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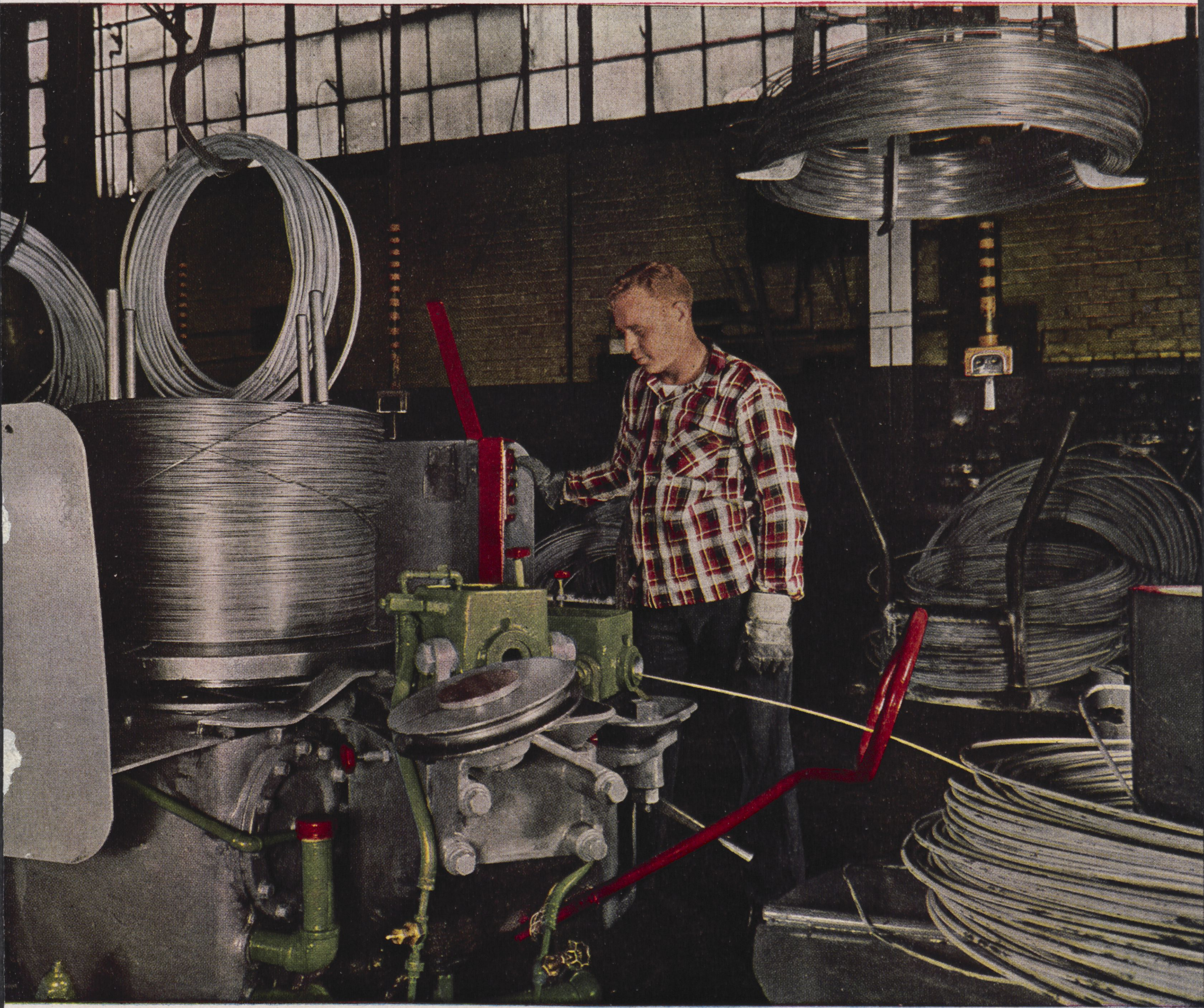
The Rose Technic



WIRE—FROM STEEL TO STRAND, PAGE 6

MARCH, 1948

MEMBER ENGINEERING COLLEGE MAGAZINES ASSOCIATED

Organic Chemicals—

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THE ROSE TECHNIC

VOLUME LIX, NO. 3 MARCH, 1948

MEMBER OF ENGINEERING COLLEGE MAGAZINES ASSOCIATED

Arkansas Engineer, Cincinnati Cooperative Engineer, Colorado Engineer, Cornell Engineer, Drexel Technical Journal, Illinois Technograph, Iowa Engineer, Iowa Transit, Kansas Engineer, Kansas State Engineer, Kentucky Engineer, Marquette Engineer, Michigan Technic, Minnesota Technolog, Missouri Shamrock, Nebraska Blueprint, New York University Quadrangle, Ohio State Engineer, Oklahoma State Engineer, Penn State Engineer, Pennsylvania Triangle, Purdue Engineer, Rose Technic, Tech Engineering News, Wayne Engineer, Wisconsin Engineer, North Dakota Engineer, Rochester Indicator.

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IN THIS ISSUE

FEATURES

COVER PICTURE

The machine, called a "Bull Block," is used for drawing wire. The steel rod feeds into the die from the right and emerges as smooth wire on the coil at the left. The four-color plates were obtained through the courtesy of STEELWAYS, published by American Iron and Steel Institute.

FRONTISPIECE

This primary, gyratory crusher is used for crushing limestone for use in making Portland Cement. The crusher is capable of breaking a limestone boulder as big as an office desk into relatively small rocks.

Cut courtesy of **Esso Oilways.**

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On April 5th, a little late for a welcome by St. Pat, the college will admit more than 140 members of the Class of 1951. For application blanks for the next class, January, 1949, write to the Registrar.

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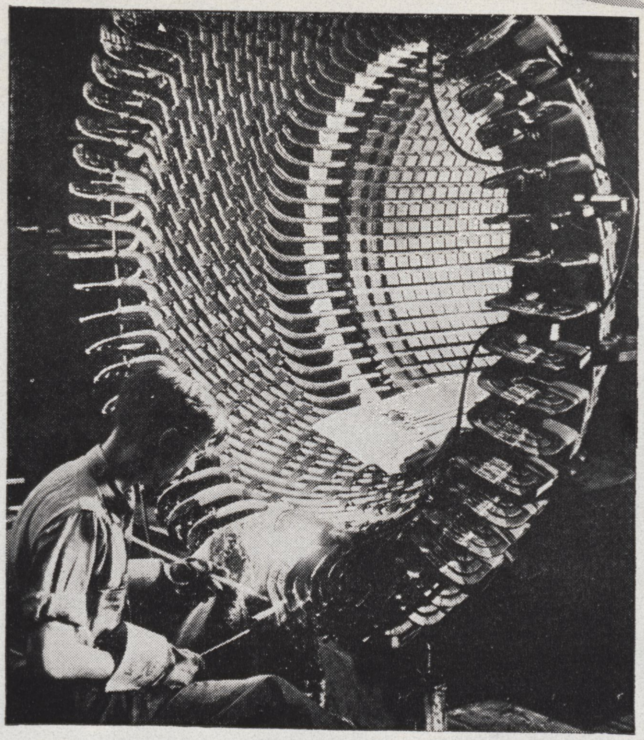

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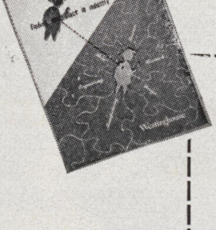

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Citizen . . . Engineer

The central theme of a number of editorials, articles, and speeches during the past several years has been the idea that engineers ought to be more conscious of social obligations. More specifically, the charges are that engineers should be more politically minded, that the trained minds of engineers are needed in government, and that engineers should feel more responsibility for the effects of industrialization upon society. Dr. Webster N. Jones, Director of Engineering and Science at Carnegie Tech, said recently, "Technical competence is not enough for the individual; it is not enough for the profession; and it is not enough for democracy".

Actually, the number of engineers employed in government service is not so small. City, county, and state governments now employ more engineers than lawyers, according to an article in *American City,* but lawyers predominate as a guiding force, whereas engineers confine themselves to technical positions. In industry, most engineers eventually hold some kind of managerial position, usually related to technical aspects of production. However, the vice-president of a certain corporation expressed an opinion recently that many engineers never qualify for top positions in management because they become so immersed in technology that they neglect to develop the awareness of human values so necessary for managing people.

These statements seem to picture an engineer as a person buried in textbooks and formulas, a person who can build machines and bridges, but who does not assume his full responsibilities as a citizen, and who rarely contributes ideas about governmental and social progress.

Probably the best reason for the tendency of engineers toward such complete technical specialization is the rapid industrialization of the nation. Besides a heavily technical curriculum in school, there is the problem of maintaining professional competence by keeping pace with a scientific development that has been amazingly rapid during the past century.

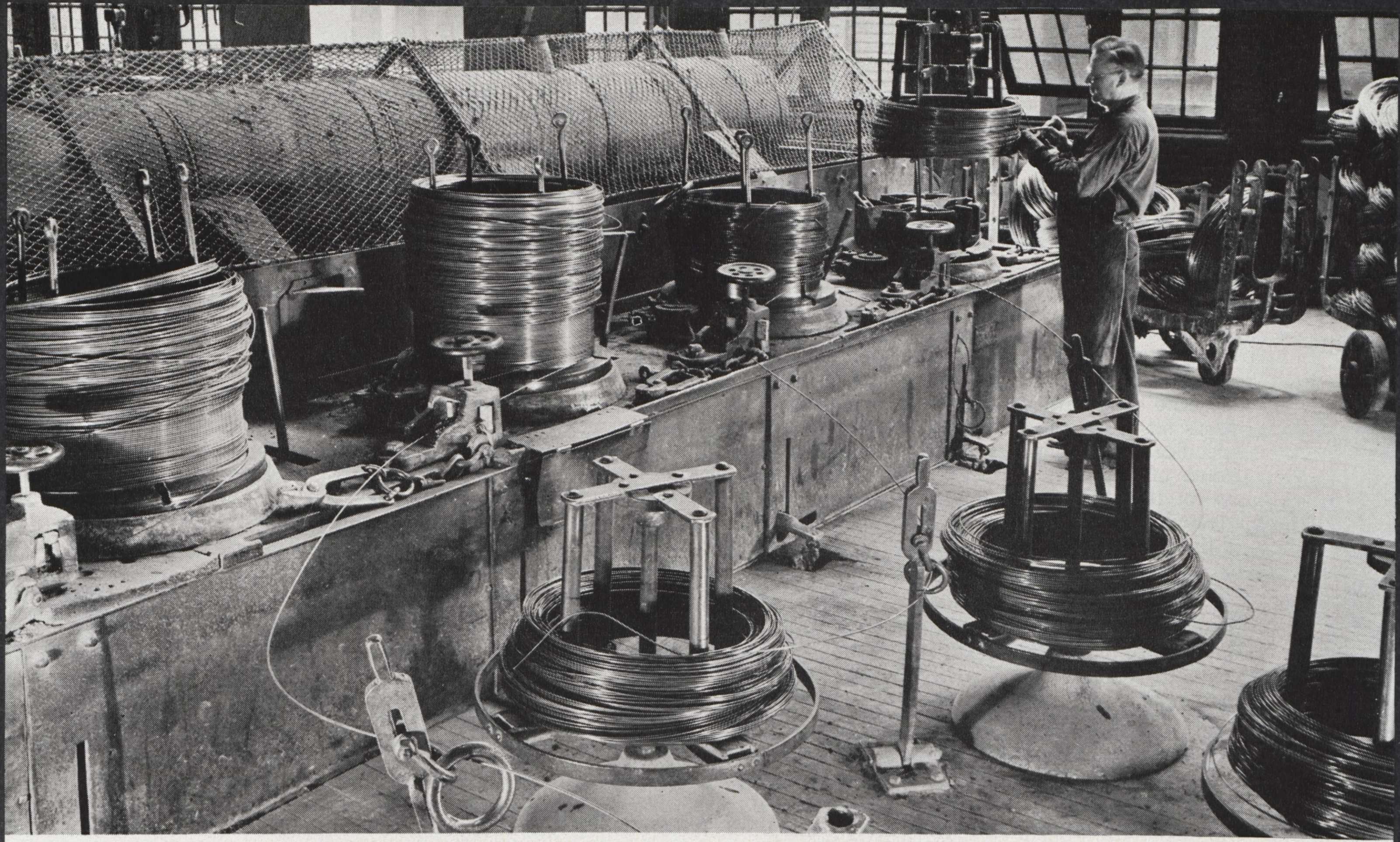
Certainly, by specializing in technical knowledge, engineers have contributed immensely to the material welfare of society. At first glance the idea of specialization might appear to be ideal. By applying the production line conception to society, by having a society composed of specialists (for example, specialist in technology, government, education), with each one confined to his specific field, each person would contribute a maximum and the result would be a most efficient organization. Evidence shows, however, that society is not yet ready to be placed on such a basis.

