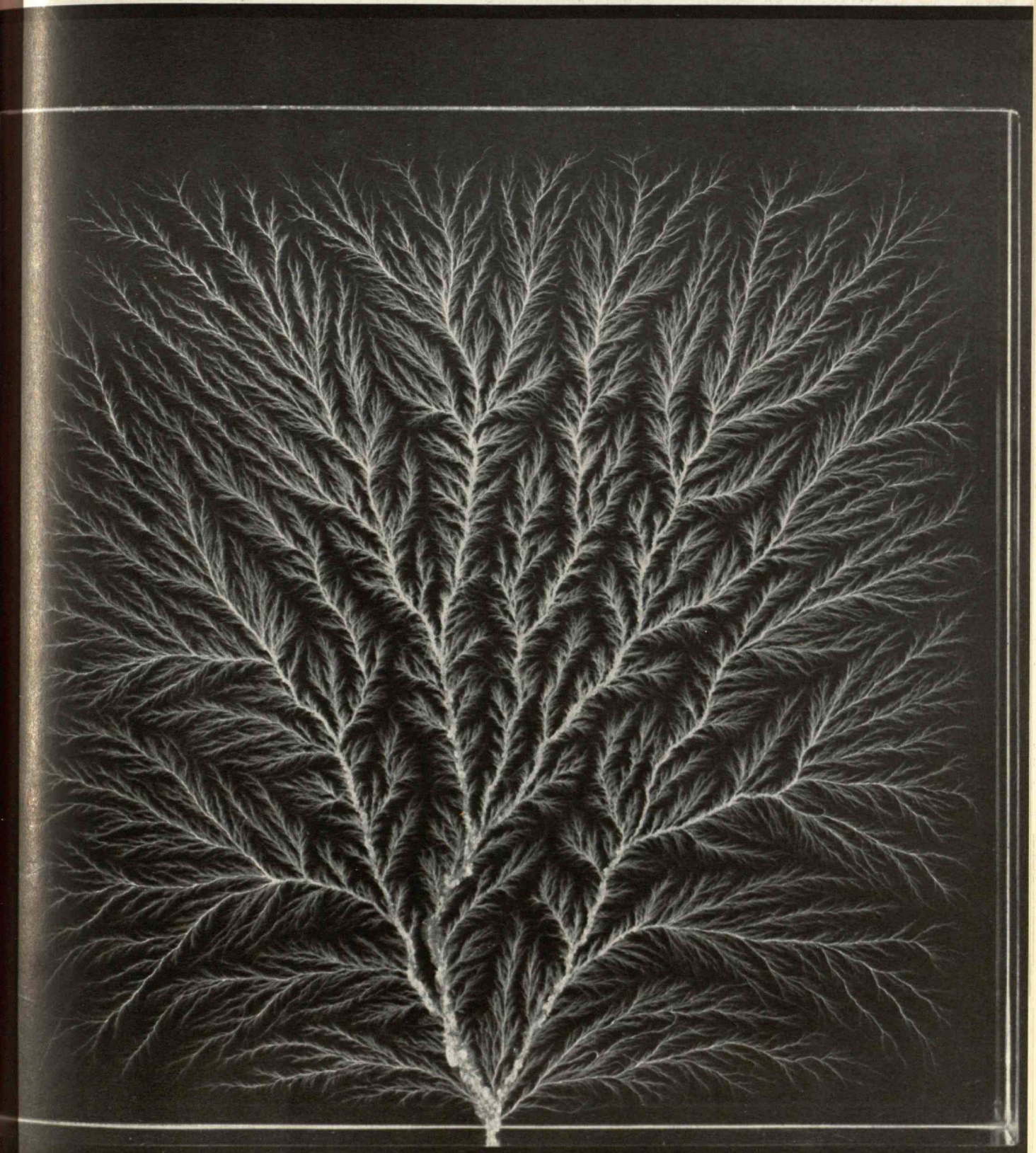
TECHNOLOGY REVIEW

December 1952



NO. FOUR OF A SERIES

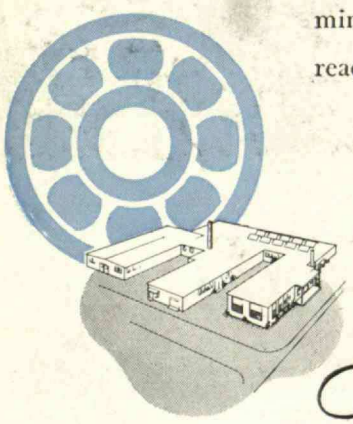
Pioneers in Precision

Bendix Aviation Corporation engineers pioneered Radar and originated the concept of its use in intercepting and tracking a moving object. Many remote control, remote indicating systems, and other highly specialized devices on the security regulations list, are current products of this Pioneer in Precision.

Miniature Precision Bearings incorporated, are the originators and pioneer manufacturers of precision ball bearings in miniature sizes. The original concept of practically every new development in this field has been by **MPB**; the pioneer in designs and dimensions now being internationally standardized.

More than 120 types and sizes are regularly supplied in 10 design series, ranging from 1/10″ o.d. **MPB** ball bearings are fully ground, lapped, honed and/or burnished to ABEC 5 tolerances or better. Exclusive, exacting finish and inspection details assure highest quality bearings—quality which has prompted more than a million applications. **MPB** ball bearings can be supplied in specific clearances and graded within the tolerance, for prompt assembly and maximum service.

MPB ball bearings are indicated for many unusual applications involving miniaturization. Complete information and detailed engineering assistance is readily available. Write for catalog–survey sheet TR 12



Demand for our product has necessitated an extensive expansion in facilities—has prompted a continued processes development. We will soon be in a position to offer greater services to you.

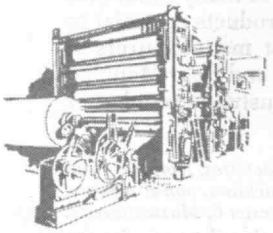
Miniature *precision* Bearings
Incorporated Keene, New Hampshire

