



25th Anniversary of
powerfax

WINTER 1948

PUBLISHED BY ELLIOTT COMPANY

CRIMDEBN00000235

SC-ETM-1477



At the special request of Santa Claus, our Design and Production Departments whipped up the above miracle machine. Typical of the supersonic age, its first assignment is to turn out the old, old wish for all POWERFAX readers,

MERRY CHRISTMAS

powerfax

25th

ANNIVERSARY

ELLIOTT COMPANY'S METALLURGICAL AND CHEMICAL LABORATORIES.....	4
CORN BELT POWER (Generators and Turbochargers).....	7
EJECTOR INSTALLATION TIPS (Discharge Lines).....	8
IMPROVING A STAPLE FOOD (Converted Rice, Inc.).....	9
IN AUSTRALIA.....	13
FIVE TURBOCHARGED DIESELS (New Bern, N. C.).....	14
GASOLINE PLANT TURBINES.....	14
RENOVATION OF HOPE NATURAL GAS COMPANY COMPRESSOR STATIONS.....	16
INSTALLING A DEAERATING HEATER.....	21
GENERATORS AND TURBINES IN TWO NEW SHELL OIL PLANTS.....	22
SYNCHRONOUS MOTORS AT PLYMOUTH OIL.....	22
NEW RESERVOIR AND PUMPING STATION FEATURE LIMA WATER WORKS EXPANSION.....	24
COKE OVEN GAS EXHAUSTERS (National Tube Company).....	26
GENERATORS AT GRAND HAVEN.....	27
MODERN SUGAR FACTORY IN IMPERIAL VALLEY (Holly Sugar).....	28
EJECTORS FOR DEODORIZING MARGARINE AND SHORTENING.....	30
POWERCRAK.....	31

● M. A. King formerly manager of engineering, has rejoined the Elliott Company as engineering vice president, Jeannette Division. With Elliott for 27 years, he was executive engineer for the turbine division of Worthington Pump & Machinery Corporation for the past five years. He joined the Kerr Turbine Company of Wellsville, N. Y., following graduation from the Univer-



sity of Michigan in 1916. Elliott purchased Kerr in 1923, made King chief engineer in 1924. He became turbine manager at Jeannette in 1932. In 1941 he was appointed manager of engineering for the company.

● J. D. Willcox, Jr. became Elliott Company district manager at Houston, Texas, November 1. Mr. Willcox came with the Elliott Company immediately upon graduating in electrical engineering from Cornell in 1935. After completing the sales training course, he was assigned to the Atlanta office where he has been ever since, with the exception of three years during the war when he served as an officer in the U. S. Navy.



• 3 •

Copyright, 1948, Elliott Company, Jeannette, Pa.

Published by Elliott Company... POWERFAX is a magazine of information for engineers and operators of steam and electric power plants, or in charge of industrial processes. More than 30,000 copies are distributed quarterly with the compliments of Elliott Company to its customers and friends. Address correspondence regarding POWERFAX to C. W. Kalbfus, Editor, Elliott Company, Jeannette, Pa.

WINTER, 1948
VOLUME XXVI
NUMBER 4

● now legal

The Elliott Company's trademark monogram, shown here, which has been used for the past 40 years, has now been registered as a trademark in the United States Patent Office for use in connection with all Elliott products.



contents
editorial

● front cover

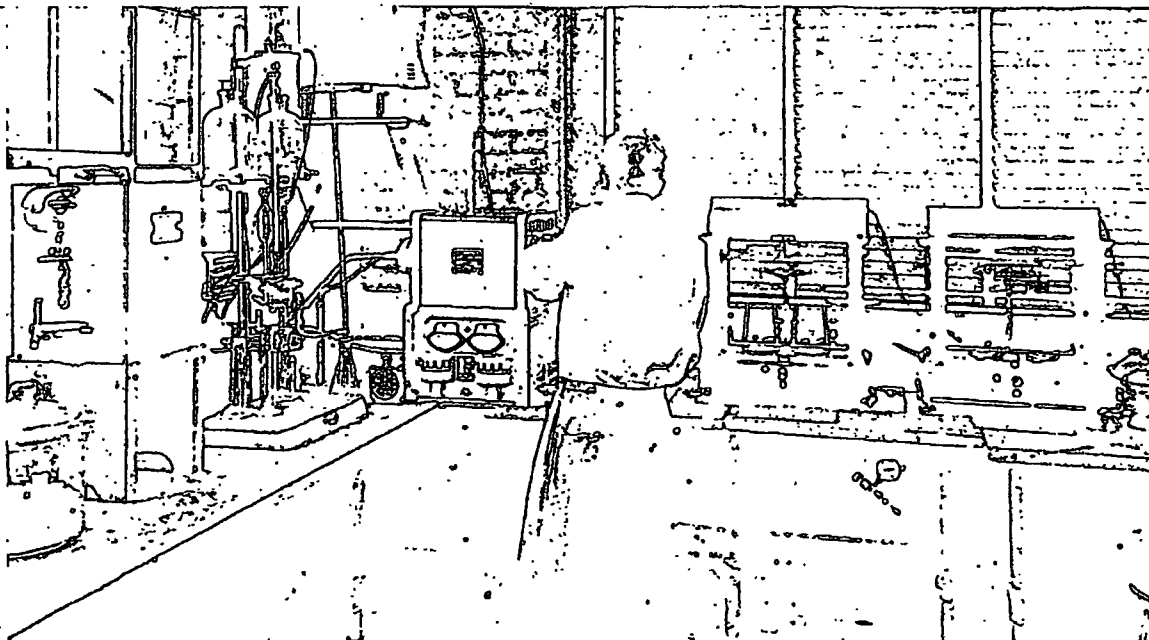
The last three Powerfax covers have depicted industries such as petroleum, power, and chemical. This time we symbolize the Elliott Company plants which are serving these and other industries. And, of course, the men and women of the Elliott plants at this Christmas season send you greetings.

● DEMA meeting

More than 70 college professors and representatives of Diesel engine manufacturers attended an all-day meeting at Elliott Company's Jeannette plant on November 9. The meeting was sponsored by the Educational Division of the Diesel Engine Manufacturers Association. Professors represented the University of Pittsburgh, West Virginia University, Ohio State University, Williamsport Technical Institute, Carnegie Institute of Technology, Bucknell University, and the Pennsylvania State College.

Discussions covered turbocharger design, application and metallurgy, research activities. Inspection trips were made through the Elliott shops, laboratories, and research departments.

