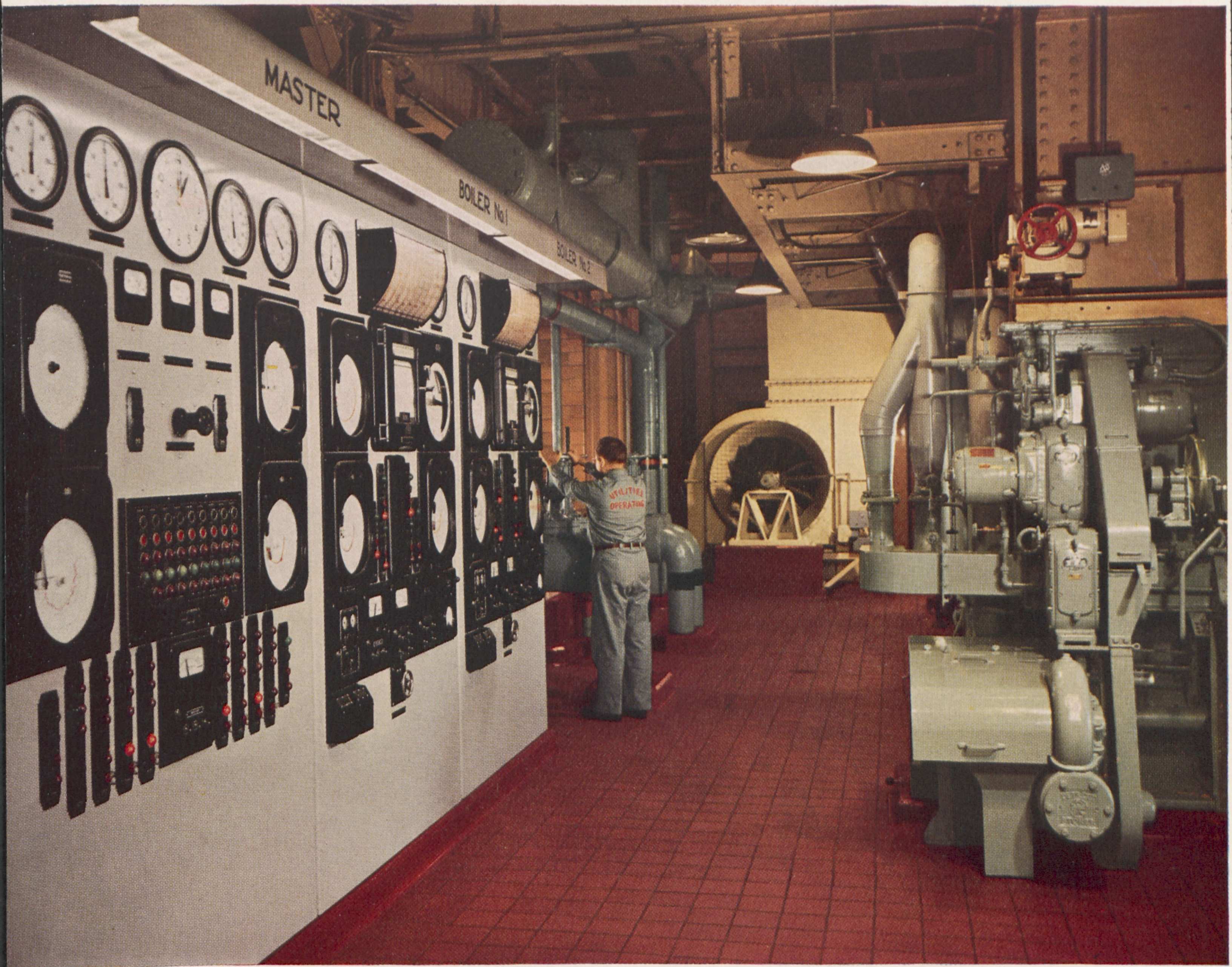
Winter 1-1951

Volume 62 - Issue 4 - January, 1951

Rose Technic Staff
Rose-Hulman Institute of Technology

RoseTechnic



MEMBER ENGINEERING COLLEGE MAGAZINES ASSOCIATED

JANUARY, 1951

Military Ball

FEBRUARY 23, 1951

ce: School Auditorium
ss: Formal (uniform or tux)
e. $2.40. incl. tax
e: 9 - 12 PM
d: Buddy Beck and Orch.

Rose Technic

VOLUME LXII, NO. 4 JANUARY, 1951

In This Issue

Cover

A view of the control board and spreader stoker drive for boiler No. 1 in the steam plant at the Electro-Motive Division, General Motors Corporation, La Grange, Ill. Kodachrome by W. Mickie. Courtesy of the PLANT.

Frontispiece

A 35-cubic-yard electric shovel, used in stripping operations. Courtesy of Westinghouse.

PHOTO CREDITS: Page 8, FAIRBANKS-MORSE NEWS. Page 9, BALDWIN. Page 11, WARREN JONES. Page 12, U. S. AIR-FORCE.

PRINTED BY MOORE-LANGEN PRINTING AND PUBLISHING CO.

140 North Sixth Street, Terre Haute, Ind.

Published monthly except June, July, August, and September by the Students of Rose Polytechnic Institute. Subscription $2.00 per year. Address all communications to the ROSE TECHNIC, Rose Polytechnic Institute, Terre Haute, Indiana. Entered in the Post-office at Terre Haute as second-class matter, as a monthly during the school year, under the act of March 3, 1879. Acceptance for mailing at special rate of postage provided for in section 1103, Act of October 3, 1917, authorized December 13, 1918. This magazine is not responsible for the opinions expressed by the contributors.

Rose Technic

Member of
ENGINEERING COLLEGE MAGAZINES ASSOCIATED

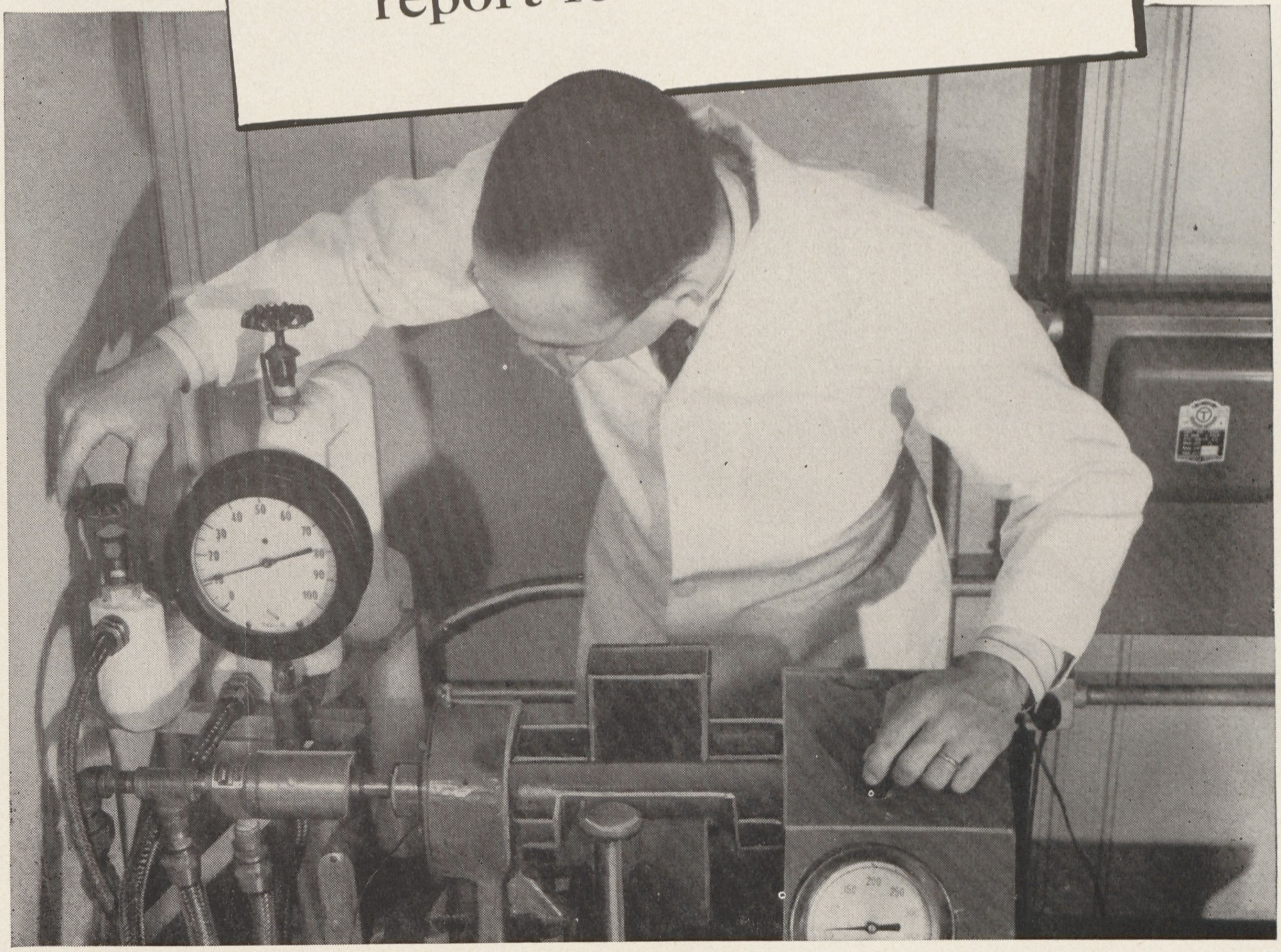
PROF. F. J. CHEEK, Chairman
College of Engineering
University of Kentucky
Lexington, Kentucky