Scientists are now face to face with the result of carrying this idea to its extreme conclusion. The traditional stand of scientists that they could not assume responsibility for the applications of their creations and discoveries now seems naive with the advent of the atomic bomb. While scientists (and engineers) work busily about their laboratories, declining responsibility for the manner in which their products are used, unscrupulous or less informed people in government and other positions of responsibility can use the products of scientific labor to bring the world down in ruins.

With an atomic bomb on their consciences, scientists have begun to reverse their former stand and are showing an increasing interest in political affairs. A group of leading scientists is now exerting an influence for world peace in an effort to avoid the use of atomic energy in warfare.

The need for more consideration of the human element by engineers in industry has been recognized at the University of California, where a course in biotechnology has been added to the engineering curriculum. The course concerns human physiology, psychology, and hygiene as related to engineering. Justification for the addition of the course to an already extremely crowded curriculum is offered with the following reasons: the interdependence of man and machines, the increasing trend of technical developments to cause artificial control of human environment, and the expanding role of the engineer in human affairs.

O. S.



Wire Drawing Frame — *Cut Courtesy of American Steel & Wire Co.*

Wire - - From Steel To Strand

By Howard Freers, sr., m.e.

Significant advances and improvements have taken place in wire manufacture in recent years, especially in the field of fine wire drawing, although the basic process is generally considered to be fairly old and well established. For example, a wire thirteen millionths of an inch in diameter was drawn recently. It would take twenty-five thousand of these wires to equal the cross section of one human hair. When mounted between plates of glass the wire is invisible if held toward the light, but its shadow can be seen.

The process of wire making consists essentially of pulling a rod through a die which has a hole smaller than the diameter of the rod. As the rod passes through the die it loses cross section, but gains length. From the manner in which it is performed, this process derived its name of wire drawing.

The preparation of the rods for drawing is just as important as the drawing itself. Some metals require heat treatment before drawing. All rods are pickled in acid, and washed thoroughly. After washing, the rods are made to rust, then dipped in a lime solution, and dried. Causing the rods to rust seems contrary to the first step of pickeling, but rust keeps the rods clean and acts as a lubricant during the drawing operation. When the rods are dry they are wound in rolls ready for drawing.

To begin the drawing operation a roll is placed on a reel, the end of the rod is hammered to a point, and the pointed end is threaded by hand through the die. The first few feet are threaded through and attached to a large motor driven drum called "the block", (see cover and illustration). The block then pulls the rod through the die.

There are two ways to draw wire. One is to draw the wire through a die, wind it up, move it to the next machine, draw it through a smaller die, and so on through progressively smaller dies until a desired size is reached. The other method is to draw the wire to a specific size in one operation by having as many as a dozen dies in a series. In the series draw it is necessary to have slack drums between each set of dies to take up the lengthening of the wire due to drawing. This series method has been very successful, especially in fine wire drawing. To give an idea of the increase in speed that a rod gains as it passes the successive dies, a wire passing the first die at one hundred and fifty feet per minute may leave the last one at twenty miles per hour, or about eighteen hundred feet per minute. This very large increase in the speed of the wire is due to the lengthening of the wire during drawing. The method of speeding the wire is used rather than to have all of the lengthening taken up on slack drums.

During the drawing process a wire drawing compound flows continuously into the die. This compound has many uses, most important being to lubricate, to impart good qualities to the wire, to insulate, and to cool the wire. If the wire is not properly cooled there is a two-fold effect: (a) hot wire wound on spools oxidizes and thus suffers in appearance, (b) the heat stored in the rolls is enough to anneal a hard drawn wire to the point that it will not pass A.S.T.M. standards. Studies on wet drawing lubricants have shown that stearated metallic soaps, such as calcium and aluminum have a specific application in high speed wire darwing.

Before World War II, large quantities of fine wire were imported from Europe. Few of our own manufacturers were equipped to economically produce fine steel and alloy wire of the quality and quantity desired. Wire which was formerly imported had to be produced in large quantities in the United States during the war.

The size of fine finished wire makes cleaning exceedingly difficult. The effects of faulty cleaning are especially evident at the speeds of the fine wire drawing operation, speeds of fifteen hundred to eighteen hundred feet per minute for wet drawing. The best results cannot be obtained unless all foreign matter, such as smut, lime, drawing lubricants, and oxides, is removed completely.

There is danger in both under-cleaning and over-cleaning. Under-cleaning leaves foreign matter, over-cleaning pits the surface by acid erosion, and both result in abnormal, uneconomical die wear. To safeguard against under-cleaning, some plants have resorted to so called double cleaning or rust-bluing operation. The material is first cleaned, then allowed to rust, and then re-cleaned. This is, however, a very costly process and should be resorted to only when absolutely necessary.

A new development has been heralded as a replacement for cleaning, coating, and extra handling before the final draws are made. This process is known as the bright annealing of process wire in a protective atmosphere. The wire is liquor coated, drawn down to final annealing size, annealed under gas, removed and taken directly to the wet drawing room. This process has proved very successful and economical, and has seen extensive application in the field of wire drawing.

Various coatings used as lubricants for wire drawing are lime, liquor coating (copper-tin), or copper. For best results the coating should be adherent, fine grain, and uniform.

In the use of lime coating, a hot light lime is used and coating thickness is developed by several dips, allowing for partial drying between dips. Fine grained character of the liquor coating is controlled by time, temperature and the concentration of the relative proportions of copper and tin.

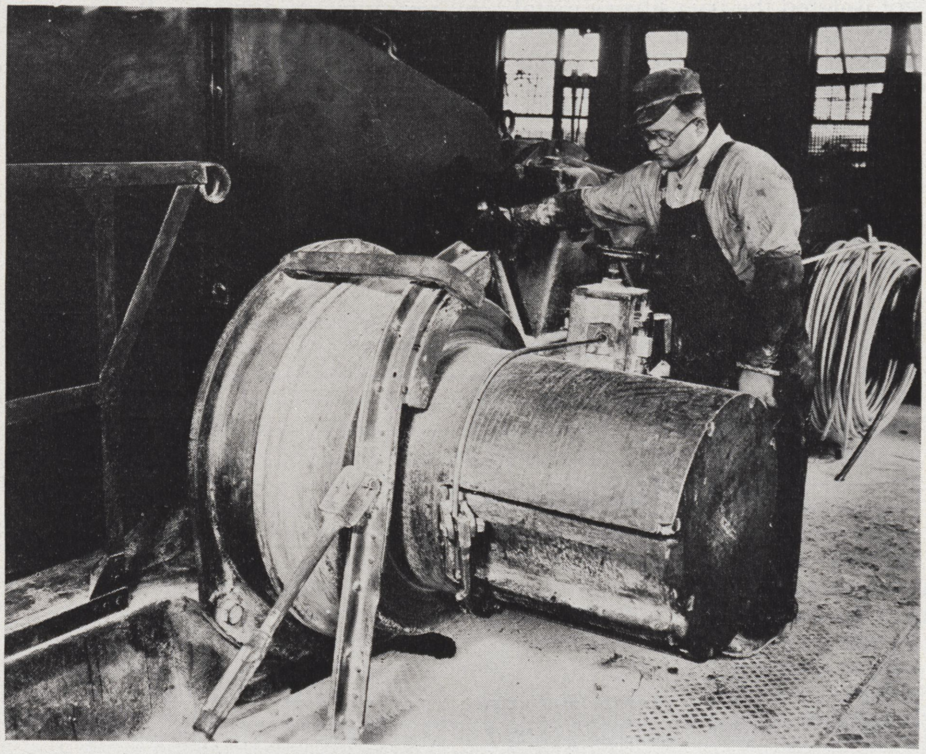
Another development is the process of coating the wire at the cleaning crane, and immediately immersing in a hot alkaline solution to form a protective coating. Wire coated in this manner is sent to the fine wire drawing room where it is drawn from a dry reel. The advantage of this method is the uniformity of coating and the elimination of the wet tubs.

The dies are made of various materials, but the cemented carbides are kings of all. The most common carbides used are tungsten, cobalt, boron, tantalium or titanium and mixtures of any or all. Hard cast iron, steel alloys and diamond dies are also used, the diamond die being the best for fine wire drawing. The die hole is wider at the entrance end than at the exit end and is very smoothly polished. A die gradually enlarges with use and is then reamed to the next largest size.

The old school of wire drawers peened and punched their own dies to suit themselves with tolerances of 0.002 to 0.005 inches. Now for medium size wire 0.001 inches tolerance is rarely exceeded, while for high grade fine wire 0.002 inches is standard.

The squeezing and stretching that the wire receives during manufacture alters its physical characteristics quite a bit. With each draw the wire becomes harder, stiffer, and stronger, until it is too brittle for most uses.

(*Continued on page* 28)



Above: Drawing extremely fine stainless steel wire.

Right: Bull Block drawing very heavy rod.

Uranium

By Robert Schwier, soph., ch.e.

Today in the mind of the average man uranium represents large explosions, Hiroshima, and mangled, distorted human beings. The word reminds him of atomic bombs, chain reaction, and radioactivity. All of these items are, of course, concerned with uranium, but they are more representative of the complex studies of the element. Before we can understand the complex, we must have a knowledge of the simple, and it is the purpose of this article to discuss the basic chemistry of uranium.

In 1789 a famous German anlytical and mineralogical chemist, Martin Heindrich Klaproth, found that pitch-blende, an ore previously believed to be composed of iron and zinc compounds, contained a new element, which he named Uranium in honor of Herschel's discovery of the planet Uranus in 1781. Klaproth reduced the ore at high temperatures and obtained a brown metallic substance which he labeled uranium. It was, in truth, uranium oxide, but because of the metallic properties of this oxide in forming a positive radical, the mistake was not rectified until 1840 when Peligot prepared a new uranous chloride which did not conform with the properties of Klaproth's "uranium." Later, in 1842. Peligot isolated the true silvery metal by reducing his chloride with metallic potassium in a platinum crucible at very high temperatures. He was also able to prove Klaproth's "uranium" to be uranium oxide.

At this point uranium faded into the realm of a laboratory curiosity for some fifty years. However, the year 1896 ushered it into the limelight again with the work of Henry Becquerel when he found that uranium ores would affect a photographic plate without exposure to light. In other words, there was some mystic body, ray, or form of energy that was passing spontaneously from the ore to the plate causing "exposure." Here began the study of radioactivity and only two short years later, in 1898, did Madame Curie make the more astounding discovery of radium, thus robbing uranium of much of its radioactive glory. After the discovery of the more active radium, uranium became more and more a by-product until, in recent years, uranium has again come into use with the atomic bomb.

Uranium is not widely distributed over the earth's crust. It occurs principally in two ores, uraninite, or pitchblende, and carnotite. Other ores contain minor amounts of uranium and are consequently less economical for commercial use.

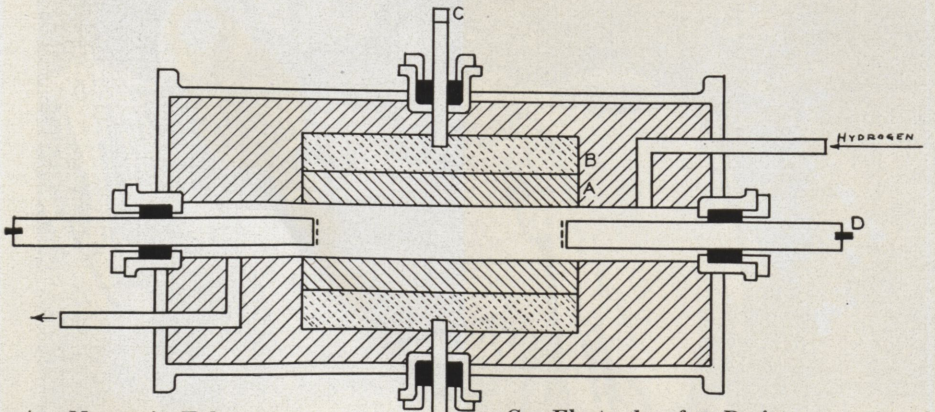
Pitchblende is the most important ore, and, by the way, the first used in uranium production. It is composed of from 40 to 90 per cent uranium oxide in the form of U_3O_8 with impurities of iron, lead, bismuth, the recovery of radium is the first thorium, radium and rare earths. The ore is found principally in Joachimsthal, Bohemia, and Johnngeorgenstadt, Saxony, with minor varied ores in Hungary, Norway, Turkey, Connecticut, North Carolina, Colorado, Utah, Bengal, East Africa, Quebec, and Cornwall.