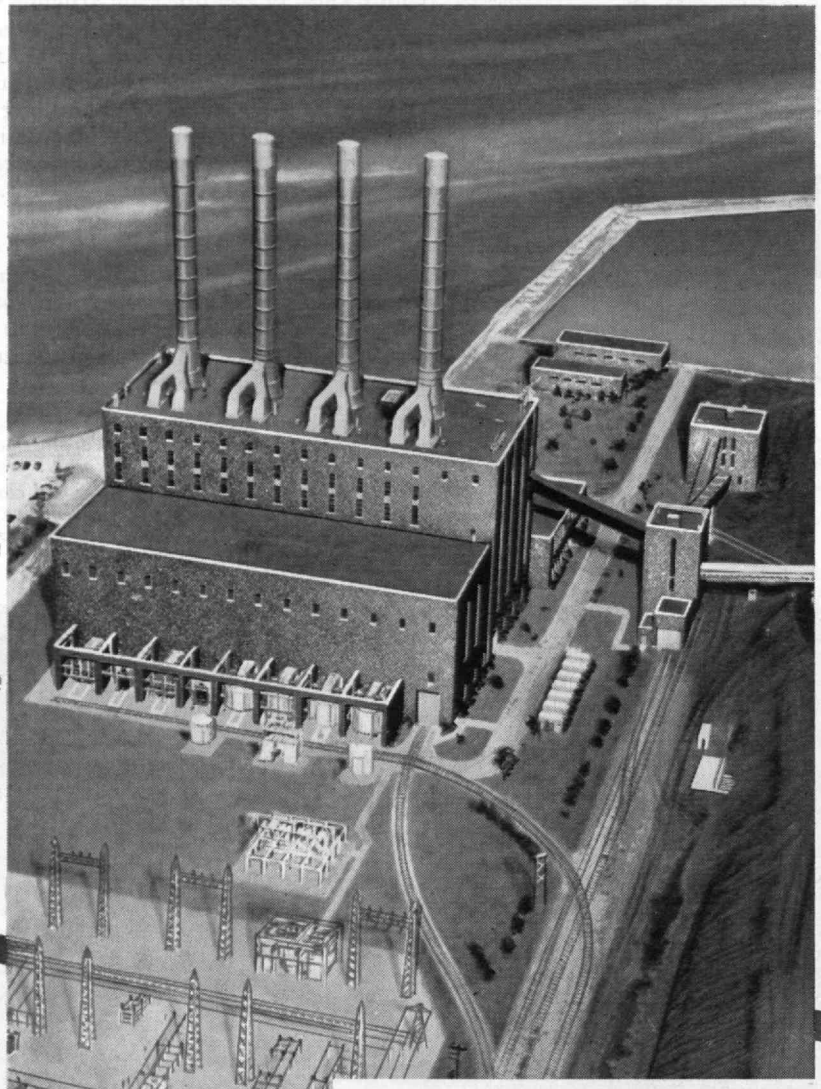
MPB

"Pioneer Precisionists to the World's foremost Instrument Manufacturers"

save
space
weight
friction

THE TECHNOLOGY REVIEW, December, 1952, Vol. LV, No. 2. 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.





NIAGARA FALLS

BUFFALO

DUNKIRK

SCHENECTADY

ALBANY

OSWEGO STEAM STATION

as enlarged by the fourth 80,000 kw unit. One of 88 steam and hydro electric plants of Niagara-Mohawk Power Corporation.

PRIVATE ENTERPRISE *In Action...*