Publisher's Representative
LITTELL-MURRAY-BARNHILL, INC.

101 Park Avenue, N. Y. 1, N. Y.
and 605 N. Michigan Avenue,
Chicago, Illinois

Arkansas Engineer
Colorado Engineer
Cooperative Engineer
Cornell Engineer
Drexel Technical Journal
Illinois Technograph
Iowa Engineer
Iowa Transit
Kansas Engineer
Kansas State Engineer
Kentucky Engineer
L. S. U. Engineer
Marquette Engineer
Michigan Technic
Minnesota Technolog
Missouri Shamrock
Nebraska Blueprint
N. Y. U. Quadrangle
North Dakota Engineer
North Dagota State Engineer
The Ohio State Engineer
Oklahoma State Engineer
Oregon State Technical Record
Penn State Engineer
Pennsylvania Triangle
Purdue Engineer
Rochester Indicator
ROSE TECHNIC
Wayne Engineer
Wisconsin Engineer

We have good news to report for the journals



SOME JOURNALS are technical publications. Some journals are the parts of rotating shafts that turn in bearings.

For both kinds of journals, there's good news in Standard Oil's performance testing program. One result is a new testing device for mill and locomotive driving-journal grease that enables us to tell more accurately than ever before what our greases will do under actual conditions of use. That, in turn, enables us to proceed more directly with the job of making our greases still better.

Standard Oil took the lead in performance testing, and is a leader today. During the war our tests furnished information that enabled the Army to procure certain products with greatly increased reliability of performance. Some of our tests have become a part of government specifications. Many users of our products are benefiting, both from better products and from more accurate information.

As time goes on, we are doing more and more performance testing. In some cases, we have to develop not only the tests but also the testing equipment. But to Standard Oil researchers and engineers, any effort is worth while if it will help make better, more useful petroleum products.

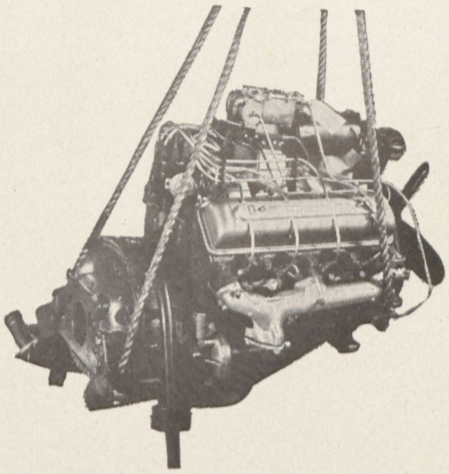
Standard Oil Company

(INDIANA)

STANDARD

FRESHMAN DORMITORY

THE DU PONT DIGEST



On the road and in the laboratory, Du Pont scientists are writing

The Inside Story of Engine Deposits

Engineers have long known that deposits which accumulate in gasoline engines have a direct bearing on engine performance. Even now, however, no way has been found to eliminate these deposits or their effects.

As a manufacturer of chemicals used by the petroleum industry, the Du Pont Company has a particular interest in this problem. It is currently the subject of a comprehensive research project, conducted both on the road and in the laboratory.

When Du Pont engineers began their studies, some aspects of the relationships between engine, fuel, lubricant, operating conditions and deposits were known. But to understand how and why deposits form and to develop corrective measures, they needed additional information.

Engineers take to the road

To get these facts, Du Pont engineers are supervising tests in a fleet of passenger cars and trucks that travel hundreds of thousands of miles yearly under carefully controlled conditions. The effects of deposits on octane number requirement, valve performance, spark plug condition and other performance characteristics are measured. After each test, the deposits are weighed and examined physically and chemically.

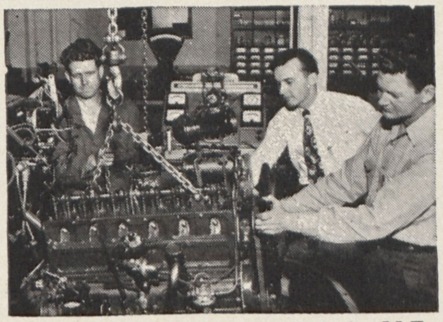
In the laboratory, other engineers study the effects of the same variables on multicylinder engines. Here, where closer control of the engines is possible, greater attention can be paid to specific fuel or engine operating effects. Performance factors, such as power output, can be more conveniently measured.

A third group of Du Pont engineers uses single cylinder engines in laboratory studies of deposit formation, adhesion, removal and harm. Exploring new fields, these men had to design complex instrumentation for measuring factors such as surface condition and deposit thickness.

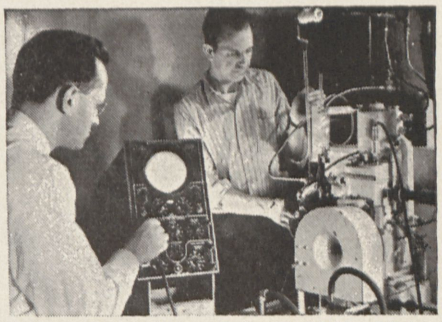
Chemists synthesize deposits

Chemists, too, have an important place in this research. They study the chemical and physical characteristics of engine deposits. Among other things, they devise ways of synthesizing, in fired engines, deposits consisting almost entirely of a single chemical compound in order to study its effect on engine performance.

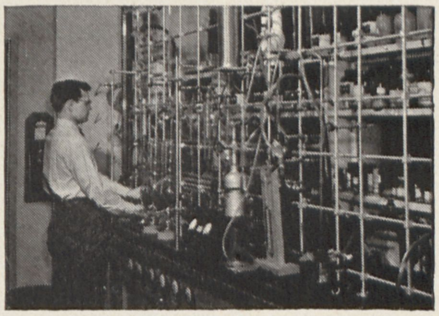
The results of this comprehensive research program are not yet conclusive, although the relationships between engine, fuel, lubricant, operating condition and deposit formation and harm are much better understood. In the past Du Pont scientists have licked even more difficult problems. Working as a team, they will persist in their effort to provide the motorist with improved engine performance through better fuels.



Douglas L. Schultz *(center), B.S. in M.E., M.I.T. 1947, supervises installation of engine for study of deposit formation in truck operating under heavy-duty conditions.*



W. E. Bettoney *(left), B.S. in M.E., Maine 1939, tests installation of single-cylinder gasoline engine used in study of factors influencing deposit formation in the combustion chamber.*



H. K. Livingston, *Ph. D. in Phys. Chem., Chicago 1941, operates apparatus for measuring porosity and absorptivity of combustion chamber deposits taken from test engines of the Du Pont automobile test fleet.*

Editorial

Contrary to popular opinion, Rose men are not distinctive in the business of complaining. This noteworthy trait will be found wherever college students gather. The men of Rose are unusual in that they have one less thing to complain about—their student council.