Carnotite is a complex ore of vanadium, potassium, and uranium with a chemical composition of $K_2(VO_4)_2(UO_2)_2 \cdot 8H_2O$ and silica impurities. This ore is found principally in Colorado and Utah, with minor deposits in South Austria and Portugal.

The purification of uranium falls naturally into two parts or sections: (1) the recovery of the pure uranium compounds from the ores and (2) the reduction of these compounds into uranium element. The purification process is further complicated by the fact that uranium production is, in general, subordinated to the recovery of radium and, for this reason, is not always the most truly efficient method of securing pure uranium.

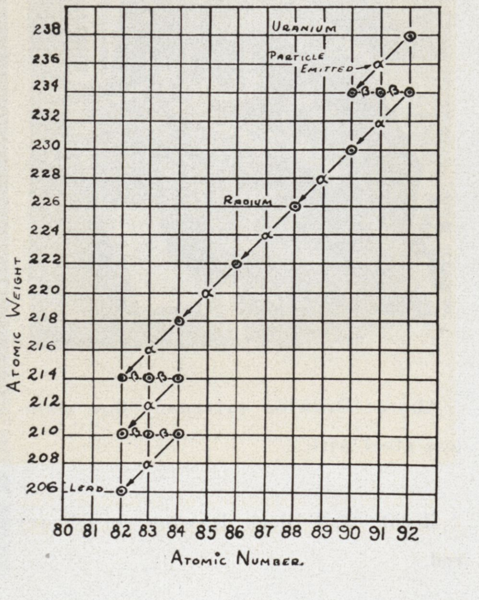
The first process to be considered is the recovery of uranium compounds from their carnotite ores. Here, as in most other purification, and most important operation.

The ores are first ground to pass a 20-mesh sieve and then the radium,



A. Magnesia Tube.
B. Carbon Resistance
C. Electrodes for Resistance part of furnace.
D. Electrodes for Arc part of furnace.

Diagram of Furnace used by Rideal.



uranium, vanadium, and several impurities are leached from the gangue by the addition of any of the principal acids, nitric acid being the best. After the nitrate solution has been filtered off, the remaining sand is washed, re-washed, and discarded, the wash solutions being added to the filtrate. The solution is now neutralized with sodium hydroxide, barium chloride is added, and the barium and radium are precipitated by the addition of sulfuric acid. The remaining liquor is boiled in an excess of sodium carbonate, removing the iron, calcium, and most of the aluminum, and then neutralized with nitric acid. The uranium, 7 to 8 per cent impure with vanadium, is now precipitated as sodium uranate by the addition of sodium hydroxide. The solution is filtered and the precipitate, sodium uranite, is again put into solution by the use of nitric acid. Air is blown through the acid solution to remove the carbon dioxide, and ferrous sulfate is added to precipitate the iron vanadate. This leaves a pure uranium compound, ready for reduction into the metal.

The other principal ore, uranite or pitchblende, is also treated for its radium compounds first. It is ground, roasted to remove the sulfur, arsenic, and other volatile ingredients, and then heated in a reverberatory furnace with sodium carbonate or sodium sulfate. The product is now digested in warm, dilute sulfuric acid and the solution taken off. This solution contains the uranium and several impurities which are removed through precipitation by the addition of an excess of sodium carbonate. The result is the pure sodium uranyl carbonate which is left in solution. These processes may be, and often are, varied according to the ores, the ease and cost of procuring chemicals, and the products desired from the reaction.

The second part in the purification of uranium is the reduction of the pure metal from its compounds. This process is divided into three main parts: (1) reduction of urano-uranic oxide, (2) reduction of uranous chloride, and (3) reduction by electrolytic methods.

The reduction of urano-uranic oxide (U_3O_8) was first performed using sugar carbon, but the reaction took place only at high temperatures (1500 degreese C.) and the resulting uranium was only about 96 per cent pure with carbon impurities. Rideal varied this reaction using magnesium rods in a hydrogen atmosphere with an electric furnace. The reaction was very satisfactory, giving pyrophoric "uranium black."

The reduction of the chloride was the historical method used by Peligot, employing the extreme activity of potassium to reduce the metal. Later Zimmerman used sodium in the presence of sodium chloride, and Rideal and Moissan elaborated on this process using magnesium and pure sodium under varying conditions to obtain products of 99.3 to 99.6 per cent purity.

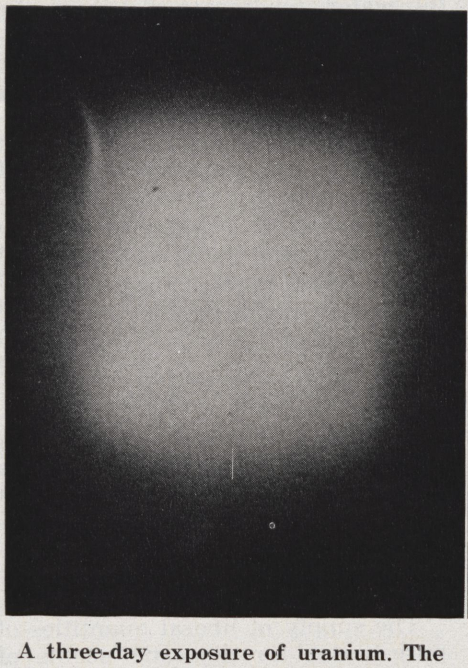
The last method, electrolysis, though giving the greatest purity, is the least practical. Moissan electrolyzed the sodium uranium chloride in an atmosphere of hydrogen using a mercury cathode. He then distilled the amalgam in a vacuum and obtained the very pure uranium. This process is not only difficult to perform, but also very costly.

Uranium is a heavy white metal having a specific gravity of 18.685, just below gold, and capable of attaining a very high luster which will tarnish in a few days on exposure to air. It belongs to group six of the periodic table under chromium, molybdenum, and tungsten, and melts at a temperature of approximately 1850° C. Uranium is composed of three main isotopes, itemized here here with their masses and respective percentages.

Mass Number	Per Cent
234	0.006
235	0.71
238	99.28

In the compound uranium fluoride, UF_6, uranium acts as a metal; in the compound uranyl chloride, UO_2C1_2, as a part of the positive radical; in the compound sodium metauranate, Na_2UO_4, as a part of the negative radical. This change in valence and activity is believed to be due to the complex construction of the element. The great positive charge in the nucleus of the atom tends to draw the inner electrons from their orbits and neutralize part of the nucleus while leaving the outer valence electrons comparatively free, thus making the action of the atom irregular.

(*Continued on page* 16)



A three-day exposure of uranium. The diffusion of rays can be noted around the edges.

A six day exposure of uranium. Flecks of uranium left on the plate, which was developed six days after exposure, caused the white spots.

A ten-day exposure with an aluminum key between the uranium and the plate. Note diffusion around edges of the key.

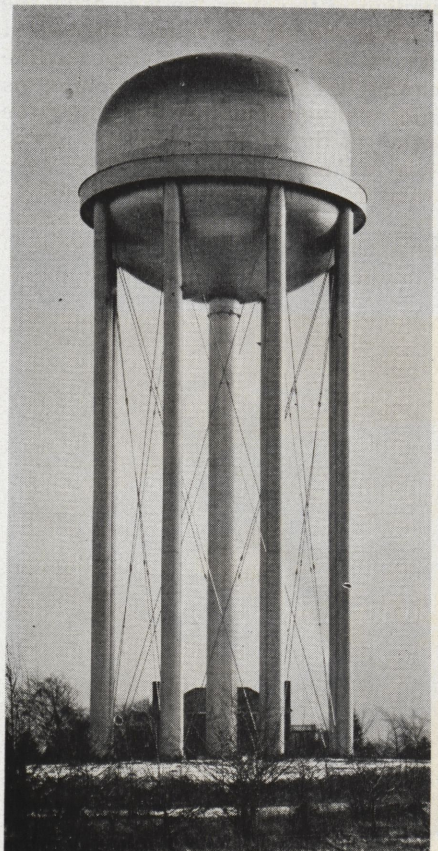
Water For Domestic Use

By Sydney Zeid, soph., c.e.

Author's Note: This article tells the general story of how water is found and how it is purified and distributed.

Water is one of the primary necessities of life. For the maintenance of health and cleanliness it is indispensable; for many industrial processes no substitute can be found; and in municipal and fire fighting services it plays a prominent part. Although for many of its functions purity is not essential, water in an impure state is an insidious means of transport for certain forms of disease. The absence of water-borne disease in a community not only testifies to the skill of the engineers concerned, but is the hall-mark of its standard of living.

The fundamental source of water supply, of course, is rain, and this is the product of distillation by the sun's heat. As rain leaves the clouds it is the purest form of water, but unfortunately in its descent it is subject to contamination. This natural rain water is excellent for washing purposes, since it possesses the characteristic known as softness — that is to say, it contains no calcium or magnesium salts in solution and will very readily form a thick lather when soap is used. But due to the lack of these salts, rain water is rather unpalatable and insipid to drink.



Courtesy of Pittsburgh-DesMoines Steel Co.

Double Ellipsoidal type elevated tank.

Rain falling on a permeable stratum—that is, a porous layer on the earth's surface — percolates downward until its passage is arrested by a waterproof layer, termed an impermeable statum. The water flows over this stratum until it reaches an outcrop or place where the stratum comes to the surface on the slope of a hill, or a point where there may be a fault or crack in the strata above, through which the water emerges as a spring. Springs often provide valuable sources of water supply, but in most cases the yield of water falls off very considerably during the dry weather at the time when the demand grows heavier.

Subterranean streams of water may be tapped by sinking wells into the water-bearing strata. The advantage of a well lies in the fact that water can be collected where it is required and that the water is often pure enough for direct human consumption. Wells, therefore, are employed by the majority of the smaller towns in America where other sources of water are not conveniently located; but consideration must also be given to expense in sinking a well, the constant outlay by pumping, and the hardness of the water.

The majority of the wells used in the United States are of two general types: the shallow well and the tube well. Shallow wells are made by sinking a heavy ring, usually of concrete or brick, down through the permeable strata. The earth is removed from the interior of the ring, which is provided with a cutting edge, and gradually, through the weight of the concrete or brick and removal of the earth beneath it, the well structure penetrates down to the water bearing strata. The sides of the well must be perfectly waterproof in order to prevent pollution of the water supply.

Tube wells are made by driving a metal tube down to the desired level, which may be from 60 to 100 feet. When this type of well is driven to depths of approximately 1000 feet the well is termed a deep well. The lowest section of the metal tube is fitted with a steel point and has perforated walls. For deep wells, the boring to the strata is made by tools suited to the particular stratum. The method of driving this well is similar to pile driving. After the boring has penetrated to the water bearing strata the water may issue forth by its own pressure, if the stratum has collected water from some point higher than the opening of the bore hole at ground level. This form of bore is known as an artesian well. Where tube wells have penetrated to a water bearing stratum that does not provide its own pressure, it is necessary to install well pumps to lift the water to the surface.

The greater part of the world's water supply, however, comes from rivers and lakes. The convenience and accessibility of these supplies offset the drawbacks of pollution and general unsuitability of their water for drinking purposes without further treatment.

The constant flow of a river has the effect of maintaining the water in a turbulent state. This causes much foreign matter to be kept in suspension and incessantly moving through the water, tending to distribute the food supply of all kinds of water-borne bacteria. Almost any sample of river water is fairly consistently infected, although, naturally, the surroundings influence to a very great extent the type and concentration of the bacteria.

On the other hand, however, a large lake is relatively still, and most of the suspended matter brought in by streams or rivers that feed it sinks to the bottom of the lake. Each particle, whatever its size, carries with it hosts of bacteria. The lake acts as a large settling basin, containing water that is remarkably free from bacteria, the sediment lying too deep to be disturbed. Provided that it is well away from habitations, water drawn from such a source requires very little subsequent treatment to fit it for domestic use.

