

TECHNOLOGY

REVIEW *March* 1954



greater sensitivity . . .

longer wear in partial rotation

ACTUAL SIZE MPB No. 2A

SIGMA RELAY 6X

HERE'S **HOW** SIGMA INSTRUMENTS, INC.
builds better relays
with MPB bearings!

OPERATING CONDITIONS — consistently accurate response to equal amounts of current . . . partial shaft rotation . . . strength to withstand severe shock, vibration, plus extreme temperature changes. CRITICAL — wear, low starting torque, trouble-free operation of bearings supporting armature shaft, RESOLVED—by use of 2 MPB No. 2A's, miniature angular contact bearings.

MPB bearings, installed in the redesigned Sigma 6X electrical relay increased sensitivity and consistency of performance. Test sample models completed many million cycles of partial rotation with no variations in performance . . . no bearing wear . . . no adjustment necessary.

“Designing in” MPB bearings can help you get greater accuracy, longer life in your precision mechanisms. For the most complete design information ever offered on miniature ball bearings request, on your letterhead, MPB catalog TR54c

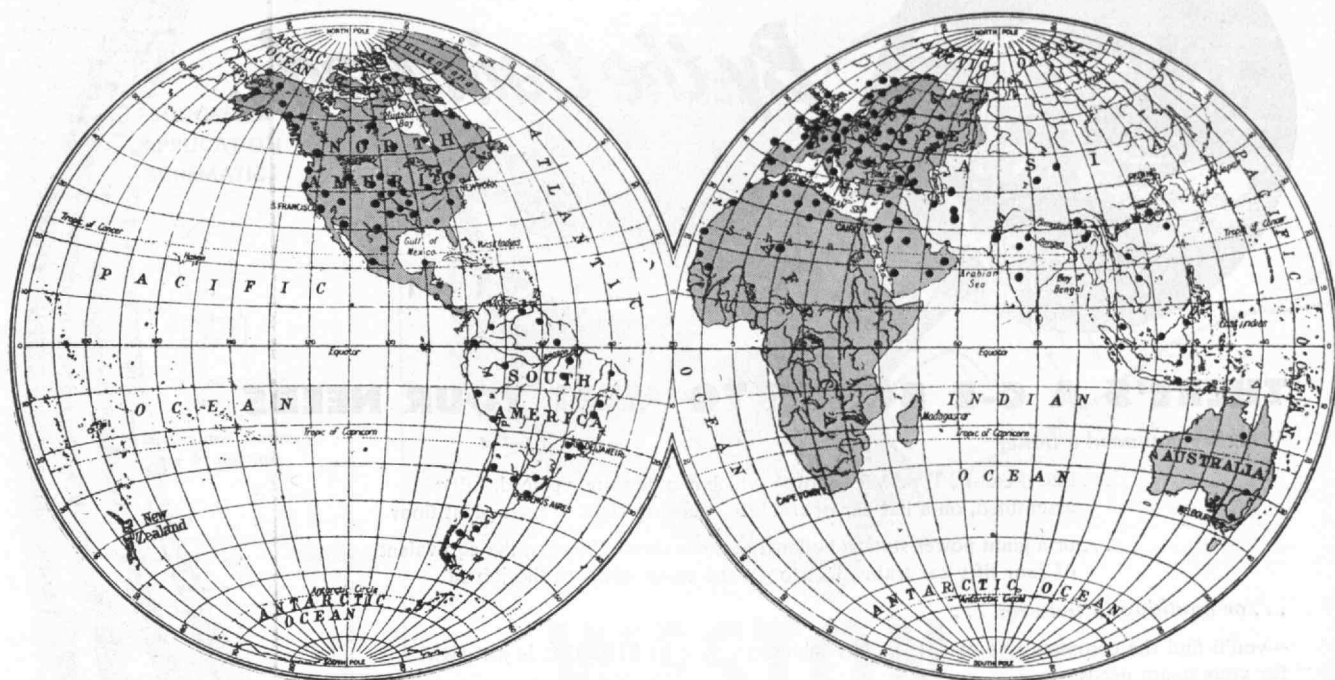
Miniature Precision Bearings, Inc.