The Niagara-Mohawk Power Corporation has 7000 circuit-miles of transmission lines and 85,000 conductor-miles of distribution lines in upper New York state. Its entire system has a rated capacity of 2,186,451 kw with 600,000 kw now under construction.

A current example of their enterprise is the Oswego Steam station, designed by their engineering department with construction supervision by Stone & Webster Engineering Corporation.

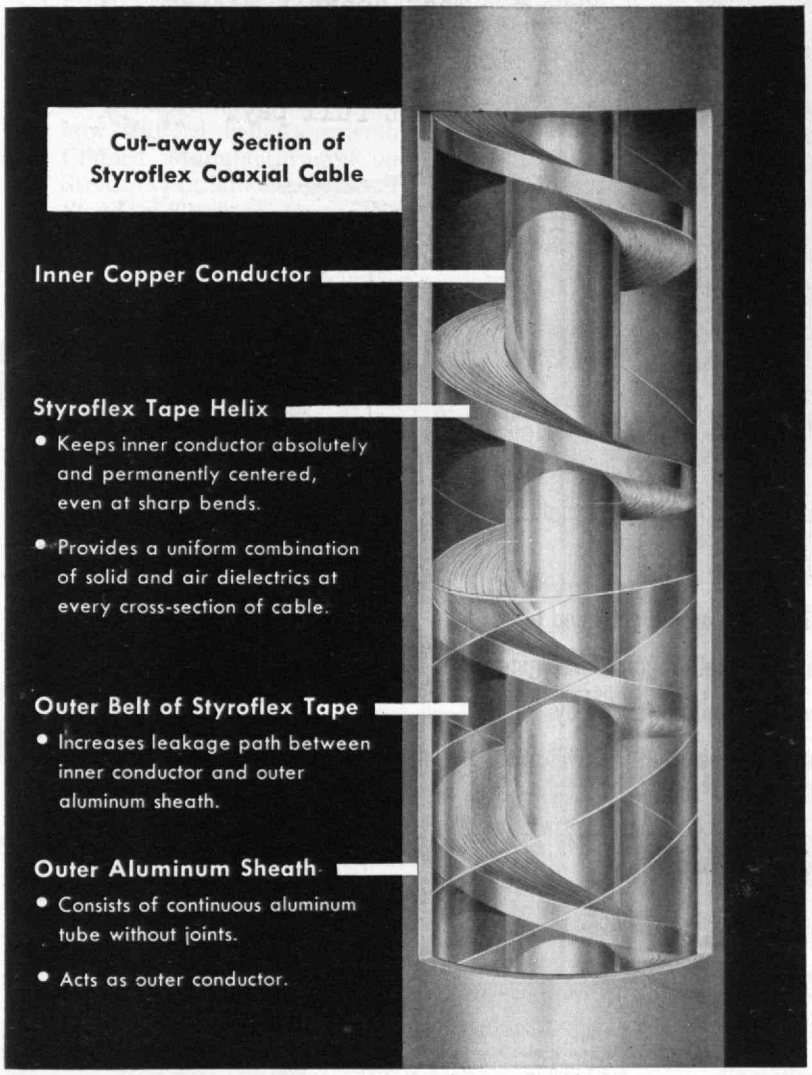
The benefits of competent business management of a privately-owned utility are again demonstrated by the Niagara-Mohawk system.

