TECHNOLOGY REVIEW Jebruary 1951







FROM SUGAR CANE

Spent sugar cane-called bagasse-has long been burned to provide steam in sugar mills. But until recently it has never been a satisfactory fuel... handling was difficult, shutdowns for cleaning boilers frequent.

About five years ago, Combustion, long a pioneer in fuel burning technique, decided to seek a better method of burning this fuel. Accordingly, a carload of bagasse was procured and shipped to one of C-E's plants. Following exhaustive studies of the special problems of feeding and burning, designs were developed and a pilot installation built. Extensive testing and further development produced results that proved the soundness of the experimental design.

The next step was a commercial installation at a large sugar plantation. Performance exceeded expectations... uninterrupted service throughout the grinding season, greatly increased boiler capacity, substantially improved efficiency and simplified operation. Word of these results spread quickly and many other installations followed.

Combustion's research and engineering staffs had put together a unit that revolutionized bagasse burning...a unit that has brought an opportunity to sugar-producing plants throughout the world for savings running to millions of dollars annually.

Of course the vast majority of C-E boiler installations burn coal, oil or gas, but even with these basic fuels, the wide variations in quality and burning characteristics makes almost every installation a different problem. That is why Combustion's resources of experience, equipment and facilities assure you the right equipment for your steam requirements.

Combustion's applied experience – focused on your particular needs – is freely available. A letter stating your problem will receive our immediate attention. B-426

COMBUSTION ENGINEERING-

200 Madison Avenue • New York 16, N.Y.



(IT WILL BENEFIT A LOT OF FOLKS!) WHAT IS IT?

T-V color tube drinking fountain □ heat-therapy lamp



ITS HIGH QUALITY METAL, in billet form, had surface imperfections removed by grinding wheels. Metal prod-ucts of every type are made from bil-lets ground by high-speed, fast-cutting wheels of Norton Alundum abrasive.



ITS HIGH POLISH came from another abrasive operation. Such products as table knives, laboratory instruments, telescope lenses and marble monuments are also polished with Norton Alundum or Norton Crystolon abrasives.

WERE YOU RIGHT? It's a drinking fountain. But as far as Norton is concerned, it could easily have been either of the other two. Because wherever there's grinding, cutting, polishing or any of countless other operations to be done, Norton — as the world's largest manufacturers of abrasives and abrasive products — is very much in the picture.



THE TECHNOLOGY REVIEW, February, 1951. Vol. LIII, No. 4. Published monthly from November to July inclusive at Emmett Street, Bristol, Conn. Publication date: twenty-seventh of the month preceding date of issue. Annual subscription \$3.50; Canadian and Foreign subscription, \$4.00. Entered as second-class matter December 23, 1949 at the Post Office at Bristol, Conn., under the Act of March 3, 1879.



We squeezed first ... and

Now IT'S YOUR TURN. Pick up one of those new pliant, unbreakable plastic bottles. Squeeze it. Feel how it gives under your hand, then see how it comes right back for more.

That's polyethylene (just say POLLY-ETHEL-EEN), one of the exciting new miracle plastics produced by the people of Union Carbide.

But before you squeezed it, they squeezed ethylene gas under terrific pressure and carefully controlled conditions. Result: the molecules of gas were *permanently* rearranged into long lines—one of the marvels of modern chemistry. And then out came this tough, flexible plastic utterly unlike any other material—natural or man-made.

Why do you find the people of Union Carbide leading in the development of polyethylene?

Because working with tremendous pressures, high vacuum and extremes of heat and cold is part of their everyday jobs. By the use and control of these forces they supply the world with a wide variety of plastics and the raw materials from which a multitude of synthetic fibres are made. They also make hundreds of other basic materials essential to modern science and industry.

Perhaps your business could profit by the use of some of these materials. Why not ask us about them?

FREE: Learn more about the interesting things you use every day. Write for the illustrated booklet "Products and Processes" which tells how science and industry use Union Carbide's Alloys, Chemicals, Carbons, Gases and Plastics in creating things for you. Write for free booklet A. UNION CARBON CORPORATION 30 EAST 42ND STREET IN NEW YORK 17, N. Y.

Trade-marked Products of Divisions and Units include -

 SYNTHETIC ORGANIC CHEMICALS
 LINDE Oxygen
 BAKELITE, KRENE, and VINYLITE Plastics

 PREST-O-LITE Acetylene
 PYROFAX Gas
 NATIONAL Carbons
 EvereAdy Flashlights and Batteries
 ACHESON Electrodes

 PRESTONE and TREK Anti-Freezes
 ELECTROMET Alloys and Metals
 HAYNES STELLITE Alloys



particles in a single ounce of carbon black

Carbon black is one of the most finely divided substances in all industry. It

RCA

6 0

is made up of particles so minute that it takes more than 300 quadrillion of them to make a single ounce of black.

