundred men reported and have been working in full swing. The unfavorable weather before recess retarded outdoor practice and forced the men indoors for part of the time, but since the middle of April, practice has been held regularly at Camp Randall.

For some time now, the men have been at scrimmage. Their playing indicates the possibility of a fine eleven next fall. With such intensive spring training and a wealth of good material, much of it from the College of Engineering, we may expect a most successful season.

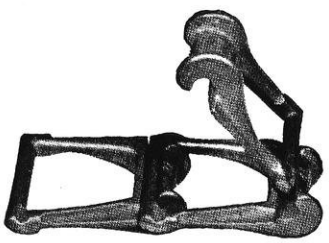
When the Inventor himself, wants light

The Inventor probably still feels a glow of satisfaction toward the old carbon filament lamp. But when he wants light he probably switches on a bulb like this.

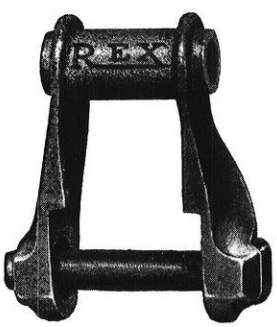


They are both electric lights, but the Mazda represents a better way of using electricity for lighting.

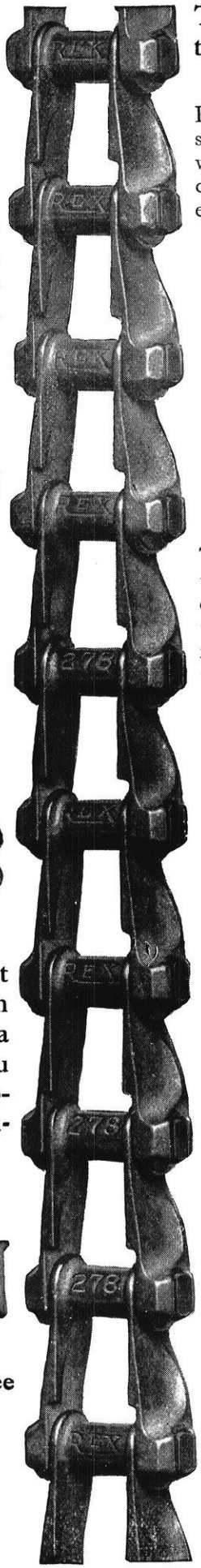
Today there are a lot of us who have an affection for some old type of chain that helped us make money in years gone by. Take old Detachable, for instance.



But that is no reason why we should use it today any more than the Inventor would use the old lamp. For Rex Genuine Griplock put the old chain on the shelf.

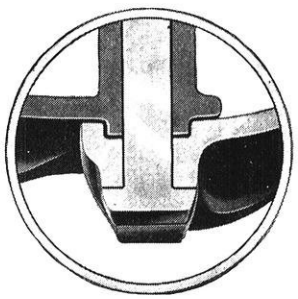


The Hidden Shoulders represent the same sort of an advance in chain engineering as the Mazda did in electric lighting. If you don't know Rex Genuine Griplock, turn the "spot" on the coupon, now.



The Hidden Shoulders that have saved thousands of dollars

Rex Griplock fits the same sprockets and does the same work as ordinary types of chain, but does it more efficiently and at a lower cost.



The hidden shoulders of genuine Rex Griplock

The greater strength and the greater live bearing area of Rex Griplock both lie in the hidden shoulders that make the chain stronger than its pins.

Rex Genuine Griplock is only one of the many improvements in power transmission and material handling equipment that have been pioneered and developed by the Chain Belt Company.

The growth of the mechanical handling has been one of the outstanding developments of industry in the twentieth century.

Whether you are a student, an executive, or a graduate engineer it might be well to find out what mechanical handling holds for you.

We will gladly furnish additional information to anyone interested.

