



MANITOWOC

SHIPBUILDING COMPANY

ENGINEERING WORKS

FABRICATING WORKS

EQUIPMENT WORKS

MANUFACTURING WORKS

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*MANITOWOC

Foreword

Since 1847, Manitowoc has been a shipbuilding and ship repairing location. In 1847, wood sailing ships launched from the banks of the Manitowoc River gave that port the name of the "Clipper City." Today, steel ships of all types are still launched here; but marine work has become only one of the many activities of the Manitowoc Shipbuilding Company.

In 1882, a group of steel shipbuilders seeking location for a new yard were impressed with the possibilities of Manitowoc. They acquired the building yard of H. E. and G. H. Bauger, who then were engaged in the building and repairing of wood vessels. Starting with a small organization (some of whom now constitute the active management of the present company), the concern expanded, and what was an adjoining wharf has since been converted into one of the largest and best equipped yards on the Great Lakes. Further expansion took place during World War I, when facilities were developed for the construction of ocean-going freighters.

By 1940 Manitowoc had grown so rapidly — in plant equipment, skilled workmen, and trained technicians — that its facilities were selected by the United States Navy for production of submarines, often called the most difficult war craft to build.

Because of steady growth and production diversification over the past 43 years, the original shipbuilding concern today has been organized into five distinct divisions, only one of which is directly related to marine production. Marine work today is as large as larger in volume than it ever was; however, various products mainly produced by standard shipyard tools have been so developed that shipbuilding and ship repairing (except during war years) represents but a minor portion of the total volume of Manitowoc's business. Experience has proved that decentralization of authority has stimulated the individual initiative of the five operations.

This book is a picture record of the scope, equipment, and products of these five divisions. We hope it will be of sufficient interest to our employees and friends to warrant its publication.

Charles C. West
President

*SHIPBUILDING COMPANY

*ENGINEERING WORKS

*FABRICATING WORKS

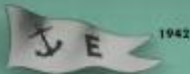
*EQUIPMENT WORKS

*MANUFACTURING WORKS

GENERAL
OFFICES

and
PLANTS

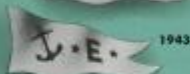
+
MANITOWOC
WISCONSIN



1942



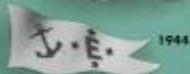
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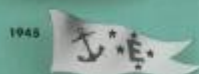
1943



1943



1944



1945

NAVY "E" AWARD

Symbols of excellence, the Navy "E" is a coveted and carefully cherished award. For years, it has been the number of times this award was received during the World War II construction program.

MANITOWOC SHIPBUILDING COMPANY

MARINE DIVISION

This operating division carries on the marine functions of the Company — the building and repairing of ships. Beginning with steel construction shortly after 1900, the Company built numerous craft of various types, many for overseas service.

In 1922 the present company, organized with many of the employees of the old company, took over. From then until World War II, expansion continued with the following types of vessels being launched: cat ferries, self-unloaders, oil tankers, bulk cargo carriers, yachts, lighthouse tenders, and Coast Guard patrol boats. Expansion also took place in contractors' equipment, resulting in the construction of larger and heavier derrick dredges, suction dredges, dump scows, derrick boats, and diesel tugs.

For World War II Manitowoc naturally turned its main facilities over to Uncle Sam. Construction and delivery of 28 submarines, 36 L. C. T. Craft, the designing and procuring for two entire L. C. T. programs, docking and repair work on freighters, tugs, etc. — all were part of Manitowoc's considerable contribution to the war effort.

Manitowoc's shipbuilding division today is fully prepared to meet competition for the still larger and more complex marine construction of the future.



MANITOWOC ENGINEERING WORKS

Because of the intermittent character of shipbuilding and repairing, the new shipbuilding company was always on the lookout for new products to avoid seasonal layoffs of the Manitowoc workmen.

Many of these products involved machine work or machine and plate fabrication. Thus the Manitowoc Engineering Works was first created to handle the sales of non-marine products. Today it is an operating division including the Pattern Shop and Machine Shops of the Company, and embraces a floor area of more than 130,000 square feet.

This division performs the machine and assembly work required on such products as Speeders and sheels, paper and cement mill machinery, miscellaneous contract work, and machine repairs. The photos that follow show much of the equipment, many of the tools, and products being built by Manitowoc Engineering Works.



ENGINEERING WORKS

MANITOWOC FABRICATING WORKS

The increased need for products built of steel plates and shapes led to the formation of the Manitowoc Fabricating Works. Under control of this division are the Plate, Welding and Fabricating, Blacksmith and Sheet Metal Shops, with a floor area in excess of 150,000 square feet.

The Fabricating Division is responsible for the shop fabrication of plate and shape for marine construction and repairs, and for other miscellaneous plate and structural contract work such as boilers, tanks, digesters, paper and cement plant equipment, sheet metal work, and forged shop products.

Booms, ribs, and structural parts of the Speedcranes and shovels are built by this division.

Because the Fabricating Works and the Engineering Works Divisions produce jointly many of the non-marine heavy machinery products of the Company, the sales of these two divisions are continued under the name of Manitowoc Engineering Works.



FABRICATING WORKS

MANITOWOC EQUIPMENT WORKS

Starting in 1946 with the manufacture of metal ammunition boxes, the Manitowoc Equipment Works expanded its capacity and products rapidly until at the present time it has outgrown its original quarters—the old Boiler Works plant of the Manitowoc Shipbuilding Company.

This division specializes in metal stamping and finishing work, producing such items as "Sub Zero" refrigerating units, metal display cases, kitchen cabinets, electrical switch boxes, and pressed metal work of similar nature.

The division maintains a staff of experienced engineers and designers able to develop new products from the original idea until the completed article is placed in production—including the development of dies, fixtures, or even complete machines for producing the article.



EQUIPMENT WORKS

MANITOWOC MANUFACTURING WORKS

The Manufacturing Division, latest division to be formed, has already demonstrated its importance to the Company. Working closely with the Equipment Division, it completes the work of that division on refrigerating equipment, assembling and insulating the steel cabinet shells, installing freezing units, wire shelves, doors, etc., and checking, testing, and shipping. To study refrigeration and other problems, it maintains a competent engineering staff which is constantly making tests and suggesting changes in design to improve products.

In addition, the division is engaged in light manufacturing: turning out quantities of machine parts; and building miscellaneous equipment such as dry cleaners, pressure filters, etc.



MANUFACTURING WORKS

THE FIVE DIVISIONS

A Pictorial Record

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SHIPBUILDING

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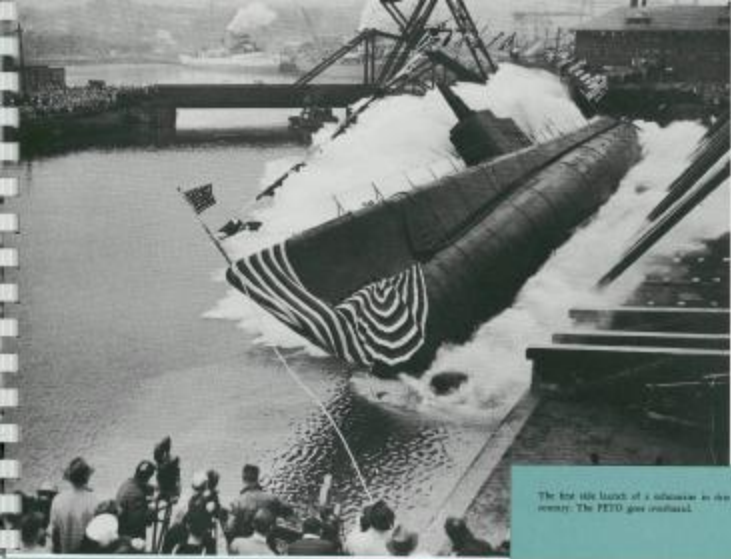
Marine's outstanding contribution to the war program was its efficient methods of submarine construction.