STONE & WEBSTER ENGINEERING CORPORATION

A SUBSIDIARY *of* STONE & WEBSTER, INC.

NEW *Styroflex* COAXIAL CABLE

Made by Phelps Dodge in semi-flexible 1000-ft. lengths without joints



Phelps Dodge Copper Products Corporation's new semi-flexible, aluminum sheathed Styroflex cable is specially designed to meet the need for a high-power, efficient low-loss coaxial cable in the AM, FM, TV and microwave fields. The cable reduces reflections—which cause ghost images in television and distortions in communications—to an absolute minimum.

It was developed by Felten & Guilleaume Carlswerk, of Cologne, Germany, which has made a great many successful installations of the cable throughout Europe. Phelps Dodge is currently making the cable for sale in the United States in standard American sizes and impedances under a working agreement with the Cologne firm. The cable is manufactured in continuous 1000-foot lengths, without joints, and shipped on reels.

Outstanding feature of the cable is the use of insulating Styroflex film to form a helix. This helix, built up of hundreds of precision-wound Styroflex tapes, firmly supports and centers the inner conductor coaxially in an aluminum sheath at all times, assuring retention of excellent electrical properties. Essential flexibility of the Styroflex tape is obtained by special manufacturing techniques.

PHELPS DODGE COPPER PRODUCTS CORPORATION

40 WALL STREET, NEW YORK 5, N. Y.

ME...
an AIRCRAFT engineer?

But I haven't majored in aeronautical engineering

That doesn't matter. Lockheed can train you... at full pay!

It's your aptitude, your knowledge of engineering principles, your degree in engineering that count.

Those—plus the opportunity Lockheed is offering you—are all you need for a career as an aircraft engineer. In Lockheed's special program for engineering graduates, you may go back to school, or you may convert to aircraft work by doing—on-the-job training. But whichever it is, you receive full pay while learning.

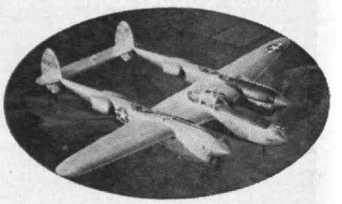
But Lockheed offers you more than a career. It offers you a new life, in an area where living conditions are beyond compare. Outdoor living prevails the year-'round. Mountains, beaches are an hour from Lockheed.

See your Placement Officer today for the details on Lockheed's Aircraft Training Program for engineers, as well as the better living conditions in Southern California.

If your Placement Officer is out of the illustrated brochures describing living and working conditions at Lockheed, write M. V. Mattson, Employment Manager

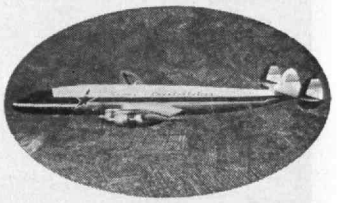
Lockheed Aircraft Corporation
Burbank, California

This Plane made History



The P-38 Lightning – first 400 mile per hour fighter-interceptor, the "fork-tailed Devil" that helped win World War II.