The supply of liberal quantities of pure water for domestic use is of vital importance to the health and welfare of a community. Although, generally speaking, every effort is made to obtain the water from the purest possible source, there are many towns and cities that necessarily drawn their water from extremely polluted sources. Despite this handicap they manage to produce an adequate supply of water entirely suitable for domestic purposes.

Unless it is drawn from a particularly pure source, the water is first allowed to flow into some form of a settling basin and there is given time to precipitate the particles that have been held in suspension. These particles settle at the bottom of the reservoir or settling tank, and as they gradually sink they carry with them the majority of the living organisms that inhabit the water. In order to speed up this action and to assist in decontaminating the water, a coagulant, such as aluminum sulfate, is often added. Provided that the water contains lime or some alkaline substance, the aluminum sulfate breaks up into sulfuric acid and aluminum hydroxide. The latter collects in gelatinous and flocculent shapes, gathers up the particles suspended in the water, and carries them to the floor of the basin.

From suitable level and location in the settling basin, the water is drawn off as required and conveyed to filters. The commonest and most efficient form of filter, known as the slow sand filter, consists of graduated layers of sand about 2 feet to 4 feet thick. The top layer is of very fine and carefully sifted sand, the size of the grains of the lower layers gradually increasing to coarse gravel. This lies on a floor of bricks or specially formed filter slabs that act as drains or conduits to conduct the filtered water away to a collecting channel.

In order that the water may pass slowly through the filter, the height of the water, or head, is maintained between 2 and 3 feet, depending upon the condition of the sand. As fresh sand will pass the water too quickly for filtration, the water is allowed to run to waste for some hours until the sand has become ripe by a gelatinous film forming over the surface of the top layer. The passages through this film, which is compased of a layer of fine sediment containing organic matter, are so small that the bacteria are retained on it and consumed there by living organisms. In addition, the individual grains of sand in the next layers are found to be coated with a sticky gelatinous substance which arrests and holds bacteria that might slip through any cracks formed in the top film. Therefore, the microbe's chance of getting through the filter is mighty slim.

After continued use the filter will become clogged and will offer resistance to the passage of water. To overcome this, the water is reversed and under high pressure the water is sent through the filter from the bottom of the tank. Also, an inch or more of the top layer of sand may be removed and replaced by a new layer of fine sand. This being accomplished, the filtering cycle is repeated by first allowing the initial flow of water to run waste until a new filter film is created. Under certain conditions mechanical filters are used, but because they are more rapid and occupy less space, they are not as efficient as the slow sand type. They are used in parts of the world where the requirements are not so exacting as in our own country.

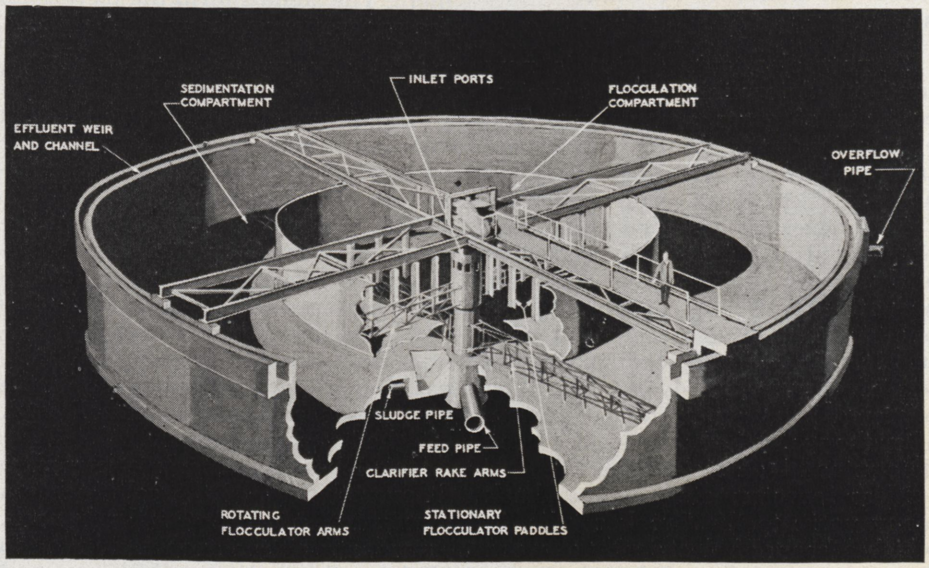
The filtering process alone will not remove odors, undesirable tastes, or unattractive discolorations from the water. Much of this trouble is eliminated by aerating the water by breaking it up into fountains, jets or sprays, or by causing it to fall in a long thin sheet that cascades down a succession of steps. Some of the undesirable properties may be removed by passing the water through a rotating drum containing scrap iron, a method known as the Anderson process. In certain cases it is also necessary to slightly chlorinate the water supply in addition to the previously mentioned steps of purification.

Often when water is pumped up from deep seated natural supplies it contains an abundance of carbonate of lime in solution, which causes it to become extremely hard and thus unsuitable for many uses. It is advantageous, therefore, to soften this water before use. A special apparatus called a water softening plant is often employed for this purpose. Lime and soda ash are mixed in a tank and pumped to the top of the water softener tower. The hard water entering from the other side of the tower is mixed with the chemicals and passes down a central pipe. The softened water then rises and, having passed through a filter of fibre, is taken by way of the supply pipes to tanks where it is stored until required.

After being aerated, and softened if required, the water is conveyed to storage reservoirs, or directly to the water mains, where distribution starts. These storage reservoirs, or clear water reservoirs, are made of such capacity that peak periods of consumption can be dealt with without having to increase the rate of filtration into the reservoir beyond that which is considered safe. Clear water reservoirs are generally covered to protect the water from the pollution to which filtered water is particularly susceptible. These reservoirs are built on the highest land in the district they supply. Where the district is particularly flat the reservoirs are elevated in the form of water towers in order to provide the necessary head or pressure required to overcome the internal friction of the water flowing in the various ramifications of the supply system.

From the reservoirs, the water reaches the home through a system of pipes of various sizes, called water mains. These water mains are generally laid about 3 feet below the surface of the ground. In most cases this gives sufficient protection against damage from heavy traffic vibration

(Continued on page 26)



Courtesy of The Dorr Company, Engineers

Combined flocculator and primary settling tank.

Research And Development

By Dale Carey, fresh.
and J. R. Brentlinger, fresh.

Largest Ram-Jet Engine

The largest ram-jet engine ever flown was successfully tested February 1. Its speed was far in excess of the speed of sound. The "flying stovepipe" shot through the air like a rocket; it was not in a plane.

The ram-jet is not a primary source of power for an airplane, but a secondary power to give sudden spurts of speed to a plane already travelling at a fast clip. A speed of from 300 to 400 miles an hour is required before the ram-jet scoops up enough air to cause combustion and set it into operation. Something similar to the ram-jet is already in use in a few planes as an "after-burner" behind the jet engine to complete combustion of unconsumed combustibles in the jet exhaust.

This type of engine has no moving parts. It is a metal tube open at both ends which scoops up air at high speeds to cause the combustion of a fuel within, giving a high-speed discharge of gases at the rear, thus causing propulsion in the same manner as the ordinary jet engine. However, it is a powerful device. Pound for pound of engine weight, the large ram-jet tested delivers about 25 times the power available from the best aircraft reciprocating engine.

Electronic Device Determines Chemical Contents of Gases and Vapors

A new electronic device is now used in determining the chemical contents of gases and vapors. The electronics are combined with a spectroscope and the instrument is called an "analytical mass spectrometer."

The apparatus has been found particularly useful for the hydrocarbon analysis of synthetic rubber, gasoline, and other petroleum products. Only one-tenth the time is required with its use as is needed by ordinary methods of chemical analysis. It can be operated by a non-technical person, after the method of analysis has been determined by a technician.

Mass spectrometers trace back many years to the Crookes tube, in which a beam of electrically charged particles was deflected by a magnet. In this device, the compound to be analyzed is introduced into a chamber where its molecular particles are charged. The molecules then pass through a magnetic field which causes them to follow a curved, rather than a straight path. Heavier molecules are deflected more than the lighter ones. The particles are thus separated to spread across a collector plate in a molecular spectrum according to their weights.

Pictures of Underwater Objects Transmitted by Electric Signals

Television pictures of moving objects deep under the surface of the sea, or pictures much like those sent by television, are possible with a new taking and transmitting apparatus. Among many uses, the device could be employed to detect and follow an enemy submarine in times of war.

The apparatus is housed in a torpedo-like shell, with propeller and equipment by means of which it can be pointed in any direction. It is operated electrically by remote control through a flexible cable which connects it with a distant mother-ship or a land-based station.

This underwater viewing apparatus contains a source of light to illuminate the object sought or found. The returned illumination is picked up by a unit within the torpedo and converted into electrical signals by an electron gun and auxiliary equipment. The signals form the picture on the apparatus on the mother ship.

Device Adds Water to Car Batteries

An automatic device which adds distilled water to your automobile battery as it is needed has been invented.

The vapors that arise from the evaporation of the water in the battery solution, which cause the cell to need replenishment, are used in this invention to trigger the trip that permits new water to be supplied. The extra supply of distilled water for the purpose is carried in a small tank attached over the battery.

This lobe-shaped tank is formed to fit over the top of the cell. It has a downward projecting valved neck, threaded to fit the opening in the top of the cell which usually is covered with a cap. The inner portion of the neck extends normally down into the battery liquid. When enough of the water in the battery has vaporized and escaped through special vents, the trigger works and fresh water enters.

Porcelain Blades in Turbo-Jet Engines

The use of refractory porcelains as material for blades of the turbines of turbo-jet powerplants is a promising possibility. Porcelains have been found which can replace metallic alloys at temperatures above 1,500 degrees Fahrenheit. At high temperatures, a porcelain blade with a tensile strength of 17,000 pounds per square inch would be the equivalent of a metal having a strength of 47,000 pounds per square inch. The new porcelains suggest ways and means of increasing the net efficiency of turbine powerplants by permitting operation at temperatures of 1,800 degrees Fahrenheit, and higher.

Mothball Method Used in Engine Designing

A novel mothball method now helps scientists design lighter and more efficient airplane engines. The mothball material is used in radiator construction to test heat effects.

The new and simple technique for testing designs utilizes models of radiators cast in napththalene, the white substance of which mothbaals are made. Air blown over this chemical causes it to evaporate. By noting the rate of evaporation at different points on the model, engineers can estimate accurately the cooling efficiency of the design.

The conventional method is to case the radiator in metal and measure its cooling in actual operation. This is a costly and lengthy procedure. The novel mothball method required the fabrication of simple plaster of Paris molds in place of metal parts. The necessary evaporation measurements are made with one small instrument, a micrometer, instead of the elaborate equipment needed to measure heat absorption in metal parts.

This new technique may find many applications in the design of other industrial equipment. Air-cooling plays an important part in air-condi-

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Great Men of Science

BENJAMIN SILLIMAN

By Ralph F. Connor, jr., m.e.

Among the American *Great Men of Science* Benjamin Silliman holds an honored position. The esteem he held at Yale College and the work he did there brought him the honor of being called "Nestor of American Science" by his fellow workers. Although he is usually considered a chemist, Benjamin Silliman was more a great science educator than a scientist.

Benjamin Silliman was born in Trumbull, Connecticut, on August 8, 1779, of a distinguished family of college graduates who had made and continued to make a name for themselves as leaders in public life. His father was a Brig. General in the Revolutionary Army, and due to his harassing forays into the Redcoat lines was a prisoner of war at the time of the birth of Benjamin. In 1790 the father died, leaving the education of the boy to his mother. Mary (Fish) Silliman, his mother, traced her descent from John Alden and Priscilla Mullins, the Mayflower Pilgrims. She died in 1818 when her son, at the age of forty, had acquired some measure of distinction.

