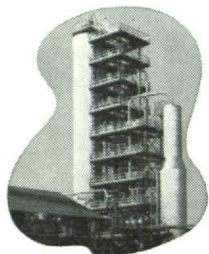


TECHNOLOGY

REVIEW *April* 1950



Our 134th Contract Abroad



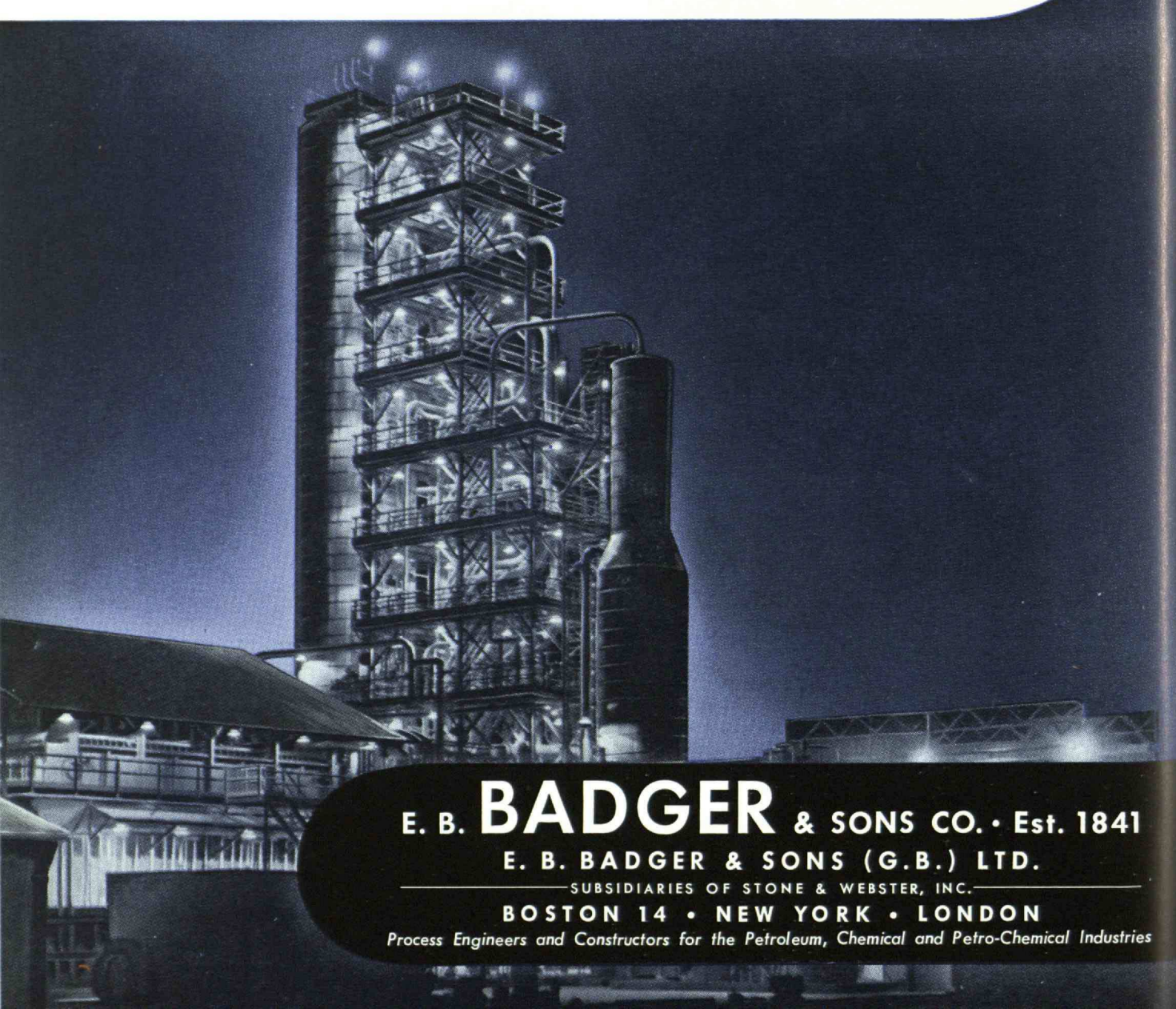
This example of Badger's current work in the Sterling area is the largest post-war refining unit in Europe yet to be completed and brought into successful operation.