Keene, New Hampshire

LUMMUS

designs, engineers and constructs petroleum and chemical plants
scope: world-wide



No petroleum or chemical area in the free world is more than a few hours flying time from a Lummus office.

From principal cities on five continents, Lummus staffs have designed, engineered and directed the construction of over 700 major plants and installations.

Think of Lummus when planning your next project — location anywhere.

THE LUMMUS COMPANY,

385 Madison Avenue, New York 17, New York

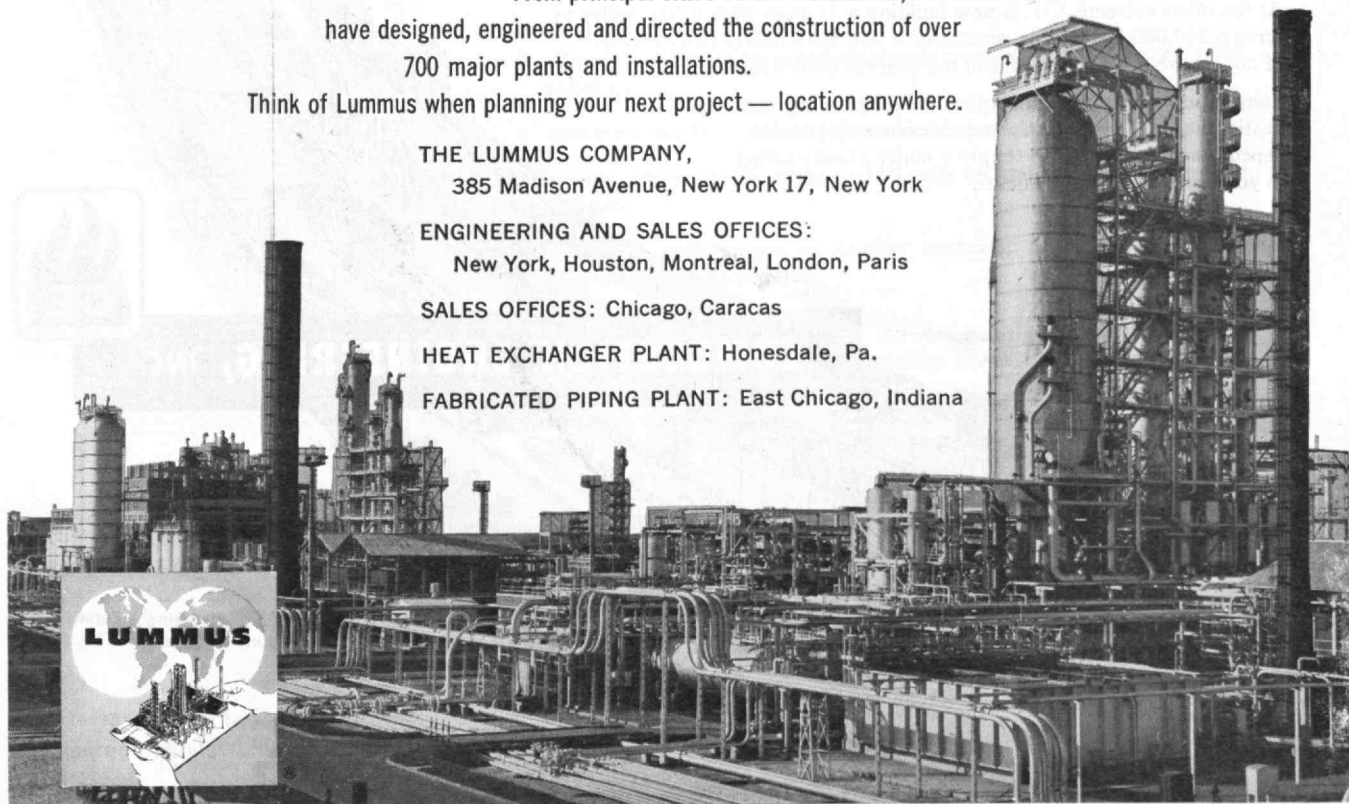
ENGINEERING AND SALES OFFICES:

New York, Houston, Montreal, London, Paris

SALES OFFICES: Chicago, Caracas

HEAT EXCHANGER PLANT: Honesdale, Pa.