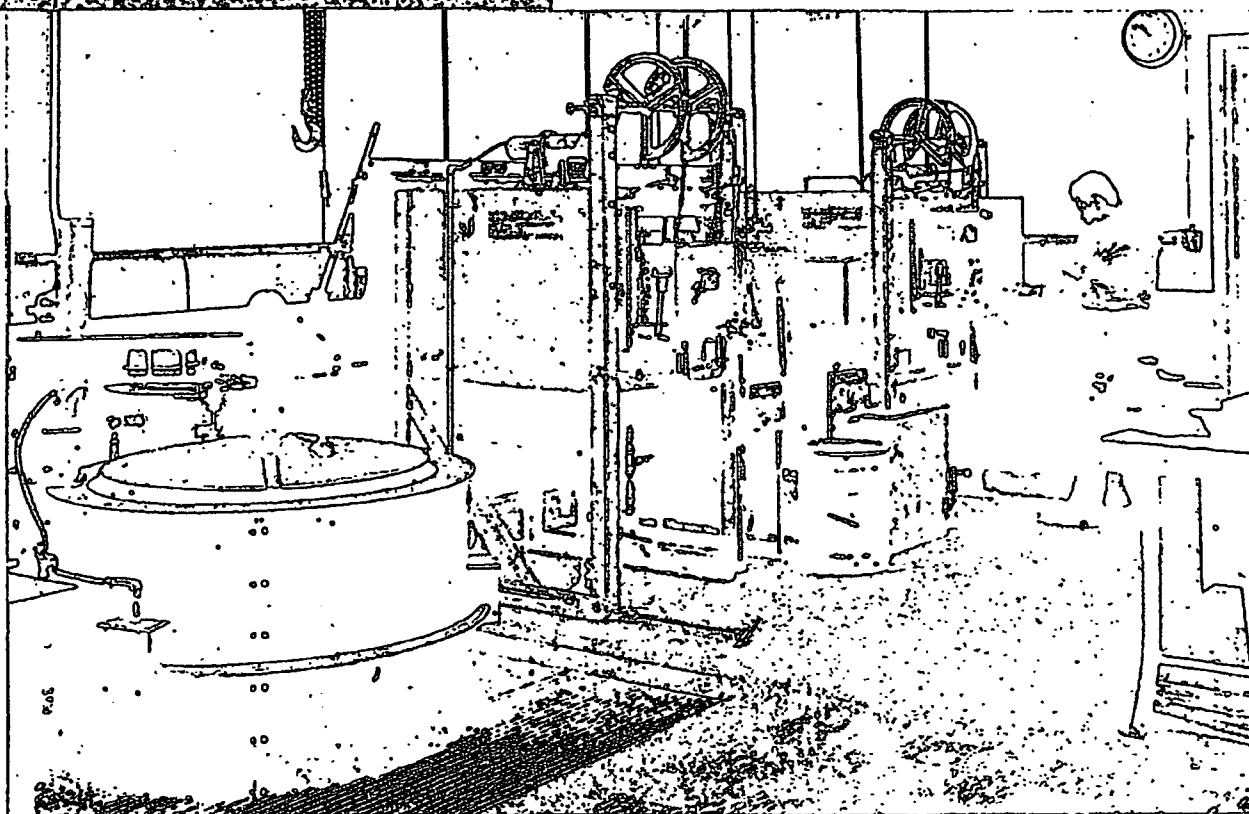
CRIMDEBN00000237



Elliott Company's metallurgical and chemical laboratories

by C. LEVANS, Jr., Chief Metallurgist

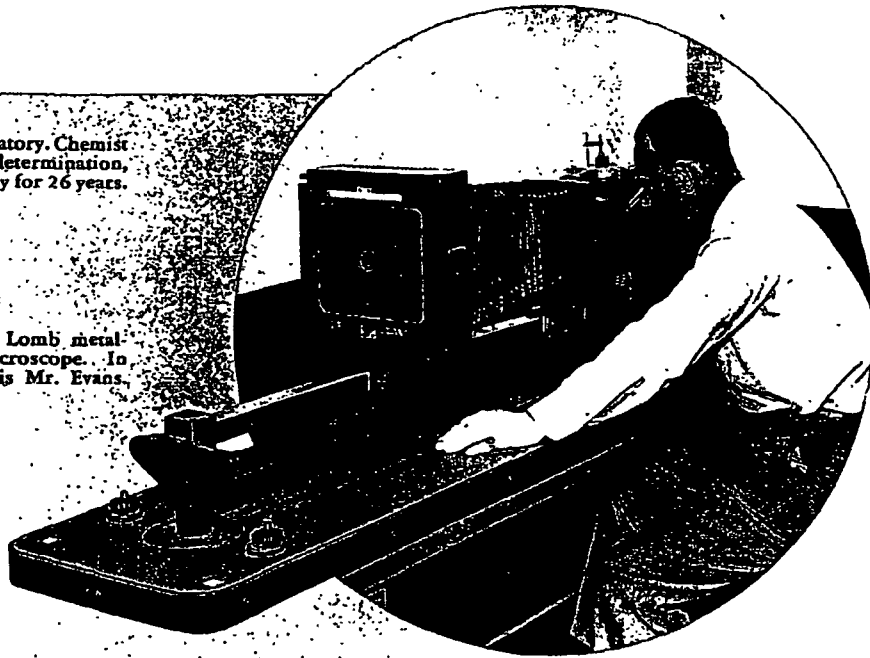
○ Although Elliott Company's chemical laboratory dates back to 1920, it was only three years ago that the company decided to put in its own metallurgical laboratories instead of having such work done by commercial laboratories or in the laboratories of suppliers. Space was found adjacent to the chemical laboratory and equipment was installed so that Elliott Company can now boast one of the best equipped metallurgical and chemical laboratories in the country. The department has three metallurgical engineers, three chemists, two welding



CRIMDEBN00000238

Left—A corner of the chemical laboratory. Chemist J. L. Trout, shown making carbon determination, has been on the job with the company for 26 years.

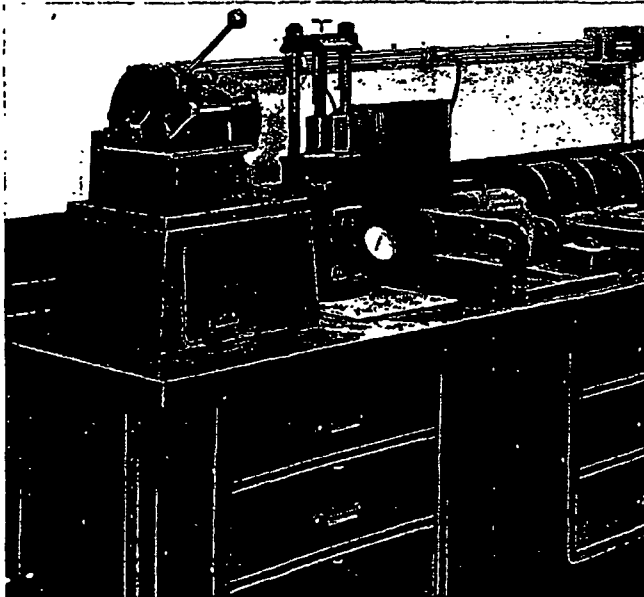
Bausch and Lomb metallurgical microscope. In the picture is Mr. Evans.



engineers, a special inspector, and a secretary, for a total staff of ten people.

The photographs reproduced here show the major equipment, but items which could not be readily photographed include: fatigue testing equipment for both room-temperature and high-temperature testing, impact tester, a special frame for testing long-time strength of low-temperature solders, galling test apparatus, salt spray corrosion test

Equipment for cutting, mounting, and polishing specimens preparatory to metallographic examination.



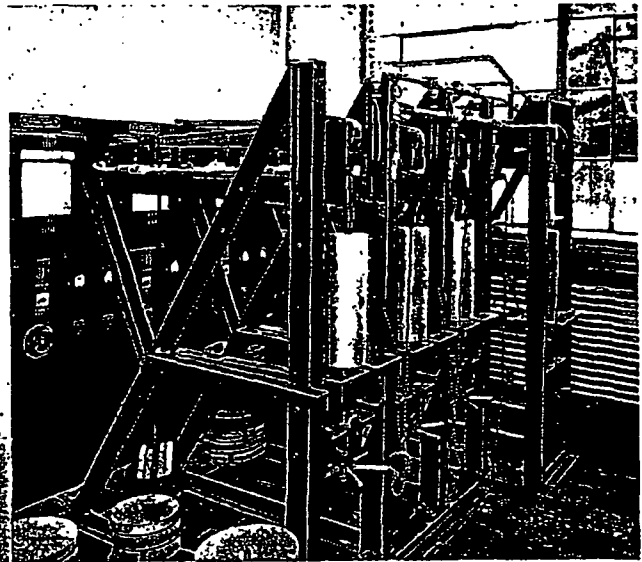
Heat-treating equipment.

cabinet, and foundry sand control testing equipment. A darkroom is also included in the layout, and a viewer for X-rays and radiographs has been provided.

The metallurgical department operates essentially as a staff function, serving all plants of the company.

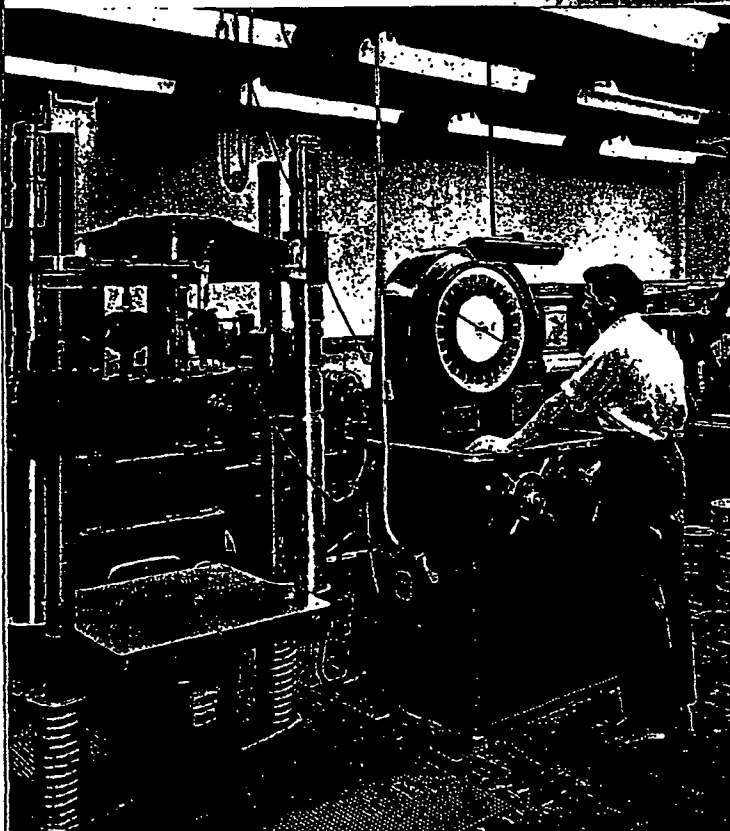
All incoming raw material of a critical nature receives chemical and physical testing against specification before it is released for production. Foundry control, heat-treating problems and practices, and welding problems constitute a major portion of the department's activities. But fundamental research is carried out on high-temperature materials for gas turbines and, at the other end of the scale, on low-temperature materials for oxygen plants.

One of the department's most vital activities concerns the investigation of field troubles. It is often possible to make recommendations which will eliminate trouble entirely or greatly prolong the life of equipment. In such cases, the user can be of real assistance in giving us as complete a service history as is possible.



High temperature creep and stress rupture furnaces for long-time high-temperature testing.

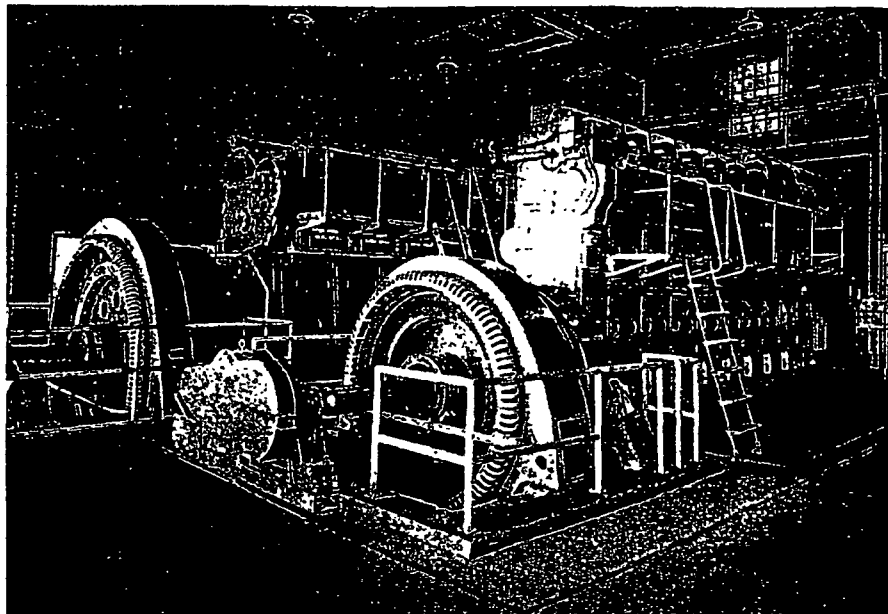
The Baldwin 120,000-lb hydraulic tensile testing machine. It is also equipped for short-time high-temperature testing.



Brinell and Rockwell hardness-testing equipment.