Below: A new section being transported to the building berth on a special carrier.

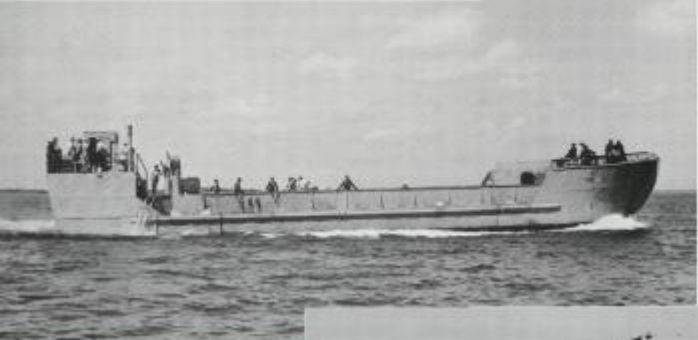
Right: Finishing a 30-ton section of submarine on the lead finish.



Matheson Shipbuilding Company



The first tilt launch of a submarine in the country. The PETO goes underway.



LANDING CRAFT

Early in 1942, MacIsaac was called on by the Navy to act as "design and procurement agent" and "leading yard" in the development of plans for the LCT. These are the LCT type of landing craft, originally used for the North African invasion and later for similar work in the Pacific, Iwojima, and Normandy campaigns. Plans were furnished and material purchased for over 1,000 of these craft, which were built by a number of structural plants in the midwest. MacIsaac built 35 of these tanks including 7 pilot models.

(Above) An LCT (1) on trial run.

(Right) An LCT (6) discharging a cargo of medium tanks during runs in Lake Michigan.





NAVY TANKER

In 1945, Manitowoc built 16 small tankers of the YT type for use in coastal and inter-island service, and fabricated the steel hulls for 19 additional tankers being built by others.

(Above) Tanker is being brought alongside dock after launching.

(Left) Under way during trials on Lake Michigan.



(Above) (1934) One of three Coast Guard cutters PANDORA, ELECTRA, and DIONE. The ELECTRA was later converted into the presidential yacht POTOMAC.



(Right) (1918) COQUINA—2800-ton auxiliary ship designed during Maritime War. One of 30 vessels of this type built during World War I.



1200-ton steel-hulled tugboat (foreground) U.S.C.G. Cutter ECHAMARA being built for our service (seen in the North Atlantic). (Background) Cutaway WABASH at New York Harbor undergoing repairs.



SELF-UNLOADER

A distinctive type of Great Lakes vessel is the self-unloader. Designed for the transportation and rapid handling of bulk cargoes, such as coal, limestone, sulphur, etc., these ships carry their own unloading and propelling machinery, enabling them to come alongside and discharge cargo on the dock at a rate of from 1200 to 2000 tons per hour.

The CHARLES C. WEST, built in 1921 for the Rockport Steamship Co., was designed to carry a full cargo on a limited draft. One of the few great acre cargo ships on the Great Lakes, the vessel is able to maneuver in restricted waterways and deliver cargo in ports where tug service is not available.

During the winter of 1947 and 1948 this vessel was out in two and lengthened 118 feet, thus adding several thousand tons to carrying capacity.



Upper Dredge MOGGE of the Great Lakes Dredge & Dock Company of Chicago.

Hull and bowlers were built by Manitowish in 1925. Dredging machinery built by Bucyrus-Erie Co., and installed by Manitowish.



Bully in 1927 for the Great Lakes Dredge & Dock Co. of Chicago, the Muck Dred Electric Hydraulic Dredge NEW HESLEY is one of the largest, most powerful dredges of this type on the Great Lakes.

The hull was built and the machinery installed by Manitowish. Machinery furnished by Bucyrus-Erie Co.



(Above) The Tanker RED CROWN, built in 1917 for the Standard Oil Company of Indiana, was the second vessel of this type built by Manitowish for that company; the E. G. SEASHORE being delivered in 1918.

(Right) The Tanker TRANSFER CITY SOCONY was built for the Standard Oil Company in 1918.





(Above) Steam tugboat NORTHWIND, built in 1929 for E. M. Clark, New York.



LAND SUCKER

A type of vessel designed to dredge sand from the lake bottom, this tugboat is less than 100 feet long. Capable of discharging its cargo on the dock on either side, the "Land Sucker" is recognized as a valuable piece of equipment.

(Left) The AMERICAN, built in 1911 for the American Sand and Gravel Company at Chicago, is shown discharging a load of sand onto its barge company.



The car ferry CITY OF MIDLAND was built in 1948 for Pere Marquette Railroad (now Pere Marquette Division of the Chesapeake and Ohio Railway Company). Largest of the Lake Michigan car ferries, the MIDLAND has a capacity for 32 freight cars or 38 autos on the car deck. It is licensed to carry over 500 persons in addition to crew, and has stateroom accommodation for 172 passengers.

Other Lake ferries built for this company include PM 23, PM 25, CITY OF SAGINAW, and CITY OF FLINT.



(Above) The cat ferry ANN ARBOR No. 7 was built in 1925 for the Ann Arbor Railroad Co.



(Left) The cat ferry named MILWAUKEE CLIPPER was rebuilt at Muskegon in 1961 for the Whittier/Michigan Ferry Company. It makes round trips throughout the winter year between St. Ignace and Michigan ports.



(Above) River tugboat FMC 30 is shown immediately after its launching. Built in 1905 for the Free Marguere District of the Chesapeake and Ohio Ry. Co. This vessel is practically a duplicate of the FMC 31 (built in Manitowish in 1917).



(Above) The river tugboat STEAMER "A" was built for Standard Oil Company of Indiana in 1908.



(Above) Built in 1939 for Marine Transit Company of Chicago, the river barge EDWARD W. KIN/KIN is shown entering a lock with a tow.



(Left) Because fixed bridges in the Chicago area have low clearance, pilot houses on these towboats are built on a hydraulic mast so as to rise and lower.

This is the towboat A. L. NASH, built in 1945 for the Marine Transit Company.



(Above) The steamer ADAM E. CORNELIUS of Island A. Greenlee, Buffalo, N. Y., was converted to a self-loader in 1930.



(Right) The tugboat GRAND RAPIDS built in 1926 for the Grand Trunk Railway System. One of three similar vessels built for this company.



ENGINEERING

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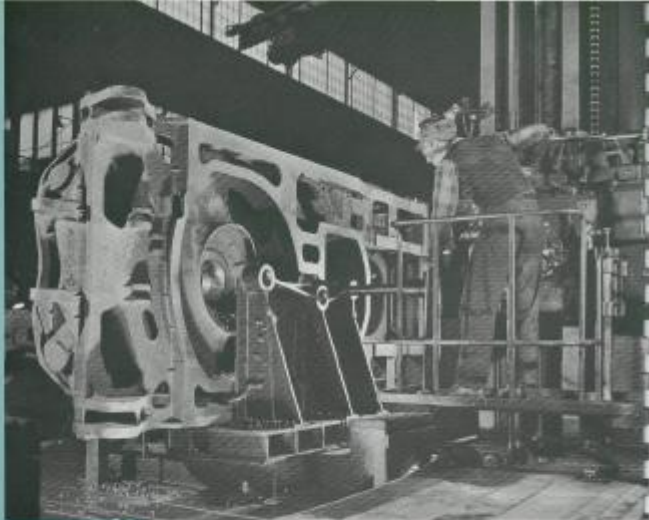
Machine Shop tool box.