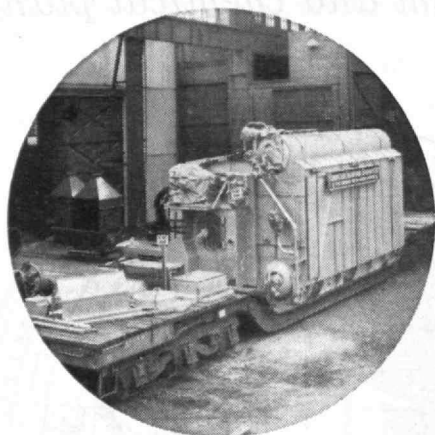
FABRICATED PIPING PLANT: East Chicago, Indiana



ILLUSTRATED: 40,000 B/D petroleum refinery at Dunkirk, France, designed, engineered and constructed by Lummus for the Société Générale des Huiles de Pétrole

THE TECHNOLOGY REVIEW, March, 1954, Vol. LVI, No. 5. 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.

By the car load...



By the train load...

THERE'S A C-E BOILER TO MEET YOUR NEEDS

Whether you need a boiler

- ... like the C-E, Type VP (above) which can be snugly placed, fully assembled, on a flat car or truck for delivery right to your plant floor
- ... or a giant power station boiler that takes about 200 cars, the equivalent of four fifty-car trains, just to get the components to the job site

... or anything in between ...

— you'll find the complete line of C-E boilers includes a type and size that is just right for your steam needs.

The Type VP, for example, is ideally suited to the requirements of small plants. Available in capacities as low as 4,000 pounds of steam per hour, the VP comes to you fully assembled and ready for operation as soon as the necessary service connections are made.

At the other extreme, C-E is now building a 15-story high utility boiler to serve a 260,000 kw turbine generator. It will burn nearly two carloads of coal an hour — enough to heat ten average homes for a year.

Long experience in building boilers for *all* power, process and heating needs is just one of many reasons why you can depend on Combustion to supply a boiler exactly suited to your particular requirements.



COMBUSTION ENGINEERING, INC.

Combustion Engineering Building
200 Madison Avenue, New York 16, N. Y.

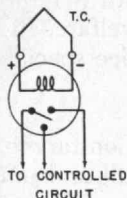
*all types of steam generating,
fuel burning and related equipment*