This very property is responsible for its intense blackness in inks, lacquers, plastics, and, to a considerable extent, for its unique ability to reinforce rubber. As particle size decreases, blackness, surface area, adsorptive capacity, electrical conductivity and reinforcing ability all increase.

In Cabot Research Laboratories the particle size and surface area of all grades of Cabot carbon black have been evaluated by the electron microscope and adsorption methods. Such measurements have been invaluable in interpreting carbon black properties.

It has been found that while volatile matter, activity and other factors may modify surface properties, it is the total amount of surface area represented in a given weight of carbon black that is chiefly responsible for its behavior.



Top of page, sketched in part, Nigrometer, which measures blackness. Semi-reinforcing furnace black, Sterling S, as photographed by the Electron Microscope in the Cabot Research Laboratories. The **NEW** Brown & Sharpe



The completely new line of Brown & Sharpe Micrometers offers an outstanding combination of advanced features. Greater durability and accuracy are provided by the exclusive, stainless steel, one-piece spindle and screw with hardened and ground threads. Easier, more accurate reading is made possible by the wide-spaced divisions, large-size thimble, black graduations, and dull chrome finish. Longwearing carbide measuring faces assure enduring accuracy. See these new micrometers at your tool supplier's. Brown & Sharpe Mfg. Co., Providence 1, R. I., U. S. A.

DISTILLATION

FOUIPMENT

EXPERIMENTAL

EQUIPMENT

EVAPORATORS

JACKETED KETTLES

PIPE. PIPE COILS.

AND BENDS

MIXERS

We urge buying through the Distributor

BROWN & SHARPE B



of metal working. Their combined knowledge and experience in engineering and building special equipment and machinery have been of value to many leading mechanical and process industries.

Write for a copy of "Process Equipment". For a qualified engineer to call to discuss your equipment requirements, telephone WAltham 5-6800 or write to: — James Donovan, '28, General Manager.



THE TABULAR VIEW

Science in Administration. - Normally we do not expect administrators, as such, to make significant contributions to science or morality, nor do we assume that our religious leaders possess unusual competence in science or administration. Yet, not infrequently are scientists berated for failing to assume active administrative leadership in applying the fruits of science to the advancement of man's moral virtue. Perhaps the scientist should be flattered that his abilities are sometimes regarded as universal - if not superhuman. But those trained in science can hardly be expected to perform outstanding service in fields which, too often, require an unscientific temperament, as PROFESSOR PHILIP M. MORSE of the Department of Physics at M.I.T., points out (page 191). Dr. Morse holds that the same progress which has been achieved by operations research in the conduct of warfare (for which this comparatively new study was originally developed) can be expected to result when operations research is applied to the peacetime administration of industry. Professor Morse speaks with particular authority on this subject, for, as research director and deputy director of the Weapons Evaluation Group of the National Military Establishment in World War II, he was chief scientific authority for the agency conducting operations research for the Joint Chiefs of Staff and the Secretary of Defense. He was also one of the originators, and the first director, of the Brookhaven National Laboratory of the Atomic Energy Commission.

Success in Individuals. — In the upheaval of uncertainty which surrounds many a young person and older ones as well-it is perhaps well to be reminded of the basic function of education in a democratic society. In "Education for Freedom" (page 195), PROFESSOR JOSEPH H. KEENAN, '22, of the Department of Mechanical Engineering, emphasizes the point that a requirement for self-government among men is a reasonably high degree of development of the intellectual and moral potentialities of the individual. Following his graduation from the Institute in 1922, Professor Keenan became engineer for the General Electric Company until 1928 when he became assistant professor of mechanical engineering at Stevens Institute of Technology. In 1934 he returned to M.I.T. as associate professor of mechanical engineering, and in 1939 was promoted to a full professorship. Professor Keenan has taken deep interest in international affairs, and, for the next term, will be on leave of absence under a Fulbright grant to study in England, as recorded in the November, 1950, issue of The Technology Review.

Safety in Automobiles. — A proper practical understanding of the forces, energies, and acceleration of moving vehicles will do much to reduce automobile accidents. Greater attention to design for safety and a willingness to forego some of the elements of sleek, fashionable appearance, will have a similar effect, (Concluded on page 182)

THE TECHNOLOGY REVIEW



Blind man's buff

Blind man's buff is an expensive game to play with alloy steels. It is safer to go directly to the steel that will give the best performance at the lowest cost per finished part.

Molybdenum steels have shown time and again that they will provide consistently good properties at surprisingly low cost. Even their impact strength is consistent because they are not temper brittle.

Send for our comprehensive 400-page book, free; "MOLYBDENUM: STEELS, IRONS, ALLOYS."