Badger's British and American companies together designed, procured and installed this 40,000 BPSD crude distillation unit at the Llandarcy Refinery of National Oil Refineries Ltd., for Anglo-Iranian Oil Company Ltd. Practically all of the materials were of British manufacture.

Here is an example of Badger at work in the

international scene. Our British Company is well established and its activities integrated with those of the American parent. Relative dollar and sterling effort and equipment can be proportioned to suit respective currency availability, and this arrangement can be extended to provide for other currencies as well.

The establishment of our British Company twelve years ago, which in itself has executed contracts totaling many tens of millions of dollars, is a further example of Badger service to clients throughout the world.



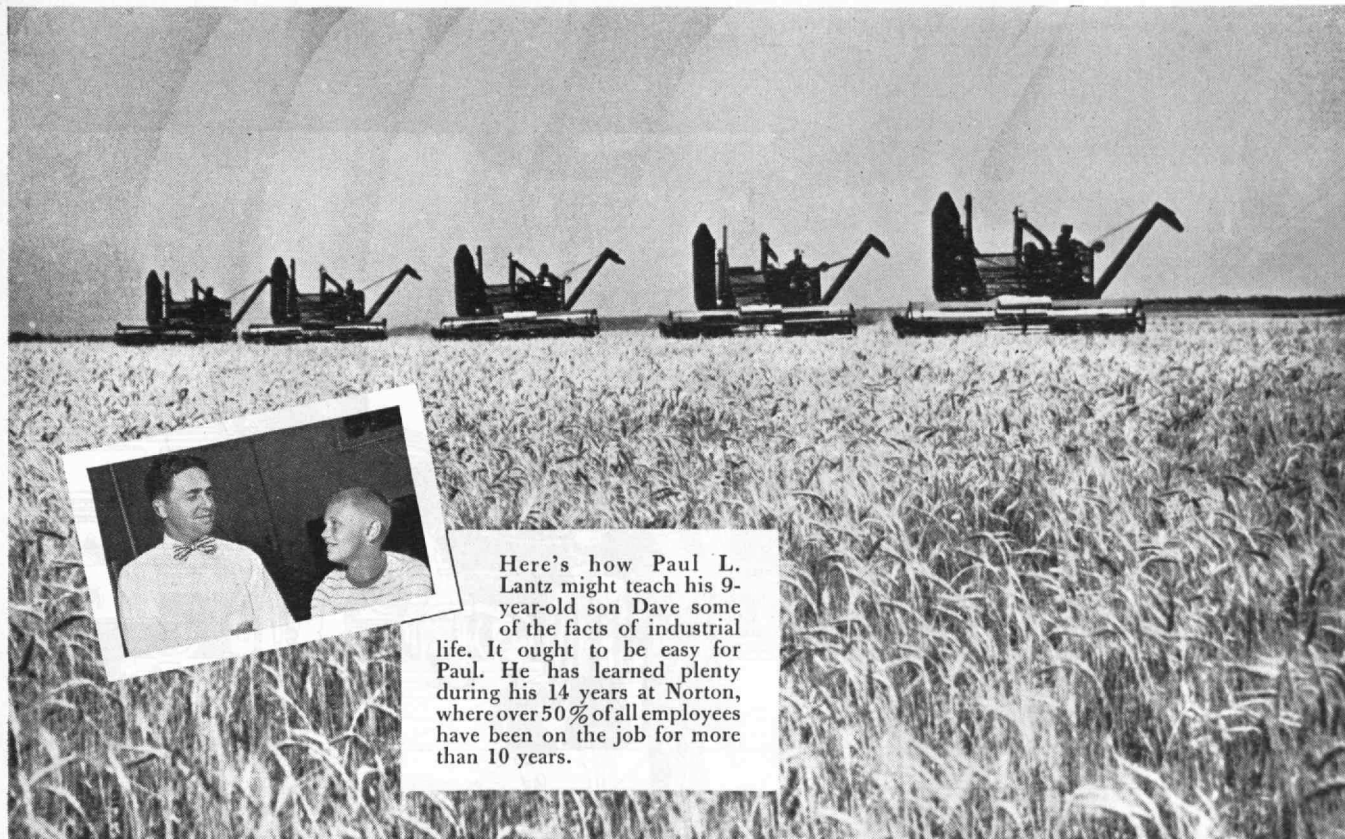
E. B. **BADGER** & SONS CO. • Est. 1841

E. B. BADGER & SONS (G.B.) LTD.

— SUBSIDIARIES OF STONE & WEBSTER, INC. —

BOSTON 14 • NEW YORK • LONDON

Process Engineers and Constructors for the Petroleum, Chemical and Petro-Chemical Industries