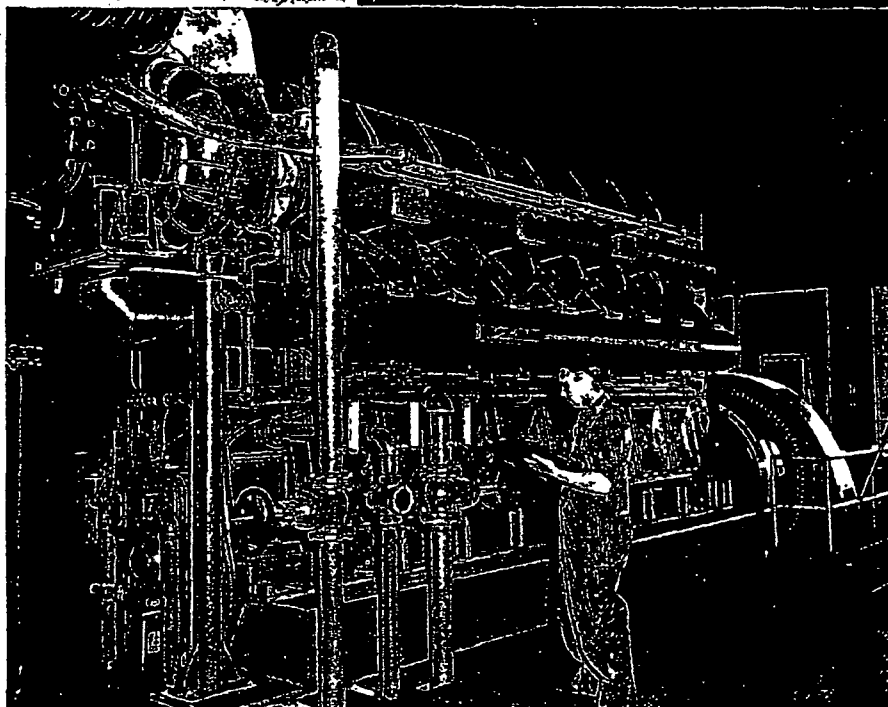


Shown at right, Elliott 1600-kw and 1000-kw generators driven by General Machinery Company and National Superior four-cycle Diesel engines in Galbraith, Iowa, plant of Corn Belt Power Cooperative.



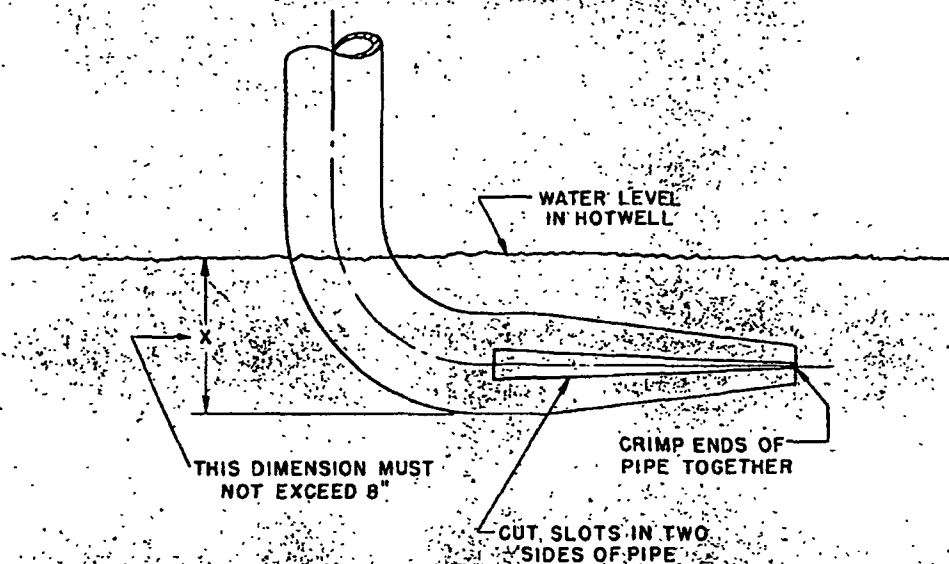
● The Summer issue of *Powerfax* carried a story entitled "Power Encircles 'The Little Brown Church.'" It was illustrated by exterior and interior views of the Butler plant of the Corn Belt Power Cooperative at Plainfield, Iowa. The two photographs reproduced herewith show the interior of the Galbraith station, another of the various plants in this Cooperative. Elliott generators serve the two engines which consist of a General Machinery Company 1600-kw, 240-rpm engine and a National Superior 1000-kw, 360-rpm engine. The latter engine is equipped with an Elliott-Buchi turbocharger.

Corn Belt power



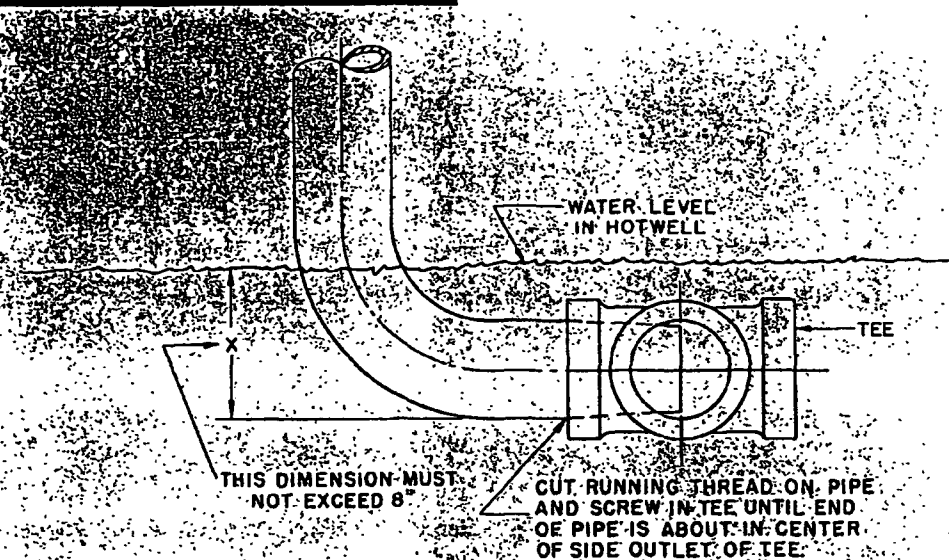
An Elliott-Buchi turbocharger serves the 1000-kw National Superior engine in the Galbraith Station, and the engine drives an Elliott alternating-current generator.

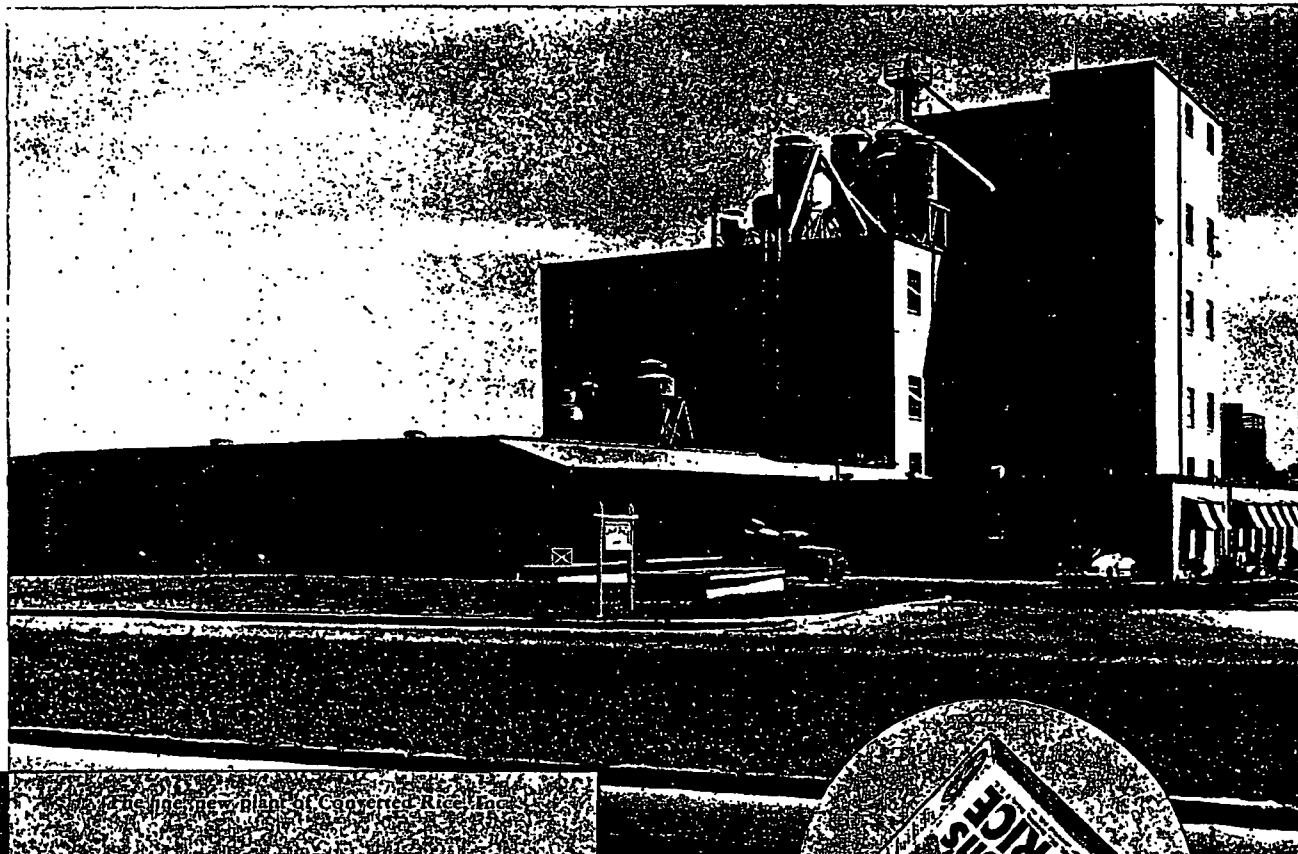
ejector installation tips



DISCHARGE LINES

- To reduce greatly the rumbling and water splattering that sometimes occurs when the exhaust steam line from the discharge of a single-stage ejector (or the last stage of a multi-stage ejector) is submerged the maximum permissible distance of 8 in. or less, below the highest level of the water in a hotwell, use either of the arrangements illustrated.