REX CHAIN

CHAIN BELT COMPANY

759 Park Street **Milwaukee**

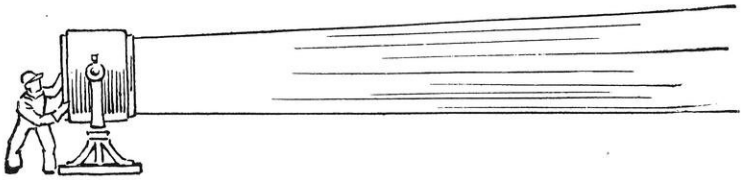
Among the Products Manufactured by the

Chain Belt Company

are:

Rex Conveyor Machinery for handling materials of all kinds.
Rex Chain for power transmission or conveying materials.
Rex Concrete Mixers for construction work.
Rex Concrete Pavers for streets and highways.
Rex Power Transmission Equipment.
Rex Traveling Water Screens.

The Chain Belt Company and its affiliated organizations employ approximately 2,000 men



A RECENT GRAD'S WANDER YEAR

(Continued from Page 271)

young student who knew a little English, (practically all of them are studying English now) when I really needed help, and he would always be anxious to practice what English he knew and to listen to my spoken English. I'm sure that within a few years every educated Japanese will have a workable knowledge of our language.

I was sorely tempted to stay longer than my time and money allowed, but after another week along the picturesque Inland Sea, I made my way up through old Korea, now known as Chosen, rugged and ancient, to Mukden in Manchuria, where the Chinese are being ousted by the more progressive Japanese. Only politically and economically, however; racially not in the least, for the race has not yet appeared which can absorb the Chinese; whereas, they have absorbed several races of people and seem none the worse for it. Mukden really warrants a longer visit than I paid it. It was once the threshold of the Mongols and ranks with Peking, Nanking, and Canton as an important Chinese city historically, although less known to Westerners. I did not tarry on my way through the Manchurian provinces to Peking, for I was anxiously expecting great things of that capital, and I was not disappointed.

Of all the cities I have been in Peking stands out as the most individual; and if it is possible for cities to have it, then, above all, Peking has personality. It is to the East what Rome is to Europe—the Imperial City. Here in the middle ages Genghis Khan and Kublai Khan planned and built the capital for their empire on a vast and magestic scale winning for it the title of the city of magnificent distances. Peking, "gets" you, with its awe-inspiring Forbidden City, its royal palaces, its imperial gardens, its many princely palaces, its magnificent temples — all beautifully planned in their relation one to another, and surrounded by the massive city wall some fourteen miles around pierced by twelve gates, each adorned with a finely wrought pagoda style tower. The Chinese may never have reached great heights of grace and beauty in architecture, especially according to our standards, but they do excel in the matter of settings for their architectural monuments. All the important buildings and temples are situated in spacious grounds with effective and dignified approaches and vistas. Even the city as a whole is effectively situated just below the last ridge of the protecting mountains to the west and north which separate the plains of Mongolia from the fertile fields of Chihli.

The intimate life of the people, too, is just as fascinating, for more than in any other large city of the Far East it has retained its old Chinese character. Except for the comparatively isolated Legation Quarter, the Chinese have successfully resisted the encroachment of the West. Not even the tram lines, the tracks of which were laid some years ago by the French, were completed. The Peking Cart, a clumsy two-wheeled affair with no springs, and the rickshaw are still the

principal means of transportation. I have no doubt, however, that Western customs will force their way into this city eventually. We are such a pugnacious people! So I was loathe to leave Peking while it was still so truly Oriental when on the eve of my departure I happily found a job which kept me there for four delightful months.

The architect of the Rockerfeller Foundation was investigating the feasibility of building several small gas-producers, and I assisted him in the design and computation of costs. China has no natural gas, and even the large cities have no municipal gas supply, for China jumped directly from candles and oil lamps to electricity. But the Rockefeller Foundation really needed gas in a half dozen hospitals and medical colleges throughout the country for laboratory purposes, Bunsen burners, and for hospital kitchens. We hoped to make use of the abundant supply of cheap coal in gas producers, but the equipment needed was too complicated and expensive for the small amount of gas needed. Furthermore we found this plentiful supply of coal too high in sulphur content and generally of poor quality for gas producing. The result, then, of four months of work was to abandon our ideas. They could not be worked out economically, and instead we purchased from Czecho-Slovakia several very efficient gas-producers using either kerosene or gasoline and producing a satisfactory gas much more economically than we could hope to produce from coal. It was my first practcial realization of the fact that an engineer's duty is not only to know what to do but also to know what *not* to do.