Here's how Paul L. Lantz might teach his 9-year-old son Dave some of the facts of industrial life. It ought to be easy for Paul. He has learned plenty during his 14 years at Norton, where over 50% of all employees have been on the job for more than 10 years.

A quintet of combines in action.

"IS FARMING AS EASY AS IT LOOKS, DAD?"

"No, son. It's just easier than it used to be, thanks to the farm equipment manufacturers who are always finding new and better ways to make farming more efficient."



"Diesel tractors give more power than 100 horses. Smooth, rugged power derived from accurate, close-fitting parts. Norton Lapping Machines finish these parts to closest tolerances possible in mass production.



"Parts like cultivator discs and plowshares, made of today's tougher metals, stand rougher treatment. Fast-cutting Alundum grinding wheels, or Alundum-coated polishing wheels, finish these parts *right!*"



"Grinding and finishing implement parts, sharpening cutting tools, heat-treating metals for improved properties are among the vital farm-equipment jobs entrusted to Norton grinding wheels, machines and refractories."



"Yes, indeed, Dave, the Norton products I help make are an important part of the preparation of every meal you eat. As a matter of fact, just about everything that makes living worthwhile today is a little bit better because Norton products added something extra to it."

NORTON

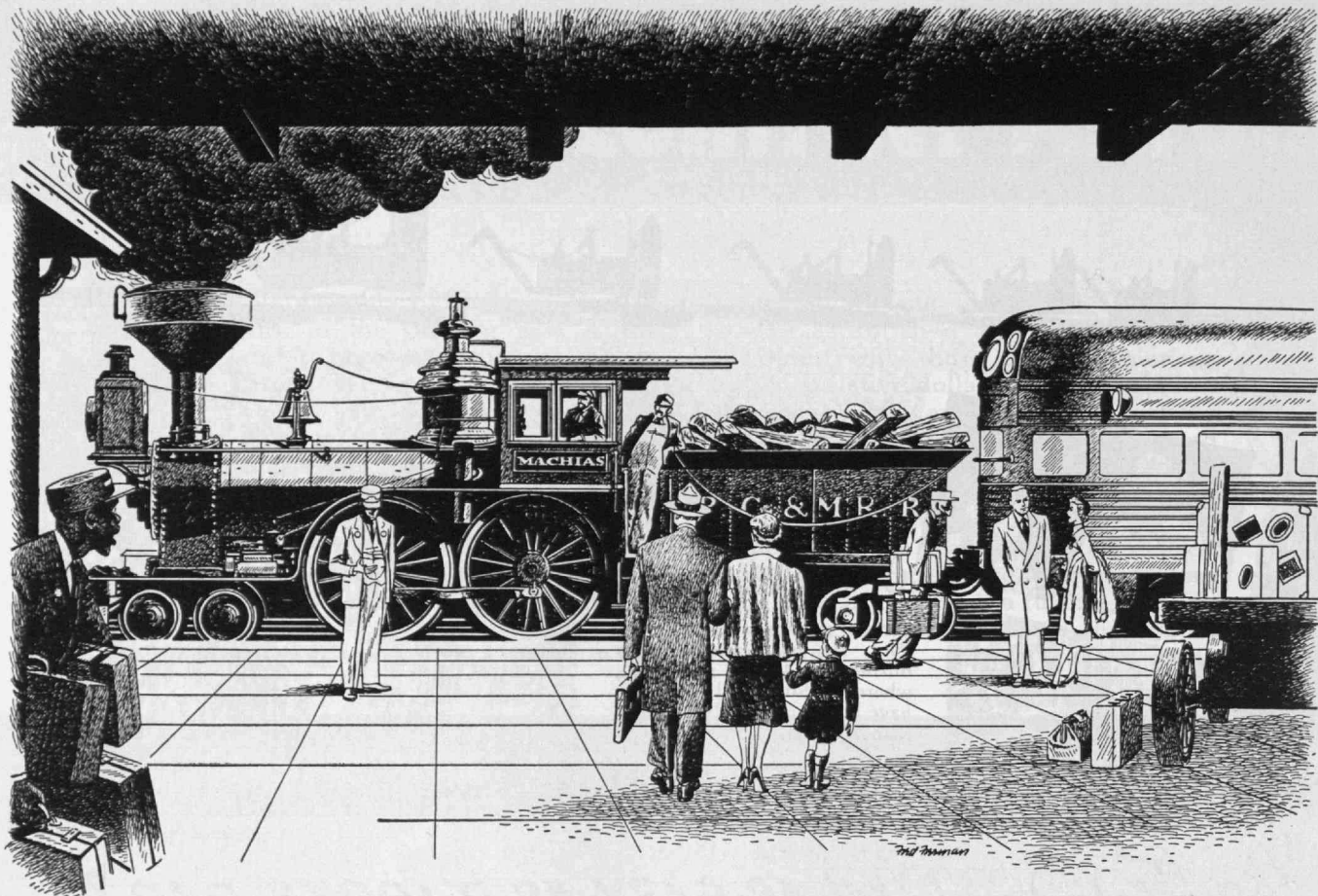
TRADE MARK REG. U. S. PAT. OFF.