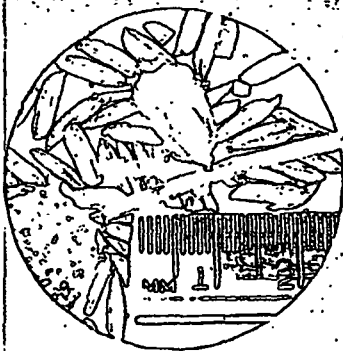
improving a Staple Food



● Rice, the world's No. 1 grain in productiveness and the basic food of a good part of the world is not too popular in the United States. Only eight of the 48 states eat much rice and these states are in the South where the grain is grown. Nevertheless, prior to the War, some fourteen million barrels of rice were marketed from U. S. production and nine million barrels were consumed in this country. Present day figures show a U. S. production of nearly twenty million barrels with domestic consumption amounting to nearly thirteen million barrels.

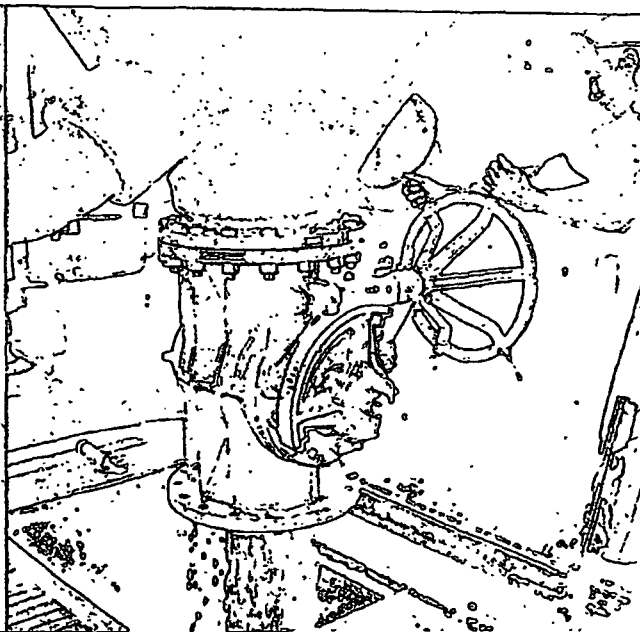
Gordon Harwell, of Houston, Texas (now presi-

dent of Converted Rice, Inc.), set himself the task of improving rice for more popular acceptance throughout this country. In order to do this, it was recognized that it would be necessary to overcome some of the more unfavorable characteristics of rice such as the tendency to become gummy in cooking. Lack of uniformity in color, flavor, and vitamin content were also noted as disadvantages in addition to the susceptibility of rice to weevil attack. After about ten years of experimentation and study, a process in use in London, England, came to his attention. Following some investigation, a license was obtained

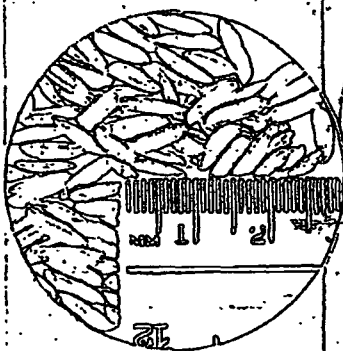


Rough rice as received from the field showing straw, broken kernels, foreign grains, and other impurities.

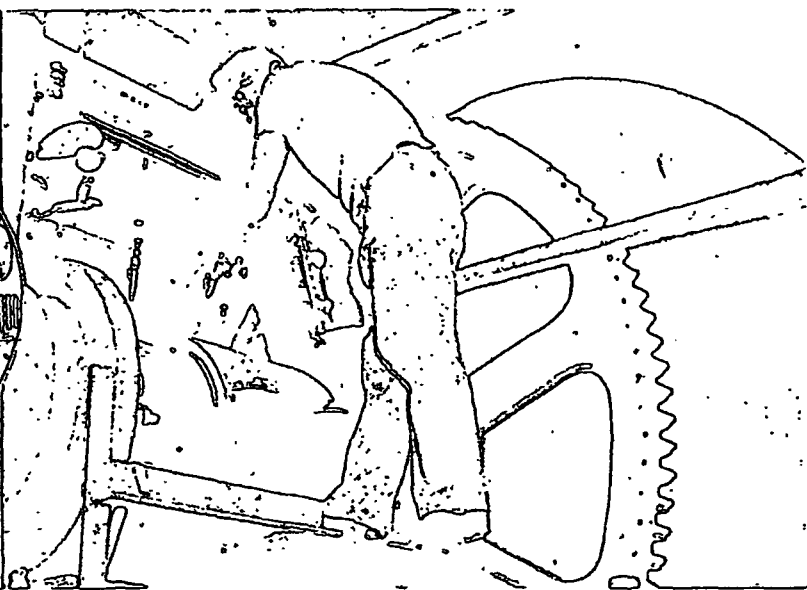
Rice flowing from steeping tank to the rotating steamer located immediately below it.



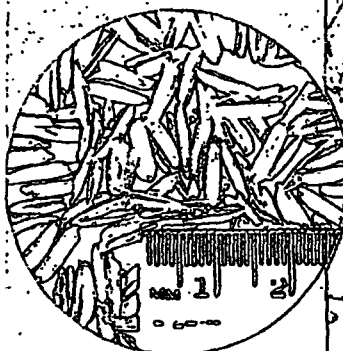
Rotating, steaming vessels where final process operation is performed.



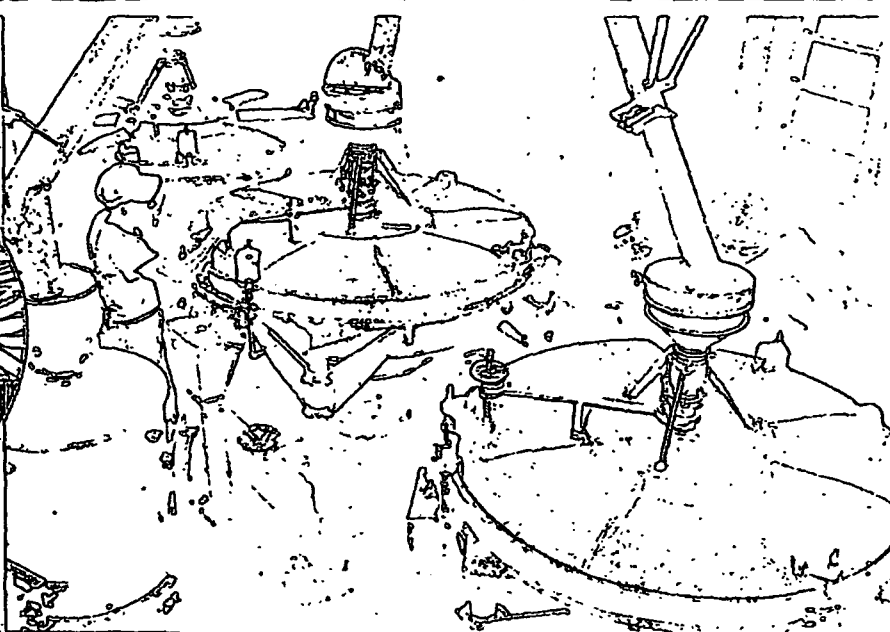
Cleaned rice ready for processing. In addition to foreign matter, broken rice kernels have also been removed.

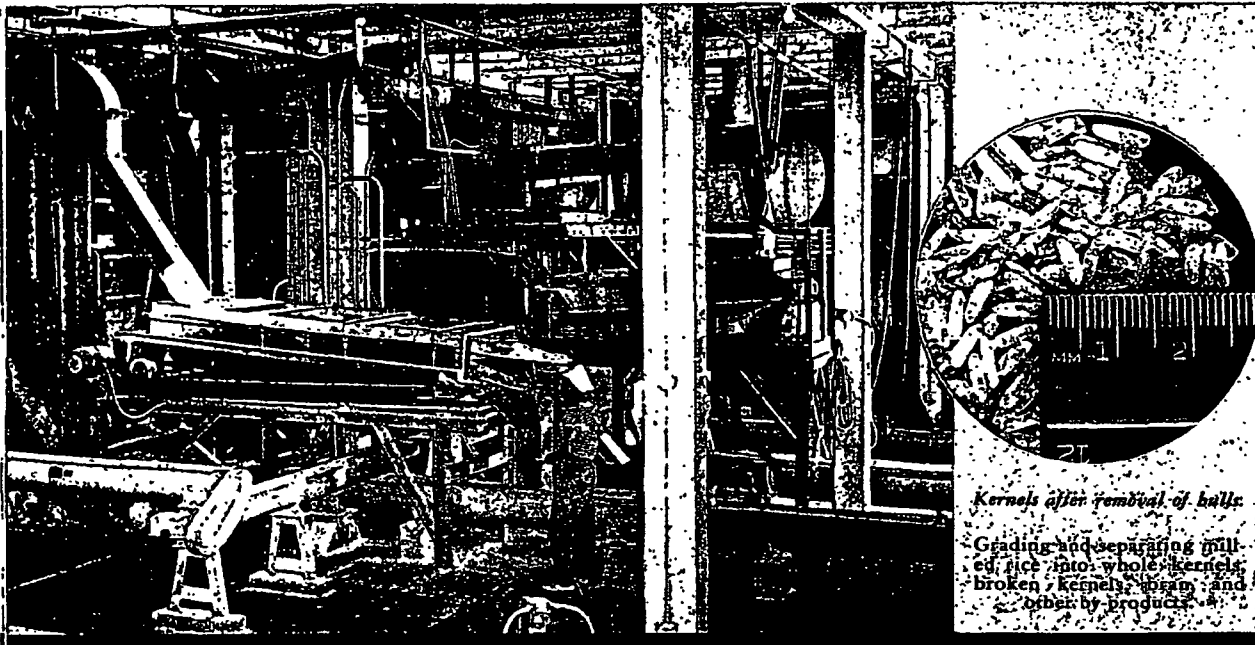


Mills which remove hulls and bran and polish rice kernels after processing.



Hulls removed by milling stone.





and immediately afterwards he started to build a manufacturing plant in Houston, Texas. Ten months later, October, 1942, the first shipment of Converted Rice was loaded.