Wherever

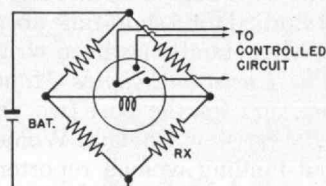
reliable

sensitive control is required

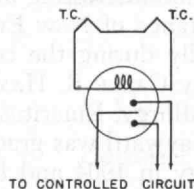
**SUGGESTED
APPLICATION
SCHEMATICS**



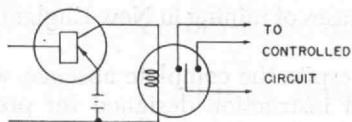
**Temperature Control
and Protection**



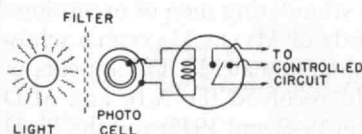
Resistance Selection



**Temperature
Differential
Control**



**Transistor
Selection**



**Low Level Light
Detection and
Control**



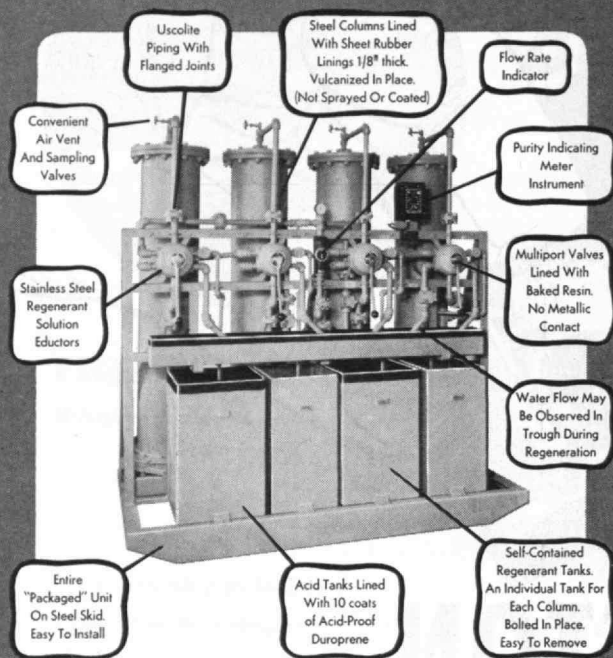
WESTON Sensitrol Relays

- eliminate need for involved electronic circuits, and auxiliary power supplies.
- operate directly on values low as $\frac{1}{2}$ microampere, or $\frac{1}{4}$ millivolt.
- handle substantial wattage at 110 volts on non-chattering magnetic contacts.
- available with single or double contacts, fixed or adjustable, manual or solenoid reset.

Designing, or redesigning, for greater simplicity, compactness or reliability, investigate these widely used, ultrasensitive relays. So sensitive that they operate direct on the output of thermocouples, resistance bulbs or photocells, they enable designers to cut manufacturing and maintenance costs by dispensing with involved circuits and many troublesome components. To help you adapt these rugged relays to your problems, engineering assistance is freely offered. Write . . . WESTON Electrical Instrument Corporation, 614 Frelinghuysen Avenue, Newark 5, New Jersey.

WESTON *Instruments*

BARNSTEAD WATER DEMINERALIZERS *are* BUILT BETTER



Barnstead Water Demineralizers are *engineered* to give you long, trouble-free service . . . they are scientifically designed to produce Pure Water — and water of *standardized, controlled* quality for as low as 5c per 1000 gallons.

Now, Barnstead Demineralizers can be used profitably in countless operations and in every industry that is plagued by the uncertainties of tap water. Demineralized Water, by Barnstead, insures *better* products, *consistent* results, *fewer* rejects, and *lower* operating costs.

Whether you need 5 or 1000 gallons per hour, Barnstead engineers will be glad to help you find the right answers for *your* specific Pure Water problem. This service is yours for the asking.

FIRST IN PURE WATER SINCE 1878

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Gentlemen: Please, send me the complete Pure Water story on Barnstead Demineralizers.

Name Firm.....

Address

City State.....