Making better products to make other products better



NORTON COMPANY, WORCESTER 6, MASSACHUSETTS

BEHR-MANNING, TROY, N. Y. IS A DIVISION OF NORTON COMPANY



What's wrong with this picture?

Obviously, the old "iron horse" and the modern streamliner don't belong on the same track. But you'll find many parallel situations today in industry... plants where modern production facilities are served by boilers almost as obsolete as old "Machias".

Technological progress often makes equipment obsolete long before it wears out. And this has been particularly true of the progress made in boiler design during the past 25 years. Modern steam generating units can so substantially reduce fuel, operating and maintenance costs that in many instances a replacement installation affords an investment opportunity that an economy-minded management wouldn't want to overlook.

Combustion Engineering—Superheater, Inc. has long been a leader in the development of steam generating and fuel burning equipment. The experience incidental to this development is at your disposal to help you and your consultants determine whether modernization can be applied profitably to your plant. A letter from you will bring an experienced C-E sales engineer to your office.

B-355

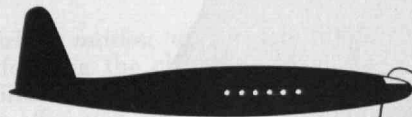


**COMBUSTION ENGINEERING—
SUPERHEATER, INC.**

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

ALL TYPES OF STEAM GENERATING, FUEL BURNING AND RELATED EQUIPMENT

you'll travel better because of carbon black



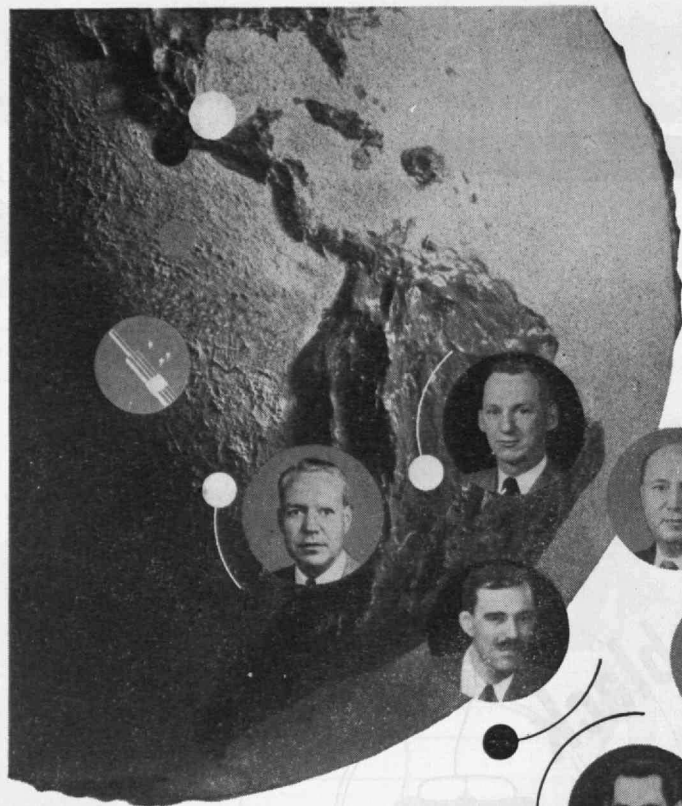
Whether on land, in the air, or on water, transportation units depend on carbon black-rubber compounds for much of their quiet, comfortable and smooth operation.