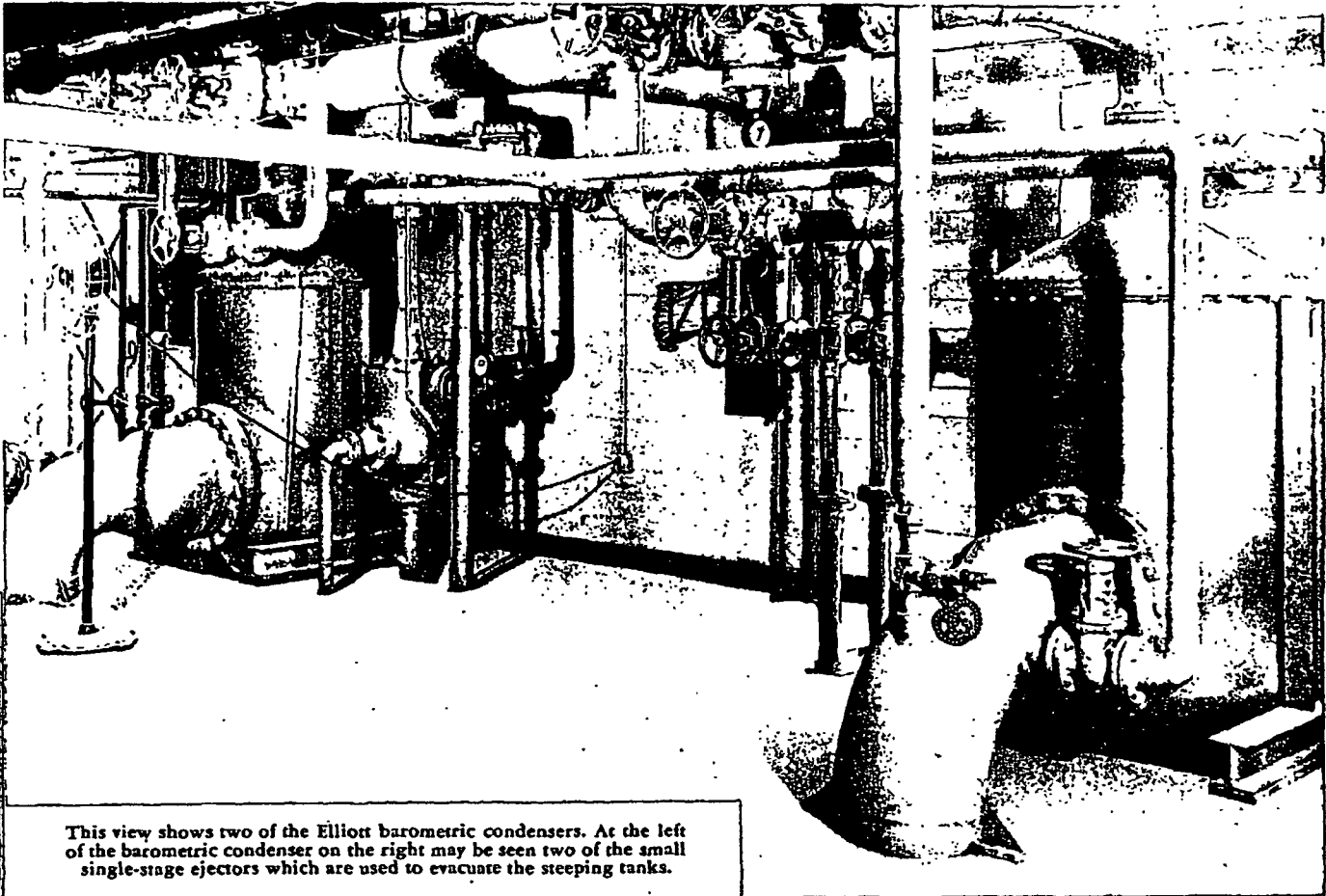
It was thus that Converted Rice, Inc. of Houston, Texas, in the best tradition of American business, started a new enterprise in the interest of marked improvements in one of the world's basic foods. The new rice is translucent in color, impervious to weevils, of optimum vitamin content, and no longer has a tendency to become sticky in cooking.

The new process soon came to the attention of the Army Quartermaster Corps. As untold millions of dollars' worth of rice have been lost annually to weevil attack, especially during warm months, the Quartermaster Corps was principally interested in

the keeping qualities of the new rice. This one important characteristic, together with the other advantages, resulted in the total output of the plant going to the Armed Forces during the war years. A large percentage still goes to them, but packages are finding their way to grocers' shelves in increasing quantities.

The Houston firm's process consists of several steps. From an overhead hopper, rice is charged into the steeping tank. Then a vacuum of 13 to 17 in. Hg, referred to a 30 in. barometer, is established by means of two Elliott single-stage ejectors. Hot water is then injected into the steeping tank until the water is above the rice. Air pressure is then applied in the vapor space above the hot water level to force water into each rice kernel. The water



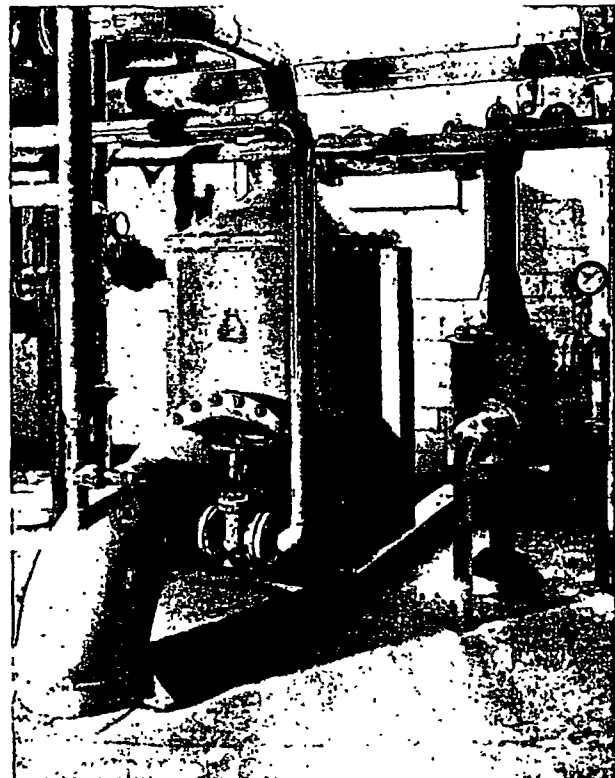


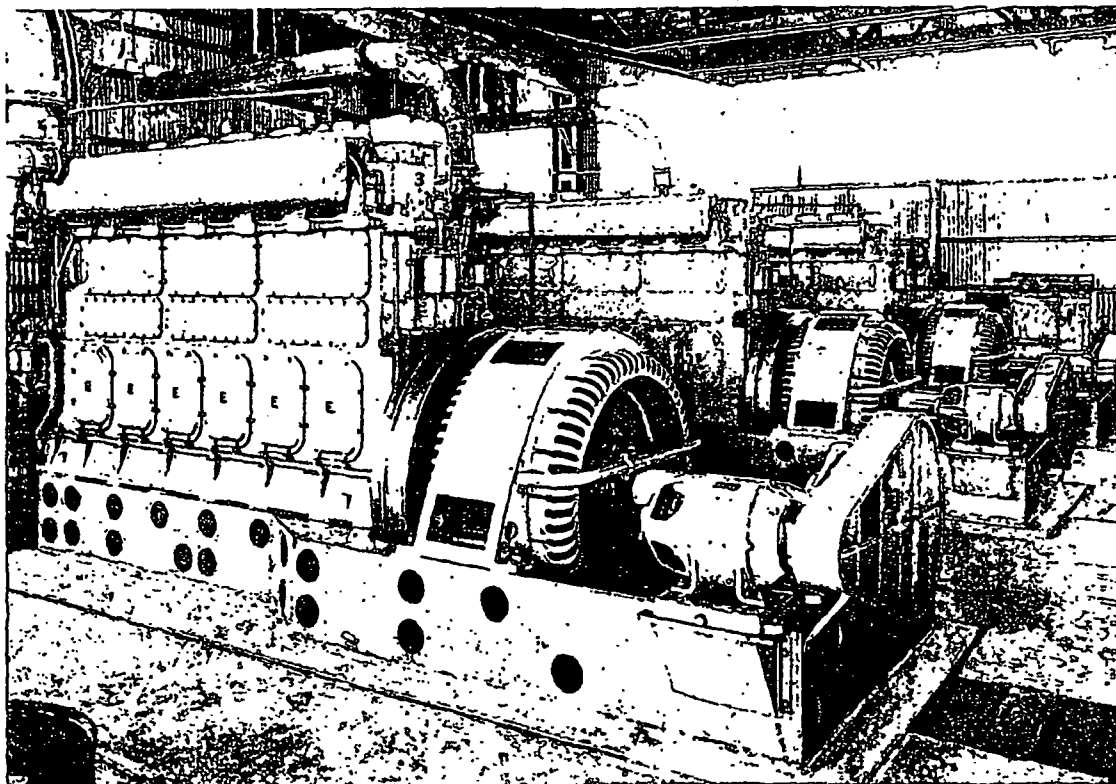
This view shows two of the Elliott barometric condensers. At the left of the barometric condenser on the right may be seen two of the small single-stage ejectors which are used to evacuate the steeping tanks.

carries with it into the grain a high percentage of the water-soluble vitamin complex ordinarily lost in usual milling methods. Following some ten minutes under this condition, the air and water are released. The wet rice is then dropped through a large valve in the bottom of the steeping tank to a rotating steamer immediately below. In the steamer the starches are gelatinized and flavor and minerals are heat-sealed into the grains. After some five minutes under a pressure of approximately 12 psig, the steam is released to atmosphere, and the vapor line from the steamer is switched to an Elliott barometric condenser and two-stage ejector. These establish a vacuum of 28 in. Hg referred, in some 25 to 28 minutes. After establishing this vacuum, steam is admitted to tubes inside the steamer to further dehydrate the rice. Approximately two to two-and-one-half hours are required to complete the process.

The rice is then dried and milled, including a polishing operation. The hard, highly polished surface achieved makes the grain impervious to weevil attack, a very desirable improvement.