This Plane is making History



The Super Constellation – larger, faster, more powerful; the plane that bridges the gap between modern air transport and commercial jet transport.

This Plane will make History

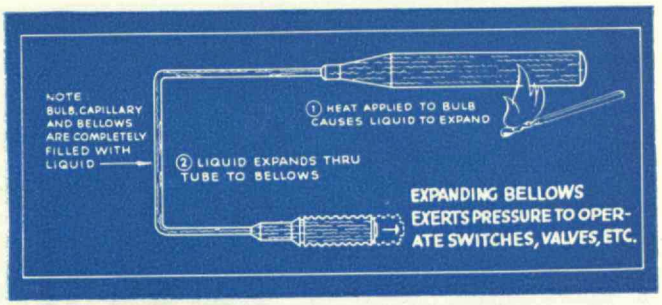
The jet of the future – the plane you will help create – belongs here.

This plane – which exists only in the brain of an engineer like yourself – is one reason there's a better future for you at Lockheed. For Lockheed will always need engineers with ideas, engineers with imagination, engineers who build the planes that make history.

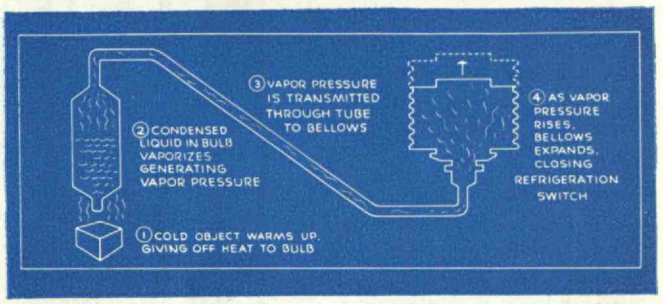
8 ways

Clifford bellows help you solve design problems

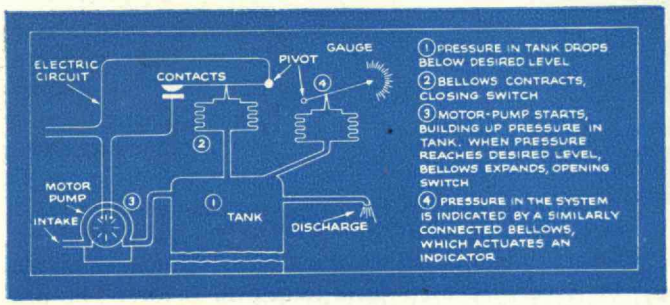
Perhaps you, too, can benefit from flexible, leakproof, metallic Clifford bellows assemblies. For individual requirements in assembling bellows to fittings, Clifford is equipped to use new molecular bonding processes, resistance welding and heli-arc-welding. Write direct for complete details on how Clifford bellows assemblies can help you. Clifford Manufacturing Company, 142 Grove Street, Waltham 54, Massachusetts. *Division of Standard-Thomson Corporation.* Sales offices in New York; Detroit; Chicago; Los Angeles; Waltham, Mass.



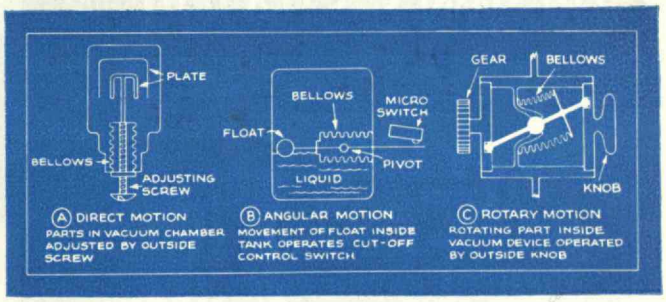
Controlling wide range of temperature with one adjusting device. Liquid filled Clifford bellows assembly permits one knob to adjust temperatures by remote control from 200° to as high as 650° or 700°. Common applications: domestic and industrial oven controls.