Cabot Carbon Blacks make rubber tougher, yet springier. They make the rubber cushions of train and plane more resilient and relaxing; they give rubber compounds their long service life as shock absorbers and vibration dampeners. Cabot carbon black applications increase rubber abrasion resistance and product life in automobile motors, bodies and tires; in airplane motor mountings and floor coverings; in the pedestal liners of train trucks; and in propeller shaft bearings of ocean liners.

Whatever the mode of travel, however far you go, the trip will be better, because of carbon black. Cabot Carbon Black keeps rubber compounder, vehicle operator, and passenger equally happy.

GODFREY L. CABOT, INC.

77 FRANKLIN STREET, BOSTON 10, MASSACHUSETTS



in process design

these Lummus men bring you a world of experience

The Lummus man

responsible for the process design of your project has had more than fifteen years' experience in design, development and operation. He holds a master's degree in Chemical Engineering from a leading university or engineering college. His background includes refinery operation, maintenance and construction along with process design engineering.

Noteworthy projects that have widened his Lummus' experience are: the 2 world's largest synthetic rubber projects; the 13 complete aviation gasoline plants; over 60 solvent refining lube oil plants, and the many thermal cracking, polyforming and coking units.

His background is worldwide. Currently, he is at work in England, Egypt, France, Sweden, Venezuela, and across the United States. He serves on technical committees, lectures on refinery and chemical engineering practice, and writes technical papers. His viewpoint is broad and practical.

The Lummus Process Design Engineer—trained to work with

molecules—is equally well equipped to work with people. You will find him keenly aware of the gains that come from co-operative interchange of information with your own technical staff. He contributes in large degree to the satisfactory relations that exist between industry and Lummus.

THE LUMMUS COMPANY
420 Lexington Avenue, New York 17, N. Y.

LUMMUS

CHICAGO—600 South Michigan Avenue, Chicago 5, Ill.
HOUSTON—Mellie Esperson Bldg., Houston 2, Texas
The Lummus Company, Ltd., 525 Oxford St., London, W-1, England
Société Française des Techniques Lummus
39 Rue Cambon, Paris 1er, France
Compañía Anónima Venezolana Lummus—Edificio "Las Gradillas"
Esquina Las Gradillas, Caracas, Venezuela



What GENERAL ELECTRIC People Are Saying

W. L. FLEISCHMANN

Apparatus Department

TURBINE ALLOYS: The application of alloy steels to high-temperature steam-turbine service relies on the accumulation of metallurgical data which are unique in some respects. Where it can usually be assumed that the properties of metals do not change, under the influence of high temperature continuous changes take place. Where ordinarily it is correct to assume that plastic deformation will occur only beyond a certain stress, at high temperatures even low loads cause constantly increasing deformation.

With a long-life turbine, the data obtained from laboratory tests are then in reality only guides which, by extrapolation, become the bases on which the alloy is formulated and the design stress set.

To allow extrapolation, one constantly has to search for indications which may be small in even a year-long test—but may become important in the long life of a turbine. Constant refinements in the test procedures and the theories of the mechanical and thermal behavior of metals under the influence of stress and temperature are, therefore, necessary to enable us to design the heat-resistant steels.

We are confident that this approach is sound, based upon the year-by-year improvement in thermal efficiency of turbines to 37 per cent, caused in no small measure by the average yearly advance of 12 F in steam temperature maintained for 40 years. These metallurgical developments benefit all of us, since, with the modern efficient turbines, the power industry is able to deliver electricity at low cost to the consumer.