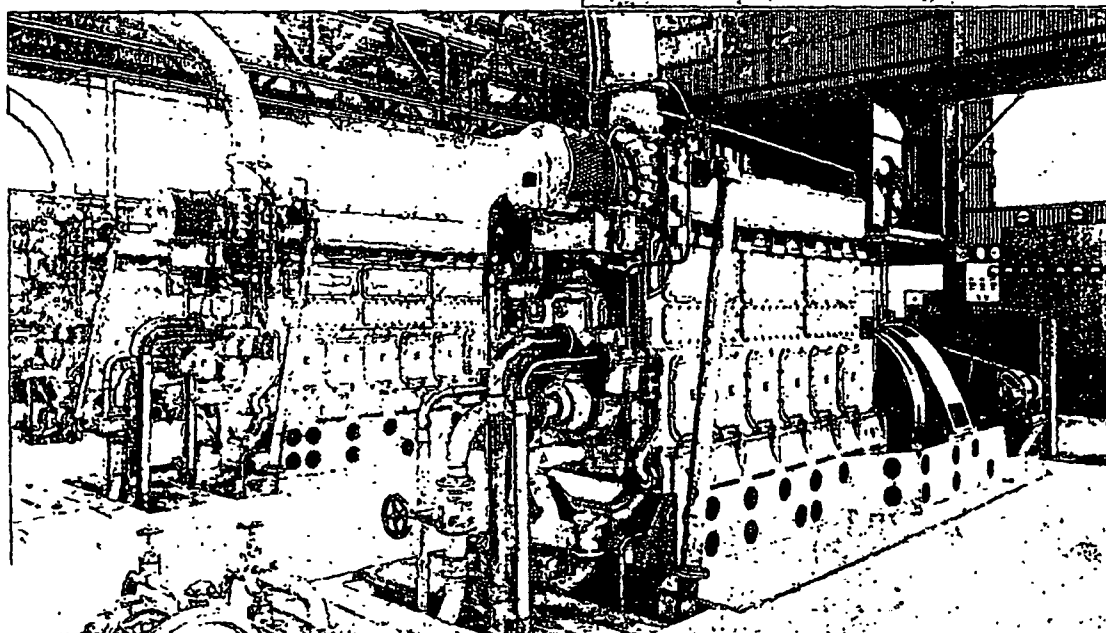
Below—Close-up of one of the barometric condensers with the two-stage condensing ejector which serves it at the right. At left the two small single-stage ejectors may be seen.





● The photographs show three Enterprise 400-kw, six-cylinder, four-cycle Diesel engines direct-connected to Elliott alternating-current generators with belt-driven exciters, turning out electric power for The Zinc Corporation, Ltd., Broken Hill, N.S.W., Australia. The engines are also equipped with Elliott-Buchi turbochargers. A shop view of one of these units was shown in the Autumn 1947 *Powerfax*. The units are semiportable.

in Australia



CRIMDEBN00000247

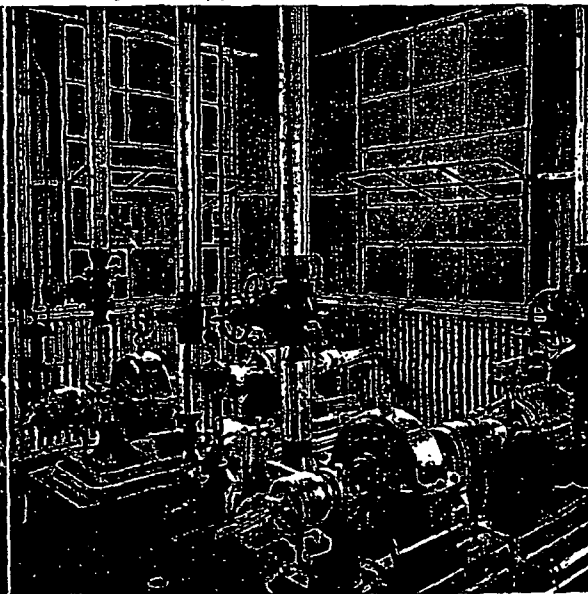
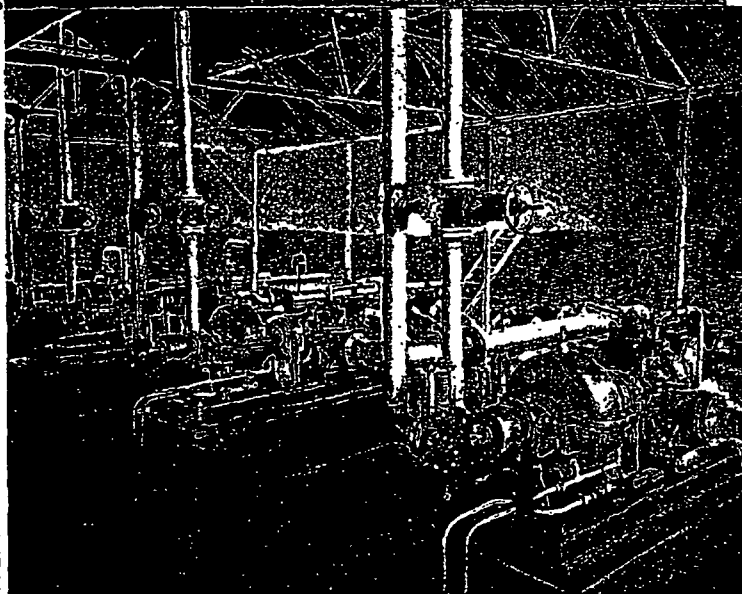


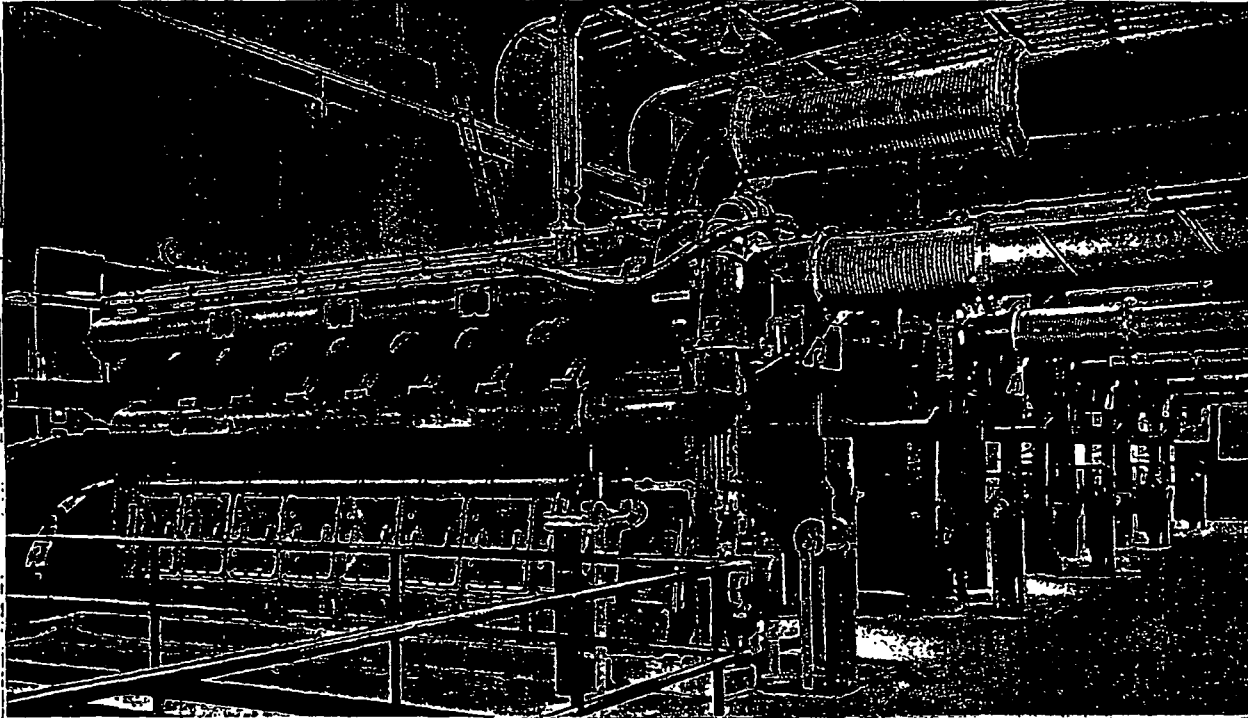
five turbocharged Diesels



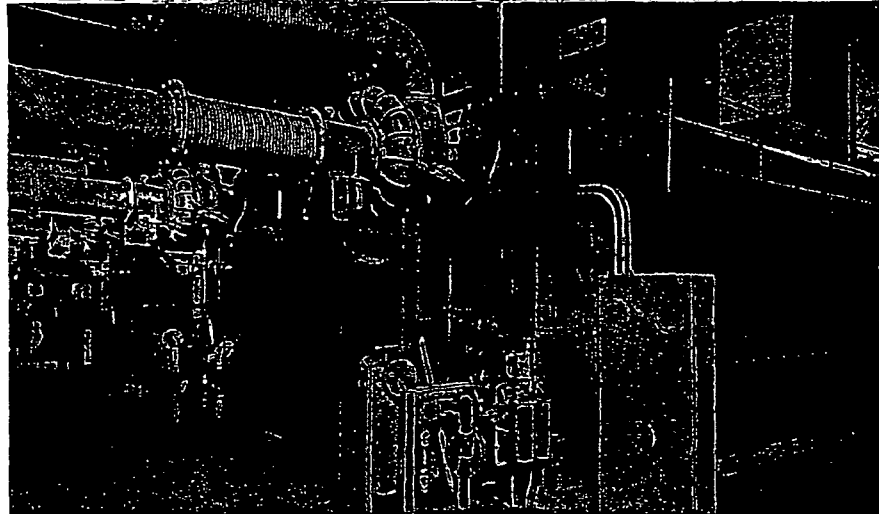
gasoline plant turbines

● The photographs below show five Elliott turbines driving loading and water circulating pumps in the natural gasoline cycling plant of Barnsdall Oil Company, located at Benton, La. This plant processes 50 million cubic feet of natural gas per day





The Elliott-Buchi turbochargers on the five Diesel engines shown on both views on this page are highlighted in the view at the right. The power plant structure is shown at the top of the opposite page.