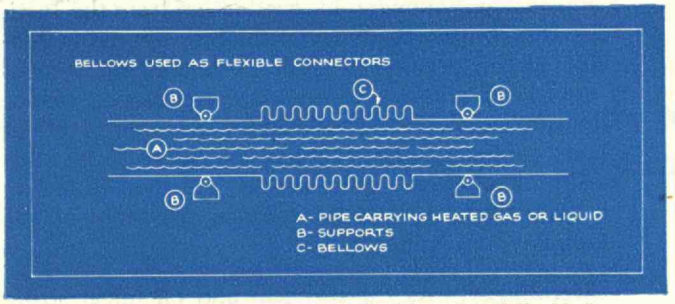
Controlling narrow range temperatures. Vapor pressure Clifford bellows system forms temperature control unit used in thermostatic devices. This device can be designed to be "fail safe" to prevent overheating even if bellows fails to function. Adjustment commonly limited to lower range than liquid filled system. Applications: refrigerator controls, auto thermostats, tank regulators.



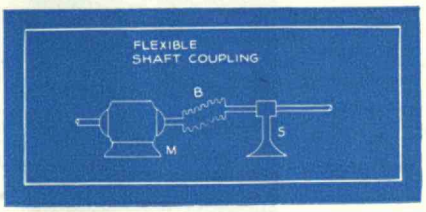
Controlling and/or indicating pressure. Clifford Hydron bellows assemblies provide close control and accurate indication in pressure systems. Pressure, exactly equal throughout the system, is immediately exerted on bellows which respond without lag. Common applications: instruments to control temperature, pressure, flow rates, liquid level.



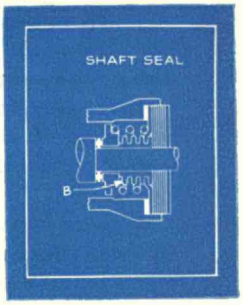
Transmitting motion from one medium to another while maintaining a hermetic seal. The inherent flexibility of leakproof Clifford Hydron bellows permits extension, retraction, rotary motion or combinations of these to be applied while hermetically sealing unit's internal elements. (A) shows direct motion, (B) shows angular motion, (C) shows rotary motion.



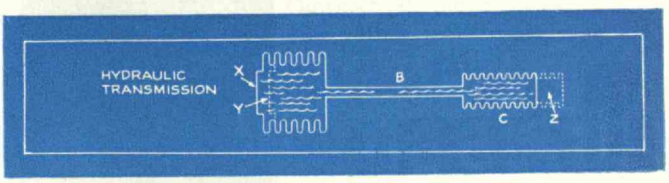
Allowing for thermal expansion in flexible piping. Clifford bellows compensate for dimensional changes caused by heated gas or liquid that would expand and buckle ordinary piping . . . without imposing excessive strain on supports. Sidewise movement of supports with respect to each other is also permitted.



Operating as flexible shaft coupling. Clifford bellows assemblies provide constant velocity torque and compensate for misalignment.



Operating as shaft seal. Clifford bellows seal in gases and liquids and prevent leakage around rotating shafts.



Operating in hydraulic transmission systems. Clifford bellows approximate frictionless lever-action for transmitting force in remote control systems.

HYDRON
METAL BELLOWS
CLIFFORD
MANUFACTURING CO.
WALTHAM, MASS.
DIVISION OF STANDARD-THOMSON CORP.
Feather Weight
HEAT EXCHANGERS