The Rose student council is one of the most powerful student government organizations existing on any college campus. That this influence is seldom used to its fullest extent indicates that the students are worthy of the trust of this power.

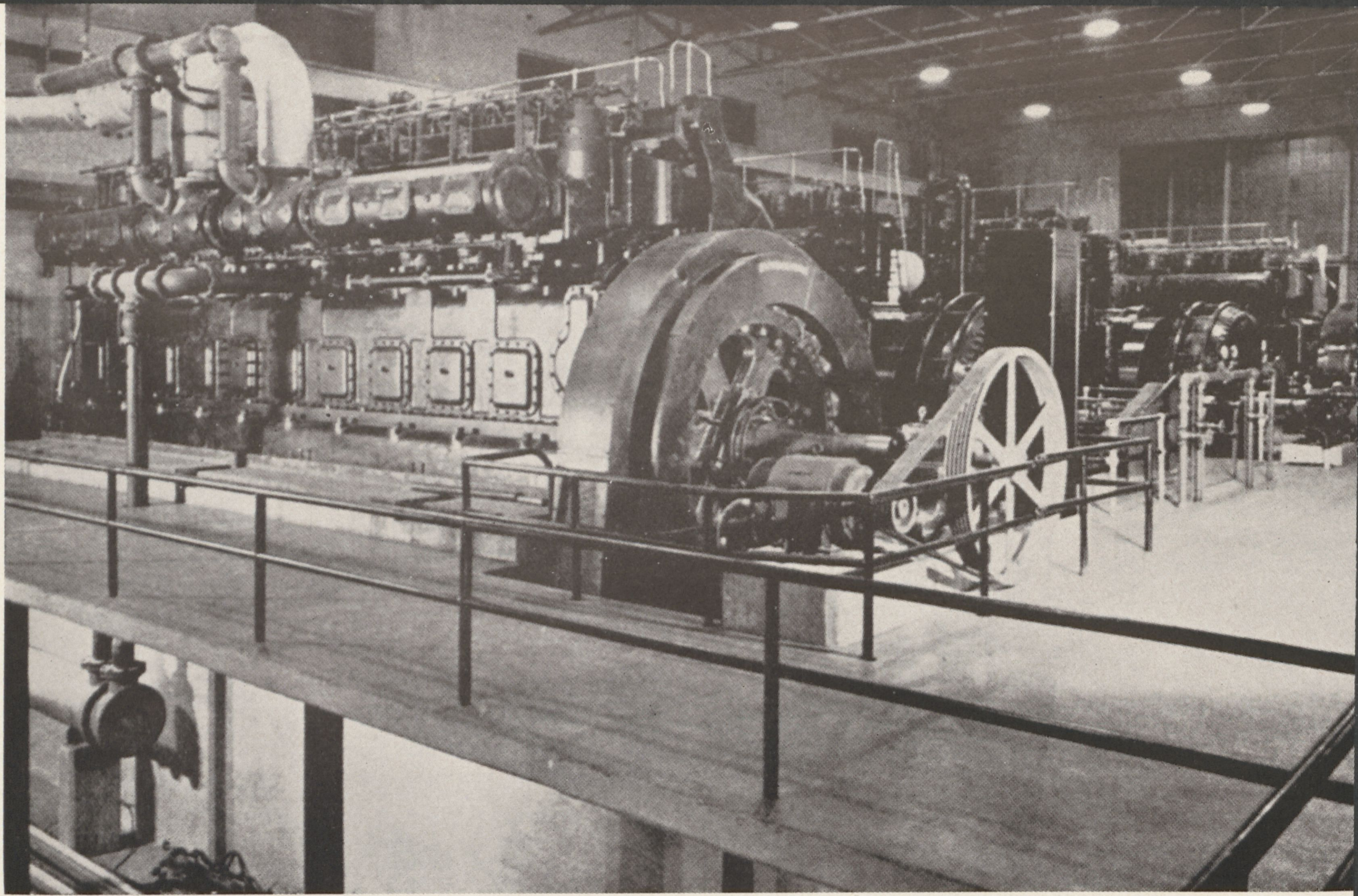
The student council recently sent delegates to a regional National Student Association convention. This organization consists of many colleges and universities throughout the country who wish to gain more power for their respective student councils. At this meeting no powers were discussed that the student council at Rose did not already have.

In one particular instance it was stated that the sole function of the student council of a leading school was to vote yes or no to a measure formulated by the faculty. This is typical.

Very fresh in the minds of Rose men is the incident concerning Saturday classes. Through the student council the students were able to abolish most Saturday classes. What better proof could there be.

The administration of Rose is to be commended on allowing the student council this power. The power of the student council is a striking example of the administration's trust in the ability of the students to make important decisions.

D B. L.



Diesel Power

By Robert Ray, soph., m.e.

The mighty diesel locomotive, as it streaks through the night sounding its mournful horn, and the gigantic ocean liner, making another trip to a far distant land are impressive reminders of the applications of the diesel engine.

The diesel engine is a special kind of internal combustion engine. An internal combustion engine is one in which combustion of the fuel takes place inside the operating mechanism, frequently a piston and a cylinder. Such an engine normally has a higher efficiency than an external combustion engine, such as the steam engine, in which the energy of the combustible is released under a boiler external to the prime mover, and the resultant steam is applied to working parts.

In the diesel engine the fuel is ignited within the combustion chamber by the heat of compression, while in the gasoline engine an electric spark is supplied to ignite the mixture and produce power in the cylinder; hence the familiar carburetor, magneto, and spark plugs of the automobile engine are replaced by the fuel injection pump and the spray nozzle or injector in the diesel engine. This explains why the average compression ratio of the diesel engine is so much greater than that of the gasoline engine. In a gasoline engine the air and vaporized fuel mixture in the combustion chamber are compressed into a space only one-sixth as large as it occupied before the compression stroke, while in the diesel engine, in order to release enough heat energy for combustion, it is necessary to compress the vaporized mixture into a space one-sixteenth as large as previously occupied.

The idea behind the invention of the diesel engine was conceived perhaps first by the Dutch scientist, Christian Huygens, who described an internal combustion engine utilizing gunpowder, in 1860. This idea predates even the first successful steam engine, which was built by James Watt in 1869.

The work of Dr. Rudolph Diesel concerning an engine deriving power from ignited coal dust was noted by a Colonel Busch of the United States, and in 1897 he formed the American Diesel Engine Company to exploit this new type of engine, using a

liquid fuel instead of Diesel's coal dust. Upon the expiration of Busch's patent rights in 1912, a number of companies undertook the manufacture of diesel engines, some of original design and some of European design. Engines produced during the period from 1912 until after the First World War were large, heavy, low-speed units suitable only for stationary power generation or propulsion of large vessels. These engines, however demonstrated convincingly the economy of diesel operation and proved it to be a reliable and dependable power source.

The period from 1920 to 1935 was one of remarkable progress in diesel development. This was an era during which the suitability of the diesel engine for locomotive propulsion was demonstrated, and during which the medium and high speed engines of today were initially conceived. As early as 1924 diesel engines, built by the Ingersoll-Rand Company, were installed in switching locomotives, many of which are still in daily service. About ten years later the first streamlined passenger trains powered by diesel locomotives went into service. These made records for speed, economy, reliability, comfort, and earning power that were prophetic of the new era in railroad motive power to follow.

At the outbreak of World War II the diesel industry was ready with engine designs to satisfy the most exacting demands of the military. Engines of all types were required—small high-speed units for tanks, portable power plants, and construction equipment; moderate-speed high output units for propulsion of submarines, destroyer escorts, and landing craft; high-horsepower, low-speed engines for propulsion of tankers and merchant vessels. In excess of 35 million horsepower was supplied to the Navy alone by diesel engines, and for the first time in Naval history installed diesel horsepower exceeded steam power.