● A fine looking line of Elliott-Buchi turbocharged Diesels—five identical units in a brand new station—is this installation at the city of New Bern, N. C. The city recently decided to “go Diesel” and installed five 8-cylinder, 1440-hp, 360-rpm, $14\frac{1}{2} \times 20$ in., four-cycle National Superior engines equipped with Elliott-Buchi turbochargers, driving 1000-kw, alternating-current generators.

The power plant is housed in a new building of

colonial architecture. In addition to the engine room, there are offices and a large basement housing the lubricating oil tanks, oil reclaimers, compressors, air storage tank, and a bank of storage batteries. The engine room is large enough to accommodate an additional Diesel-electric power unit.

The city of New Bern, population 20,000, is located near the Atlantic Coast and has owned and operated its own power plant for more than 40 years.

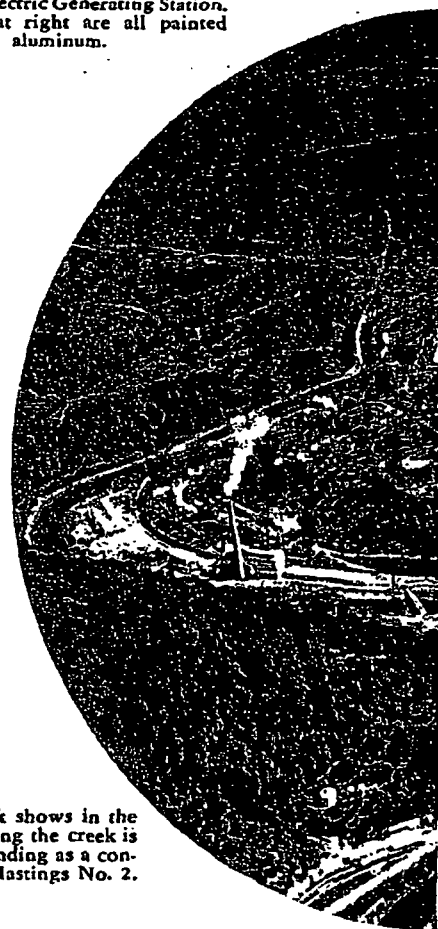


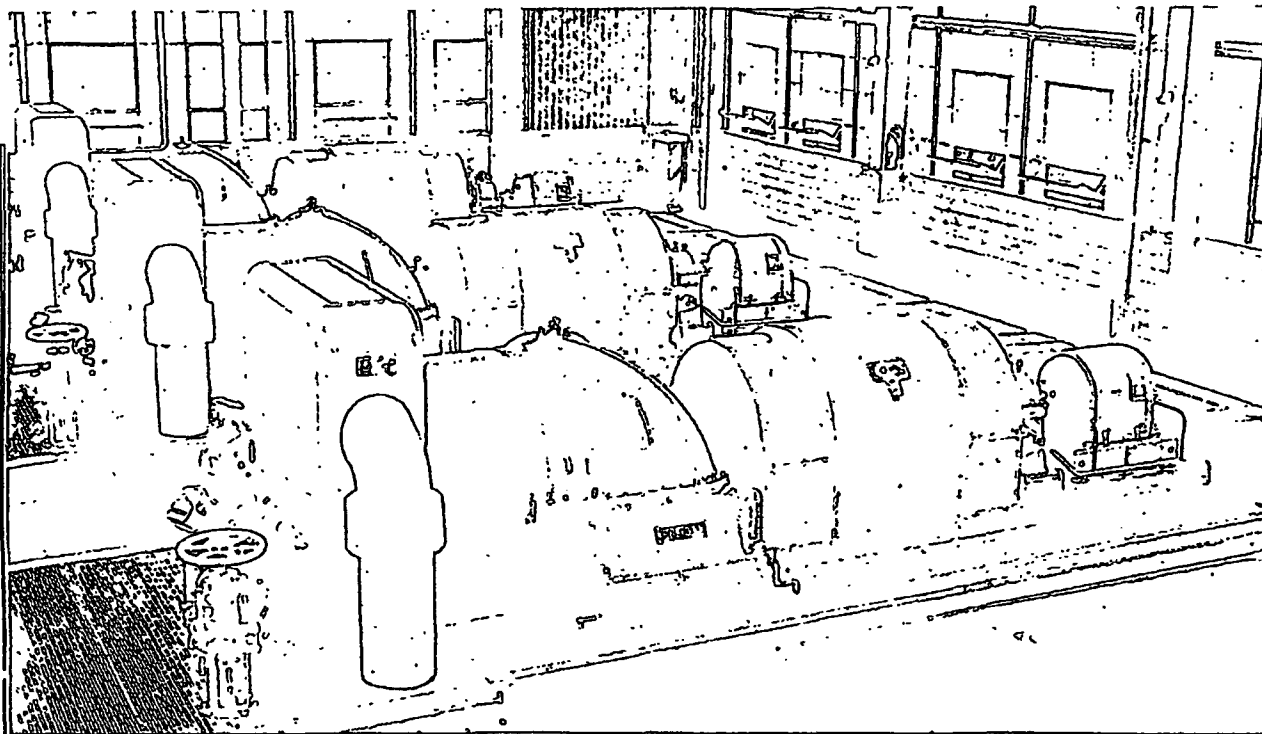
renovation of Hope Natural Gas Company Compressor Stations

The New Electric Generating Station.
Gas lines at right are all painted
aluminum.

● This year marked the 50th anniversary of the Hope Natural Gas Company, whose headquarters are located in Clarksburg, W. Va. Very appropriately the Company has just completed an expansion program in which its plant facilities have been more than doubled within the past eight years. Beginning 50 years ago with a small number of oil and gas leases in Marshall and Wetzel Counties, five or six gas wells, several miles of line and a few customers, the Company now has a plant investment of more than \$100,000,000; owns gas leases totaling 1,234,951 acres, operates 3301 active gas wells in 35 counties of West Virginia, operates 53 compressing stations with a total capacity of 135,625 hp, owns 5509 mi. of pipe line, produces approximately 40,000,000 gal of gasoline and by-products yearly, has 3026 mi. of telephone wire, 27 radio cars, and seven land stations, uses 204 trucks and 128 cars, purchases gas under 391 gas purchase contracts. It employs 2220 people.

This aerial view down the valley of Fishing Creek shows in the foreground the Natural Gasoline Plant. Next, along the creek is Hastings No. 1 with its 275-ft concrete stack standing as a conspicuous landmark. Farther down the valley is Hastings No. 2.



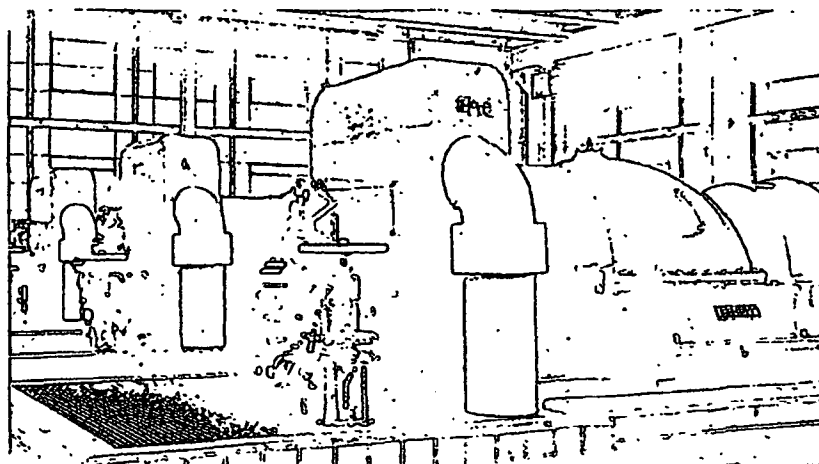


The three Elliott 1500-kw turbine-generator units as seen from the switchboard. Generator units are painted vista green, tops of foundations tile red to match the floor. Operating room ceiling and walls are cascade blue.

The three turbine-generator units as seen from the generator end. Balustrade shows stairway from the condenser basement.



Close-up of the turbines.



CRIMDEBN00000251

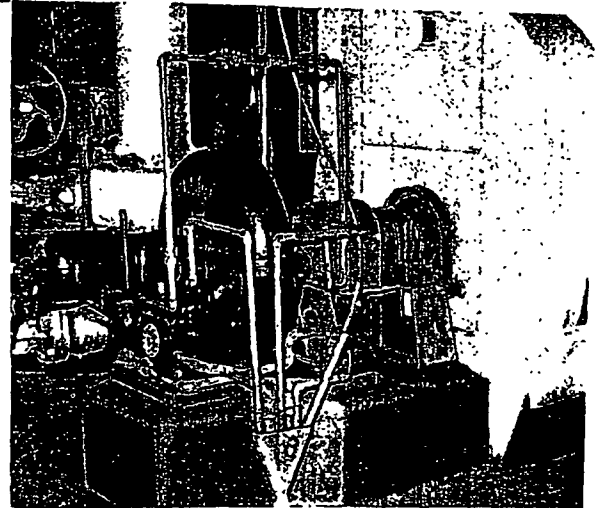
Elliott turbines driving forced and induced-draft fans, and a coal pulverizer and primary air fan connected together by a V-belt (middle one of the three views).

This story will be confined to the Hastings compressor stations of the company, which during 50th Anniversary week in September, stood resplendent in colorful paint for the inspection of company officials. The No. 1 compressor station had just been completely rebuilt with new equipment, new buildings, and new landscaping. Exterior piping showed up in aluminum and interiors of the compressor house, pump house, and electrical plant gleamed in dynamic colors—green, red, and yellow.

When the Hope Natural Gas Company was formed in 1898, its trunk line system consisted principally of one 10-in. line which ran from Hastings, to Akron, Ohio. It was one of the first lines carrying gas in interstate commerce. This line, which remained in service until 1919, required no compression, as the gas produced was delivered by natural well pressure.