*Louisiana Engineering Society,
New Orleans,
January 13, 1950*



F. B. SCHNEIDER

Apparatus Department

CYCLONE DUST COLLECTORS: Independent of the design, all "cyclones," from the ancient centrifugal dust collectors to the modern vortex collector, suffer from a common handicap. This disadvantage is the large pressure drop caused by the

whirling motion of the gas while performing the cleaning action. In addition, with higher dust-separation efficiency, the pressure drop increases, so that the highly efficient vortex collectors have a pressure drop which is a multiple of the pressure drop of the common centrifugal separators. Since the latter are mostly used in connection with the cleaning of large volumes of air, the power consumed is considerable, and even small reductions of the pressure will provide substantial savings of horsepower.

The pressure drop across cyclone dust collectors can be reduced by relatively simple means. A recovery of 75 percent can be attained on centrifugal separators by employing gradually enlarged tangential inlets together with cylindrical hoods at the outlet. The pressure drop across vortex collectors can be reduced by approximately 80 percent by using diverging inlets and recovery drums at the outlet which discharge clean air into ducts. If the vortex collectors discharge the air into the atmosphere, the pressure drop across them can be decreased by 34 percent with two concentric cones at the outlets, and by amounts up to 80 percent when these cones are combined with a diverging tangential inlet.

*General Electric Review,
February, 1950.*



R. O. FEHR

General Engineering & Consulting Laboratory

SOUND PLEASANTNESS: The pleasantness or unpleasantness of a sound determines if an equipment is acceptable from the acoustical standpoint. Sound intensity meters now being used in industry do not give this answer . . . they tell as much about the pleasantness of a noise as a light meter tells about the quality of a painting.

Instruments based on new concepts must be built. We believe that

the ultimate will not be achieved in the near future, but we are well on the way to obtaining practical instruments which are far superior to anything we had several years ago.

*American Society for Metals,
Terre Haute, Ind.,
January 9, 1950*



K. H. KINGDON

Knolls Atomic Power Laboratory

ATOMIC-ENERGY TRAINING: About 60,000 people are now engaged in the new and potentially large field of atomic-energy work. At present these people are employed directly by the Atomic Energy Commission and its contractors. If the production of power from atomic energy becomes an economic reality, such production will doubtless be participated in by private industry and will demand additional technical people.

Most of the technical people to be used in the atomic-power effort in the future will need training in special fields of current engineering, and in physical, chemical, and metallurgical skills. Perhaps ten percent will need the new fission and neutron knowledge of modern nuclear physics. Some of this they will be able to get in universities, but security restrictions and the probably continued general unavailability of nuclear reactors and other expensive and restricted equipment and materials will mean that much of the specialized technical knowledge will have to be obtained on the job.

A considerably larger group than the ten percent mentioned, and consisting of chemists, chemical engineers, and health physicists, will need practical knowledge of how to handle radioactive materials in bulk. Here, again, this knowledge will probably have to be obtained on the job.

*General Electric Review,
February, 1950.*

You can put your confidence in—

GENERAL  ELECTRIC

MORE NET PRODUCTION

because the No. 000
Plain Milling
Machine
has
AUTOMATIC
CYCLE



Here's a machine that's compact and simple; yet can do a big job in almost any plant. In milling small parts, it can handle a wide variety of materials efficiently, using cutters down to the smallest end mills.

Automatic cycle operation reduces operator fatigue to a minimum and assures a steady, constantly-high production rate. In addition,

this important production feature prolongs cutter life, provides more uniform finish and consistent accuracy. Table reverses within an accuracy of .002".

The No. 000 has a wide range of spindle speeds and feed rates, with cutting feed lengths from $\frac{3}{8}$ " to $5\frac{1}{2}$ ". Write for bulletin. Brown & Sharpe Mfg. Co., Providence 1, R. I., U. S. A.

BROWN & SHARPE 



UNDIVIDED ATTENTION

Diefendorf gives every order expert, undivided attention at every step of manufacture—whether the order is large or small—whether for a complete new installation or for a few replacement gears.

Diefendorf is equipped to make gears of all types and all sizes—all materials. Specification orders only.