Though characterized by a high cost of installation, the operating costs of the diesel engine are lower than those of most other internal combustion engines. It is also true that the larger the engine, the higher its efficiency, but these larger engines operate at slower speeds. It is interesting to note the rapid extension of diesel power in some fields, where its features are desirable, and the striking absence of its use in other fields of power production, where it can not compete with other types of engines economically.

The main advantages of the diesel engine over the gasoline engine are greater fuel economy and greater "lugging" or pulling ability at low speeds. Diesel fuels, though requiring as much care in selection as gasolines, consist of crude oil mixtures —that is, refinery residues, distillates, and furnace oil; hence diesel fuels are lower in cost than gasolines, by as much as ten cents per gallon less near inland refineries and oil fields.

Improved torque or pulling ability at lower speeds is a desirable quality possessed by the diesel engine. Diesel fuels burn slower than gasoline; hence the pressure applied to the piston during the power stroke is a more gradual force than the explosive force in the gasoline cylinder. This feature, combined with the fact that each cylinder receives a fixed amount of fuel regardless of the speed of the engine, gives the desirable "lugging" feature which makes possible a smooth, constant pulling force.

Though possessing these advantages, the diesel engine apparently has no future in the automobile industry. Substantial engineering problems are present in the production of small diesel engines of weight, size, performance, and characteristics comparable to the gasoline engine. In such small sizes the gasoline engine is much cheaper to produce. For similar reasons the diesel engine has not displaced the gasoline engine in the lighter road trucks; but in the larger sizes of long-distance carriers, earth moving equipment, and larger passenger buses, the operating economies of the diesel offset its higher initial cost and have brought about its extensive use.

Considerable attention has been devoted to the production of light weight diesel engines for use in aircraft and airships. In the middle 1930's diesel engines, although heav-

Continued on Page 16

Diesel Switcher

Alumni News

By Chris Sharpenberg, jr. m.e.

'86 Wesley Cline Masterson, 84, died December 10, In Indianapolis. Mr. Masterson was the last living member of the class of 1886 of Rose. This was the first class to graduate after taking all four years here.

Born in Carrollton, Kentucky, Mr. Masterson worked for the Baltimore and Ohio Railroad offices until 1932, when he retired. He had lived in Indianapolis 64 years.

Mr. Masterson is survived by three children, seven grandchildren, and seven great-grandchildren. Mrs. Masterson had preceded him in death in 1934.

'05 C. Brenton Cook, vice-president of the Elwell-Parker Electric Company, has been named the 1951 president of the Electrical Industrial Truck Association. The trade organization is composed of electric truck and battery manufacturers.

Upon graduating from Rose, Mr. Cook started with the Allis Chalmers Electric Company. Before joining Elwell-Parker in 1914, he also worked for the Stevens Duryea Motor Company.

The "pallet" truck, a designation which is common in materials handling, was originated by Mr. Cook.

A former president of the Industrial Marketers of Cleveland and the Cleveland Export Club, Mr. Cook is also active in the Cleveland Chamber of Commerce.

'28 George J. Mason has been promoted to the rank of Lt. Colonel in the Corps of Engineers, U. S. Army. He entered the army in December, 1940, and was a unit instructor at the Letterkenny Ordinance Depot. His present address is 595th Engineer Base Depot, A.P.O. 719, Postmaster, San Francisco, California.

Aug. '50 Alan T. Junker is now stationed at Camp fantry detachment of the Field Arfantry detachment of the field artillery. In a recent letter, he reports, "One thing that makes this deal boring to me is that they're giving us the same material that I had in R. O. T. C." Also, "The food tastes like boiled paper and is twice as binding." Finally, "I sure wish I were back at old Rose—it was HEAVEN compared to this."

'41 Quentin R. Jeffries, employed by the Commercial Solvents Corporation in Terre Haute, is planning to enter the University of Illinois in February for work towards a Ph.D. in Chemical Engineering.

'10 Nathan A. Bowers has retired from the editorial staff of the *Engineering News-Record* after forty years of service to pursue, uninterrupted by deadlines, a multitude of scientific interests developed through the years.

Mr. Bowers joined the ENR staff in 1910 as an assistant editor. The following year he was promoted to associate editor and placed in charge of the department of hydraulics.

In 1913 he went to Vancouver as Northwest representative, and the next year he established the ENR office in San Francisco where he remained until retiring. During his early years he was Pacific Coast editor for several other McGraw and McGraw-Hill papers.

Although Mr. Bowers entered editorial work immediately after graduating from Rose, he had been working at engineering for eight years previously and had taken college preparatory work at Throop Polytechnic Institute (now California Institute of Technology) in Pasadena. On this background, an insatiable curiosity and a bent for technical writing, he soon became one of the top-notch editors in the country.

A student above all else, he obtained a Ph.D. from Stanford University in 1926, the first civil engineer to be awarded such a degree by that institution. His thesis was on "Engineering Failures in the Water Power Field," which proved a timely subject two years later when the great St. Francis Dam failure occurred. Dr. Bowers' coverage of the accident was one of the great technical reporting jobs of modern times, and his conclusions as to the cause were later substantiated by investigating boards. He received the editorial award of the Associated Business Papers for his St. Francis Dam articles.

Another opportunity for outstanding reporting was grasped in 1944 when Bowers followed the Seabees to the Pacific, writing of their notable construction accomplishments. His stories form part of the book *Bulldozers Came First.*

Never one to be idle, even in leisure, Dr. Bowers earned a federal license as a radio operator in 1920 an airplane pilot's license in 1930 and became proficient as a deep-sea diver. He is an authority on forestry and author of the book *Cone Bearing Trees of the Pacific Coast.* He has been president of the San Francisco Engineers Club and has held most of the offices, including president, of the San Francisco Section of the American Society of Civil Engineers. In addition to his editorial duties Dr. Bowers was also vice-president and general manager of the McGraw-Hill Company of California from 1930 to 1934. His home, aptly named "Dunmovin," is in Atherton near Palo Alto, California.

Campus Survey

By James Myers, jr. e.e., Duane Pyle, jr. c.e.
and Allen Forsaith, jr. m.e.

"About the Picture. . . "

In the interests of culture and the fine arts, we've printed a classic photograph in this issue.

So much for the introduction, now for the body.

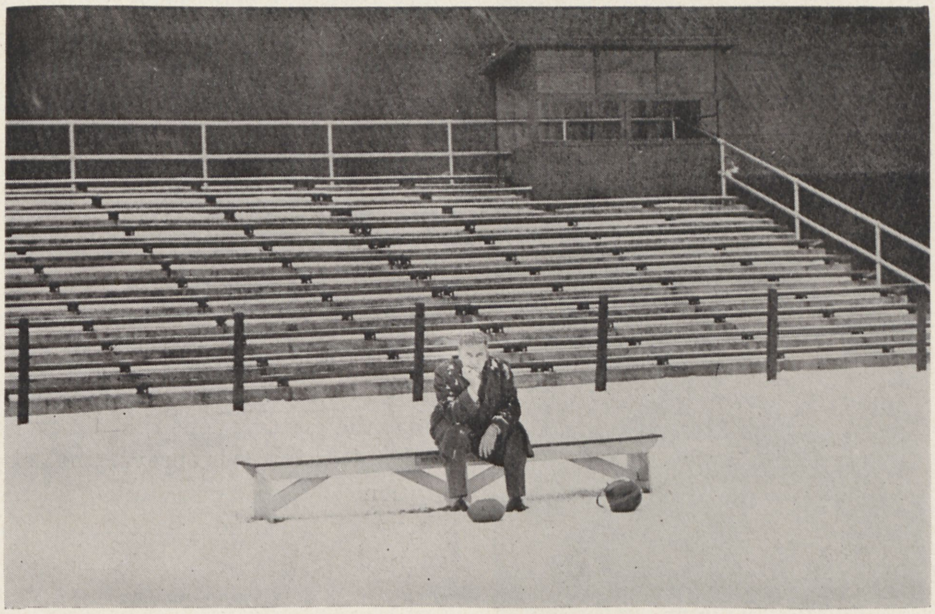
The body in the center of the above photo is named Brown. Now, why in hell is he sitting there on the bench, looking forlornly across the snowy wastes of the R.P.I. football field? Phil looks like he's at the yield point where further stress will result in permanent deformation. Does the fact that Rose lost all its football games during the past season have anything to do with it? Frankly, we don't know; all we have to go on is the picture.