Benjamin's education as a boy was entrusted to the minister of Fairfield, The Reverend Andrew Eliot. From this Harvard scholar he acquired a love for the classics, especially Virgil. In New Haven, at the age of 13 (second youngest in the class), Benjamin began his formal education at Yale College. He was noted for his unusual maturity in addition to outstanding ability as a student. Proficiency in the composition of poetry led him to write considerably, and upon graduation he wrote and read a quite lengthy poem which compared the living conditions of Europe and America. After taking his degree, in the class of 1796, Benjamin experienced the usual problem of many college graduates —what to do in the future. Unlike people who select a profession and prepare themselves for it, he did exactly the reverse, and it was that course which eventually led him to greatness. During this period of uncertainty the young Silliman varied his experiences in life by taking care of his mother's affairs, teaching school and beginning the study of Law. While pursuing those studies, he held the office of tutor in Yale

Benjamin Silliman

College, having received the appointment in 1799 at the age of twenty years. An eye witness, then a student, described the young man at his initiation into the office of tutor thus: "I recall a fair and portly young man, with thick and long hair, clubbed behind, (*a la mode George Washington*), following President Dwight. . ." . . ." In the year of 1802 Benjamin Silliman was admitted to the bar, also becoming a member of the College (Yale) Church.

The first indication of an interest in science by Silliman appeared at the age of sixteen, at which time he read before the Brothers in Unitey at Yale a concise essay concerning the three kingdoms of nature in their fundamental pecularities. As he was strolling the campus one morning in 1801, debating his fate—he had received a letter from friends suggesting he come to Georgia and open a law office—he met President Dwight and asked his advice. President Dwight's advice surprised Silliman. The immediate answer was "No, do not go.", but the reasons aroused his interest most. President Dwight then proceeded to say that Yale had recently voted to establish a Professorship of Chemistry and Natural History. No American appeared to be qualified to hold that position; however, there were objections to offering the position to a foreigner. Therefore, the College had decided to select one of the younger graduates, and encourage him to qualify for the position. Thus began a career which exerted a strong influence upon scientific program in the United States for the next half century.

By virtue of the influence of Franklin and Rittenhouse, Philadelphia was then the principal seat of science in America. The University of Pennsylvania Medical School had acquired distinction, and at this school Dr. James Woodhouse, who had been associated with Sir Humphrey Davy, lectured regularly on Chemistry. Therefore, Silliman selected Philadelphia as the place to begin his preparations for the professorship at Yale. Among his companions was Robert Hare, who had invented and perfected the oxyhydrogen blowpipe. Silliman worked with Hare and made suggestions for improvements of the blowpipe. While in Philadelphia he met other men of science, among whom were Dr. Wistar, the famous Joseph Priestly, Dr. Rush, Dr. Barton and Dr. Maclean. Upon the instruction of President Dwight, Silliman paid particular attention to the analyzation of stones.

After two winters in Philadelphia he began his lectures at Yale in 1804. Silliman was officially Professor of Chemistry and Natural History, but he taught only chemistry, mineralogy and geology, omitting zoology and botany from the curriculum. His equipment consisted mainly of Florence flasks, (cleaned with sand and ashes), glass tubes, vials, bottles, corks, a tapered iron to be heated for boring corks, a few gun barrels and a few coals for heating in experiments.

In 1805 the College decided to spend $10,000 to purchase books and apparatus for the new professorship. The plan at first proposed to obtain the material through an agent, but Silliman persuaded the College to send him abroad. After stopping in Belgium and Holland, he arrived at the University of Edinburgh, which was then the center of intellectual activity of the English-speaking world. At Edinburgh was a pupil of Lavoisier, Dr. Thomas Charles Hope, whose lectures the young professor

(*Continued on page* 24)

Campus Survey

By Jim Morris, soph.
and Michel Cvengros, jr.

Military Ball

Tau Nu Tau, the school's military fraternity, presented its annual Military Ball on the night of January the 30. Students of Rose and residents of Terre Haute have come to regard the Rose Polytechnic Military Ball as one of the highlights of the social season, and this year's ball proved to be no exception.

In the atmosphere of military uniforms, tuxedos, and formals, guests of the Tau Nu Tau danced from nine until twelve to the excellent music of Wayne Karr. Mr. Karr, who operates from Champaign, Illinois, is not unfamiliar to students of Rose as he has played for other student functions.

All in all the ball was a social success and the members of Tau Nu Tau are to be congratulated.

Basketball News

On Thursday, February 5, Rose Poly met Canterbury on the opponents' home floor and was defeated by the score of 57 to 37. Thus ended a modest nine-game schedule, the first since 1942.

Although the season was rather disappointing from the viewpoint of games won and lost, the coach and the team did an excellent job considering the numerous handicaps with which they were confronted.

Mr. Carr, in his first year of college coaching, was faced with the prospect of introducing a new system to a new group of men; men who either had no college experience, or had not played since entering the service. During the greater part of the season the lineup was constantly shuffled in an effort to find a winning combination.

Despite these handicaps there was a steady improvement in the team, and with most of this year's team returning the prospects for next year are much brighter.

The complete list of games, and their scores, was as follows:

R. P. I.	36	Franklin	50
R. P. I.	39	Earlham	36
R. P. I.	50	Manchester	74
R. P. I.	61	Shurtleff	84
R. P. I.	42	Cedarville	51
R. P. I.	47	Earlham	60
R. P. I.	45	Hanover	91
R. P. I.	59	Centre	80
R. P. I.	37	Canterbury	57

Baseball News

In approximately one more month Rose will begin its baseball season, with the opening game scheduled for April 16. A number of men have been loosening up in the gym for about a month now, and between 50 and 60 candidates are expected to try for positions on the varsity squad. Early season opinion is that Rose will be strong behind the plate and in the infield, but little is known about the outfield or the pitching staff.

The complete schedule, to date, is as follows:

Apr. 16	Indiana Central	there
Apr. 17	Manchester	here
Apr. 21	Canterbury	there
Apr. 27	Indiana Central	here
Apr. 29	Anderson	there
May 8	Franklin	here
May 12	Hanover	here
May 17	Anderson	here
May 25	Earlham	there
May 29	Franklin	there
Jun. 7	Canterbury	here

A.S.M.E. News

At the beginning of the fall term the members of the student chapter of the A.S.M.E. went on an inspection tour of Allison's in Indianapolis. Other activities consisted of a dinner at Louises and various student meetings.

On January 29th of this term the chapter met and elected the following new officers: Chairman, Norman Pera; Vice-Chairman, Francis MacDonald; Secretary, Max Lindley; and Treasurer, Glen Follis. Mr. Mac Williams was chosen as faculty adviser.

A.I.Ch.E. News

A meeting of the Student Chapter of the American Institute of Chemical Engineers was held on Wednesday evening, February 4, 1948, in the Chemistry Lecture Room.

Dr. C. E. Kircher, Head of the Chemical Engineering Department at Rose Polytechnic Institute, presented an enlightening dissertation on "Atomic Fission." Following the lecture, an inquiry period was staged and Dr. Kircher was besieged with questions from the more than fifty persons who attended.

Currently the Student Chapter is undergoing a revamping and will, from all indications, be a top-notch functional campus organization.

A.I.E.E. News

The first '48 meeting of the AIEE Student Chapter gave encouragement to all those interested in the organization. The meeting, held January 22, 1948, was very well attended. Credit

Military Ball.

for this attendance should be given to George Wolf, who gave an informative talk entitled "Review of the Construction of the Palomar Telescope". This telescope is to be the largest in the world and presented some interesting construction problems.

At the second meeting on February 5, 1948, Kenneth Wise described the operation of the "Capacity-Operated Relay". For a week prior to the meeting, the device was in a Physics Laboratory showcase with the secret of its internal mechanism hidden. Spectators watched with curiosity whenever onyone placed his hand close to the showcase window. A light would turn on and a buzzer operate as the hand approached the glass. Because of this advance publicity, Kenneth Wise's talk was also well attended.

The organization decided at the February 5th meeting to plan early for this term's banquet. It appears from the enthusiasm and interest shown that AIEE activities for the year will really keep the Chapter in the active category.

A. S. C. E.

In the last meeting of A. S. C. E. on February 26, the chapter was shown slides showing the construction of the George Washington Bridge. Marvin Shelley, program Chairman, served as narrator.

The term banquet was held March 11, at the Y. M. C. A. The speaker for the evening was Mr. Wood of Purdue University. Mr. Wood presented slides on "Soil Survey of the Alcan Highway."

The March 11, meeting was the last one of this term.

Sines of Life

By Jim Simms, soph.

Like our feathered friends, most of us straggled back to this dear institute of learning as per schedule on January 5. Of course some were detained a few days but this is easily explained by the heavy snowfalls. Anyway, I'll bet the registrars viewed it as a season of snowing. Really, though, this going to school is not such a bad life. It's just that sometimes it seems to be a rather indirect method for mastering the art of removing earthen materials.

Speaking of sines (log that title) one of the first things to greet us lowly underclassmen this term was a manuscript declaring the existence of a Senior Shaving Committee. Now, I haven't discussed this matter with Mr. Haist, but someone told me this whole course of action was brought about by an epileptic frustration. The crux of the uproar is that one Mr. Brunsman was observed leading the social life of Danville, Illinois, New Year's Night. His major attraction to the fair sex was a flowing red beard. Chemicals please investigate; perhaps shellac is the miracle hair stimulant.

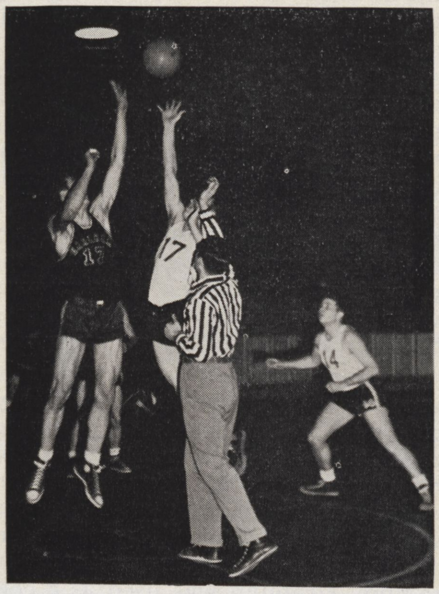
One of the fraternities used their time and skill to best advantage during the last snow fall by sculpturing a buxom snow woman. That certainly was a dainty little bra you gentlemen constructed of burlap. Well, anyway, I hear the grade school set appreciated your efforts.

The Rose basketball team played its lone home game January 30. Since the gym was crowded to its limited capacity it was probably a lucky coincidence that the Military Ball was held on the same evening. After a slow start Rose made a very fine showing against a tall Earlham team. John Bush demonstrated to all present that he is endowed with the old Rah-Rah college spirit. John even went so far as to give some of his good red blood for the cause. Did our campus gestapo have him swab down the gym after the game?

I am sure I speak for the entire student body when I say thanks to the basketball team and Jim Carr, the new coach. We think you did a fine job with limited time and facilities. Now that ground has been broken for the new field house we can all look forward to a new experience —winning teams!

The biggest social event of this term was the Military Ball. Evidently it was a great success, although everyone seemed to spend more time in the "annex" than on the dance floor. But, after all, generations of Rose Students have found this practice both entertaining and educational.

And now I leave you with this one thought: if you think this article is rotten, you will be shocked at how horrible the next one will be!



Into the Wild Blue Yonder.

Rubbernecking at the Earlham game.

Alumni News

By Edward Meagher, jr., ch.e.

All Rose men will be shocked to hear of the untimely death of Claude M. Gray, '21, a member of the board of managers of the Institute and a past president of the Rose Alumni Association. He had been suffering from a near nervous breakdown for some time.

Mr. Gray was raised in Terre Haute and was graduated from Rose in 1921 after serving overseas during World War I. Following graduation he took a position with the St. Louis Public Service Company rising to vice president of the firm. A little over a year ago he accepted a position as head of the Baltimore Transit Company. He was always active in the alumni affairs of Rose and served as president of the Alumni Association in 1946-47. At the time of his death he was alumni member of the board of managers.

'01 Harry A. Schwartz, Manager of Research for the National Malleable and Steel Castings Company, has been invited by the Institute of British Foundrymen to give the Edward Williams Lecture at their meeting in London on June 9th. The Williams Lecture is the principal lecture at the annual meeting of the society. Previous lecturers have included Sir Lawrence Bragg, Director of Cavendish Laboratory, Nobel Laureate, and Sir Charles G. Darwin, Director of the National Physical Laboratory and a descendent of the illustrious Charles Darwin.

'12 Colonel Alvin C. Rasmussen has been named commander of the 1st Indiana Logistical Division (Provisional), a new streamlined reserve unit organized by headquarters of the Indiana Military District.

'13 C. Dolly Gray, president of the Ready-Mixed Concrete Corporation of Indianapolis, has been elected president of the National Ready-Mixed Concrete Association. Gray formerly was chief engineer of the Indiana State Highway Commission.