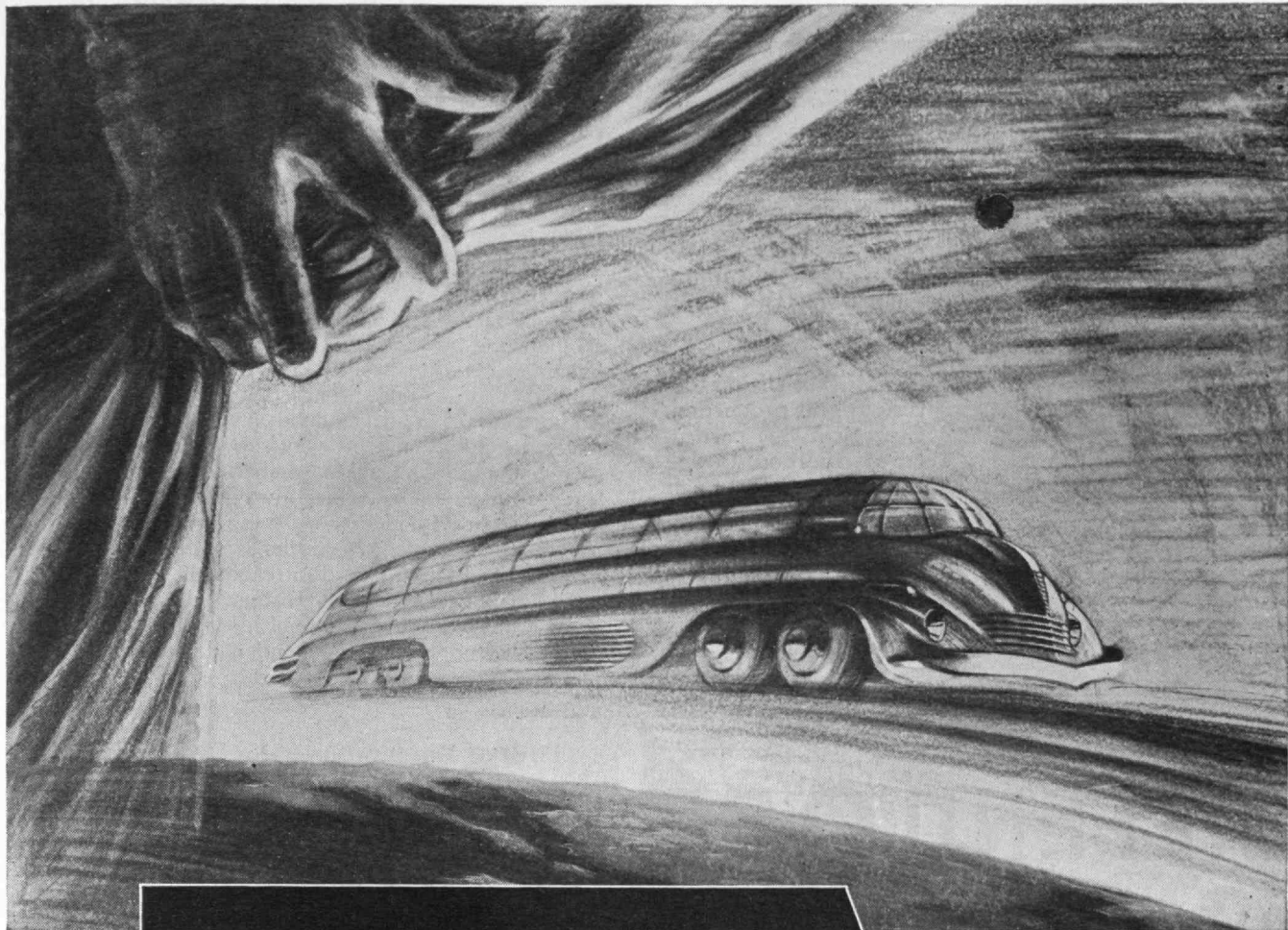
THE TABULAR VIEW

Educational Feedback. — When the Graduate School of Brandeis University was inaugurated on January 14, Technology's President, JAMES R. KILLIAN, Jr., '26, delivered the major address. The Review is happy to bring to its readers (page 239) this address, "The University and the Community." In speaking of the new relationship which universities have developed with agriculture, industry, management, and labor, Dr. Killian presented a study of the ways in which the intellectual and physical facilities of the modern university generate new firms, products, and services whose wealth is returned to their community for the common welfare. In the process, the university is able to produce special benefits for its own community.

Physical, Quizzical Prof. — Contrary to the views of many, physics need not be dull and uninspiring. In fact, MARY HANDY, staff writer of *The Christian Science Monitor*, finds it can be fabulous, at least when taught by Hans Mueller, M.I.T. Professor of Physics. Miss Handy received the A.B. degree from Principia College, Elmhurst, Ill., and studied for a short time abroad at Oxford and at Paris. Miss Handy has been writing about education for *The Christian Science Monitor* for the past three years, and for the past two years she was awarded a medal by New England Women's Press Association as outstanding woman reporter in New England. Her story is reprinted (page 243) as it appeared in the December 23 issue of the *Monitor*.

New England Mining. — Some interesting and unusual sidelights on the importance of New England minerals and mining, especially during the colonial times, are given (page 245) by CARLE R. HAYWARD, '04, Professor of Process Metallurgy, Emeritus. Born in Yankton, S. D., Professor Hayward was graduated from the Course in Metallurgy in 1904 and for the next two years was instructor in science at Bellows Free Academy in Fairfax, Vt. He has been associated with the Department of Metallurgy since 1906, and has written extensively on process metallurgy, especially of copper, lead, and zinc. His article records a surprising number of cases of mining in New England.

Tech's Medics. — Despite the complete absence, at M.I.T., of a course of instruction designed for pre-medical students, Technology Alumni who take up medicine have made an impressive record. The reason for this gratifying state of affairs may be the fact that "The Institute abounds with excellent courses in many fields, taught by stimulating men of exceptional ability" to use the words of MYLES MAXFIELD whose article, "Premedical Education at M.I.T.," appears on page 251. Dr. Maxfield received the A.B. and M.D. degrees from Harvard in 1942 and 1945, and the Ph.D. degree in biophysics from M.I.T. in 1950. He was a research associate in biophysics at M.I.T. 1950-1952, and since 1952 has been assistant professor of biophysics, and member of M.I.T.'s medical staff.