Maybe Phil is contemplating organizing a winter football team which, equipped with snowshoes, could schedule games with visiting Eskimos. Maybe he's looking for all those Rose Athletic Department T-shirts which have mysteriously been lost from the field house. Maybe he likes to sit in the snow, just reminiscing about those good old days when Rose was no worse, athletically speaking, than most other small colleges.

The picture literally thrusts upon the looker the urgent need for something-or-other; the latter quality is, without doubt, just what our team lacks. Phil has seached diligently for this something-or-other, but his search has been in vain. You can't create it, but its got to be there. When half the student body went to Franklin just to return an old hunk of bronze, this something-or-other flamed stoutly for a brief moment; the flames quickly burned out.

Just Phil, sitting there all alone, staring vacantly at the field, a football and an empty helmet lying at his feet. It's funny, at first, but after awhile it doesn't look so funny. Perhaps that's why Phil wanted it printed.

A Brown Named Phil



Library Notes

When an anthropologist and a statistician, husband and wife, respectively, find themselves out of their jobs, the chances are that they will turn to almost anything else that has promise of a living.

George Woodbury, author of *John Goffe's Mill,* and his wife, Connie, who had been employees of the Peabody Museum of Harvard University, found their particular skills suddenly unwanted, with their only tangible asset being an ancestral property consisting of a small tract of land having on it a broken down saw mill, powered by water.

As a result of these circumstances the book *John Goffe's Mill* by Mr. Woodbury is a particularly happy reading experience. His experiences in rebuilding the dam which was in ruins, in repairing the mill which had tumbled in and in learning from scratch the sawyer's trade are related with charm and gusto.

It is because he does have a deep respect for old machines and for the tools that one uses and because he does have a considerable faith and a lasting admiration for the skill that is found in one's hands, that the book retains its likable qualities.

As a suggestion from the library, potential engineers, whatever the kind, might find this book enjoyable reading.

By way of a grant from the Institute of Human Relations of Yale University, the Rose Library has been able to purchase several books at half price. Among these are: *Dimensional Analysis,* by Bridgman; *On Understanding Science,* by Conant; *Education at the Crossroads,* by Maritain; and *Science and Criticism* by Miller.

Following are some titles of new books in the library which are too good to miss: *Autobiography of Robert A. Millikan; The Diplomat,* by Aldridge; *Modern Arms and Free Man,* by Bush; *The Art of*

Conncluded on Page 20

Research and Development

By Fritz Wheeler, soph., m.e.

Automatic Parachute

A parachute with a built in brain has been devised—a new automatic back-type model that knows when and where to open in high speed, high altitude bailouts.

The hazards of dropping from fast planes and high altitudes with open chutes, including severity of opening shock, lack of oxygen, extreme cold and vulnerability to enemy fire, were pointed up in the early days of World War II and have become increasingly serious with the advent of newer, swifter planes. But the disadvantages of free fall jumps can be serious too—failure to pull the ripcord at the right time, or failure to pull it at all due to injury or anoxia (lack of oxygen).

The new parachute takes the bugaboo out of free fall drops. It requires only that the pilot get out of his plane and pull a handle connected by cable to an automatic release. From there on in, the release takes over, opening the chute only after the airman has fallen to a safe altitude. The automatic release is designed to control the opening of the parachute by both time and altitude delay.

Automatic Parachute

Before the pilot takes off, he sets a timer—usually between five and seven seconds—and an aneroid element for an altitude 5,000 feet higher than the highest point over which he expects to fly. For example, if the highest point on the terrain is 8,000 feet, he sets the release for 13,000 feet. Then, should it become necesary for him to bail out at 40,000 feet, his chute will not open until he free falls to the preset altitude of 13,000 feet.

This safety feature corrects several of the old ills of parachute escape. At 40,000 feet, the opening shock is four times as great as it is at sea level. Also, if the chute were to open at 40,000 feet, the descent would naturally take longer and lack of oxygen or the extreme cold of high altitudes could prove fatal.

Should a pilot be forced to bail out at high speed and low altitude, the timer will provide a sufficient delay for him to clear his plane and slow down to a safe speed before the chute opens. The timing device can be set from one to twenty-six seconds.

Normally, however, between five and seven seconds is enough time to clear the plane and reduce velocity from an initial speed of 600 miles an hour to 130 miles per hour at 20,000 feet and to 120 miles an hour at sea level.

The aneroid element will supercede the setting on the timer at high altitude, this preventing operation of the parachute release above the altitude preset on the aneroid.

Concluded on Page 22

Fraternity Notes

Theta Xi

Theta Xi wishes to extend a welcome to Bob Young who was recently pledged. Congratulations are also in line for the new officers of the fraternity who are John Anderson, President; Bob Rinker, Veep; Don Somes, keeper of the funds; Bob Miller, house manager, and George Wence, his aide. Jim Mook is now corresponding secretary.

New men who have taken the first step toward disaster are Cliff Hennig, whose steady is "Cecy" Mullens and Jim Sherman, with Barbara Akers as the bait. Gene Hailstone received the last rites over vacation as did alumnus Jode Morrow. Both were married during the holidays. Gene and Susie are residing in town.

The winter dance held at the Rose Poly Auditorium was a gala affair. Those in attendance were Mr. and Mrs. Hollis and Dr. and Mrs. Knight. Many faculty members were present also.

Congratulations are extended to our two new brothers, Carl Vaughn and Robert Owens, who were initiated on January 14.

Sigma Nu

In mid-December the State-Day convention of Indiana was held in Indianapolis and from Beta Upsilon the representatives were Commander Chuck Butel and Marshal Pork Stewart.

Returning bleary-eyed but happy from the much-needed holidays, the chapter has turned its thoughts toward planning a winter dance, scheduled to follow finals sometime in February.

Congratulations to Bob Greminger who married the former Sarah Ellen Boling of Terre Haute during the Christmas vacation.

The beer was gratis when Bob Ray announced the pinning of Dolores Baldridge, a Delta Gamma of DePauw University.

Lambda Chi Alpha

The fraternity event which eclipsed all others for Rose Lambda Chi's during December was the Holly Ball. This annual dance was held at the Terre Haute House's "Mayflower Room." with Leo Baxter and his Orchestra furnishing the music.

The dance was exceptionally well attended; nearly all the brothers were there. Several alumni were present including Bill Gordon and his brother Dick, Mr. and Mrs. Dave Smith, Bill Bannister, and Mr. and Mrs. William Chambers.

Among the faculty members present were Mr. and Mrs. Ralph M. Ross, Mr. and Mrs. E. A. MacLean, and Mr. and Mrs. Marvin E. Hansell. Brothers from the other three of Rose's fraternities attended.

Preceding the dance, the brothers gave Mr. and Mrs. Chambers, who were present at the house for dinner, a lovely set of crystalware for a wedding present.

Alpha Tau Omega

With everyone fully recovered from the parties of the holiday vacation, attention is centered on plans for State Day, to be held March 3 at Indianapolis. With Stan "Poondike" as director, Gamma Gamma has been holding song rehearsals following the regular meetings, and by the time Saturday the third rolls around, the numbers should be in fine shape. The rehearsals are always well attended, for they usually wind up "just around the corner" from 63 Gilbert.

"Bushman" McKeen, social chairman, is getting things "lined up" for that big house party scheduled for the last of the month. Riley says he'd like to have "something (or was it "someone" a little different" this time. Before laying this aside be sure to "check" the picture of escaped convicts in this issue—the one of the A.T.O. officers that is!!

A. T. O. Officers

Great Men of Science

SIR WILLIAM MITCHELL RAMSAY

Stanley Updike, jr. m.e.

Broadway! The street of a million lights. Lights of a multitude of colors spelling out names of people, plays, and places. Every light carrying with it a story, some happy, some sad. A story of a struggling actor or a little known play wright whose greatest desire was to see his name in the lights of Broadway.

