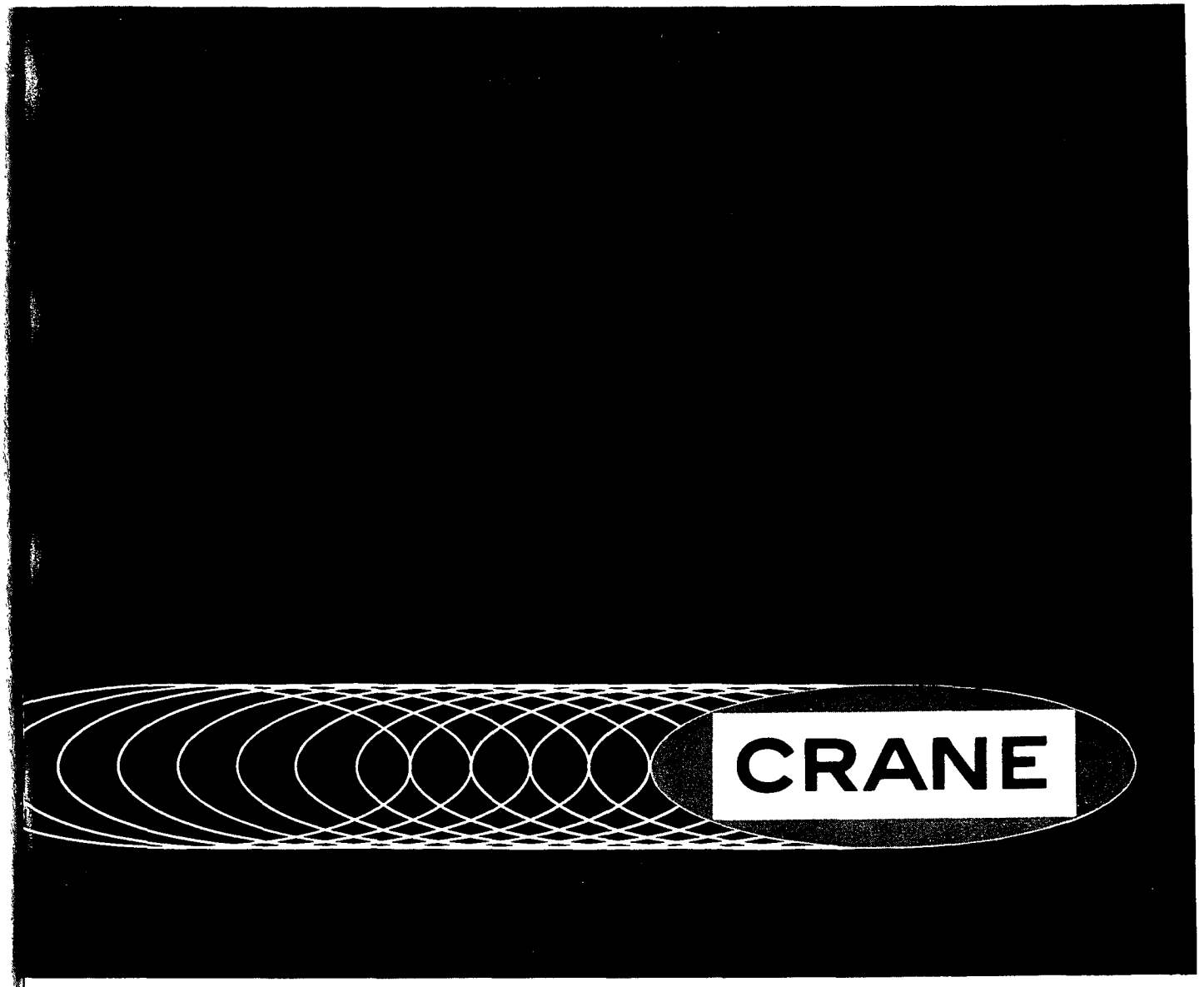
CRANE

PLAINTIFF'S EXHIBIT

WK CC 5004

VALVES • FITTINGS

CATALOG NO. 60



VALVES • FITTINGS

CRANE CO.
Industrial Piping Products
4100 SOUTH KEDZIE AVE.
CHICAGO 32, ILLINOIS

TERMS AND CONDITIONS

WARRANTY

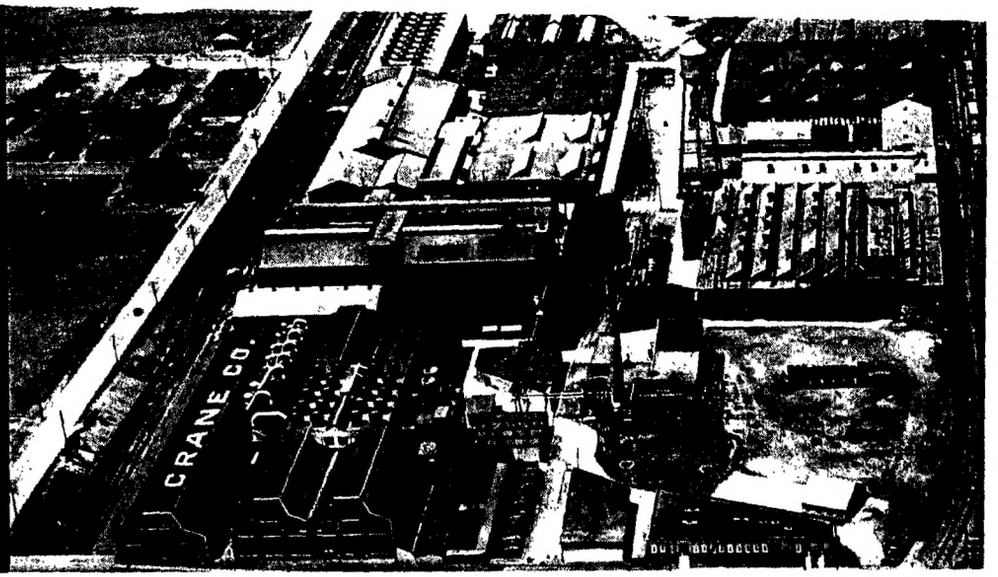
If, within one year following date of delivery, any material manufactured by or trade-marked for Crane Co. proves defective, Buyer shall not return it unless requested to do so but shall immediately notify Crane Co. stating full particulars in support of his claim and, if faulty workmanship or material is involved, Crane Co. will adjust the matter fairly and promptly. Under no circumstances shall Crane Co. be obligated to allow claims for consequential