Density of vertical roller lathes in the stock and shop.

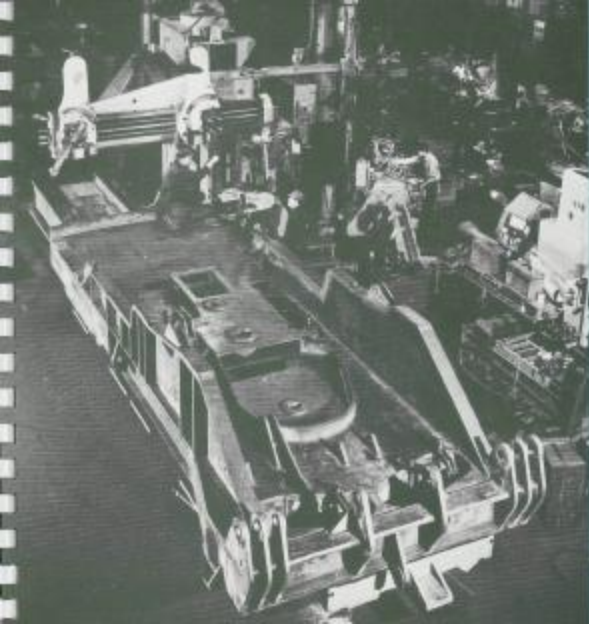




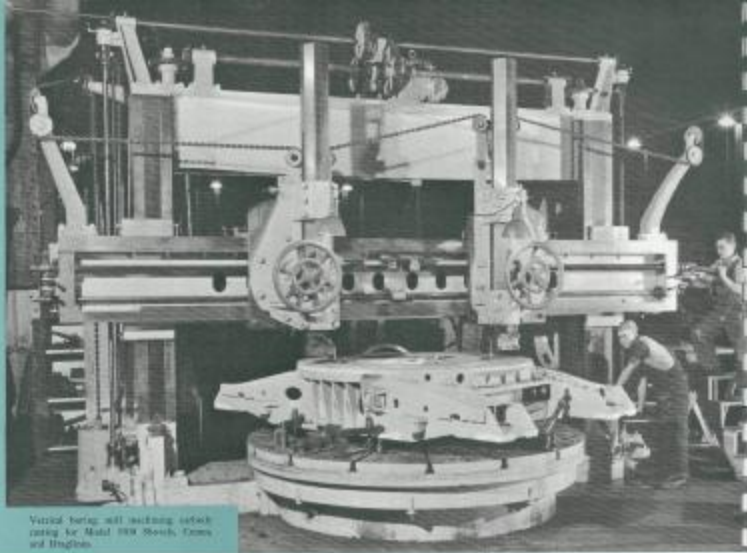
General Motors Assembly Shop



Horizontal boring mill machining an 3500-pound alloy steel casting — for Spectracore Model 5500 rotating bed.



Swinging head of Kobel 200
Open crane being machined on
large spindle plane.



Vertical boring mill machining cast-iron
rotors for Model 1000 Shochi, Enns
and Hingbois.



WIND-DRIVEN CRANE

Shows and layout of the hydraulic crane and is shown with a 4-yd. drag bucket in a 100-foot boom.

The crane frame and counter are removable for oil, repairs and the machine made ready for work in from three to five days.

The machine shown weighs about 100 tons.



Model 700 high lift shovel equipped with telescopic boom and rock.

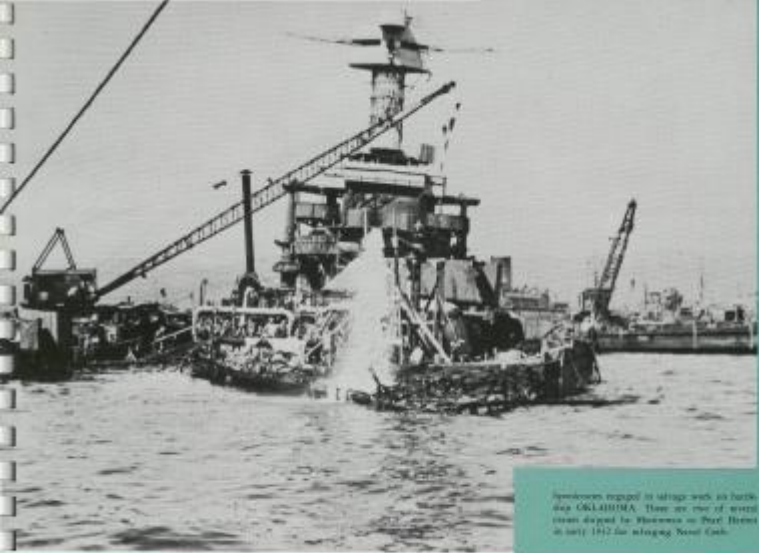


Model 350 manual shovel
at work on the new Dams
project in Colombia.



Howman 21-ton Road Sliding Crane Jack

Howman Engineering Works



Battleship engaged in salvage work in Pacific after OKLAHOMA. Here are one of several views depicted by Henshaw in Pearl Harbor in July 1942 for salvaging Naval Cade.



*Manitowoc derricks working on the steeply pitching
athousaic view of Union Pennsylvania coal fields.*



Model 4700 Dugles handling 4-cubic yard bucket on a boom 145 feet long.



Model 1001 Spadone
starting steel work.





(Above) Two Model 900 Speedcranes place a girder (137 feet long; weight 185 tons) on its supports at the New Jersey entrance to the Lincoln Tunnel.



(Right) A Manitowoc Speedcrane with 100-foot boom and 30-ton jib shown setting steel on a building.

Maximus Specimens with 100-foot boom hoisting concrete bucket on a dam project.



Model 200 Specimens with clam shell bucket loading rail.



1000 Model 10-125 Shovel moving a car.



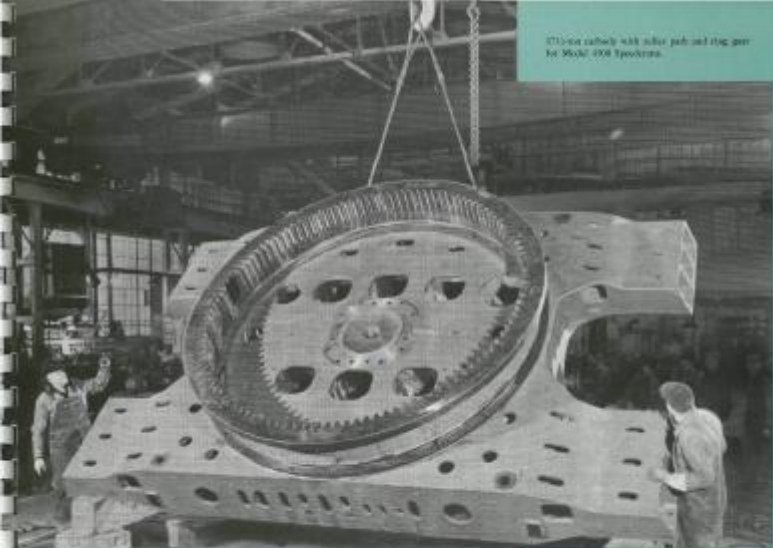
This Model 1000 Crane is shown lifting the ceiling of a heavy press into position.