But what of the lights themselves, what made them possible? They too carry a multitude of stories behind them. One of these is the story of Sir William Mitchell Ramsay, a chemist.

Ramsay was born in Glasgow, Scotland, in 1852. He was a precocious, idle, and dreamy child, traits which are common to many geniuses. His main interest was in foreign languages and during sermon time in church he would often read and translate French and German texts of the Bible. When eleven he joined a Latin class at Glasgow Academy but did little Latin and much dreaming.

His first introduction to chemistry came through athletics. One day while in football skirmish his leg was broken and he was forced into a long convalesence in a cast. During this period of convalescence he began reading a chemistry book with the intention of finding out how to make firecrackers.

While reading he became very interested in chemistry and upon recovery his room became a maze of glass tubing, bottles and testubes. His actual chemical schooling did not begin however until three years after entering the University of Glasgow Then is when he first met Professor Thompson (later Lord Kelvin) who gave him the task of removing the kinks from a large roll of copper wire. This job took a week but Ramsay impressed the Professor so with his systematic method of work that he was rapidly advanced from such menial tasks. After a year Ramsay had decided upon his life work and he became a student at Heidelberg University and then went on to Tubingen. His days at Tubingen began at 4:00 o'clock in the morning and lasted until 10:00 at night with one hour for lunch and one for dinner.

For his doctors degree Ramsay wrote a desertation on toluic and nitrotoluic acids. He then became an assistant in the Young Laboratory of Technical Chemistry. It was here he began experimentation with specimens of "Dippel-Oil" which lead to his discovery of the pyridine bases.

At this time Lord Raleigh was engaged in determiniation of exact densities of a number of gases. In his research he found that the density of nitrogen obtained from air was consistently higher than that from artificial sources. This fact interested Ramsay and he began research to find out just why this was true.

Ramsay knew that nitrogen was absorbed readily by magnesium so by removing the oxygen from air and passing the remaining gas over heated magnesium time after time he obtained a new gas which gave a characteristic spectrum all of its own and which would not combine with any other element. This gas was called argon.

Soon after this discovery Ramsay heard of the experiments of Hillenbrand of the U. S. Geological survey who had obtained nitrogen from a rock called clevite and it was suspected that this nitrogen also contained argon. Ramsay began experimentation on this new form of nitrogen and found not only argon but also a yellow line in the spectrum close to the sodium lines and which belonged to an element not yet found on earth but given the name Helium.

From a careful study of Mendeleff's periodic grouping of elements Ramsey predicted that other inert gases should lie between argon and Helium. This began a period of intense research on his part to discover and produce these unknown gases. All possible sources were used in his research but with no results until one day while distilling liquified argon it was found that the first portions of gases to bail off were lighter than argon. By allowing the gases to bail off slowly and with use of the spectroscope three new gases discovered were Neon, "the new one"; Kryton, "the hidden one"; Xenon, "the stranger".

The discovery of these gases, Helium, Argon, Neon, Krypton, and Xenon opened new fields in lighting, refrigeration, aviation and chemistry.

In 1904 Ramsay received the Nobel prize in chemistry and in 1906 he was knighted Sir William Mitchell Ramsay.

In 1912 Ramsay retired and in 1916 he died leaving behind him a world of knowledge for future generations. Knowledge which may have been years late in coming if the inquisitive mind of a boy had not wanted to find out how to make firecrackers.

Diesel Power

Continued from Page 9

ier than corresponding gasoline engines, seemed promising in certain fields of aircraft operation due to the lighter weight of fuel consumed and the resultant higher pay loads. However, subsequent improvements in gasoline engines offset this advantage with the result that the early promise was not fulfilled and the diesel engine has never found a wide application in aircraft.

The use of diesel engines in stationary power stations is limited. The power units in most of the world's largest power stations are coal-fired steam turbine sets. Such stations in their most modern form approach overall efficiencies of 33 per cent and are customarily based on the use of low cost coal fuel. The corresponding large size, slow speed diesel engine has never been able to compete in this field, for despite a correspondingly high efficiency in fuel combustion, the slow speed of the extremely large diesel engine cannot meet the speed demands of the power plants. In the smaller sizes of stationary power units, ranging generally from 100 to 2000 hp., the diesel engine has found a wide field of application. Here, where less power is demanded, small engines may be used with accompanying higher speed and lower installation costs.

In the marine field the diesel engine has been an outstanding success, to the point where the larger part of the world's fleet today is powered by this type of engine. Here the economy is dictated not only by the use of relatively compact power units compared with corresponding steam engines and their boilers, but there is a considerable saving in space and weight necessary for the storage of fuel. The diesel engine has found universal use in submarines where the necessity for power concentration has been a major factor in developing minimum weight, high speed units.

At the time of the first diesel application to railroad locomotives around 1913, light weight diesel engines had not yet been developed, and the first locomotives were relatively heavy and less powerful than other types. For these reasons they were limited in application to switcher duty.

Subsequently the appearance and development of larger capacity, compact, light weight diesel engines and a broader experience in the design of the electrical transmission equipment permitted the construction of units of motive power having application on both passenger and freight trains in mainline service. Passenger train operation in the United States was pioneered by some of the early Zephyr trains operated Quincy Railroad with engines developing about 80 hp. per cylinder and weighing around 25 pounds per horsepower.

Following the successful trials of these prototypes, the application of diesel locomotives on railroads in the United States was extremely rapid. Thus in the relatively short period of fifteen years prior to the end of 1949, the preference of the railroads for diesel power forced the builders of steam locomotives to convert their facilities almost entirely to the production of diesel locomotives. Diesel motive power was then handling 41 per cent of the total railroad freight traffic, 52 per cent of the passenger traffic, and 57 per cent of the switcher traffic.

Due primarily to savings in fuel and repair costs, the overall oper-

Concluded on Page 18

Drill Night

From a point high on the campus, a radar beam searches the sky. Lights burn in classrooms. Khaki replaces tweed and covert for the night as college men assigned to Reserve units study the machines and methods of defense.

Preparedness is the order of the day.

And the Bell System stands prepared. In five busy years, we have added more than 12,500,000 telephones. Many improvements have been made in the quality and speed of service. Our force of highly skilled, experienced men and women has been greatly enlarged—and now numbers more than 600,000.

A nation in a hurry goes by telephone. This country has the best telephone service in the world.

BELL TELEPHONE SYSTEM

Diesel Power

Concluded From Page 16

ating cost of these locomotives has been only approximately 60 per cent of the corresponding operating costs of the replaced steam locomotive. Improved manufacturing techniques and volume production of standardized units have together insured that the initial cost of the diesel locomotive, basically more expensive than the steam locomotive, is kept to a minimum.

The rate of application of diesel motive power in the rest of the world has not kept pace with that in the United States. The outstanding economic factors which apply in the American applications do not necessarily repeat themselves elsewhere. Dependence on local supplies of coal fuel and the absence of local sources of oil fuel have in some countries limited diesel locomotive power mainly to switching applications. There are very few examples of diesel power in main-line railroad service outside the North American continent.

In the decade from 1935 to 1945, installed diesel horsepower in the United States increased from 5 to 45 million. Conservative estimates indicate an annual production of approximately 10 million horsepower during the next ten years.

If diesel utilization is to continue its upward trend in the face of the challenges offered by improvements and perfection of its chief competitors, the spark-ignition engine and the gas turbine, progress in its refinement must continue uninterrupted. The industry, aware of such challenges, is not content with today's product. in laboratories throughout the nation the relentless search for improvements proceeds.

New television microphone, developed at RCA Laboratories, virtually vanishes when in active use.

Vanishing Microphone lets the stars shine

Now you see it, now you don't! RCA's new "vanishing microphone" is plainly visible when standing alone—but let a television performer stand before it and it seems to disappear.

Called the "Starmaker," this RCA microphone is little larger than a big fountain pen . . . and principles of design based on modern camouflage techniques blend it with an artist's clothing. There's no clumsy "mike" to distract your attention from the artist's performance—and it's also a superbly sensitive instrument.