damages or for any labor or other expenses incurred by reason of the use or sale of any defective material, the sole measure of damages being the price received therefor by Crane Co.

ILLUSTRATIONS

Catalog illustrations are actual representations of a certain size of each line of products but do not necessarily represent all sizes in all details. The designs shown are subject to change without notice.

WEIGHTS

Weights shown in catalogs, price schedules, quotations, acknowledgements or orders are approximate and are in no sense guaranteed. They represent the average weight of Crane Co. products as made from patterns in use at time weights were compiled.



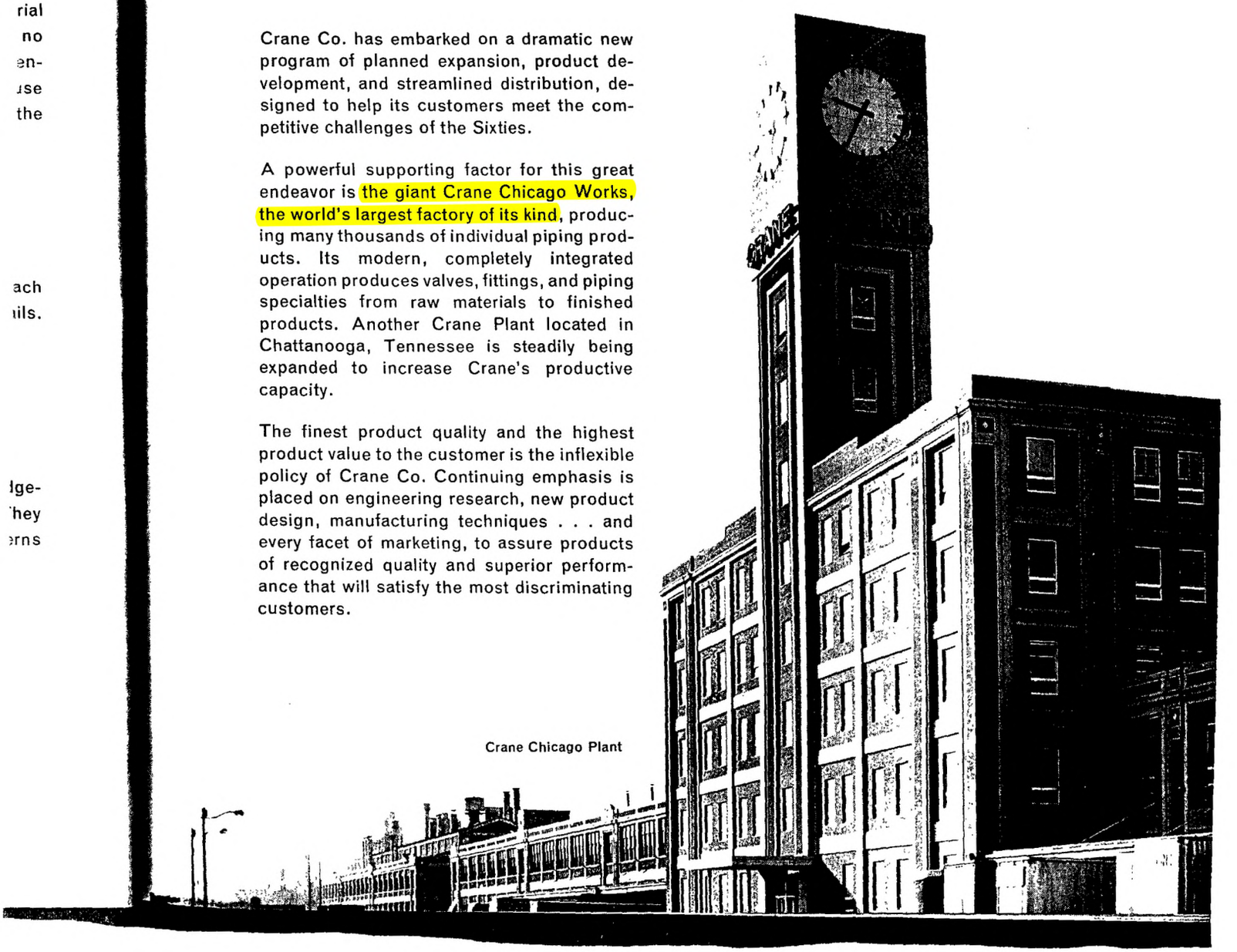
Giant Crane plant in Chattanooga, Tennessee