**DIEFENDORF GEAR
CORPORATION**

920 Belden Avenue
Syracuse 1, New York

DIEFENDORF 
G E A R S

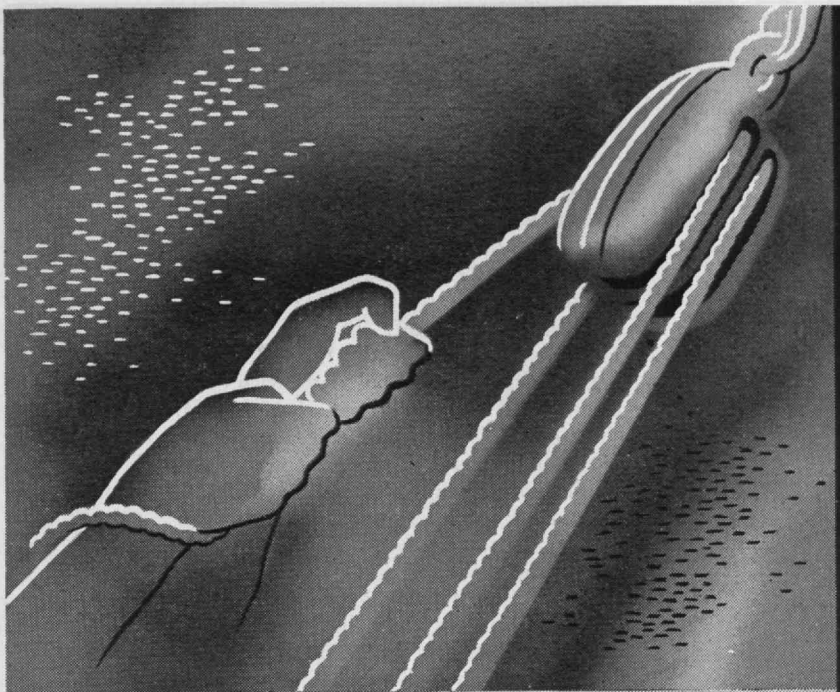
THE TABULAR VIEW

Education. — An examination of certain phases of the relatively greater progress which has been made in the physical sciences, as contrasted to human, social, or ethical studies, appears in "American Education in a Quandary" by C. C. FURNAS, Part I of which appears (page 304) in this issue. Since receiving his B.S. degree from Purdue University in 1922 and a Ph.D. from the University of Michigan in 1926, Dr. Furnas has been associated with the United States Bureau of Mines, Yale University, and, during World War II, the National Defense Research Committee. In 1943 he was appointed by Curtiss-Wright Corporation to take charge of its research laboratory. When this laboratory was given to Cornell University in 1946, Dr. Furnas became, and has since been, director of the Cornell Aeronautical Laboratory.

Earthenware. — The age-old, traditional methods, in which manual operations and trade secrets played a major role in pottery, are giving way to newer modes of operation employing mass production, and new uses for ceramics are being developed as the hand of science touches this field. Recent progress in ceramics is reviewed in "Science Enters the Ceramics Art" page 307) by FREDERICK H. NORTON, '18, Professor of Ceramics in the Department of Metallurgy at the Institute. The significant role which M.I.T. is playing in this transition is apparent as Professor Norton's graduate students assume responsible positions in the ceramics field. Professor Norton received his Sc.D. degree from Alfred University in 1949. He is author of two books — *The Creep of Steel at High Temperatures*, and *Refractories*.

Enemy. — Under present conditions, the effort of scientists is required in the preservation of industrial society just as much as it is necessary in warfare. Civilian defense against air invasion is the topic of "Air Defense" (page 312) by ERVIN H. BRAMHALL, '27, with pen-and-ink drawings by H. G. Miller. After receiving his A.B. degree from Stanford University in 1926, Dr. Bramhall obtained an S.M. from M.I.T. in 1928, and in 1931 his Ph.D. from Cambridge University in England. He was a research associate in the M.I.T. Department of Physics during 1932-1933, then served as physicist with the Byrd Antarctic Expedition in 1933-1934. During World War II he was operations analyst, Pacific Theater, and is now in the Operations Research Office, Johns Hopkins University.