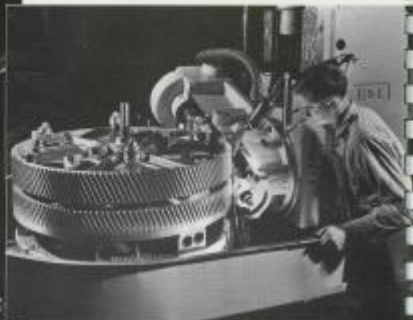
Mounted on a heavy articulated undercarriage, the 1000 Model is a jacking unit capable of operating as a derrick or derrick, and also as a crane capable of handling 25 tons or a 12-ton roller in any position without outriggers.



Loading rock with a Manitowoc Model 2000 Speckhoev

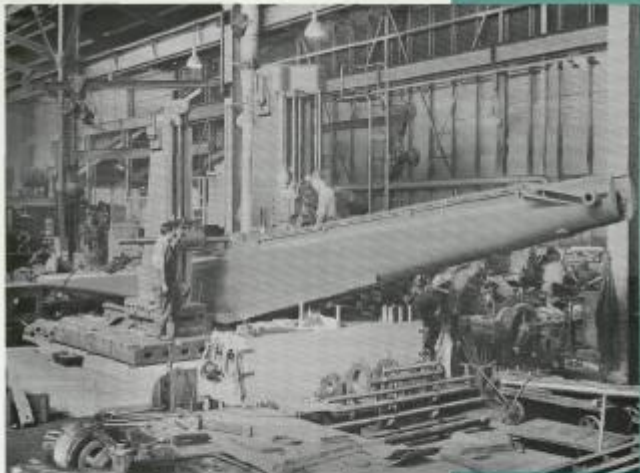
175-ton railway wheel with roller path and ring gear for Model 400 Spectra.



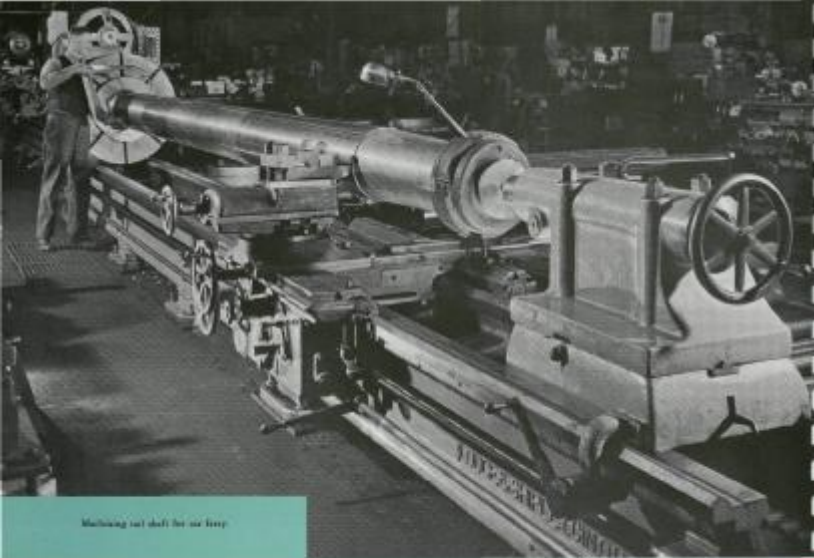


(Above) Hobbing 2 helical gears for Speedcrane transmission

(Left) One man taking initial cut on pair of large ring gears



During the slipper shaft knowings of a Colson Model 1500 tripping shaft on large lathe and boring machine.



Machining tail shaft for car ferry.



TORPEDO TUBE ASSEMBLIES

The main activity work required in the construction of submarines is the building and assembling of the torpedoes, mechanism which controls the firing operation of the torpedoes.

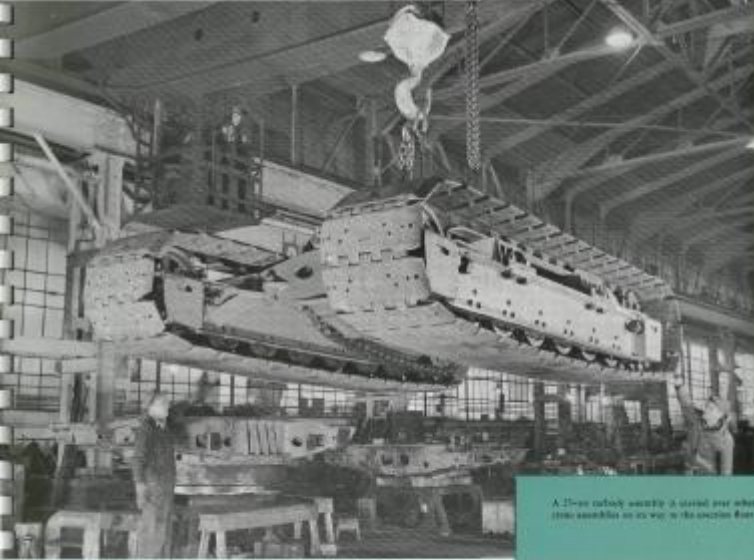
Shown here are torpedo tubes being assembled prior to installation on ship, and the assembling of various control mechanisms.



Left: A group of ocean liners under restoration in the ship yard is being moved in a single railroad plan.

Right: Triple expansion motor engines in motion. Box.





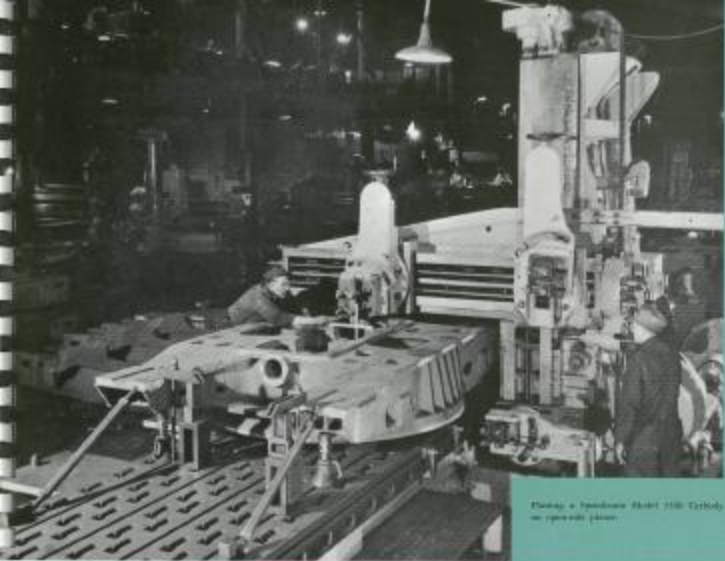
A 15-ton railway assembly is stored over what
iron assemblies are in way in the section floor.



SMALL SPEED CRANE ASSEMBLY

After all the separate cases and stored parts are machined and fitted into subassemblies they are brought to the assembly floor and assembled there to make the complete machine. The special attention given here is the accurate fitting of bearings to journals and spline fitting of gears and shafts at various positions of mounting, and consistently accurate spacing parts. These views show: (above) a line of craning but assemblies in different stages of completion, and (right) a close-up view of a Model 300 showing opening mechanism prior to fitting the sub in place.