FROM THESE MODERN CRANE PLANTS COME THE FINEST PRODUCTS FOR INDUSTRY

Crane Co. has embarked on a dramatic new program of planned expansion, product development, and streamlined distribution, designed to help its customers meet the competitive challenges of the Sixties.

A powerful supporting factor for this great endeavor is the giant Crane Chicago Works, the world's largest factory of its kind, producing many thousands of individual piping products. Its modern, completely integrated operation produces valves, fittings, and piping specialties from raw materials to finished products. Another Crane Plant located in Chattanooga, Tennessee is steadily being expanded to increase Crane's productive capacity.

The finest product quality and the highest product value to the customer is the inflexible policy of Crane Co. Continuing emphasis is placed on engineering research, new product design, manufacturing techniques . . . and every facet of marketing, to assure products of recognized quality and superior performance that will satisfy the most discriminating customers.



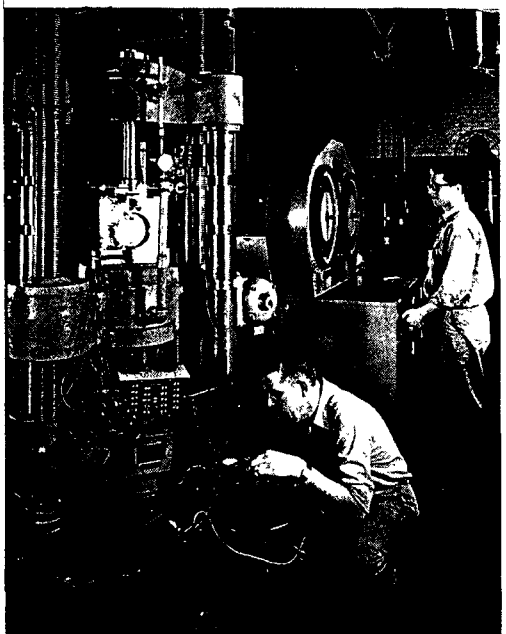
Crane Chicago Plant

CRANE

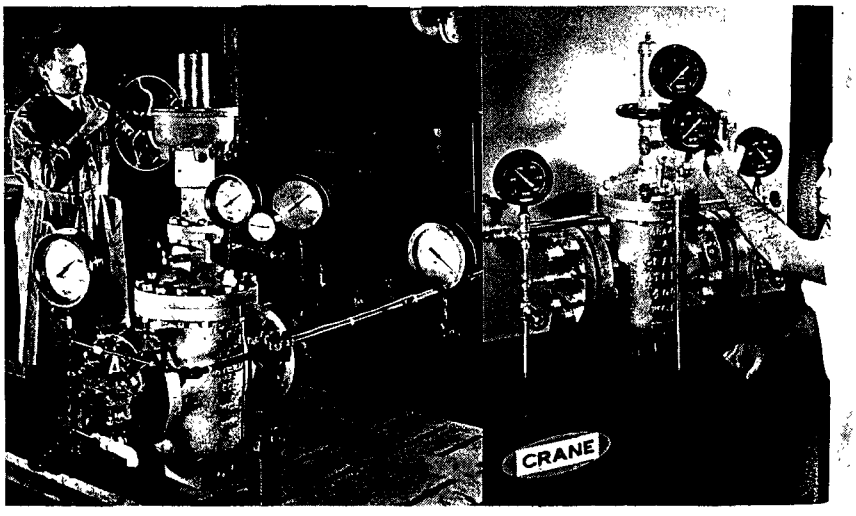
RESEARCH AND ENGINEERING KEY TO PRODUCT DEVELOPMENT

Carefully engineered and tested products have always been a hallmark of the Crane Co., and research and development by Crane Engineers continues to be a vital part of company philosophy. Useful new products, the result of planned engineering development, are being produced regularly. And existing products are continually being improved to assure long life, reliable performance, and minimum maintenance requirements.