'24 W. E. Lisman, president of Leland Electric Company of Dayton, Ohio, has been chosen chairman of the Dayton company of Junior Achievement. Lisman has been with the Leland company since 1933, and was elected its president in 1945. He was employed by the General Electric Company until he joined the Leland company. Junior Achievement was founded to instill in the minds of teen agers the fundamental principles of sound business practices. It is sponsored and backed by businessmen.

'27 Edwin S. Booth is the new president of the Chicago Rose Alumni Club.

'28 Major George J. Mason has been assigned as unit instructor of the Organized Reserve Corps Engineer units in Chambersburg, Pennsylvania. Major Mason served with the Army Engineers in India during the war. He was employed by the State Highway Commission of Indiana and the Pennsylvania railroad before he was called to active duty in 1940.

'30 Mr. and Mrs. Royer Blair announce the birth of a daughter, Barbara Katherine, born October 25, 1947. Congratulations from the TECHNIC.

'41 Robert G. Brittenbach, mechanical engineer for the service devision of the Ford Motor Company, died January 18th in Indianapolis. He served overseas during the war as a bomber pilot in the China-Burma-India theater.

Hales is with the Westinghouse Electric Corporation in Chicago.

'42 King is with the Corn Products Refining Company at Argo, Illinois.

'43 Povelites is a junior scientist at the Los Alamos Scientific Laboratory, Los Alamos, New Mexico.

'46 Loring has taken a position with Bahrein Petroleum Company, in New York City.

'47 Lowell L. Smith has taken a position with the American Radiator and Standard Sanitary company in New York City.

The alumni editor will greatly appreciate news of the activities of the alumni. Often the Technic serves as the only means of contact between former friends and classmates, a service which we are happy to perform, but we cannot function without your cooperation. News about you, your family, your job, will be welcomed by the alumni editor and will help you to keep contact with your many friends and classmates from Rose.

URANIUM . . .

(*Continued from page* 9)

Uranium combines readily with the halogens, oxygen, and ammonia, and with barium, lithium, potassium, iron, calcium, and many other metals to form salts. It also combines with nitrogen, phosphorus, antimony, arsenic, carbon, and cyanogen. However, there are no hydrogen-uranium compounds known.

Possibly the best known property of uranium is its radioactivity. This rare ability to disintegrate is not affected by heat, cold, cathode rays, or pressure. The resulting emmissions may be grouped into three types of rays. The first of these are the alpha rays which are the heavier, less penetrating rays composed of helium nuclei. The second, beta rays, are the accelerated negative electrons which are much more penetrating than the alpha rays. The third, gamma rays, are similar to the X-rays except that they are much more penetrating and are generally present with the beta rays. The prime fact to be remembered is that the alpha and beta rays are actual particles of mass having weight while the gamma ray is really a form of light.

This emmission of mass and energy from radioactive elements obviously reduces the weights and forms of these elements. These changes are arranged in three charts or series called the actinium, thorium, and uranium series; however, the uranium series is the only one we shall consider. It is interesting to note that as an alpha particle is emitted the element loses four units of weight and moves two groups to the left, and as the beta particle is emitted the element moves one place or group to the right and only loses one unit of weight.

One of the most interesting aspects of uranium is its ability to affect a photographic plate and it was in this manner that the rays were first discovered by Becquerel. Pictures shown were taken with Super-XX 35 mm film and through two thicknesses of black paper. The uranium was placed over the paper and the rays were consequently forced to pass through the paper before exposure.

For many years uranium had little use other than that of a laboratory curiosity and a means of studying radioactivity. However, it would not be fair to say that it was forgotten altogether, for the mining of the ores was of considerable importance in obtaining its more precious impurity, radium. Uranium was used as a col-

(*Continued on page* 30)

Fraternity Notes

Alpha Tau Omega Notes

Under the direction of pledgemaster Arnold Hannum, the ATO fraternity successfully conducted another Hell Week that terminated with the initiation of fifteen men into the fraternity. Throughout the week the pledges were busily engaged in work around the house, and several worth while projects were carried out. On the Sunday following Hell Night the fraternity attended church at the Terre Haute Church of Christian Science. That evening the new members were initiated. Then men initiated were as follows: Jayson Brentlinger, Dale Carey, Max Clingerman, James Gaston, Paul Godwin, Jack Hill, Alexander King, Joseph Mees, all of Terre Haute; Michael Cvengros of Clinton, Indiana; Clifton Doak of Effingham, Illinois; Terry Francis of East Chicago, Indiana; John Holmes of East Orange, New Jersey; and William Orbaugh, Richard Weatherford, and John Rentchler of Indianapolis, Indiana.

The Edgewood Cabin has been quite popular with the fraternity during this term. While Hell Week was in progress, a stag party was held there. This was one of the most successful parties of this type that the fraternity has sponsored. Guests included Don McCarty of WBOW and our own Dr. Sousley of the Rose Math Department. Early evening entertainment was furnished by a bald headed piano player named Sam.

Later in the month we again rented the Cabin, this time for a Valentine dance. Lawrence Liggett, who is currently appearing in one of our local "places", furnished the music.

The fraternity is busily laying plans for the ATO conclave that is to be held in Terre Haute on the 6th of March. Some five hundred ATO's, their dates, and their brothers from Province Seventeen, will invade the Terre Haute House for another reunion.

The very active mother's club recently held a card party at the house. The affair proved to be an outstanding success with some one hundred people attending.

Several of our brothers have been quite active in other fields this term. Brother Glenn Follis, who recently gave his pin to Miss Mary Ida Lemmons of Terre Haute, favored us with a pin talk and the usual cigars. Brothers John Bush and Bill Schumann, recently became engaged. John to Miss Varla Haltarman of St. Louis, Missouri, and Bill to Miss Louise Fisher of Indianapolis, Indiana. The fraternity extends congratulations to these men.

Sigma Nu Notes

The open house held on January 31 proved to be a huge success. The theme for the evening was "Gambling". A miniature roulette wheel, dice games, card games, and bingo were set up and each person was given stage money as he entered. A prize was given to the couple who amassed the greatest fortune during the evening. Miss Betty Paitson and Brother Bob Cotterman carried off top honors for the affair.

A dance, honoring the pledge class, was held at Edgewood Cabin on February 6. According to reports, everyone had a good time at the dance and the ensuing "get-together" afterwards. The pledge class, having survived the traditional "Hell Week" activities, was initiated on February 22 in an impressive and formal ceremony. The men initiated were: James R. Cooney, Richard Bricker, James P. Laughlin, Kenneth Sheetz, Norman Bell, Ivan W. Terry, Max M. Scott, Andrew R. Hallden, Frank G. Walker, James L. Rogers, Paul D. Ford, William E. Slagley, Jr., Albert Seiler, Robert M. Baugh, Roger R. Pardun, Robert G. Ragsdale, Charles B. Strickland, Robert R. Atherton, Denzil Hammond, and Gilbert Hilt.

The chapter was honored by having Norm Pera elected President of the Senior Class. Ralph Davis has pinned Miss Joyce Valy of Park Ridge, Ill.

Lambda Chi Alpha

Founder's Day will be observed by the local chapter with a dinner meeting Monday night, March 15. While nationally the fraternity will celebrate the day on March 22, the local observance has been moved ahead one week because of the Winter term finals. Invitations to attend have been sent to all surrounding chapters and to all local alumni of the fraternity, whether alumni of the Rose Chapter or not. The committee in charge of the occasion consists of Edward Feagher, Robert Devlin, Donald Stolzy, John Mitchell and Warren Lundy.

A formal intiation was held on Feb. 13 and 14 for 11 new members. They were: James Russell Boyd, Terre Haute, Ind.; William Emery Caudill, Indianola, Ill.; Verle William Fiegel, East Chiacog, Ind.; Morton William Hief, Jaseper, Ind.; Aaron Gilbert Hogg, Royal Oak, Mich.; Ogdon Allan Kiefer, Charleston, Ill.; Richard John Kuehl and Ronald Artuh Lange, Chicago, Ill.; Bill Gene Pittman, Troy, Ohio; Raymond Darrell Summerlot, Bowling Green, Ind.; Carlyle Harry Wokasien, Buffalo, N. Y.

Lambda Chi Alpha has recently pledged Henry C. Spear, Jackson, Miss.; Robert Harpring, Paris, Ill.; Robert Woody, Shaker Heights, Ohio; and Mark Hunt, Sullivan, Ind.

Dave Smith has recently transferred to Rose from nearby Xi of DePauw University. Theta Kappa extends Dave a welcoming hand and wishes him the best of success in Rose Poly.

The following Lambda Chis were awarded scholarships last term: Morton W. Hief, Phillip C. Gardner, Aaron Hogg, Norman Meyer, Donald C. Coughanour, William R. King and Donald B. Spencer.

Congratulations were extended recently in a smoker meeting to Stanley Wyatt who announced his engagement to Janeda Northrop.

Theta Xi

On Monday evening February 16, at a formal ceremony the following men were pledged to Theta Xi: Donald A. Boyd, Aberdeen, South Dakota; Leonard H. Silverman, Chicago, Illinois.

The Scholarship Award for the fall semester was won by James Mitten. Calculations were made by Don Springman and Bruce Woolcott.

Friday, February 20th, marked a TX Stag Party held at the Theta Xi House. A good time was had by all.

The Chapter wishes to congratulate the following members who have recently been elected or appointed to the following offices:

Bill Blount, President of the Student Council

JoDean Morrow, Secretary of the Student Council

Jim Hurt, Vice President of the Senior Class

John Nevins, Athletic representative for Senior Class

Bob Royer, President of the Junior II Class

Bob Campbell, President of the

(*Continued on page* 30)

Careers at GENERAL ELECTRIC

PHYSICIST . . . CHEMIST . . . ENGINEER

for each, General Electric has assignments to his liking

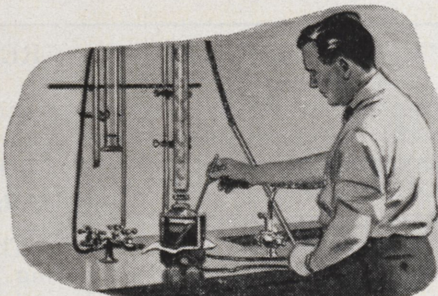
General Electric is not one business, but an organization of many businesses, ranging from the building of giant turbines at Schenectady to the molding of plastics in Pittsfield. The 165,000 people of General Electric work in 93 plants in 16 states. Graduates of American colleges and universities are finding that General Electric offers opportunities to all degrees of specialists, all sorts of enthusiasms, all kinds of careers.

ATOMIC PHYSICIST

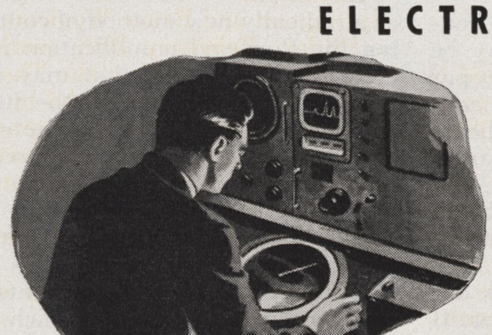
As the result of its research in nucleonics, General Electric was asked by the Government in 1946 to take over operation of the giant Hanford Works, one of the major units of the Manhattan Project. With this development, and with the construction of both a new Atomic Power Laboratory and a new Research Laboratory at Schenectady, opportunities in all phases of nuclear research have increased enormously. Herbert C. Pollock (left), one of the first scientists to isolate U-235, works now with such electron accelerators as the Betatron and Synchrotron.

CHEMIST

General Electric is the largest molder of finished plastics parts in the world. It has also played a large part in the development of silicones, new chemical compounds from which a whole new industry is springing. Developments like these have meant unprecedented opportunities for chemists and chemical engineers at General Electric. Dr. J. J. Pyle, graduate in chemistry at British Columbia and McGill, became director of the G-E Plastics Laboratories at the age of 29.



ELECTRONICS SPECIALIST



For good reason, General Electric Electronics Park has been called the "Greatest Electronics Center in the World." Its 155 acres look like a campus. Its laboratories, shops and production lines are the most modern of their kind. It's a Mecca for men whose attentions perk up at the sight of a circuit diagram—men like Dick Longfellow, who has worked his way up through television and high-frequency assignments and is today section engineer in charge of ground radar equipment.

FOR YOUR COPY OF "CAREERS IN THE ELECTRICAL INDUSTRY," WRITE TO DEPT. 237-6, GENERAL ELECTRIC CO., SCHENECTADY, N. Y.