By this time I was quite anxious to make more important connections, but I soon discovered that it was impossible to do so. The civil strife which had been threatening the peace of the country more or less intermittently was becoming more serious. All foreign capital and much native capital was being withdrawn from new developments in transportation, mining, power generation, and similar activities; hence many engineers, against whom I could not compete for any jobs that might have been open, were out of work. Things went from bad to worse. Feng Yu Shaing, the so-called Christian General, with his army deserted his political party and set himself up as the power in Peking. That was my cue to leave, and I did so, reluctantly but promptly. Fortunately I was able to take the last train that left Peking for some time. Feng was confiscating them for troop movements.

One must not get the idea that the Civil War in China is comparable to our own notions of a civil war (although at the time of writing there really seems to be some actual fighting around Tientsin). For the most part it is political maneuvering and personal intrigue on the part of the military Tuchuns of the several provinces of China. On the other hand it is generally admitted that the entire structure of the republican form of government set up by the revolution of 1911 has collapsed. The Chinese are not suited to the re-

publican form of government by reason primarily of their temperament, but also by reason of the poor communication between the many provinces, the lack of a universal language, and the high percentage of illiteracy. I, for one, cannot see how anything but a monarchy can restore political order for the present. But when that order comes, and it must come before long, the engineers who were forced to leave their work will return again and many more besides, including, I hope, myself.

Of course, my thoughts were of other things while I was on that train bound for Shanghai. We were rather uncomfortably crowded, passengers were far too numerous for the few civilian trains running, and we were often sidetracked to allow troop trains to pass. The military atmosphere was very tense, and I felt like a boy running away from an exciting fire (if there ever was such a boy), but I afterwards learned that as usual nothing came of all the maneuvers. I was more concerned, as a matter of fact, about my prospects of "shipping out" of Shanghai.

The darkest hour in the history of any young man comes when he sits down to study how to get money without honestly earning it. — *Horace Greeley.*

THE NEW DIESEL

(Continued from Page 269)

sleeve which carries the fuel pump cam. This sleeve is fastened to the end of the main shaft by three cap screws. By loosening the screws, the sleeve can be shifted to cause the time of injection to occur earlier or later with respect to the crank position. The governing action takes place by shifting a cam carried on a secondary sleeve, which rotates on the main sleeve. The position of this governing cam controls the time of closing of the suction valve on the fuel pump. Thus, the fuel pump always makes a complete stroke; but fuel is injected during only a portion of the stroke.

The lubricating oil is continuously filtered. One oil pump discharges used oil to the filter and another pump discharges filtered oil to a mechanical lubricator from which it is distributed to all bearing surfaces.

At the present time, the engine is loaded by means of a prony brake. Provision has been made whereby a water dynamometer can easily be connected to the engine. This feature will be added whenever funds are available for such apparatus.