Crane engineers are hard at work on solutions to the problems engendered by the super-high temperatures and pressures of modern processing systems. In all industries, Crane engineers are meeting challenges with new, sometimes radical, but always carefully engineered products. For example: valves for operation in a pure helium atmosphere . . . a universal valve trim material for use with oil or steam . . . flexible steel discs that seat tighter with lower operating torques . . . these are but a few of the exciting new ideas produced by Crane engineering . . . ideas that can help you in your job.



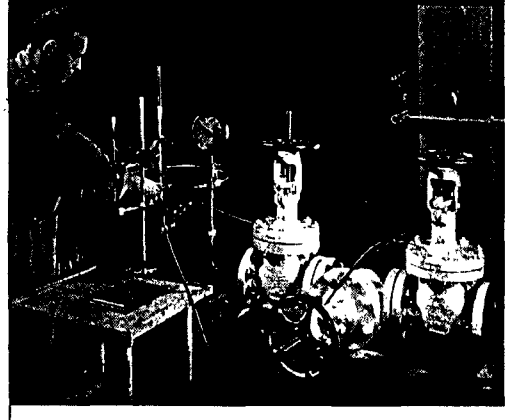
Measuring stress by means of electric strain gages in a valve component undergoing tensile and compressive loads similar to service.

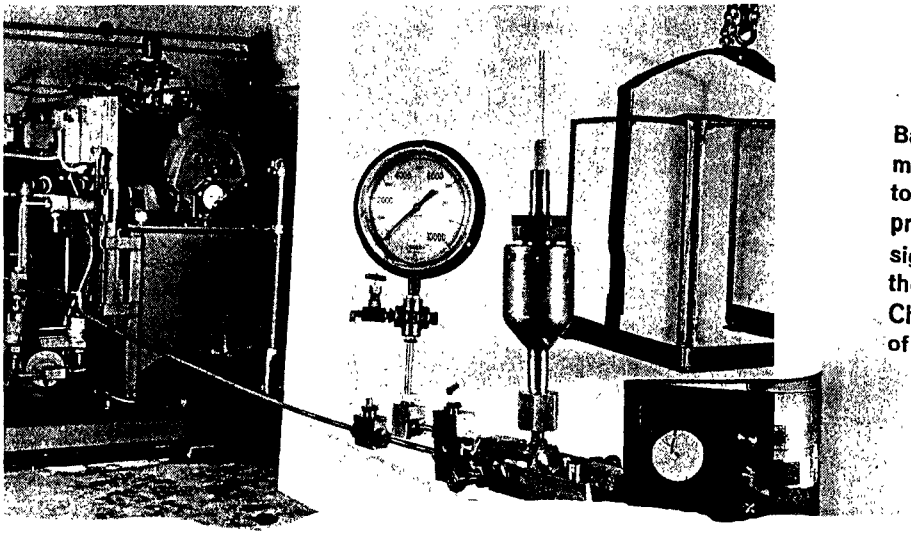


Arrangements used for extreme tightness tests at both inlet and outlet of Conduit Valves with Teflon seats help determine valve suitability for any given application.

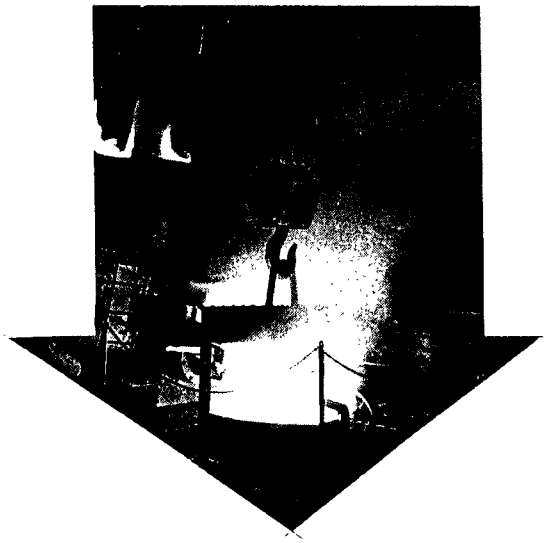
The effect of thousands of operatic on seat tightness is determined, well as the ability of all valve parts withstand the wear and tear of sir lated service conditions.