38.2.32

THE TABULAR VIEW

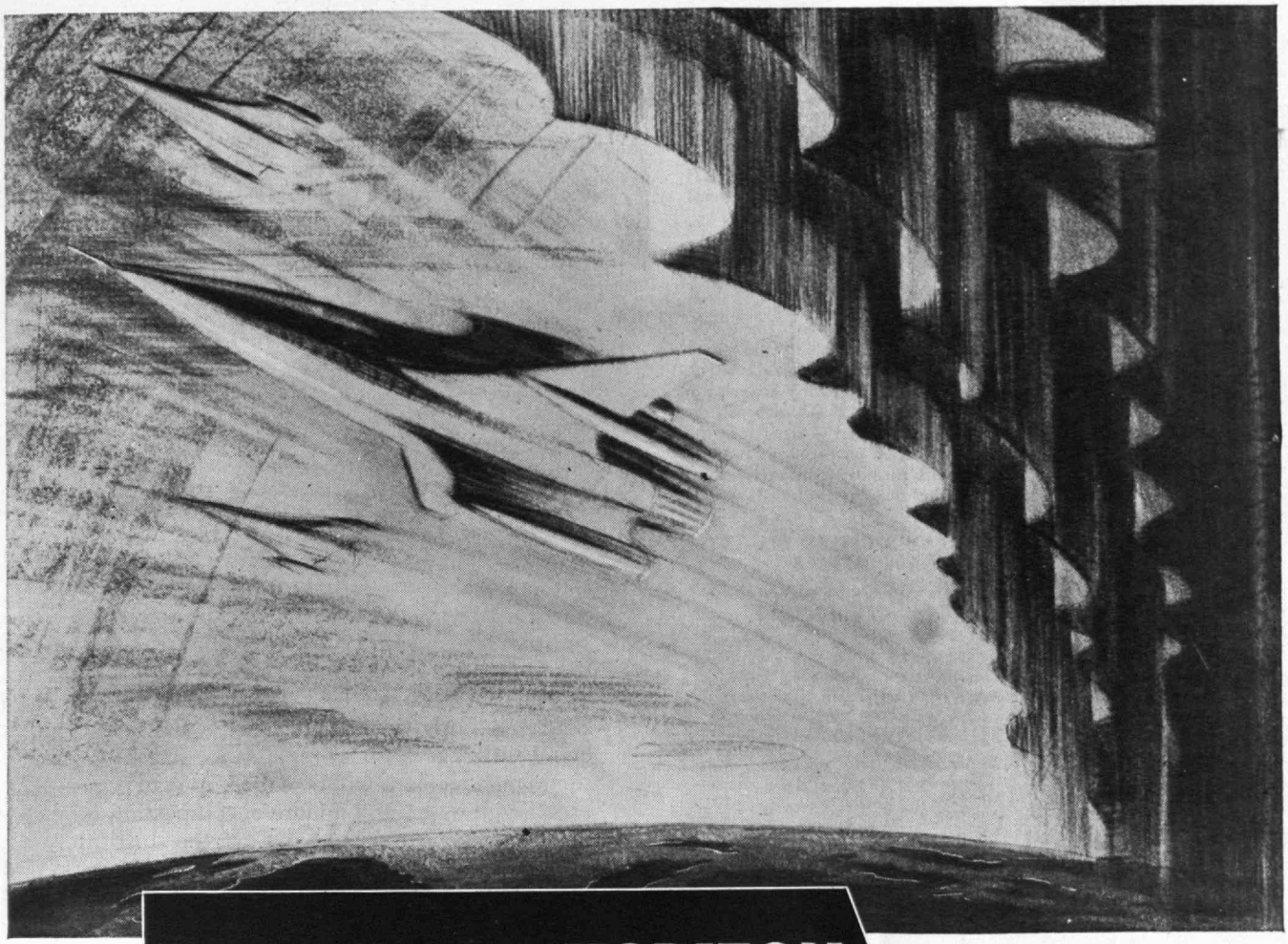
Metals.—For a long period of time it has been The Review's practice to devote the July issue (the last of each volume of The Review) to the exhilarating and uplifting events of Alumni Day and commencement activities. Thus the Metals Processing Laboratory failed to receive the editorial attention which the splendid new equipment and buildings warrant, although pages 500 and 501 of the July issue did report the dedication of the laboratory as a news event. A description of the new facilities appears in three articles in this issue of The Review.