Flouting a Spoolhouse Model 3100 Turbine
on a special platform



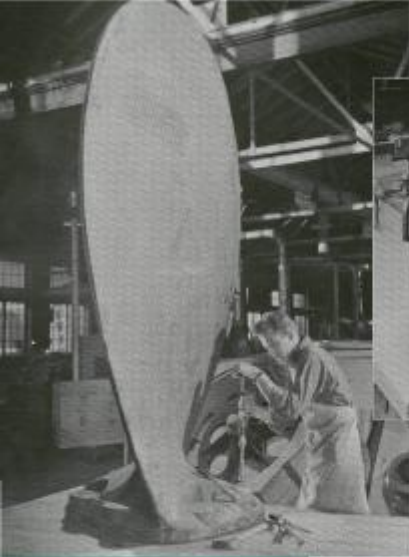
(Above) Bending 6-inch pipe by machine.



(Left) Curing 2 helical plates on boiler.



General view of Pattern Shop, where patterns are made up for all castings required, including the massive cylinder casting shown on Page 42.



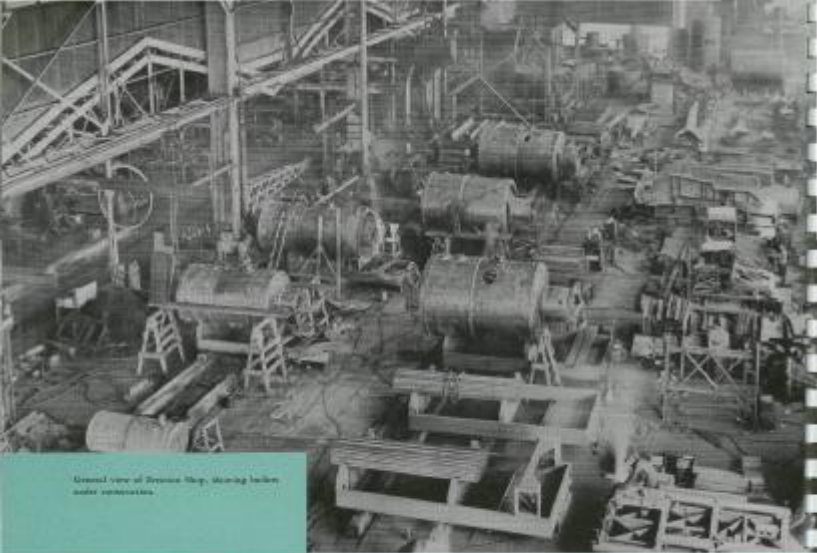
(Above) First step in making the pattern of a propeller blank.

(Left) The finished pattern.

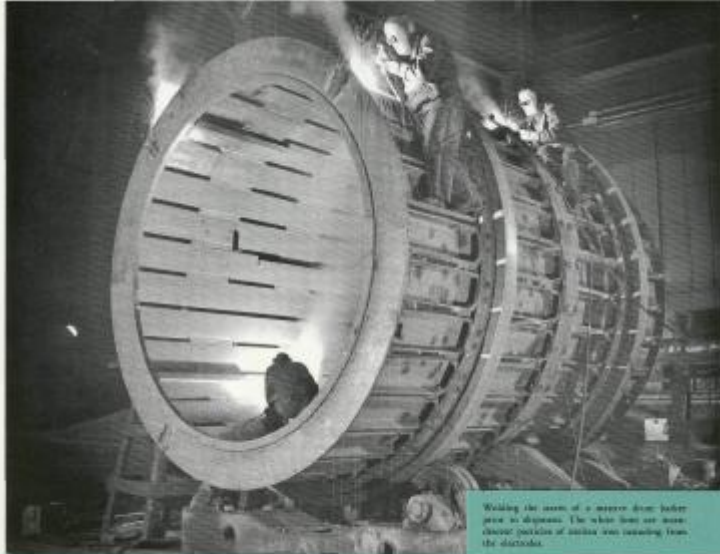


FABRICATING

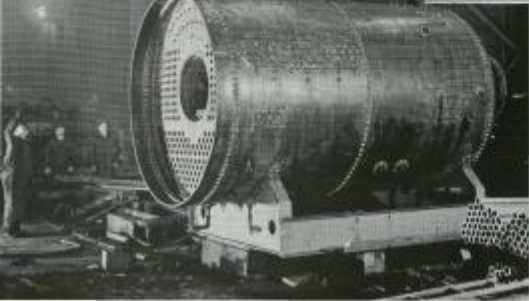
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General view of Drydock Shop, showing hulls under construction.



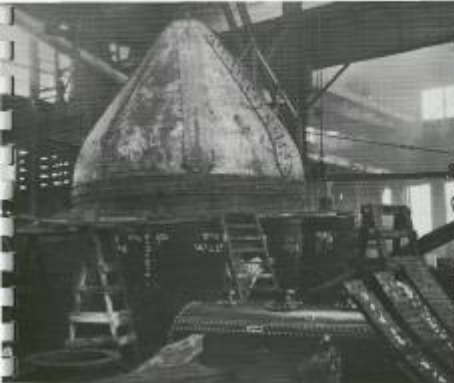
Welding the seams of a massive steam boiler prior to shipment. The white lines are iron-oxide particles of molten iron cascading from the electrode.



High pressure industrial boilers under construction.

(Above) A completed boiler with oil burner and accessories assembled ready to ship.

(Left) A boiler being moved by overhead crane high above the boiler on the floor, which is undergoing hydrostatic test.



(Above) Solphire Poly Digger in process of ship assembly

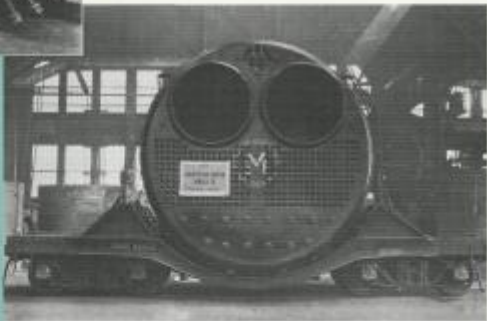


(Right) Fitting longitudinal beams on a boiler shell.



(Left) The open ends of a rotating cylinder used for testing rollers.

(Right) A large Scotch Marine Boiler loaded on a special railroad car is ready for its journey from Manitowoc to Detroit, where it will be installed in a reactor.



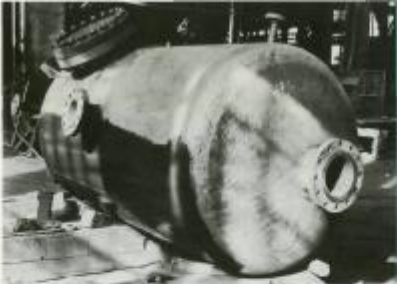
(Right) A sulphite pulp digester ready for shipment. Used in converting wood chips into pulp for making paper, more sulphite digesters are too large to be shipped in one piece and must be assembled at the erection site. This is a small one.



(Left) A large pressure tank for storage of gas under high pressure. Notice the "diamond" type of bracing.