GENERAL ELECTRIC

RESEARCH & DEVELOPMENT

(*Continued from page 12*)

tioning and refrigeration, for example. The new method is suitable for design use in these industries.

X-Ray Measures Red-Hot Metal

The X-ray is now used in measuring the thickness of red-hot metal strips emerging from the rollers in giant steel mills, too hot to be measured otherwise.

The process is automatic and continuous, although the metal may be moving at speeds up to 2,000 feet per minute, and there is no physical contact with the red-hot steel. A beam of X-ray which passes constantly through the steel does the trick.

At the same time another beam passes through a standard reference sample of the desired thickness. The densities of both emerging rays are picked up in a radiation detector. If the densities of the two are the same, the steels are of equal thickness. If the densities are different, the hot steel is indicated as too thick or too thin.

In conventional methods, thickness is measured by hand-held calipers which can not be used until the metal is cool. If the thickness is found incorrect, re-rolling is necessary. With the new X-ray method, adjustments can be made immediately if proper thickness is not being obtained.

Current Amplified 500 Times

An electric current shot at a diamond chip has been amplified, or strengthened, as much as 500 times by a new method developed.

The discovery has been described as a radically new method of controlling the flow and amplification of an electric current, one that may have far-reaching influence on the future of electronics. It is not expected to replace existing electronic techniques but rather to supplement them.

The method is based on the discovery that when beams of electrons are shot at an insulator, in this case a diamond chip, electric currents are produced in the insulator which may be several hundred times as large as the current in the original electron beam.

The diamon chips used are what are called saw-cuts, obtained from a natural diamond in shaping it for a gem. They are roughly the size of a

(*Continued on page 22*)

RESEARCH & DEVELOPMENT

(*Continued from page* 20)

small snowflake. Before they are used for this electrical process, they are coated with very thin films of gold, applied by the evaporation method, to afford electrical connections.

Methods of amplifying currents in gas or vacuum tubes have been known for 35 years. But this has never been done previously in solids. The process is somewhat similar to the technique of translating the energy of light into electricity by the well-known photo-electric cell.

The experiments stemmed directly from previous research in which current was induced in diamonds by bombarding them with alpha particles. These are relatively heavy, positively charged bits of matter shot off by radioactive substances. The findings were verified by other laboratories, particularly at the National Bureau of Standards. The development promises a new and improved laboratory tool for detecting and counting alpha particles. The National Bureau of Standards has already announced that diamonds might be used to replace the Geiger counter, the standard instrument to detect radioactivity discharges.

Storm-Proof Airplane Transmitter

Storm-proof transmission to airport towers and radio range stations used in aerial navigation will be available to flyers of personal planes with the aid of a miniature radio transmitting set.

Affectionately dubbed "Sendin' Sam" by electronic engineers who designed it, the set weighs only two pounds, nine ounces. It uses less than one-tenth the power of a conventional private-plane radio transmitter.

First transmitter to be designed to take advantage of the six radio frequencies recently allocated by the Federal Communications Commission for personal aircraft, "Sendin' Sam" has a range of approximately 50 miles over level terrain from an altitude of 5000 feet.

The set is able to get a message through from a plane to an airport control tower under adverse weather conditions because it operates at frequencies ranging from 121,500 to 122,900 kilocycles, relatively unaffected by thunderstorms and other climatic conditions.

"UNOX" Penetrant—A New Fire-Fighting Aid

UNOX penetrant, a chemical espe-

(*Continued on page* 28)

Successful telecasts of surgical operations show value of television to medical education.

"Step up beside the surgeon—and watch"

Not long ago, a radio beam flashed across the New York sky—and "carried" more than 7000 surgeons into a small operating room . . .

Impossible? It was done by television, when RCA demonstrated—to a congress of surgeons—how effective this medium can be in teaching surgery.

In a New York hospital, above an operating table, a supersensitive RCA Image Orthicon television camera televised a series of operations. Lighting was normal. Images were transmitted on a narrow, line-of-sight beam . . . As the pictures were seen the operating surgeons were heard explaining their techniques . . .

Said a prominent surgeon: "Television as a way of teaching surgery surpasses anything we have ever had . . . I never imagined it could be so effective until I actually saw it . . ."

Use of television in many fields—and surgical education is only one—grows naturally from advanced scientific thinking at RCA Laboratories. Progressive research is part of every instrument bearing the names RCA or RCA Victor.

When in Radio City, New York, be sure to see the radio and electronic wonders on display at RCA Exhibition Hall, 36 West 49th Street. Free admission to all. *Radio Corporation of America, RCA Building, New York 20, N. Y.*

Continue your education with pay—at RCA

Graduate Electrical Engineers: RCA Victor—one of the world's foremost manufacturers of radio and electronic products—offers you opportunity to gain valuable, well-rounded training and experience at a good salary with opportunities for advancement. Here are only five of the many projects which offer unusual promise:

- Development and design of radio receivers (including broadcast, short wave and FM circuits, television, and phonograph combinations).
- Advanced development and design of AM and FM broadcast transmitters, R-F induction heating, mobile communications equipment, relay systems.
- Design of component parts such as coils, loudspeakers, capacitors.
- Development and design of new recording and reproducing methods.
- Design of receiving, power, cathode ray, gas and photo tubes.

Write today to National Recruiting Division, RCA Victor, Camden, New Jersey. **Also many opportunities for Mechanical and Chemical Engineers and Physicists.**

RADIO CORPORATION of AMERICA

SILLIMAN . . .

(*Continued from page* 13)

attended. Silliman describes his meeting with Dr. Hope thus:

"Dr. Hope was a polished gentleman, but a little stately and formal withal. After reading the letter of introduction, he turned to me and said, 'I perceive that I am addressing a brother professor.' I bowed, a little abashed; a very young man, as I still was (at the age of 26), thus to be recognized as the peer of a renowned veteran in service, the able successor, as he had been the associate, of the distinguished Dr. Black. He proceeded, 'Now sir, from long experience, I will give you one piece of advice, that is, never to attempt to give a lecture until you are entirely possessed of your subject, and never to venture on an experiment of whose success you are doubtful.' I bowed respectfully my assent. . . . He proved himself a model professor, and fully entitled to act as a mentor."

Silliman met many *Great Men of Science* on his travels. Among them were Watt, Cavendish, Sir Joseph Banks, Dugald Stewart, and Dr. James Gregory. He later acknowledged the value of the stay in Edinburgh by stating that except for what he had learned from Robert Hare, had he been content with the Philadelphia standard, the chemistry of Yale College would have been a humble affair.

As is the case of most great men, the domestic life of Silliman was happy. In 1809 he married Harriet Trumbull, and their home was noted for it's simplicity and refined hospitality. Dana, his son-in-law, was his next door neighbor on one side, and his son, Benjamin, was on the other side. After the death of his first wife he married Mrs. Sarah Webb, a relative of his first wife.

When Silliman reached the age of seventy years he tendered his resignation, but the trustees refused to accept it until four years later in 1853. Silliman did not limit his attentions within the academic walls. In 1807 he examined a meteor which fell in Connecticut and his report gained him distinction abroad when read before the Royal Society. *Silliman's Journal,* in which all notable events of physical sciences were described, appeared in 1818. Later, the magazine became the *American Journal of Science.* Without precedent, as early as 1808, he gave lectures for adults of the nature of our present day university extension work. These lectures were expanded to lecture tours as far away as New Orleans. Between the years of 1830 and 1836 he carried out several projects for the government; a study of the coal fields of Pennsylvania, an inspection of the gold mines of Virginia, and a survey of the culture and manufacture of sugar in the Southern States. Silliman was also the first president of the *Association of Geologists,* today's *American Association for the Advancement of Science.* He discovered the fact of the fusion of carbon in the voltaic arc; he edited a college text of Chemistry; he aided the establishment of the Yale Medical College and the Sheffield Scientific School; sillimanite was named for him.

Benjamin Silliman's accomplihments ceased with his death on 24 November 1864; although his body was frail, his mental faculties were keen until the last.

It is generally admitted that no one has ever been connected with Yale College who was entitled to greater affection and admiration than Benjamin Silliman. Edward Everett Hale styled him as " the Nestor of American Science."

WATER FOR DOMESTIC USE

(*Continued from page* 11)

and also prevents the water from freezing during the winter. The mains are of a size suited to the requirements of the districts they feed, but care must be taken to prevent a reduction of the bore by heavy crops of rust blisters or incrustations of deposits due to the nature of the water. To prevent water from stagnating in dead ends, the water main system is generally lead out of a grid-iron plan that also permits water to flow from two sides into a hydrant or controllable water outlet. This feature is particularly valuable when a great quantity of water at high pressure is required on such an occasion as an outbreak of fire.

The pipes conveying water from the source of supply may become fouled by organic growth and slime, but water mains carrying water filtered and softened, as described above, are free from this trouble. Notwithstanding all the precautions taken, after some years of service it may become necessary to scrape the interior of the mains. Many ingenious types of scrapers have been devised to effect this. At intervals the main is provided with traps or sumps for the collection of the material scraped away and from which it may conveniently be removed.

At the highest point of a supply main it is necessary to provide for the escape of any air that may be trapped in the system. This air would impede the flow of water and might cause undesirable hammering effects, tending to start a leak at joints or even cause a fracture in the piping. An air valve, which is used for this purpose, consists of a hollow metal ball arranged so that, when water rises in the pipe and displaces the air, the ball, floating on the water and guided in a cage, rises up and shuts off the vent hole. In sections where a water main ascends in the direction of the flow for some distance, it is necessary to place a nonreturn reflux valve at the base, in case the main on the pumping side should leak or burst and require attention. The reflux valve is merely a hinged flap held up clear of the stream of water by the pressure. When there is any tendency for the flow to reverse, the flap immediately falls back across the pipe and holds the water in the rising main. When pumping recommences and the pressure of the water is sufficient to overcome the head of the water in the ascending main the reflux is pushed aside and permits the water to flow without obstruction.

Some years ago, before effective means were devised for checking the wastage of filtered water, the supply for domestic use was intermittent and householders had to provide themselves with means to store their water. But this led to pollution of the water and insufficient water supply for fire fighting. Now the convenience of a constant supply system is taken for granted. It has the great advantage that the mains are continually full and there is no danger of the infiltration of noxious gases or impurities into the system.

At the point where the consumer's service pipe branches off the supply main, a stop cock is located to enable alterations and repairs to the system on the consumer's premises without interfering with the general supply to the rest of the neighborhood. This stop-cock is also connected to a meter to measure the amount of water used.

Thus, thanks to the efforts of the sanitation and hydraulic engineers, when the householder opens a water tap in his home he is usually assured of getting water that is free from harmful and disease breeding bacteria—water that he may use with safety for himself and his family.

DU PONT Digest

For Students of Science and Engineering

Research simplifies print making with development of "Varigam" Paper

Chemists and physicists make important contributions

Photographic film that has been overexposed or overdeveloped usually means a "hard" or "contrasty" negative—too much silver is deposited on the highlights in comparison with that in the shadows. The opposite effect, a "soft" or "thin" negative, results from underexposure or underdevelopment. At one time photographers had to stock four or five grades of enlarging paper to correct for these conditions and get the right degree of contrast.

To eliminate this expensive, unwieldy situation, scientists developed "Varigam" variable contrast photographic paper. With "Varigam," the whole procedure of getting different degrees of contrast is reversed. Instead of using several grades of paper, the photographer uses only one. He gets variation in contrast by use of filters that control the wave lengths of light reaching the paper, thereby getting finer degrees of contrast than are otherwise possible.

The action of "Varigam" depends on the ability of certain dyes to extend the sensitivity of silver halide emulsions beyond the blue and blue-green regions. This effect was well known to scientists. But "Varigam" has an added feature—it gives high contrast in the blue portion of the spectrum and is also sensitive to light in the green region, *with low contrast.*

"Varigam" the work of many men

The first job was one for the physical chemists. Silver halide emulsions, normally sensitive to blue light, had to be made to give maximum contrast when exposed to light in this region.

It was known that certain dyes would extend the sensitivity of the emulsion over as far as the infra-red. But they were not practical for photographic paper, being affected by the red safety light used in the darkroom. Research by chemists showed that certain dyes such as 1:1′-diethylthiopseudocyanine iodide extended the light sensitivity only to the green region. And, most important, they produced low contrast when used in lower-than-normal concentrations. When such a dye was combined with high-contrast silver halide emulsion, the result was an emulsion that gave high-contrast prints when exposed to blue light, and low-contrast prints when exposed to green light.