BEYOND THE HORIZON....

Coming developments in transport—still beyond the horizon—will depend very largely upon the new alloys the metallurgists can supply the engineer. The laws of thermodynamics dictate higher temperatures for greater efficiency in engines and, as the addition of Molybdenum to many alloys allows the use of higher temperatures, it will certainly be used more and more in the engines of the future.

Climax furnishes authoritative engineering data on Molybdenum applications.

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SILENT HOIST FORK LIFTTRUK available in 5, 7½, 10, 15 ton capacities, are noted for their superb mobility, long continuous service, and low upkeep.

Made by the manufacturers of KRANE KAR Mobile Swing Boom Crane and LIFT-O-KRANE Combination Boom Crane and Fork Lift, with separate power winch for Load Line.

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Pioneers of Heavy Duty Materials Handling Equipment

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more lifting power—
more carrying power—
means bigger loads,
heavier loads, higher
stacking, fewer trips.
Faster in-loading and
out-loading at factory,
mill or storage yard,
more efficient interplant
flow means great savings
in time and manpower.

SEND FOR BULLETIN 77

MAIL RETURNS

Comments on the January Issue

FROM RAYMOND E. HANSON:

The urge to congratulate you upon the current issue of The Technology Review is too strong to resist. Dr. Carmichael's article, "Psychology, the Machine and Society" should bring forth acclaim. It seems to me the most enlightening, erudite exposition of the fallacy of certain dangerous, present-day trends that I have seen to date. And I believe you have done a great service to your readers in publishing this very superior essay of a type so much needed today to combat tendencies which a study of history reveals have always led to disaster, disillusion, and destruction.

The article on decorative tiles is both interesting and informative. I look forward to reading Part II.

"Yellow Fever's Role in History," dramatizing as it does, a rather unknown phase of history, makes a worthy companion for these above-mentioned articles.

Boston, Mass.

Tiles of England and the United States

FROM E. A. LANE:

Your article on tiles is most interesting, and very well presented; I am glad to see that you have included several illustrations of pieces in the Museum. No doubt you will be following it up with a further article, and I look forward to this—especially if it contains information about tiles made in the United States. We over here have almost no knowledge of the latter.

In England there are two or three collectors of English delftware who have, during the last five years, made fairly intensive studies in the subject of English tiles, attempting to attribute them to the different centres of Lambeth, Liverpool and Bristol. Prewar information now seems somewhat out of date; but the present experts do not always agree with each other!