Through research carried out at RCA Laboratories, the "Starmaker" microphone picks up sound from all directions—hears and transmits every sound the human ear can detect. It's not only small and almost invisible, but it's also one of the most efficient microphones ever devised.

• • •

See the latest wonders of radio, television, and electronics at RCA Exhibition Hall, 36 West 49th Street, New York. Admission is free. Radio Corporation of America, RCA Building, Radio City, 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 producing 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

World Leader in Radio — First in Television

CAMPUS SURVEY

Concluded From Page 11

Teaching, by Highet; *How to Get and Hold the Job You Want,* by Larison; *Story of Ernie Pyle,* by Miller and *How to Write Better Business Letters* by Buckley.

A man who had been a bookseller for twenty years decided there was more money in peddling vacuum cleaners and secured the local agency for a well-known brand. His very first prospect was a skeptical housewife who asked, "Are you sure that contraption will gather up every speck of dust?"

"Lady," said the salesman earnestly, "I ran this cleaner lightly over a copy of *Lady Chatterlyey's Lover* yesterday and when I was finished, it was Louisa Alcott's *Little Women."*

A company that publishes one of the great encyclopedias advertised for a male stenographer who could also answer routine inquiries. An applicant who arrived in America from Shanghai, after a long stopover in Honolulu, didn't quite get the job with this letter: "Me Chinese Bing Foy drive typewrite with hell of noise and my English is it. Last job left itself from me for simple reason big man was dead on account of not my fault. So what of it? If you same anxious like me I will arrive on day as you can guess."

Basketball

The Rose basketball team ended 1950 with two victories in six starts, having defeated Concordia and Eureka and lost to Canterbury, Huntington, Earlham and Taylor.

Canterbury pulled away in the third quarter to beat the Polymen 68-50. High point honors went to Warren Allen and Hary Badger who each scored 11 points.

In one of the wildest ballgames of the year Huntington managed to squeeze by Rose 82-78. During the course of the evening six Rose men left the game on personal fouls. The high point man was Warren Allen with 17 markers.

Concluded From Page 12

Higher Altitudes for Jets

American jet planes now are flying higher and farther because of a unique chemical development.

It was revealed that specially treated carbon brushes — which pick up and relay power to the plane's electrical system — have increased the high-altitude life of jet engines by many times. Development of the new brush was a key factor in the U. S. Air Force's program to extend the range and flying hours of jet planes without frequent brush replacement.

Carbon brushes are small, porous blocks of carbon that convey electricity from the rotating commutator of the generator to the plane's radio, gun turrets, and other vital auxiliaries. In the extremely dry air of 40,000 or 50,000-foot altitude, these brushes must create their own lubrication; otherwise they will grind themselves to powder against the copper cummutator and the flow of electricity will stop.

The problem was solved by impregnating the brushes with a special chemical compound belonging to the same family as table salt. As the brushes are pressed against the revolving commutator, the new ingredient promotes the formation of a lubricating film that prevents harmful friction at the highest altitudes attainable.

Despite its tenacity, the lubricating film is so thin that two thousand layers of it would barely equal the thickness of a sheet of paper.

The temperatures created on the face of the brushes during the starting phase of jet engines using starter-generators may run as high as 1000 degrees Fahrenheit. This may evaporate the chemical treatment in the carbon brush, so that when the plane reaches an altitude of forty or fifty thousand feet, the brush cannot produce the necessary lubricating film.

The new chemical treatment can stand up under both the terrific heat of jet engine starting and the thin, dry sub-zero air of stratosphere flying.

Radiation Monitor

A new atomic radiation detector to permit direct radiation readings at a glance has been developed. Called a "radiation monitor," the new instrument weighs less than a pound and is about the size of a quart oil can. It is equipped with a self-contained power source, and has neither tubes nor batteries.

According to the engineers who developed the device, radiation measurements are read from the monitor simply by noting the position of a pointer as it moves across a graded scale. The speed at which the pointer moves across the scale is in proportion to the strength of radiation, and the distance it moves in a given time indicates the amount of radiation to which the instrument has been exposed.

The monitor is for use by engineers, scientists, doctors, and technicians who are working with or near sources of radiation. The detector can warn of the presence of radiation in amounts much less than those permitted by even the most stringent safety regulations, according to the engineers.

This sensitivity, coupled with a continuously-visible indication, will give warning of a radiation hazard in an area while there is still time to avoid excessive exposure. This differs from the type of monitor that is read only at intervals, when it may already be too late to prevent an overdosage.

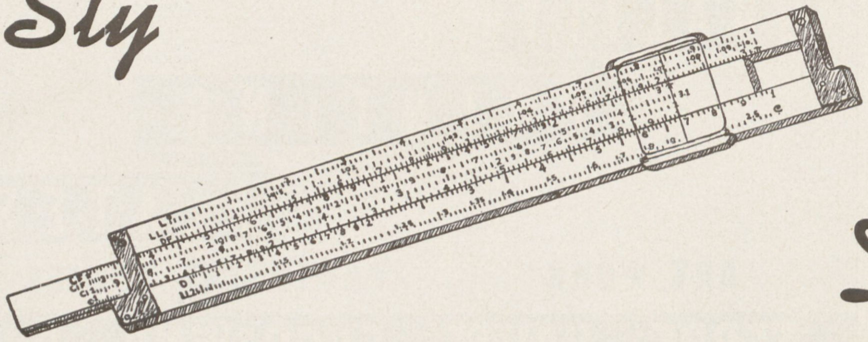
Ion Guage

Almost complete nothingness — man's nearest approach to a perfect vacuum—now can be accurately measured by an electronic pressure-gauge 200 times more sensitive than any ever produced before.

Called an "ion gauge," the new instrument can detect the presence of air in a vacuum where only one air monecule remains out of every 10,000 billion originally present. So rare are air molecules at this pressure that each one must travel some 500 miles before striking another. While scientists have gone this far in their quest for a perfect vacuum, until now it has defied measurement.

When these electrons collide with air molecules in their path, they knock off part of the molecule to create a positively charged particle called an ion. The number of ions formed in this way each second is an accurate measure of the pressure inside the vacuum system. It is read from a meter attached to the system. Previous ion gauges were limited in their sensitivity because of false readings produced by x-rays inside the gauge.

Sly Droolings



By Richard Myhre, soph., m.e.
and Bud Welling, soph., ch.e.

"Maggie, were you entertaining a man in the kitchen last night?"

"That's for him to say, ma'am."

* * * *

A young woman with adventure in her soul, joined a circus. Anxious to do everything right, she asked her employer for a few tips.

"I don't want to make a lot of beginner's mistakes," she said.

"Well for one thing," replied the manager, "don't ever undress around the bearded lady."

* * * * *

Patient: "Doctor, I blush so easily that it worries me. When I sit down and think, I blush. How can I stop it?"

Psychologist: "The best way, young lady, is to think about something different."

"Yesterday I walked ten miles without seeing a human face."

"Where were you?"

"In a nudist camp."

* * * * *

1st. Old Maid: "I love soldiers."

2nd. Old Maid: "Oh, you say that every war!"

* * * * *

The three-year old and his father were toward the back of the quickly filling elevator when a kindly woman turned to the Dad and said, "Aren't you afraid your little boy will be badly smashed?"

"Not a chance, lady," answered Dad. "He bites."

* * * * *

Judge: "I'm sorry, but I can't issue a marriage license until you have a properly filled out form."

Gal: "Listen, if my boy friend doesn't care, why should you?"

* * * * *

Betty: "I nearly fainted when the fellow I was out with last night asked me for a kiss."

Joe: "Baby, you're going to die when you hear what I have to say!"

* * * * *

Co-ed in local store: "I want to buy a new slip."

Clerk: "What bust?"

Co-ed: "Nothing, it just wore out."

* * * * *

E.E.: "I like mathematics when it isn't over my head."

C.E.: "That's the way I feel about sea gulls."