Physicists Develop Filters

Physicists made this contrast control a reality by preparing sharp-cutting filters that allow the user to control his printing light selectively. These filters, which are attached to the lens of the enlarger, range from blue for high contrast to yellow, which cuts out the blue almost entirely and gives low contrast. In between are eight grades of filters with intermediate degrees of blue and yellow light transmission. All of the filters are made in such a way that neither light nor printing time needs to be varied as filters are changed, except the last two on the blue end. These require approximately twice the time of the others.

In "Varigam," made by Du Pont, chemical science has given the photographer new economy and convenience in printing, and a degree of contrast control more precise than is possible with any combination of commercial papers.

Questions College Men ask about working with Du Pont

What types of training are needed?

The majority of openings for college graduates at Du Pont are in technical work and are usually in chemical, physical, or biological research; chemical, mechanical, civil, electrical, or industrial engineering. Openings are available from time to time in other fields, including architecture, ceramics, metallurgy, mining, petroleum and textile engineering, geology, mathematics, accounting, law, economics, and journalism. Write for booklet, "The Du Pont Company and the College Graduate," 2521-C Nemours Building, Wilmington 98, Delaware.

DU PONT
REG. U. S. PAT. OFF.

BETTER THINGS FOR BETTER LIVING
. . . *THROUGH CHEMISTRY*

More facts about Du Pont — Listen to "Cavalcade of America," Mondays, 8 P.M., EST on NBC

Normal print (center) can be obtained from either a "soft" negative (left) or a "hard" negative (right), using "Varigam" variable contrast paper.

RESEARCH & DEVELOPMENT

(*Continued from page 22*)

cially developed for fire-fighters, is now available. When one part of this new penetrant is added to 100 parts of water, the extinguishing efficiency of water is increased 3 to 5 times.

Contrary to most chemicals used for fire-fighting, this compound itself does not act on the fire but changes the characteristics of the water used to fight the fire. Water that has been so treated has less tendency to run off the surface of a burning material. Instead, the water penetrates, allowing a more effective absorption of the heat from the fire. This penetrating action means that the fire is put out more quickly with much less water, and with less water damage. Smoke and heat are also greatly reduced giving the firemen a chance to attack the fire at closer quarters.

It has been tested for several months by a number of municipal Fire Departments with excellent success. It has been used on cotton bale fires, building fires, textile fires, and on the recent forest fires in the East. During these forest fires, drums of UNOX penetrant were flown to Maine. Additional quantities were used by firemen on New York State forest fires. While only a limited amount was available at that time reports have been received which praise its highly effective action.

Water that has been treated with UNOX penetrant, is called "wet water" by firemen, because it wets so thoroughly whatever it contacts.

WIRE DRAWING . . .

(*Continued from page 7*)

These effects are corrected by heat treatment after drawing.

Molten salts for heat treatment are fighting hard to replace the lead baths. It is maintained that some of the new salts heat treat and clean the rod in one operation.

With the accent on speed, studies of time losses reveal that thirty per cent of the down time is due to improper payoff of the wire. The use of larger reels, and a corresponding reduction of the speed of the pay-off reels, allows more time for strand orientation.

The trend in wire drawing machine design is to machinery which will carry a heavier load faster, and to designs which minimize vibration. Vibration reduces the efficiency of moving parts and is therefore objectionable.

The trend toward faster equipment has shown up in the last twelve years, during which time the speed of wire drawing has increased eightfold. The advent of better lubricants which will not break down at high pressures has been of great help to speeding the process. It has proved possible to make eighteen or more successive draws on fine wire. Finishing speeds of five thousand feet per minute are in use, with speeds of six thousand feet per minute under development. To work in the modern high speed machines the preparation of the rods must be excellent. The surface must be perfect, with one hundred per cent of the scale removed. The trend toward higher speeds has led to advancements in other fields, one notable example being the improvement of welding techniques in the welding together of large coils.

One of the latest developments is the drilling of diamond dies with electricity. Electric sparks from a platinum needle are shot at the diamond while both are immersed in a chemical solution.

The wire making industry is not a new one, and many things have been learned to increase the efficiency of the process, but the technological advances in the future may overshadow by far the knowledge which has been gained in the past.

FRATERNITY NOTES

(*Continued from page* 18)

A.S.C.E.

Bill Backes, Secretary of the A.S.C.E.

Tim Kelley, President of the Rose Men's Assoc.

Max Lindley, Secretary of the A.S.M.E.

Orville Stone, Editor of the TECHNIC.

Our congratulations also to the following men who won their letters in basketball: Paul Doehrman, Don Smith, Ed Bockhold, Bob Campbell, (manager).

The TX basketball team dropped their first game to Sigma Nu by a score of 30 to 20. Members who participated in this game were Hurt, Wright, Grant, Flanagan, Stanfield and Bryant.

The date for "6294" has been tentatively set for Saturday, May 1 at the Severin Hotel in Indianapolis.

URANIUM

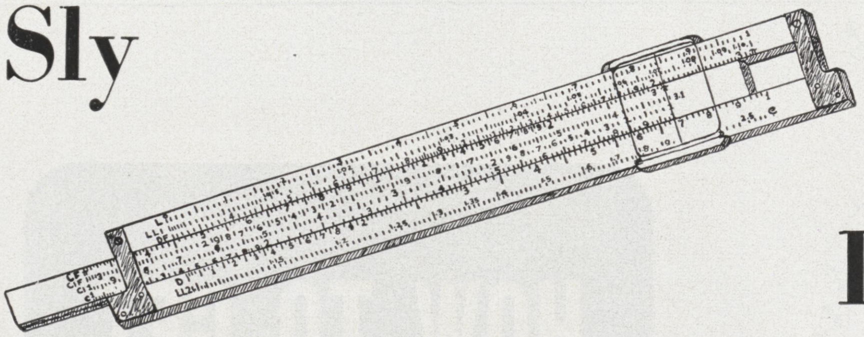
(*Continued from page* 16)

oring agent for glass, giving a canary-yellow color; and as a pigment in china, giving a black color. Its compounds were also used in photography.

One of the most interesting phases of uranium is its attachment to geology. By caluculation and experimentation, scientists have found the disintegration periods and equilibrium constants of the various radioactive elements. Rutherford found that by finding the amount of uranium, radium, or lead and the amount of helium in rocks, he could calculate the age of many of them.

Suddenly the world became very conscious of uranium and radioactivity. Sub-atomic particles became the popular subject and such men as Fermi found that bombardment of uranium with electrons gave new and artificial elements. Uranium and radioactivity became the linking point and "mediator" between chemistry and physics. However, the study has not stopped here but has led to atomic bombs, nuclear energy, and now finally has entered the world political arena with deposits of its ore and information of its reactions as the supreme "trump card."

Sly



Droolings

By Robert Campbell, sr., c.e.

Drunk (phoning to wife): "That you dear?"

"Tell the maid I won't be home tonight."

* * * *

Mother: "What have you been doing, Mary? It's nearly three A. M."

Mary: "Walking Mother."

Mother: "For goodness sakes."

Mary: "Yes, Mother."

* * * *

Senior: "Hello, are you leaving school?"

Freshman: "Yeah, the doctor's advice."

Senior: "Which one?"

Freshman: "Dr. Sousley."

* * * *

Willie: "Say, Pop, did you go to Sunday School when you were a boy?"

Father (bragging): "Yes, son, regularly. Never missed a Sunday."

Willie: "Well, I'll bet it won't do me any good either."

* * * *

TRUE STORY

John DeReamer, wanting to find out the type of school that Centre College in Danville, Kentucky, was, said to the elevator operator in the hotel, "Is Centre College co-educational?" The bewildered but helpful native replied, "Ah, don't know about it being co-educational, but there sho' is a lot of girls ovah theah."

* * * *

By the time a wise guy is old enough to marry, a fool has children big enough to support him.

* * * *

Ch. Engineer Student: "A girl's greatest attraction is her hair."

Electrical: "Nope, I think it's her smile. What do you think, ...?"

Civil: "I think the same as you guys do, but I'll be d——— if I'll lie about it."

* * * *

SHORT STORY

Two old maids went for a tramp.

FAMILIAR SONG???

"Who ever told that guy he was a prof? He might know it, but he can't teach it. The trouble is that he is too far advanced. Every time he tries to explain something, he gets so far off the subject that no one understands anything about it. He aughta go back to the farm, or try teaching a more advanced course—

"Yeah,—I flunked it too."

* * * *

Golf Pro: "You'll never make a golfer—"

Cute Pupil: "I might—if I could keep him off the course."

* * * *

Physic Prof: "What is a gram?"

Student: "One of those little brass things that looks like a collar button."

* * * *

SHORT STORY

Once upon a time there were two Irishmen.

There are lots of them now.

* * * *

Myrt: "I hear that you've accepted him. Did he happen to mention that he'd proposed to me?"

Mable: "Not specifically. He did say that he'd done a lot of foolish things before he met me."

* * * *

"Dear," said Mrs. Greene, "I think I'll appear in the Charity show. What do you think people would say if I wore tights?"

They'd probably say that I married you for your money," dourly replied Mr. Greene.

* * * *

For the many people who have been wondering why the cow got a divorce: from the brilliant head of our animal department comes the most probable answer—she got a bum steer.

* * * *

Tourist Guide: "We are now passing the oldest rum house in England."

American: "Why?"

Sr. Civil: "Hello, is this the Indiana Bridge Commission?"

Voice: "Yes, what can I do for you?"

Sr. Civil: "How many points do you get for a little slam?"

* * * *

She: "I think dancing makes a girl's legs too big, don't you?"

He: —"Yeah."

She (after a short pause): "I think swimming gives a girl awfully big shoulders, don't you?"

He: "Yeah—(pause) You must ride a lot too."

* * * *

"Mr. Smith," said the lady at the church festival, "won't you buy a bouquet for the lady you love?"

"Sorry. I'm a married man."

* * * *

Father was deep in his easy chair relaxing after a hard day at the office—Junior, aged 5, was bedeviling him with an endless succession of unanswerable question.

"Daddy whatta ya do down at the office?" he asked.

"Nothing!" grumbled his father.

Junior pondered at this extraordinary statement for a moment then: "How d'ya know when you're thru?"

* * * *

A man with a nose as red as a tail light was arrested for selling smuggled whiskey. The lawyer who defended him knew a few tricks of the trade. When he put his client on the witness stand he asked the jurors to look carefully at the man. After a dramatic pause the lawyer continued:

"Now ladies and gentlemen of the jury, you've looked carefully at the defendant. Can you sit there in the jury box and honestly believe that if he had a quart of whiskey he would sell it?"

"Not guilty!"

Kodak

Because photography lasts . . .

For 48 years photography has preserved this passing scene . . .

Yet today, as a record, it's as complete and accurate as ever. Photography lasts . . . and because it lasts, has great usefulness to business, industry, and the professions:

Demonstrate a product, tell a sales story, in motion pictures—its appeal and showmanship stay fresh, its delivery always "letter perfect."

Reproduce a blueprint, a specification sheet, a production chart on Kodagraph Paper—its definition stays crisp, its usefulness is prolonged.

Photograph an accident scene, an operation, a construction project—every detail remains accurately, lastingly fixed.

File contracts, correspondence, cancelled checks on Recordak microfilm—they "stay put" in fixed order, and cannot be altered without detection.

All this you can bring about because photography lasts. Because it does . . . because of its other useful characteristics . . . you can do even more. For examples, write for "Functional Photography." It's free.

Eastman Kodak Company, Rochester 4, N. Y.

Theodore Roosevelt on tour during the 1900 Presidential campaign.

Functional Photography is advancing business and industrial technics


ALL THESE STARS APPEAR
IN DAVID O. SELZNICK'S PRODUCTION
"THE PARADINE CASE"
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CHARLES COBURN
ANN TODD
ETHEL BARRYMORE
LOUIS JOURDAN
GREGORY PECK
VALLI
Chesterfield
CIGARETTES
LIGGETT & MYERS TOBACCO CO.
WITH THE STARS
IT'S CHESTERFIELD
BECAUSE A ALWAYS MILDER
B BETTER TASTING
C COOLER SMOKING
THE RIGHT COMBINATION...
WORLD'S BEST TOBACCOS
ALWAYS BUY CHESTERFIELD