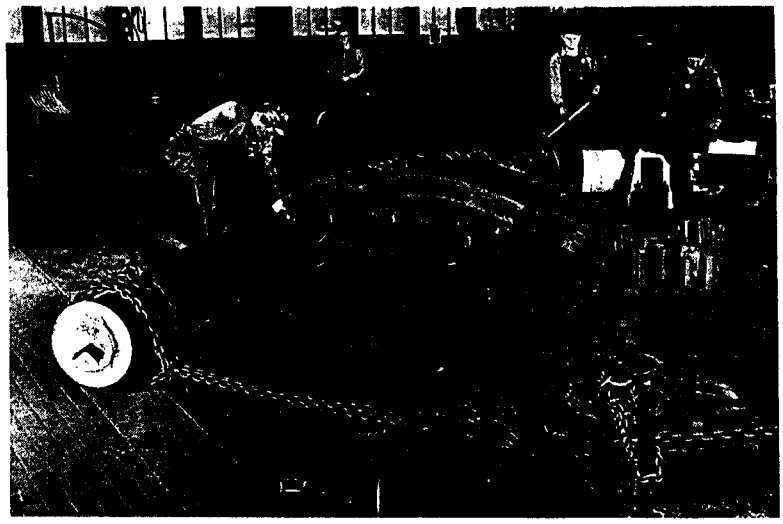
Laboratory set-up of three 6"—300 lb. Crane Steel Flex Gate valves verifies both inlet and outlet seat tightness under actual service conditions.





Tests at pressures up to 75,000 pounds per square inch assure valves and components that will function per-





CRANE FOUNDRY AND FABRICATION FACILITIES HELP GUARANTEE GREATER PRODUCT PERFORMANCE

An integral part of Crane operations is a full complement of modern foundry and fabrication facilities designed to supply every customer requirement.

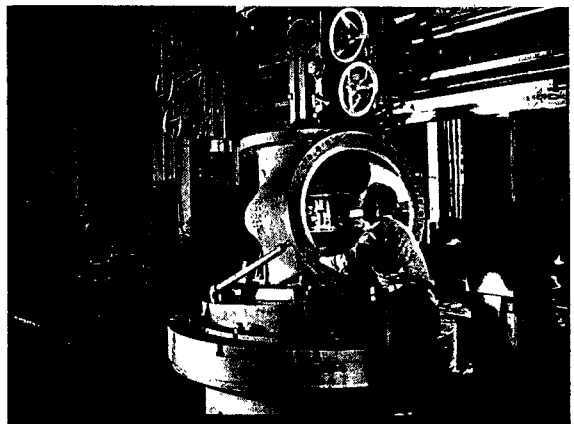
Electric furnaces with capacities ranging from 1000 to 20,000 pounds, with an average melting rate of 24,000 pounds of steel per hour, give Crane a capacity among the largest steel foundries in industry. For melting alloy steels, irons, and bronzes, Crane operates additional furnace units of the most modern design and function, capable of meeting the special quality requirements of the valve industry.

Moulding, pouring, and shakeout operations are fully mechanized, utilizing modern roller, belt, or over-head conveyor systems for continuous movement of castings and equipment.

In the fabrication and bending of piping, Crane supplies years of experience by engineers skilled in piping system design. Fabrication by full-time, skilled specialists . . . members of the United Association of Pipe Fitters, A. F. of L.

CRANE MAINTAINS MODERN METHODS IN MACHINE AND ASSEMBLING OPERATIONS

Basic operations in any manufacturing plant, both machining and assembly are an art at Crane, geared to match the exacting standards established for Crane products. Hundreds of the finest machines, many designed by Crane Engineers for special needs, occupy thousands of square feet in the Chicago Works and at Chattanooga. They insure the exceptional high quality of Crane Valves.