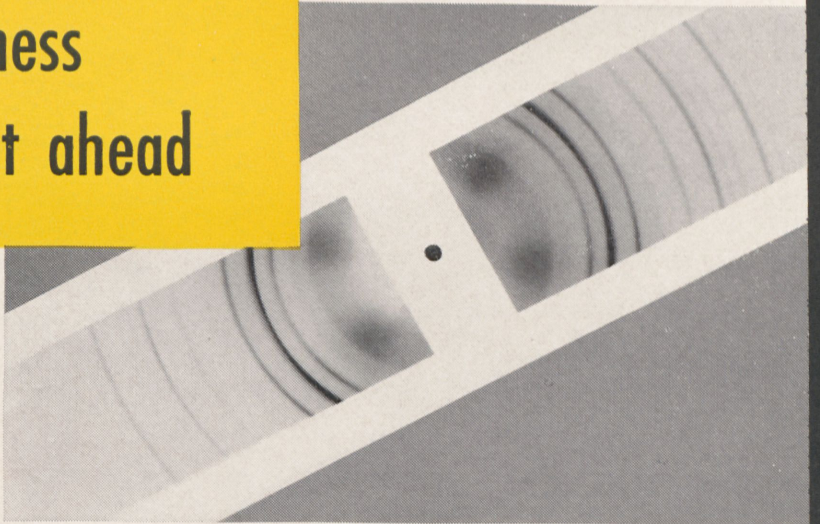
"You hold him, I'll get a rope!"

Photography makes big things small— small things big— and business comes out ahead

DISPLAYS MASSIVE PRODUCTS—A Diesel locomotive can roar across the Rockies—all on a movie screen in a prospect's office. All because photography can take huge things or small, and make them of a size for a salesman, teacher, or demonstrator to show.

MAKES MICROSCOPIC DETAILS CLEAR—Photography takes great magnifications produced by the electron microscope (20,000X) on fine-grain Kodak plates, enlarges and records them up to 100,000X on Kodak projection papers. Previously undetectable details and new facts are revealed.

REDUCES FILING SPACE BY 98%—With microfilming, bulky records can be reduced and stored on a few rolls of film. 675 drawings, 24″ x 36″, can be recorded on a 100′ roll of 35mm. Recordak or Kodagraph Micro-File Film. And everything is quickly ready for reference in the Recordak or Kodagraph Film Reader.



REVEALS STRUCTURE AND CONDITION OF METALS—X-ray diffraction patterns on Kodak films or plates provide important information concerning the crystal structure of metals. These patterns help show how alloys can be improved or new alloys made—give data on the effect of machining, drilling, and punching upon the structure of the material.

With the speed of a flick of light, photography can reduce or enlarge accurately to scale, and without missing the tiniest detail. And that's not all.

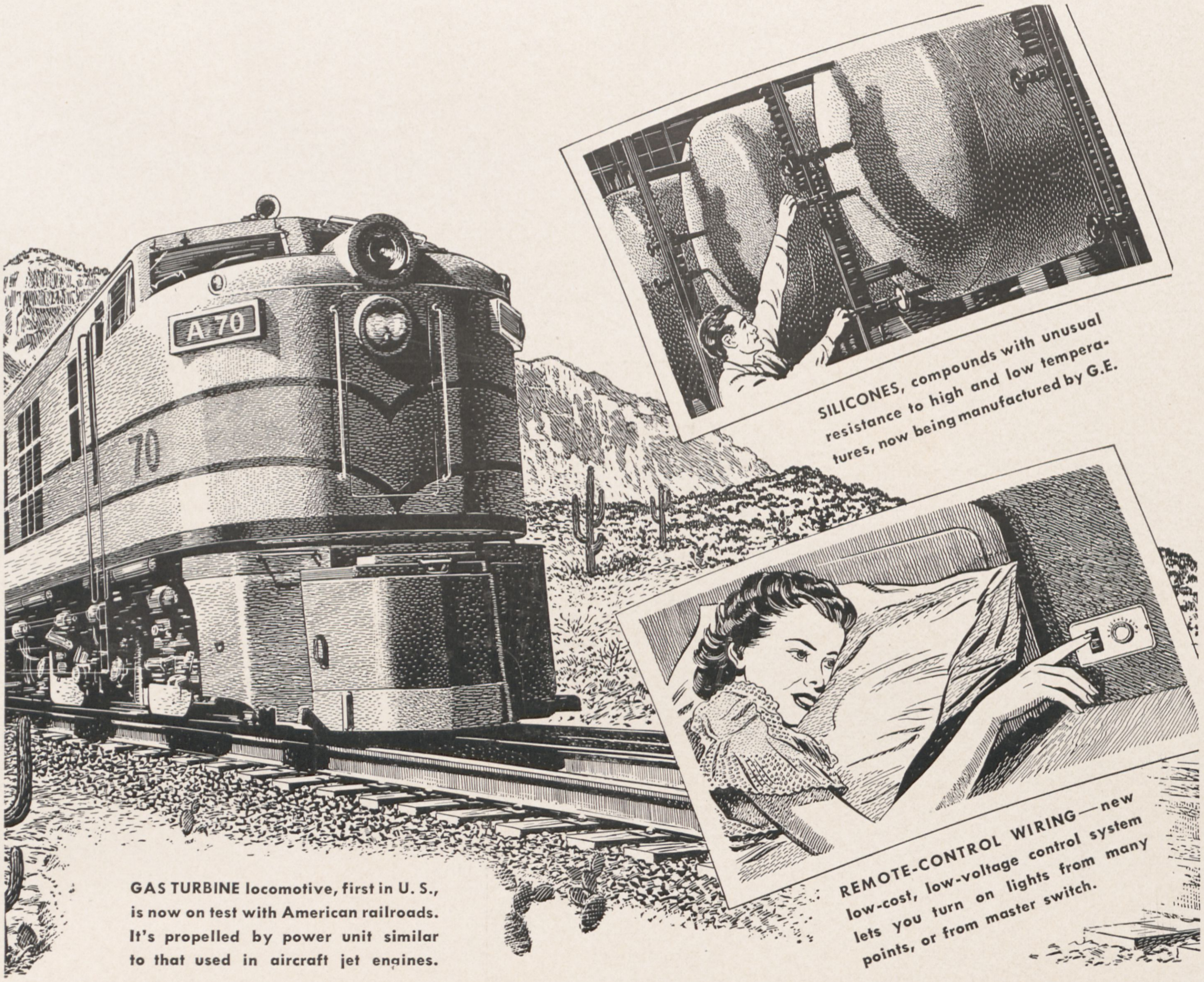
It can magnify time with the high speed motion-picture camera so that the fastest motion can be slowed down for study. It can record the penetrating x-ray and reveal internal conditions of materials and products. With movies and stills, it can repeat a story, time and again, without the loss of a single detail.

Yes, photography serves business and industry in many important and valuable ways. It can work for you, too. If you would like to know how, please feel free to write for literature, or for specific information which could be helpful to you. Eastman Kodak Company, Rochester 4, New York.

FUNCTIONAL PHOTOGRAPHY

serves industrial, commercial, and scientific progress

Kodak
TRADE-MARK



GAS TURBINE locomotive, first in U. S., is now on test with American railroads. It's propelled by power unit similar to that used in aircraft jet engines.

SILICONES, compounds with unusual resistance to high and low temperatures, now being manufactured by G.E.

REMOTE-CONTROL WIRING—new low-cost, low-voltage control system lets you turn on lights from many points, or from master switch.

These new G-E developments are creating exciting new opportunities for G-E men

The gas turbine, drawing power from red-hot gases, is being applied by General Electric to the propulsion of locomotives, ships, and planes, and to the generation of electricity. More than 350 G-E engineers, physicists, and other specialists, assigned to this work, are in on the ground floor of a development that promises to revolutionize the production of power.

It's a similar story for the chemists, chemical engineers, and other specialists working today in the development of G-E silicones, and for those who are helping to win a place in the construction industry for General Electric remote-control wiring.

New developments like these, springing from G-E research, are opening up new opportunities at General Electric, and are giving more college graduates the chance of finding exciting, satisfying work.

By placing prime importance on the development of talent and skill, by providing opportunities and incentives for creative minds, General Electric keeps ahead in electrical research, engineering, and manufacturing.

You can put your confidence in—

GENERAL ELECTRIC