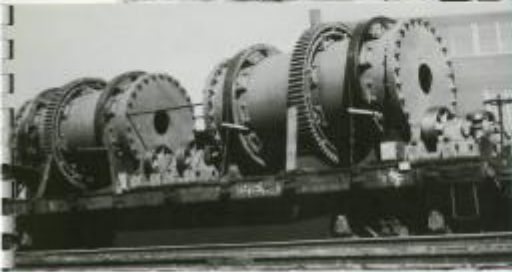
Keeping up construction and integrity of work was achieved by assembling submersible hulls complete in the shops prior to their erection on the ways.



(Above) One of several types of working vessels used in industry, this fifteen diameter Globe Water Diagram is used for cooking meat and starchy materials under pressure. Because of its size, it would be assembled in the shop, then "wooded down" and put together again in the line of erection.

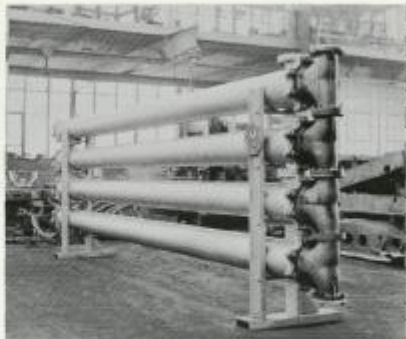
(Upper left) Welded pressure vessel prepared to shop test.

(Left) A shipment of grinding mills for pulverizing coal is shown leaving the plant.

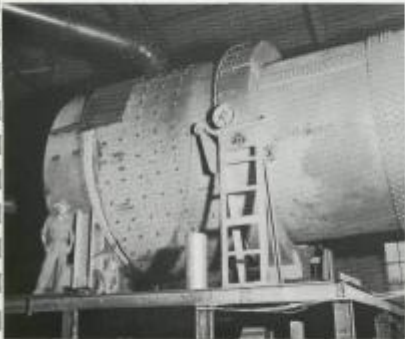




*Heat Exchanger for inland
making of wood pulp.*



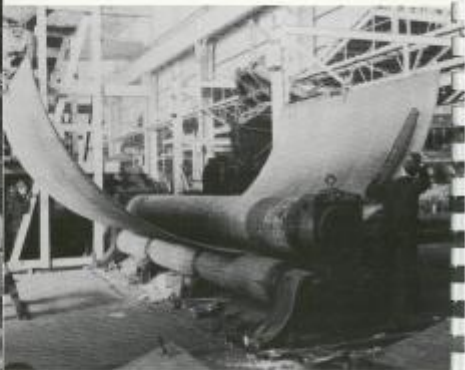
*Heat Exchanger for paper mill mounted
in shop prior to shipment.*



The bow end of a concrete hull showing a Vanderwerp Recuperator in place. The rapid cooling of concrete slabs by means of a recuperator improves the physical properties of the concrete.



A two-story curing drum installed in a concrete shipyard. Logs for pilings are installed around the drum to ensure that, previously, in constructing the logs into ships before coating in pigment.

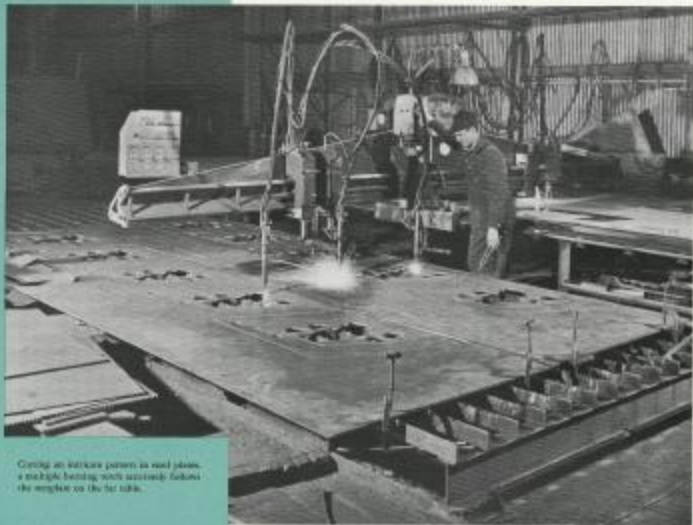


(Right) Rolling boiler shell plates in 20-foot horizontal rolls.

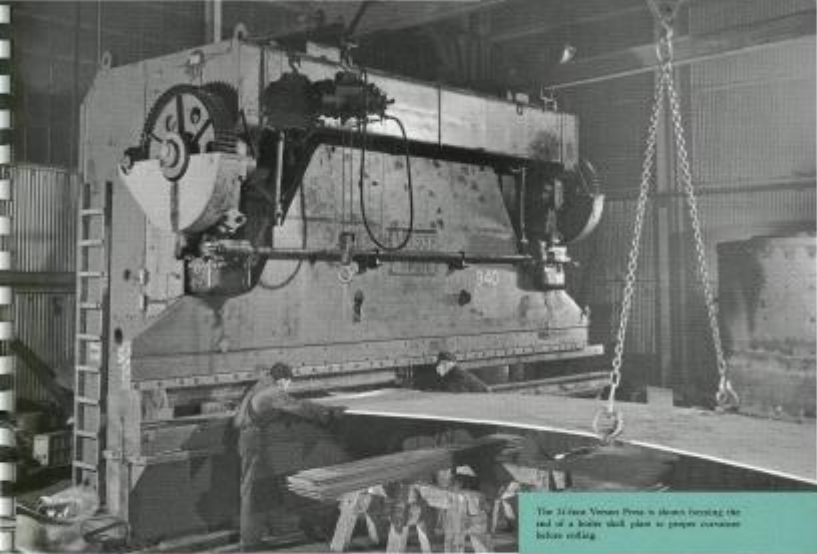
(Left) Rolling a plate in the vertical rolls.



Held rigidly in place in a jig to prevent distortion, a steel beam is being welded together.



Grinding an intricate pattern in steel plates, a multiple bending machine accurately follows the blueprint on the flat table.



The J. I. Case Vanner Press is shown bending the end of a boiler shell plate to proper curvature before rolling.

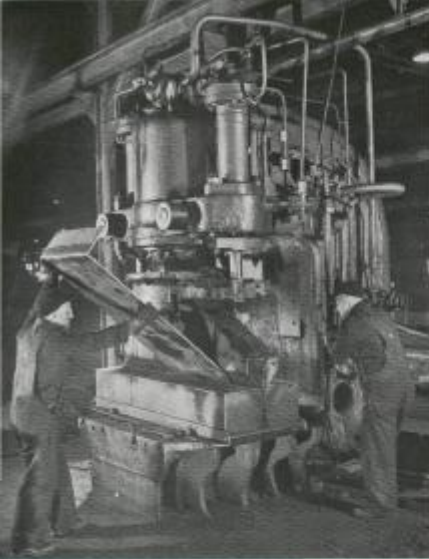
A 1918 U.S. Army tank
being a soldier's work.

Handbook of Manufacturing Works





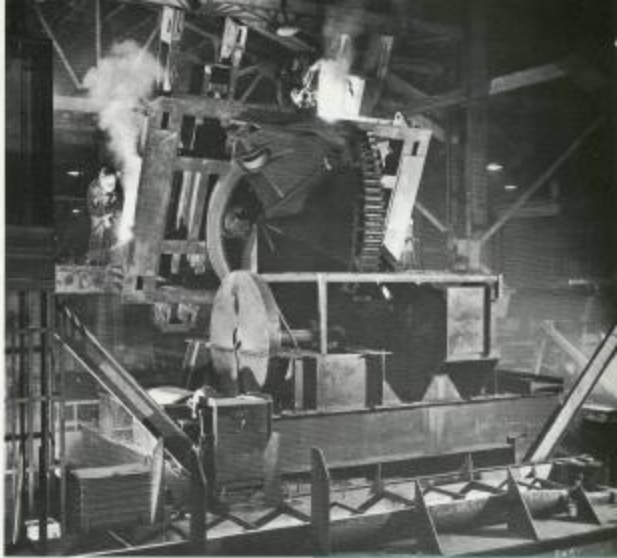
Timberwork is used to shape channels (see ship frames) in dry-dock sheds where hulls from the single hulls.