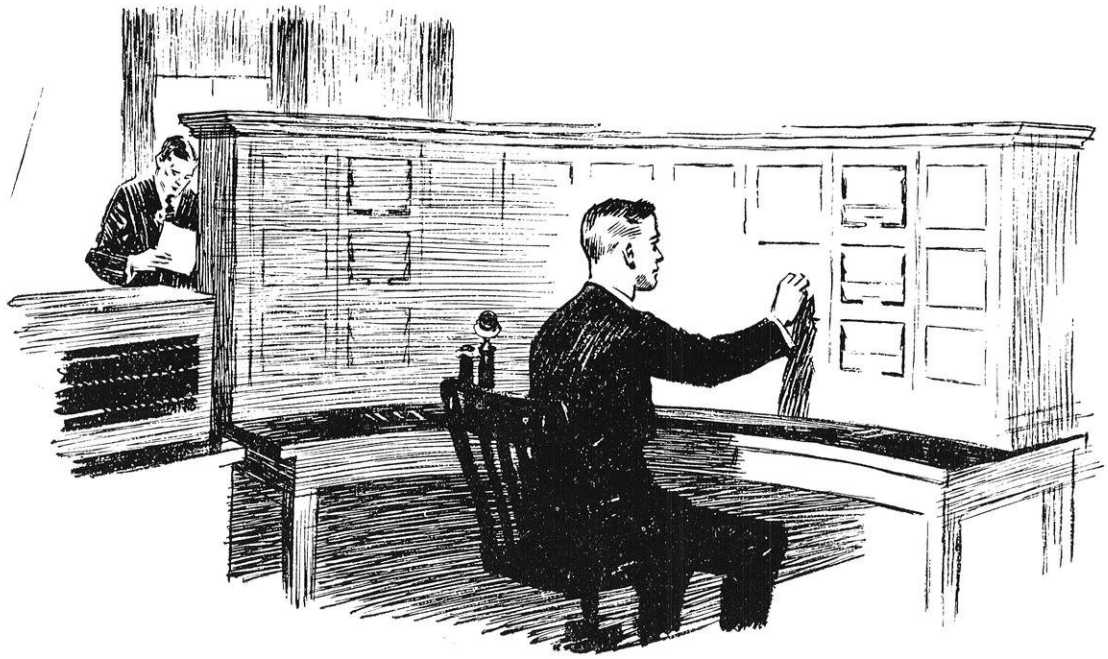
There has been remarkable development in the Diesel Engine during the past few years. It has never been a question of high efficiency for that was achieved even with the first invention in 1892 by Dr. Rudolf Diesel. Improvements during the succeeding five years developed an engine which operated on the present day cycle. The problem has been to produce this engine on a manufacturing basis. The Diesel Engine, with a thermal efficiency of 30%, has the record of being the most efficient heat-power motor in practical use at the present time. The fuel guarantees for the engine installed in the Laboratory are as follows: —

100% Full load — 0.48 pounds of fuel per B.H.P.- Hr.
75% Full load — 0.50 pounds of fuel per B.H.P.- Hr.
50% Full load — 0.58 pounds of fuel per B.H.P.- Hr.

These fuel rates correspond to a thermal efficiency of about 28% at full load. It will be necessary to operate the engine for some time before a satisfactory fuel rate test can be made. It has shown a capacity for carrying 110% rated load continuously and 125% rated load for short periods of time.

One of the important reasons for installing this engine is that of research. There are many problems which remain to be solved. The manner of supplying fuel and controlling combustion is one of the most difficult problems. The difficulties of solution are increased by the fact that these engines must be built to operate on a wide range of fuels. With the testing equipment which is available in our Engineering Laboratories, many interesting problems can be investigated.

Ingratitude is monstrous; and for the multitude to be ungrateful, were to make a monster of the multitude. — *Shakespeare.*



They call it the "Pierce Type"

R. T. PIERCE

When the class of '15 at Maine was being graduated, the name "Pierce" meant no more in the field of metering than Sweeney or Jones. Today, however, if you'll talk to such companies as the Detroit Edison Company, The Southern California Edison Company, the Duquesne Light Company, or the United Verde Copper Company, you'll learn that "Pierce" means a type of remote metering, which enables a man in a central dispatcher's office to read the condition of a sub-station several miles away.

Superpower brought in the need for an improved method of remote metering, and R. T. Pierce, Maine '15, in the employ of Westinghouse, devised it. He designed a system that operates on a new and different principle, and that has met with general acceptance in the Central Station field. He also was active in the recent re-designing of the entire Westinghouse instrument line.

The question is sometimes asked: Where do young men get when they enter a large industrial organization? Have they opportunity to exercise creative talents? Or are they forced into narrow grooves?

This series of advertisements throws light on these questions. Each advertisement takes up the record of a college man who came with the Westinghouse Company within the last ten years or so, after graduation.

It was only a few months after Pierce had completed the graduate student course at Westinghouse that he was given an assignment in the instrument section of the engineering department. He took it merely as a "fill-in" job. Soon he saw that instruments play a vital part in every electrical operation. As an instrument engineer, Pierce spent several weeks on the U. S. S. Tennessee and the Colorado during their trial runs. He has ridden in the cabs of electric locomotives. He is in closer touch with radio than anyone not a radio engineer.

A design engineer comes continuously in contact with sales negotiations, and Pierce's contact with them proved so beneficial that he was lately made head of the Instrument Section of the Sales Department, which means that he really has charge of the sale of all instruments to Westinghouse customers.

Westinghouse