First of the trio of articles (page 89) describes the laboratory building, and illustrates the assignment of space to the Department of Mechanical Engineering and the Department of Metallurgy for their respective teaching and research programs at the undergraduate and graduate levels. In the preparation of this article, the editor acknowledges with thanks the wholehearted co-operation of Robert M. Kimball, '33, and Philip A. Stoddard, '40, Director, and Assistant to the Director, respectively, of the Institute's Division of Business Administration; and the assistance of John J. Rowlands, Director of News Service, editorial associate, and perennial friend of The Review.

Machines.—When it left Boylston Street to take up new roots in Cambridge, one of the show places of the new Technology was the Machine Tool Laboratory of the Department of Mechanical Engineering. With the dedication of the new Metals Processing Laboratory, this portion of the activity of Course II, along with research in metal cutting, has been transferred to the new and greatly improved quarters, where emphasis on the science of metal working can be developed more fully than ever before. The program of teaching and research which the Department of Mechanical Engineering now conducts in the Metals Processing Laboratory is described (page 93) by PRESCOTT A. SMITH, Associate Professor of Mechanical Engineering. Following his graduation from the Institute, from which he received the S.B. degree in Mechanical Engineering in 1935, Professor Smith spent a decade in industry as equipment engineer, manufacturing engineer, methods engineer, superintendent plant engineer, and factory manager. With this wealth of practical experience, he returned to M.I.T. in 1945 where he has since been in charge of the Machine Tool Laboratory.

Metallurgy.—As the physical and chemical structure of metals and alloys is more thoroughly understood, significant advances in the casting, welding, and working of metals, as well as in powder metallurgy, occur. The program of the Department of Metallurgy in the new Metals Processing Laboratory is described (page 97) by PROFESSOR HOWARD F. TAYLOR, 2-46, of the Department of Metallurgy. Professor Taylor received the B.S. and M.S. degrees in 1936 and 1938, respectively, from Michigan State College,

(*Concluded on page 76*)



BEYOND THE HORIZON....

Progress in reaction-motor propulsion becomes possible only as the metallurgist supplies new alloys to withstand the stresses, temperatures, and corrosive attack developed by new rocket fuels.

Molybdenum additions to many alloys are known to improve strength at high temperatures. For this reason Molybdenum will be used more and more in the reaction motors of the future.

Climax furnishes authoritative engineering data on Molybdenum applications.

Climax Molybdenum Company

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MOLY

THE TABULAR VIEW

(*Concluded from page 74*)

and spent a year at that institution in a teaching capacity. From 1937 to 1945 he was engaged in welding and steel-casting research at the Naval Research Laboratory in Washington, D.C. Upon the conclusion of World War II, he came to the Institute as associate professor of mechanical metallurgy, and was promoted to a full professorship in 1952. Professor Taylor is the author of numerous articles in his professional field, and in this issue of The Review takes opportunity to outline the educational philosophy underlying undergraduate and graduate teaching in mechanical metallurgy at M.I.T. In 1945 Professor Taylor won the Simpson Medal, American Foundrymen's Society.

Management.—In the political campaign just ended as these words are written, both sides made a strong plea for new leadership, for high moral courage, for spiritual strength to play the leading role. A plea of the same type is made by EDWARD MCSWEENEY, '23, in his article (page 101) entitled "The Managerial Evolution." Mr. McSweeney holds that the stage is being set for a business renaissance in which professional management will be called upon to play a more exacting, a wiser, and a more encompassing role than ever before. After studying at the Institute, Mr. McSweeney was engaged in newspaper work and was subsequently affiliated with Conde Nast Publications and Butterick Publications for several years before founding his own company of management consultants, Edward McSweeney Associates, in 1933. At present he is treasurer and director of the Perkins-Goodwin Company, and a director of MacFadden Publications, Inc., Southland Paper Mills, Inc., National Heart Committee, Castleton China, Inc., and the Philadelphia Publications Corporation. He has been lecturer at New York and Northwestern Universities, and is a member of the Advisory Committee of the School of Industrial Management at M.I.T.