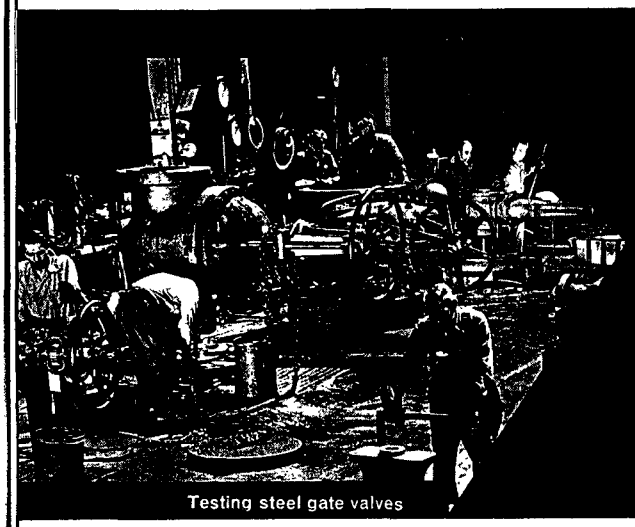


Skilled efficient Crane machine operators

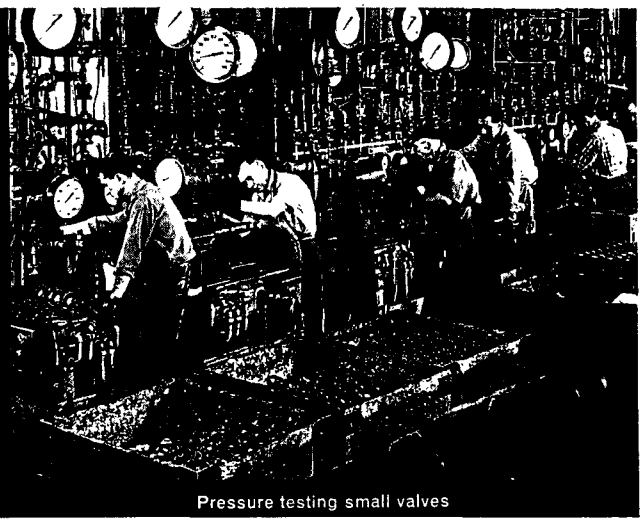
Smooth operating valve assembly line

RIGID INSPECTION AND TESTING INSURE PRECISE QUALITY CONTROL

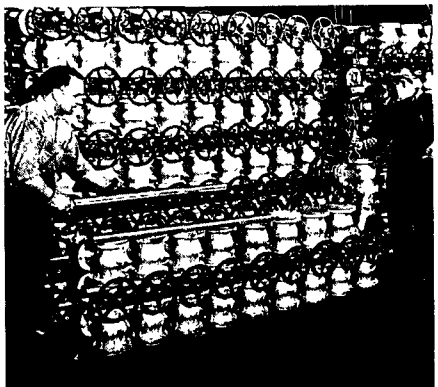
Quality control is absolute at Crane. By insisting on the most uncompromising methods of thorough inspection and rigorous testing, Crane guarantees product performance second to none. At Crane there is no substitute for quality, no short cut to insure it.



Testing steel gate valves



Pressure testing small valves



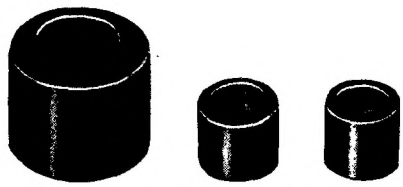
Distributors have complete stocks on hand

STREAMLINED PRODUCT DISTRIBUTION

Crane is steadily expanding its channels of product distribution through addition of vigorous, aggressive, independent distributors. Geared particularly to serve the industries in their local areas, these independent distributors can give you reliable recommendations for any of your valve applications.

Crane distributors across the country carry a sufficient supply of staple items to permit filling many orders from stock. Further assurance of fast action on your orders is the large factory inventory at both Crane Plants.

Crane Valve Packings



Packing for Small Size
Bronze and Iron Body Valves

The homogenous type of endless molded ring packing is used in small size bronze and iron body valves. They are made in various shapes to fit each size stuffing box.

Packing for Large Size
Bronze and Iron Body Valves

The large size bronze and iron body valves use a plastic core packing similar to the type used in the smaller size valves, but with an asbestos jacket and a corrosion inhibitor added.

Packing for Steel Valves

Steel valves for use in high pressure, high temperature service require an extremely tough, yet pliable, construction. Crane valves use plastic cores encased in a jacket of Inconel wire and yarn. The cutaway of a straight section of the packing shows how the Inconel wire supports the core.

Packing for Valves
For Corrosive Services

Teflon, a proven material in corrosive services, is used in Crane stainless steel valves and in valves for chlorine service.

Just as there are many types of valves designed for specific purposes, so there are many types of valve packings to handle various liquids and gases. However, since the common lines of valves can be divided into three general classes . . . . and since these three classes handle the bulk of service conditions encountered today . . . . Crane, by careful selection of packing, particularly in regard to quality and adaptability in the intended service, has been able to standardize on relatively few types. These packing types are used in the following valves

1. Bronze and iron body valves for moderate pressures and for temperatures up to 550 F.
2. Steel valves for high pressure service at temperatures up to 1200 F.
3. Corrosion-resistant valves and valves with special trim for chemical and corrosive services.

Packings for Bronze and Iron Body Valves

Crane bronze and iron body valves in the smaller sizes (usually 2-inch and smaller) use packing made of endless molded rings; larger sizes have plastic cores encased in woven asbestos. The packings are suitable for steam, water, oil, gas, liquefied petroleum gases, gasoline, and air. Although the packings generally are suitable for temperatures up to 550 F, the pressure-temperature ratings specified for the individual valves apply. All rings are accurately die-formed to fit into stuffing boxes with minimum effort.

Endless molded rings (illustrated at upper left) are formed from a homogenous mass consisting principally of asbestos filler, graphite, and binder. The fiber length is carefully determined and the percentage of asbestos and graphite accurately apportioned to maintain deformable qualities in each ring.