Victoria and Albert Museum
South Kensington, London, S.W. 7



**13 contracts in the
past 32 years for
ALEX SMITH, Inc.**

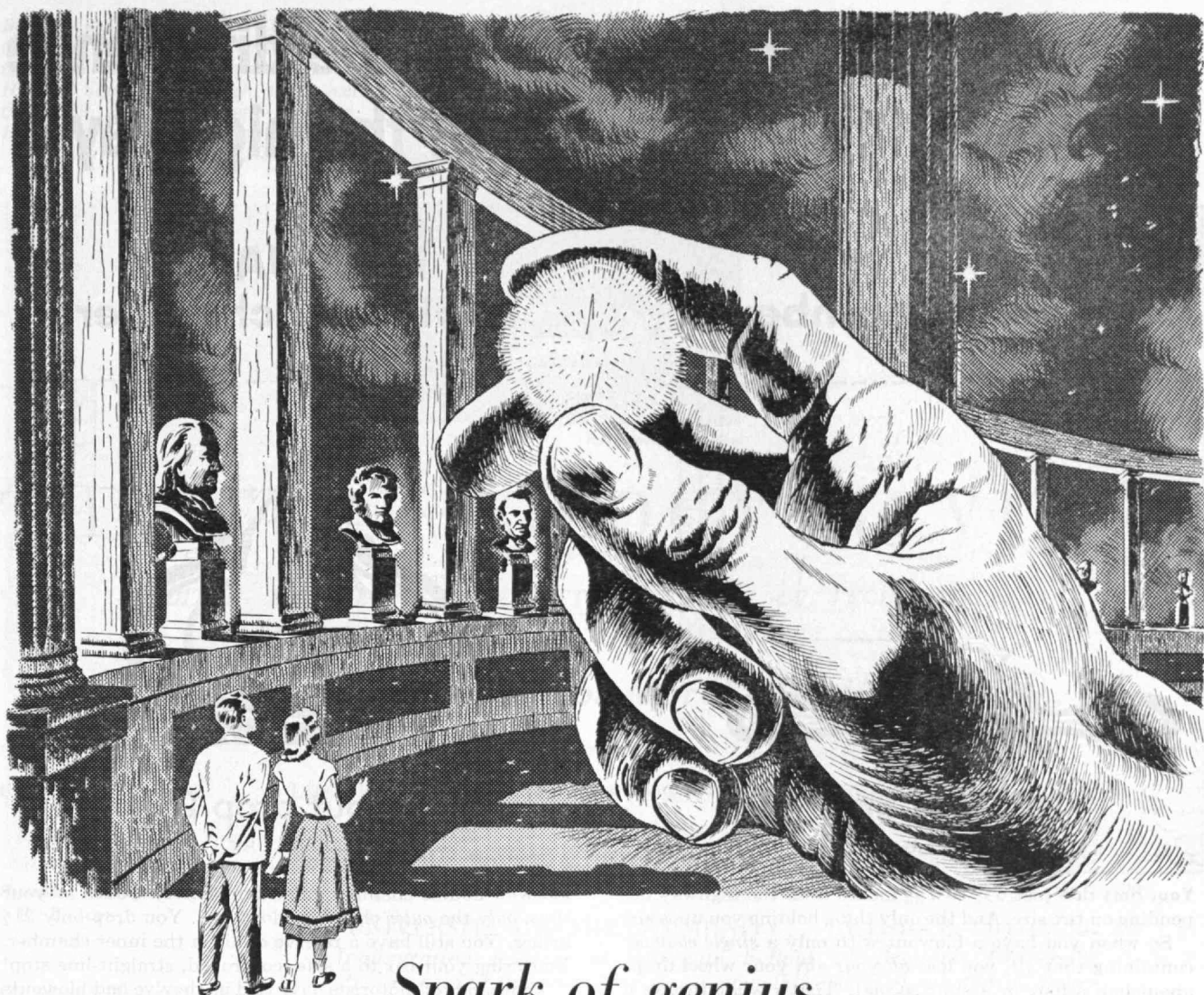
W. J. BARNEY CORPORATION

Founded 1917

101 Park Avenue, New York

INDUSTRIAL CONSTRUCTION

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Spark of genius

"The great objective...

is to open the avenue of scientific knowledge to youth"*

Franklin...Fulton...Lincoln...Bell...Willard—geniuses? Yes, in the sense that they had the creative spark and the ability, courage, and leadership to see and speed to us inventions and ideas beyond the horizon of their day.

FUTURE IN TODAY'S YOUTH—The scientists, statesmen, inventors, and humanitarians of tomorrow are among our youth of today. The future depends upon our discovering, fostering and using their creative genius.

OPPORTUNITIES ABOUND for all of us "to direct the genius and resources of our country to useful improvements, to the sciences, the arts, education..."*

SCHOLARSHIPS AND FELLOWSHIPS—To help meet this need, Union Carbide has established undergraduate scholarship and fellowship programs in a number of

liberal arts colleges and technical institutions to assist deserving students who are interested in business and scientific careers.

THE PEOPLE OF UCC hope you, too, will do everything in your power to discover and encourage the creative talent of our American youth. In them is our greatest assurance of an ever better tomorrow.

TO LEARN MORE about the Union Carbide scholarships and fellowships, their purposes, and the colleges and universities in which they have been established, write for booklet *A*.

*from Tablets in the Hall of Fame, New York University.