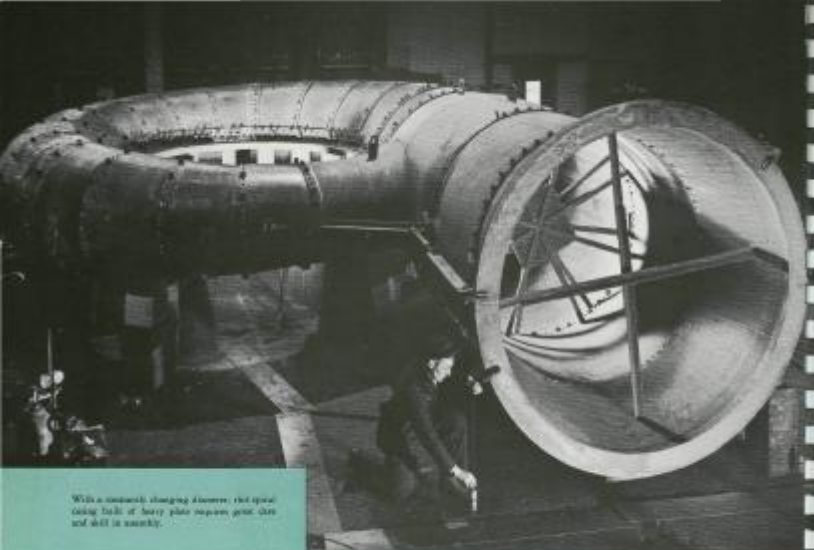


(Above) A job requiring great care is the building of the controls on this press as it turns the flange on an Adams-on furnace section.

(Left) Forging this particular plate is no effort for this 200-ton juggler, which is capable of much more strenuous effort.

Built in our own shops for welding heavy structural assemblies for machines, this large positioning table makes it possible to stress better construction of side frames for Speculators and shovels.





With a constantly changing diameter, the spiral casing built of heavy plate requires great care and skill in assembly.

Bushman Fabricating Works



EQUIPMENT

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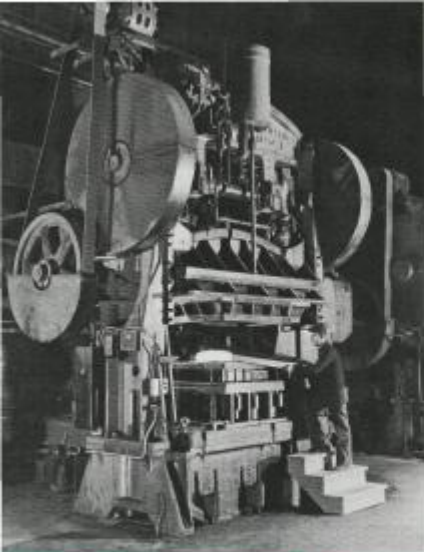
General view of Paint Shop

McClure Equipment Works



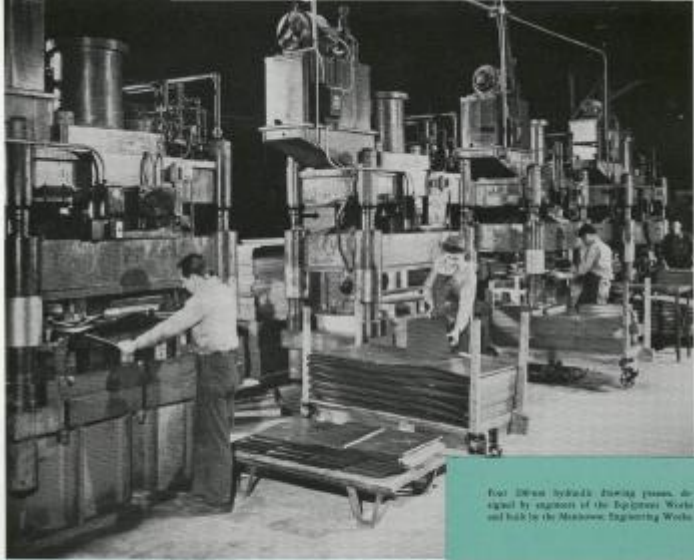
Holding schematische für Sch-Zern

Monteview Equipment Works

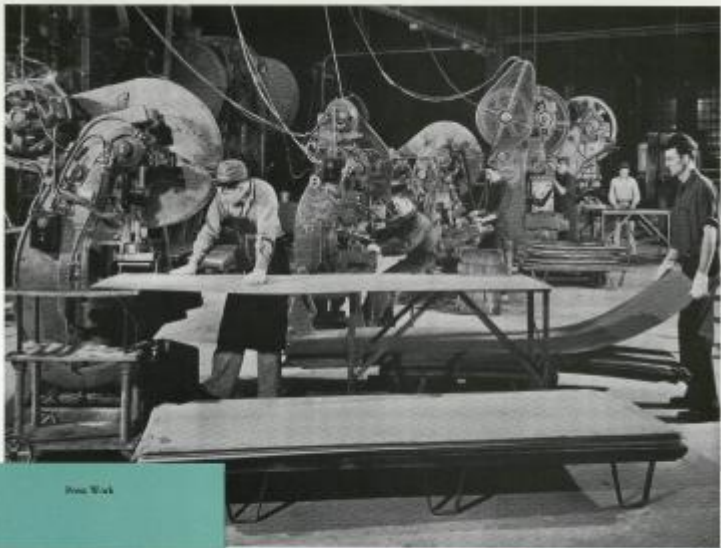


(Above): Drawing a Sch-Zero compressor component part on large press.

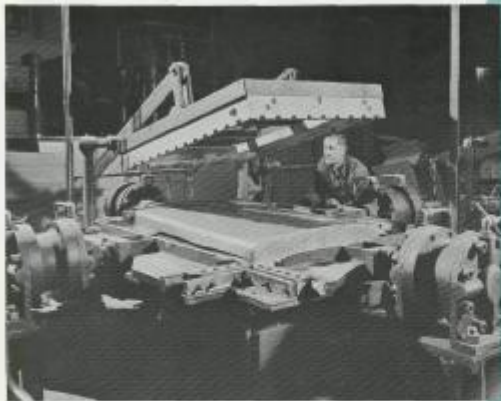
[[Left]: Door for Sch-Zero cabinet being drawn.



Four 150-ton hydraulic drawing presses, designed by engineers of the Equipment Works and built by the Machine Engineering Works.



Iron Work



(Above) Special hydraulic reshoring and lashing machine for Sub-Zero crane doors.

(Right, top and bottom) Hydraulic jacks bending machine for Sub-Zero crane shell.