Encounter. — In "Athletics at M.I.T." (page 315) WARREN BERG traces the development of physical recreation at Technology and outlines the scope of its present activities. Mr. Berg received the degree of B.S. in engineering from Harvard University in 1944, but found athletics more enticing than engineering. He coached Freshman basketball at Harvard for three years before coming to M.I.T. as varsity baseball coach and assistant basketball coach. In addition, he is publicity adviser for the Athletic Staff.



When sail trimming is required

No business can stay healthy without an occasional overhaul of its production set-up—particularly when a seller's market begins to quiver.

Molybdenum steels may be just what the doctor ordered to reduce production costs, and still maintain the product's reputation for consistent performance.

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

CLIMAX FURNISHES AUTHORITATIVE ENGINEERING DATA ON MOLYBDENUM APPLICATIONS

Climax Molybdenum Company
500 Fifth Avenue • New York City

MOLY

® c4

MARTIN-HUBBARD CORPORATION

Engineering Consultants

Computers — Servomechanisms

Instrumentation for Nuclear Research

Applied ultrasonic research and development

Design and construction of scientific instruments
to your performance specifications

Complete engineering of original or unique electrical
and mechanical devices and machinery

Technical reports

11 BEACON STREET

BOSTON 8, MASSACHUSETTS, U. S. A.

Telephone: CApitol 7-6990

"Cable Address MARHUB-Boston

BUSY MEN

appreciate the relief afforded by making use of the Agency Service of our Trust Department. By this means they can free themselves from the necessity of watching investment trends as well as from the tedious details of cutting coupons, collecting other income, making up income tax returns, etc. At the same time, if they so desire, they may retain complete control over decisions as to changes in their holdings. This plan enables the business man to direct his faculties entirely to the development of his own enterprises.

Our Booklet "Agency Service" sent on request



State Street Trust Company

Boston, Massachusetts

MAIN OFFICE

Corner STATE and CONGRESS STREETS

Union Trust Office: 24 FEDERAL STREET

Copley Square Office: 581 BOYLSTON STREET

Massachusetts Avenue Office

MASSACHUSETTS AVENUE AND BOYLSTON STREET

Safe Deposit Vaults at All Offices

Member

FEDERAL RESERVE SYSTEM

FEDERAL DEPOSIT INSURANCE CORPORATION

MAIL RETURNS

Real Co-operation

FROM W. O. WEBBER:

I have read Dr. Montagu's article "Living in an Atom-Bomb World" which appeared in the February, 1950, issue of The Review. I agree.

But he skipped. Concerning our need for active world co-operation, he said: "If we are to evaluate the answer in terms of what we do, rather than what we say, the logical conclusion is that we do wish to see the end of ourselves, and of our children and their children." And again: "There is only one thing that can save us, and that is to stop talking about brotherhood and to live it." And again: "Congress is waiting for the people to tell it what to do. If we raise our voices, we shall be heard."

After these very sound suggestions, he recommends re-constitution of the United Nations. Instead, I suggest . . . (1) making an existing French university into an international university, with the permission of course of the existing university. Invite adult students from industry, government, and other university staffs. (2) Plan and activate international research on projects of mutual concern: on medicine, for example, in heart disease and the common cold; on engineering, for example, in road building and design; on languages. Have our national professional societies suggest research programs. (3) . . . scheduling sports events where sportsmanship will be encouraged. (4) Promote an internationally participated-in play to tour the world . . .

Only after co-operation is real will the advantages of peace be apparent — when co-operation can cease only at an obvious disadvantage to all concerned.
Baytown, Texas

The Gloucester Fisherman

FROM SIDNEY L. KAYE, '30:

My sincere thanks for printing The Gloucester Fisherman in the March, 1950, issue of The Review. I notice that on the Contents Page you have captioned the picture as being a photograph. Of course it is a pen-and-ink drawing, and you may wish to correct this in a future issue.
Boston, Mass.

Canada Dry Ginger Ale, Inc.
We have erected two large
plants for this company



What Canada Dry said of our Service

"I want to congratulate you on completing both of these projects at a cost less than the original estimates. This is a real accomplishment, particularly in view of the fact that you built these plants when it was difficult to get materials promptly."

W. J. BARNEY CORPORATION

FOUNDED 1917

101 PARK AVENUE, NEW YORK

INDUSTRIAL CONSTRUCTION

Alfred T. Glassett, '20, Vice President