MOLY

CLIMAX FURNISHES AUTHORITATIVE ENGINEERING DATA ON MOLYBDENUM APPLICATIONS

Climax Molybdenum Company 500 Fifth Avenue - New York City

181

BB C3

CAMBRIDGE electron-ray RESEARCH pH METER



RANGE AND ACCURACY: Sensitivity .005 pH; readings reproducible to .01 pH; accuracy .02 pH. Range 0 to 14 pH; 0 to 1200 m.v. ELECTRON-RAY NULL INDICATOR: Replacing the usual galvanometer, the electric eye provides quick and accurate null-point indication without possible damage to a delicate galvanometer. NO BATTERY NUISANCE: All-electric; plugs into any 110-volt AC Outlet. ELECTRODE SYSTEM: Sturdy glass electrode of condenser type is supplied. Micro condenser or dipping type glass electrodes can also be furnished. COMPACT AND PORTABLE. Laboratory and Industrial Models also available. Send for bulletin No. 910 MA.

LINDEMANN ELECTROMETER



This instrument is extensively used for the determination of radio-active emission. Has high sensitivity, good stability and does not require leveling. Send for descriptive literature.

CAMBRIDGE INSTRUMENT CO., INC. Pioneer Manufacturers of Precision Instruments 3707 Grand Central Terminal, New York 17, N.Y.



Speed Reducers *stocked* in the widest selection of types and sizes — and the one you want is *near at hand*, ready to take off the shelf of the one of *eighty* Authorized Boston Gear Distributors that is nearest you.

BOSTON GEAR WORK

72 HAYWARD ST., QUINCY 71, MASS.

The new Boston Gear Catalog No. 55 makes it easy to select the one best Reductor (Speed Reducer) for your job. Write for free copy.



BOSTON REDUCTORS

For More Trouble-free

HORSEPOWER per Dollar HOURS per Dollar

THE TABULAR VIEW

(Concluded from page 180)

even for those who have never been exposed to a course in the dynamics of rigid bodies. In fact, as DAVID O. WOODBURY, '21, reminds us (page 196), suitable co-operation between the public and automobile manufacturers, perhaps backed by a proper educational campaign, can do much to minimize casualties on the road. A graduate of the Institute's Course in Electrical Engineering, Mr. Woodbury has turned to literary channels and, since 1929 has been a free-lance interpreter of science. Something like a dozen books are to his credit, in addition to many magazine and newspaper articles on the significance of science and engineering.

Sojourn in Avesta. — Last summer five recent graduates of Technology had the unusual opportunity and good fortune to be selected to carry on engineering research in industrial plants and research organizations, all within a radius of approximately 100 miles of Avesta, in Sweden.

Based on reports written by Jacques A. F. Hill, '47, Richard M. Schotland, '48, and Robert N. Randall, '50, "Study in Sweden" (page 197) records the benefits of expanded horizons which are inevitably the result of rubbing elbows with colleagues in another country. Now back at M.I.T., Mr. Hill is continuing research in aeronautics at the Supersonic Wind Tunnel, and Mr. Schotland is engaged in research and advanced study in the Department of Meterology. Mr. Randall's visit was extended to a full year, and he is still engaged in metallurgical research in Sweden. The reports from these three graduates come to The Review through the consideration of Norman D. Padelford who is professor of international relations in the M.I.T. Department of Economics and Social Science, and chairman of the Foreign Study Committee.



180 of America's leading industrial companies have employed the W. J. Barney Corporation as builders — 104 of them repeatedly. Proof of satisfactory and low-cost building construction.

The Bulk of the World's Production of Blood Plasma, Penicillin, Streptomycin

is made on National Research Equipment

PRODUCERS USING NATIONAL RESEARCH EQUIPMENT:

Chas. Pfizer & Co., Inc. E. R. Squibb & Sons Sharp & Dohme, Inc. Merck & Co., Inc. Lederle Laboratories Div., American Cyanamid Company Schenley Laboratories Commonwealth of Massachusetts State of Michigan The Upjohn Company And most of the major foreign producers

Laboratory rarities twenty years ago, today freeze dried antibiotics and blood plasma are readily available. With the completion of the new Sharp and Dohme blood plasma plant our vacuum dehydration equipment will have been used on practically the world's mass production of these life-saving products.

Our scientists and technicians take satisfaction in making this major contribution to the welfare of the world. National Research Corporation, 70 Memorial Drive, Cambridge.

National Research Corporation

Seventy Memorial Drive, Cambridge, Massachusetts In the United Kingdom: BRITISH-AMERICAN RESEARCH, LTD., London S. W. 7 — Wishaw, Lanarkshire



Industrial Research • Process Development High Vacuum Engineering and Equipment Distillation • Coating • Metallurgy Dehydration • Applied Physics

Doesn't it stand to reason that the tire that gives the most people the greatest satisfaction is the best tire for you to buy?

More people, you know, ride on *Goodyear* tires than on any other kind.



Super Cushion by



THE GREATEST NAME IN RUBBER

Super-Cushion, T.M.-The Goodyear Tire & Rubber Company, Akron, Ohio