Testing rebar rods in tank



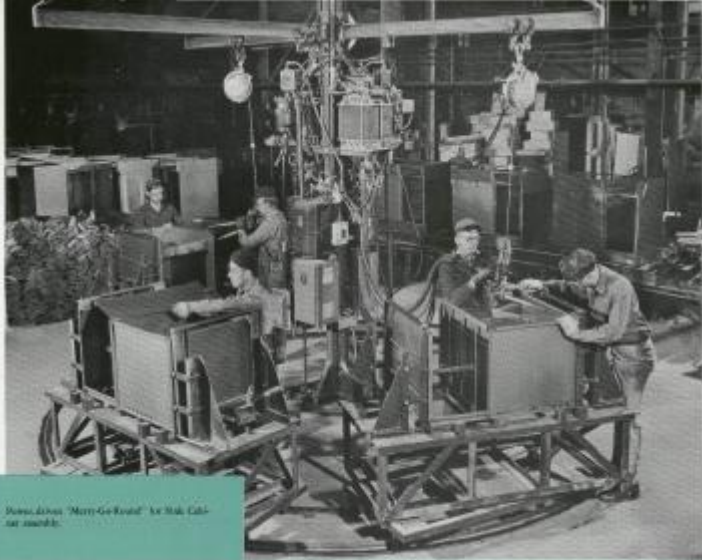
Spot welding head frames inner jacket.



Flange notching operation on Sub-Zero wrapper shell.



Spot welding back on Sub-Zero inner jacket.

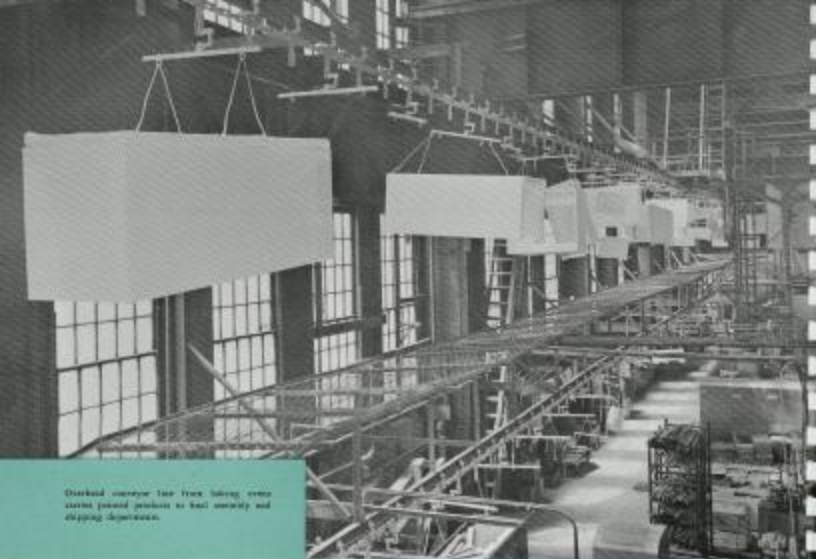


Down below "Merry-Go-Round" for Main Cabinet assembly.

PAINT SPRAYING

After passing through the "bonding" bath for rust proofing and descaling, the steel are ready for painting as they pass through the spray booth on the way to baking ovens.





Overhead conveyors take from fabricating areas
various finished products to final assembly and
shipping departments.



ASSEMBLY LINE

Collect them the trim is installed, doors and drawers fitted, and the cabinet made ready for leaving the assembly.

Check Engineering for stock.



Air-conditioned ready-to-ship trailers in final assembly line where trim and fittings are added to units and final finish and inspection made prior to shipment.



MANUFACTURING

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Sub-Zero with drawer arrangement.



Sub-Zero lined with plastic doors to shelves.



Below: Sub-Zero refrigerators under 24 hour test.

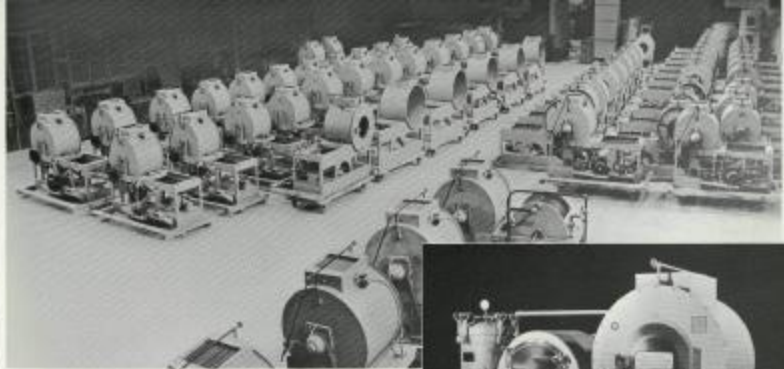
Left: Interior of dual temperature Sub-Zero cabinet.



(Above) Tumbler developed for dry cleaning plants



(Right) Famous Blue and Pink Mercury Cleaners



(Above) Assembly line of Mercury Counters

(Right) A Mercury Counter is shown ready for shipment. These counters are used extensively in counting establishments





1



2



3

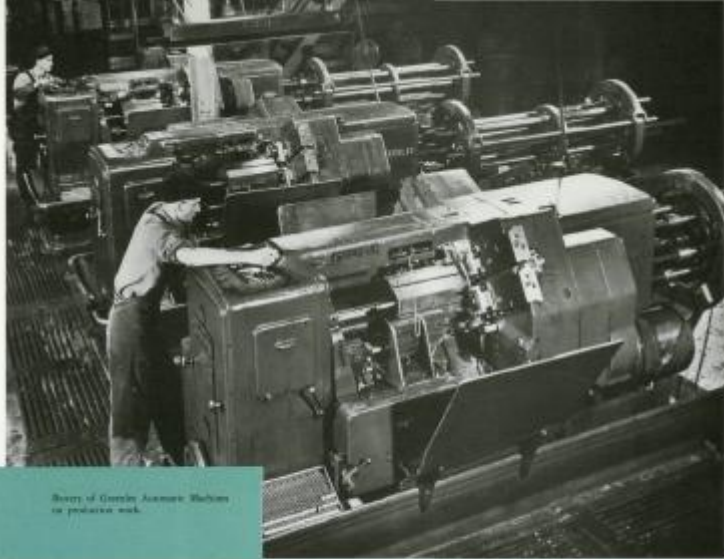


5

STEPS IN ASSEMBLY OF A DISPLAY CABINET

The inner and outer shells of display cabinets are shipped from the Equipment Division for assembly and completion by the Manufacturing Division. (1) Sheet bearing refrigeration coils on display cabinets. (2) The inner case is being lowered into the outer shell after the space between the two shells has been filled with insulating material. (3) Refrigeration units are being installed and connected up. In (4), on opposite page, the completed units are undergoing tests. (5, above) A unit shown in service with display board complete.





Row of Greenley Automatic Machines
in production work.



Highway Accessory Machine at work



Placing is being used in a large extent in manufactured products to improve appearance, to retain moisture and heat, and to reduce food processing machinery down sanitary. These views show screens in our placing plant.





(Above) Buffing or polishing plating racks.



(Left) Removing a rack of fingers from Chlorine Plating Bath.



Afterword

During the war years we expended every effort in the production of submarines for Uncle Sam. Today, while many of our activities have been directed into civilian lines, no essential change has been made in our organizational facilities that will permit a return to submarine or other such construction should the need arise.

We have attempted, in this book, to tell our story—a pictorial record of what we have done and what we can do. No pictures of officers, leaders, or workers have been shown—less recognition be given to some and not to others. The men and women who work and have worked here have contributed enormously to our story. We hope it will be a satisfaction to them to see the results of their efforts.





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