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UCC's Trade-marked Products include

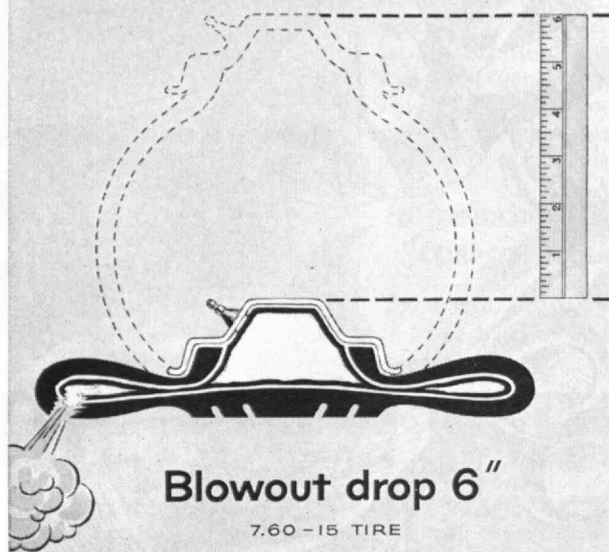
LINDE Oxygen
PREST-O-LITE Acetylene
SYNTHETIC ORGANIC CHEMICALS

ELECTROMET Alloys and Metals HAYNES STELLITE Alloys PRESTONE Anti-Freeze
PYROFAX Gas DYNEL Textile Fibers UNION Carbide
EVEREADY Flashlights and Batteries

NATIONAL Carbons
LINDE Silicones
BAKELITE, VINYLITE, and KRENE Plastics

These few inches can mean the difference between life and death on the highway!

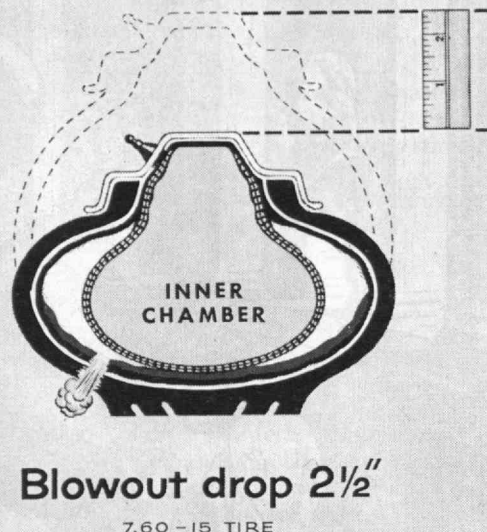
Single Chamber



Your rims ride just $5\frac{1}{2}$ to $7\frac{1}{2}$ inches from the highway depending on tire size. And the only thing holding you up is air!

So when you have a blowout with only a *single chamber* containing that air, you lose *all* your air, your wheel drops about half a foot in a split second! That's what throws a car out of control, into danger!

LIFEGUARD double air chamber



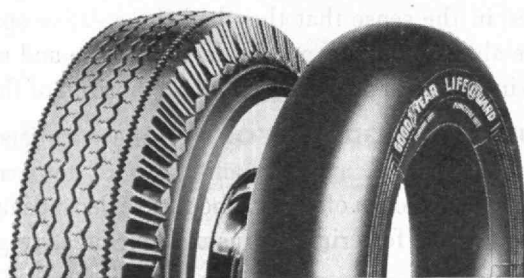
But with double-chamber LifeGuard Safety Tubes in your tires, *only* the *outer* chamber blows out. You drop only $2\frac{1}{2}$ inches. You still have a reserve of air in the inner chamber. You bring your car to a safe, controlled, straight-line stop!

Thousands of motorists have told us they've had blowouts without even realizing it with LifeGuard Safety Tubes!

Only the double-chamber LifeGuard principle protects against blowout accidents! LifeGuards fit any tires!

No matter what make tires you now own, you can make them safe against blowout accidents *and* guard against the inconvenience of punctures with New LifeGuard Safety Tubes. And you can use them in three or more sets of tires for 100,000 miles or more of blowout-safe, puncture-safe driving.

So you actually save 20% to 43% per wheel over other types of blowout and puncture protection. See your Goodyear dealer soon! Goodyear, Akron 16, Ohio.



America needs better, safer roads. Let's bring them up to PAR.

NEW LIFEGUARD SAFETY TUBES

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