Core packing (see second illustration at left) consists of a plastic core encased in an asbestos jacket. The core material is essentially the same as that used in the molded ring packing; the length of asbestos fiber is carefully determined, and a corrosion inhibitor is added. Jackets are generally comprised of a commercial grade yarn or braid. After the braid is applied to the core, the packing is drawn through a light binder and graphite to provide adequate external lubrication. The rings are the split-type so that they are easily slipped on the stem. The diagonally cut ends provide a bevel joint for good sealing when the gland is pulled up.

Packing for Steel Valves

Steel valves intended for high pressure-temperature service demand the utmost in well-constructed packing. In Crane valves, the core materials are asbestos and graphite with a minimum of binder which will not harden in service. The cores are soft enough so that the packing, under fluid and gland pressure, will conform to the shape of the stuffing box with no detrimental effect. Suitable agents are included to inhibit stem corrosion.

Jackets, made by using Inconel wire inserts in each strand of triple-A asbestos yarn (see third illustration), support the cores and provide the strength needed to withstand high pressure and temperature.

Packing for Valves for Corrosive Service

Valves used in chemical and corrosive services present the greatest packing problems. Teflon (DuPont tetrafluoroethylene), when used within its temperature range, has proven very effective against almost all chemicals, liquids, and gases. Because of the flexibility and general efficiency offered by the "V" ring construction (see bottom illustration), Teflon "V" Rings of that design have been selected for regular use in Crane 18-8 SMo and Craneloy 20 stainless steel valves for corrosive services and in steel valves for chlorine service.

Crane Sheet Packings and Gaskets

C.C. Rubber Sheet Packing

C.C. Rubber Sheet Packing is a high grade rubber composition packing compounded to a special formula and manufactured solely for Crane. It is exceptionally tough, durable, and resilient. Frequent, careful tests throughout the manufacturing process assure high, uniform quality.

This packing is recommended for all pressures in services such as saturated steam, hot and cold water, air, and gas.

C.C. Rubber is available in rolled sheets (page 320) or in finished cut gasket shapes (pages 321 and 322).

Cranite Sheet Packing

Cranite is a superior gasket material prepared from selected long fiber asbestos, cross-laminated to secure exceptional strength and durability. It has a high and uniform compressive strength, does not deteriorate with age, and is ideally suited for use with water, air, gas, gasoline, ammonia, steam, oil, acids, alkalies, etc. It is used for temperatures up to 750 F.

Cranite is approved by the Underwriters' Laboratories, Inc. (National Board of Fire Underwriters), for use on hazardous liquids.

Cranite is available in flat sheets (page 320), in finished cut gasket shapes (pages 321 to 323), or for tongue and groove flange unions (page 292).

Spiral Wound Gaskets

Spiral wound gaskets consist of plies of preformed metal with asbestos or some other material as the filler strip. Corrugations in the continuous metal strip impart tension and resiliency when the gasket is under compression; the edges of the strip create multiple barriers against leakage; the soft filler strip seals minute imperfections in the flange faces.

The gaskets are self-adjusting to compensate for shock, vibration, and temperature change. They are recommended for use against steam, oil, gases, and liquids including most chemicals, in high pressure, high temperature installations.

Compressibility is made to vary by changing the number of plies to accommodate the pressure requirements and bolt load; it is therefore necessary, when ordering, to specify the nominal pipe size, ASA pressure class, and type of facing.

Styles are available for application to all pressure classes and to all types of end flanges. For large male to male face product, supplemental centering rings or guides may be obtained to position the gasket in relation to the bolts; these contain markings to indicate the nominal pipe size, the ASA pressure rating, the metal, and the manufacturer.

Teflon Gaskets

Teflon flat ring gaskets (or Cranite full face gaskets; see adjacent column) are recommended for use with 18-8 and Craneloy 20 stainless steel end flanges. Solid Teflon (Du Pont tetrafluoroethylene resin) is tough and is particularly characterized by chemical inertness, making it ideal for such use. In fact, these qualities have led to the regular use of Teflon for bonnet gaskets in Crane corrosion-resistant valves.

Normally, for end flange use, gasket dimensions conforming to ASA B16.21 are satisfactory. If crevice corrosion is a factor in handling a particular solution, consideration should be given to a change in the inside diameter.

Corrugated Metallic Gaskets

Corrugated metallic gaskets must have proper strength, ductility, and toughness. They are recommended for service where temperatures exceed 750 F and are generally made of copper or soft iron.

To secure a smaller bearing surface with the resulting increase in unit compressive load, the inside diameter of these gaskets is made larger than the port diameter of the joint. For dimensional information, see page 323.

Rings for Ring Joints

Ring joints can be utilized as connections for all pressure classes of Crane steel valves and flanges. They are particularly recommended for high pressure hydraulic installations and for high pressure-temperature steam and hot oil lines.

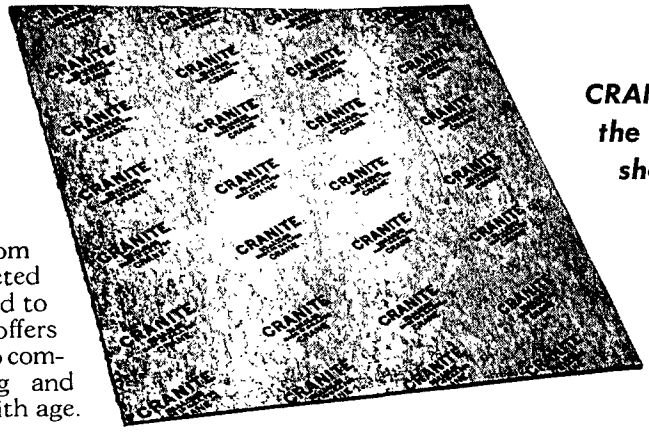
Ring joints require the use of a metal ring which seats in a specially prepared groove in each flange face, thus sealing the joint. The rings are generally made of soft steel or of 4 to 6 per cent chromium steel with ½ per cent molybdenum. Oval and octagonal shapes are available. For ring joint dimensions, see pages 334 and 335.

Composition Discs

The dependability of the Crane line of renewable type composition discs for use in globe, angle, and check valves is the result of years of constant research. Crane composition discs are made from high quality materials . . . . compounded, cured, and tested for specific services such as steam, hot and cold water, oil, air, gases, including liquid petroleum gases, and gasoline services. Users are urged to choose the type and material best suited to the service requirements. For complete details and recommendations, see page 281.

Cranite Sheet Packing

The name "CRANITE" is registered in the United States Patent Office.



CRANITE — the best in sheet packing

An asbestos composition manufactured solely for Crane

Cranite Sheet Packing is made from an asbestos composition. The selected long fiber asbestos, cross laminated to provide unusual tensile strength, offers very uniform and high resistance to compression, is exceptionally strong and rugged, and will not deteriorate with age.

Recommendations: The packing is unhesitatingly recommended for a multitude of services such as steam, water, oil, dry air, acids, ammonia, alkali, gases, etc., and is suitable for temperatures up to 750 F.

Underwriters' approved: Cranite Sheet Packing has been approved by the Underwriters' Laboratories, Inc., for use on hazardous liquids.

Easy to stock—no spoilage: The adaptability of Cranite packing to a large number of services and its frequent usage coupled with its high quality and ability to withstand deterioration make it convenient and economical for the user to carry large quantities in stock with no fear of loss through spoilage.

Proper use: For best results, gaskets cut from Cranite packing should be coated with Crane Thread Lubricant or Anti-Seize Thread Compound when being installed. For description of thread lubricant and compound, see page 324.

Sizes and Weights — Prices on Request

Thickness	Size of square sheet	Average Weight
Inches	Inches	Per Square Foot
1/32	36 or 48*	.33 pounds
1/16	36 or 48*	.62 pounds
1/8	36 or 48*	1.23 pounds
1/64 3/32 1/4	up to 120 inches made to order	on request

*Other sheet sizes up to 120 inches square, made to order; information on request.

Wide choice of sizes: As indicated in the table above, Cranite packing is regularly furnished in thicknesses of 1/32, 1/16, and 1/8-inch and in sheets 36 or 48 inches square. Other thicknesses and sheet sizes are made to order; information on request.

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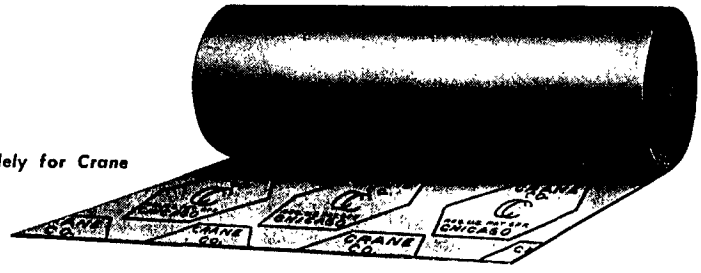
"CC" Rubber Sheet Packing

Manufactured solely for Crane



"CC" Rubber Sheet Packing, manufactured solely for Crane, is especially well adapted for high or low pressure service on saturated steam, hot and cold water, air, gases, etc.

Wide choice of sizes: As indicated in the table at the right, "CC" Rubber Sheet Packing is regularly furnished in rolls 36 inches wide and in thicknesses of 1/16-inch, 3/32-inch, or 1/8-inch. Other widths, up to 72 inches, are available on special order; information will be furnished on request.

Sizes and Weights — Prices on Request

Thickness	Width of roll	Average weight	
		Per Square Yard	Per Roll
Inches	Inches		
1/16	36†	5¼ pounds	200 pounds
3/32	36†	8 pounds	200 pounds
1/8	36†	10½ pounds	200 pounds

†Rolls of other widths, up to 72 inches, made to order, information on request.