By 1902 the "Akron 10-in.," as it was called, had proved so successful that an 18-in. line was laid from Hastings station into the city of Cleveland. As the natural well pressure was not sufficient to carry the gas to Cleveland, a compressing station was built. This was the start of the Hastings station.

The original two 4500-hp twin-tandem gas engines ran successfully for ten years when they were cut in two to make four single-tandem engines, which continued to operate for 43 years, or until replaced by newer type engines in our recent program.

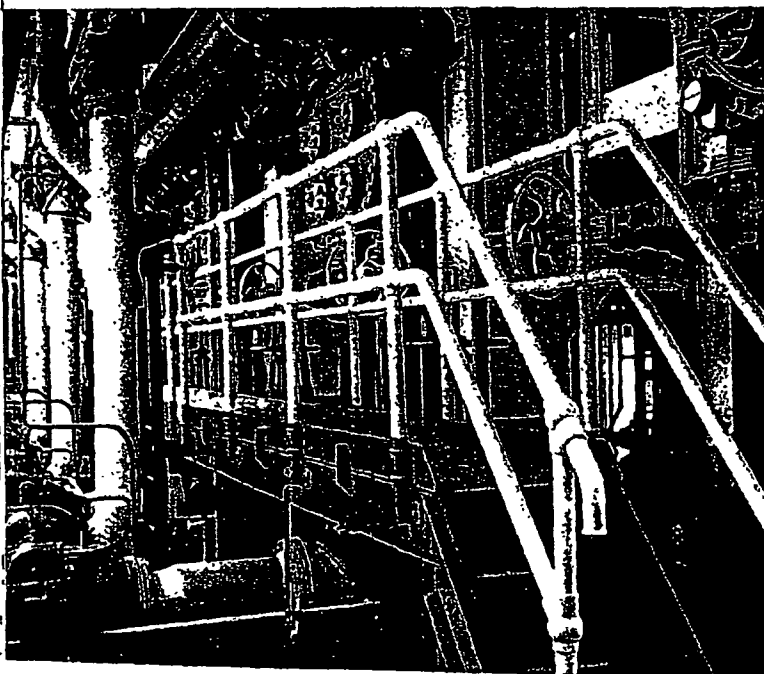


By 1906 it was necessary to lay another 18-in. line. This required the first large increase in size of the Hastings station which involved nine steam-engine-driven gas compressors rated at 1350 hp each. To furnish steam for these engines, twelve 385-hp gas-fired steam boilers were installed. These engines ran for 40 years when they were torn out to make room for the new Hastings station.

In 1912 the demands of the market called for another 20-in. pipe line from Hastings to Cleveland. A 3350-hp, low-pressure steam turbine was installed to drive through reduction gears two reciprocating compressors, the turbine taking steam at one pound pressure from the exhaust of two of the engines.

World War I again increased the demand for gas and another 20-in. line was laid from Hastings to Cleveland, four new 415-hp boilers were added, and to conserve gas for sale it was decided to change the

A view of the condenser floor including three Elliott 2500-sq ft condensers. The three circulating pumps shown at the left are driven by Elliott steam turbines. Right—The water box end of one of the Elliott 2500-sq ft condensers with its twin two-stage ejector shown at the left.





boiler fuel to coal. For a while coal was obtained on the Hastings property but later had to be purchased.

In 1930 a completely new boiler house was built containing three stoker-fired 80,000-lb-per-hr boilers, with all necessary boiler auxiliaries.

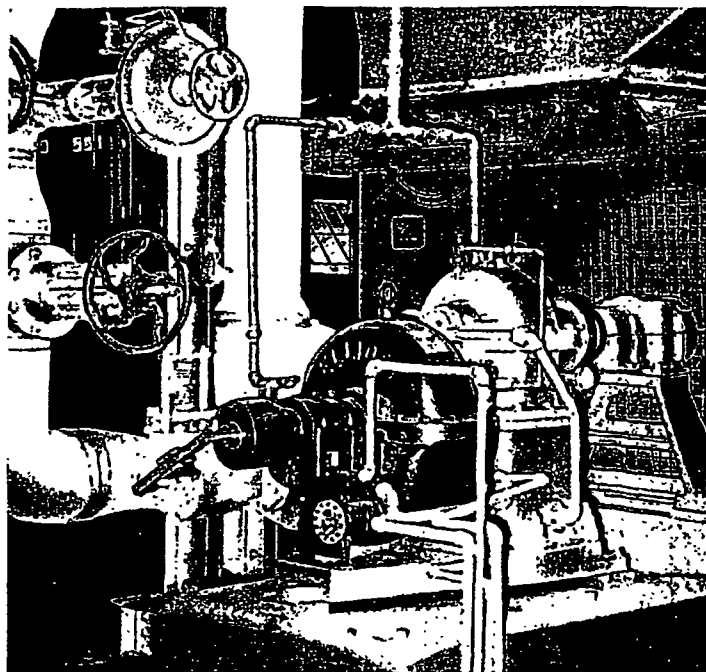
In 1926 a No. 2 compressor plant was built a quarter of a mile away from the No. 1 station. In this plant was installed four 2000-hp steam-engine-driven compressors as well as four 25,000-lb-per-hr steam boilers. The No. 2 plant had its own electric and water supply and was intended to be an independent plant, although discharging gas to the same pipe line system as No. 1 plant.

In 1940 a new 100,000 lb-per-hr powdered coal boiler was installed in No. 1 plant.

In 1944 it was decided to supply New York State Natural Gas Company directly from Hastings by laying a high-pressure 12-in. pipe line from Hastings to Clarion County, Pa., a distance of 144 miles. This line was designed for 1300-psi operating pressure and two 2000-hp steam-engine compressors were added to the No. 2 plant along with another 80,000-lb-per-hr powdered-coal-fired boiler.

In 1946 a new 1300-psi line was laid to the East Ohio Gas Company.

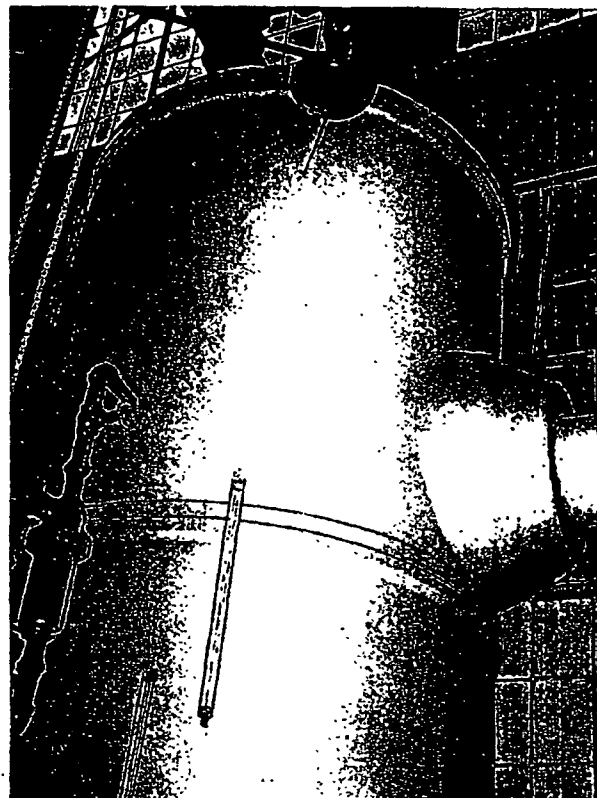
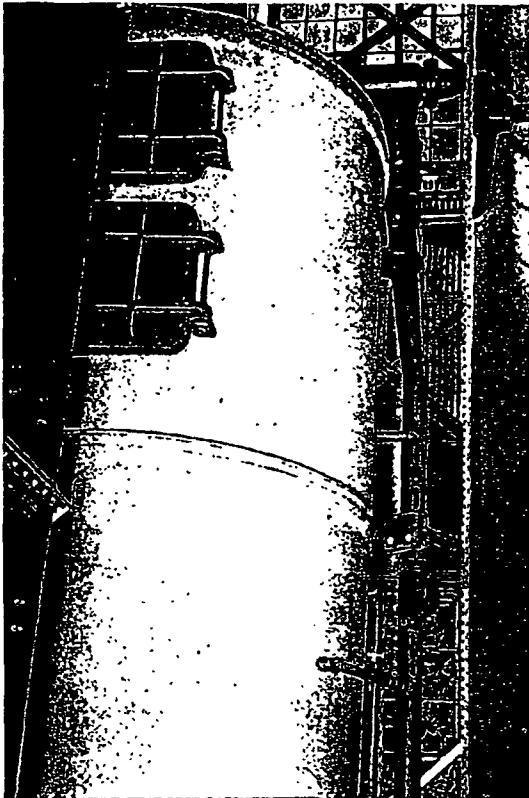
Completely new compressor and electric generating stations at Plant No. 1 have recently been put into operation. Designed by the Company's engineering department, to the exact requirements of the stations, these plants incorporate excellent equipment, well arranged, and painted in the latest dynamic color scheme, on the theory that operating personnel will be inspired to take best care of such equipment. The No. 1 compressor plant now consists of seven 2000-hp, two 800-hp, and one 500-hp engines, making a total of 16,100 hp. No. 2 plant contains eight 2000-hp engines, making a total compressor capacity of 32,100 hp. To supply



steam for these engines a new 125,000-lb-per-hr boiler was added to the No. 1 plant and an 80,000-lb-per-hr boiler to the No. 2 plant. New water cooling towers were added, additions made to the boiler water treating plant, and many other improvements.

To serve the electrical requirements of both stations a new electric generating plant was built. The site chosen for it was formerly occupied by the boiler house. The concrete foundations of the old boilers had to be blasted out before construction could begin. The three Elliott 1500-kw turbine-generator units are supplied with steam at 175 psi from the boiler house approximately 100 ft away. There is a bleeder connection on each turbine to supply low-pressure heating steam when needed. The turbines are served by three Elliott 2500-sq ft condensers and auxiliary equipment. Circulating water pumps are 3000 gpm each and discharge into a header permitting any pump to service any condenser. The electricity which is generated in the plant at 2400 volts, 3 phase, 60 cycles, is distributed at this voltage and, through transformers, at 480 volts, to a load consisting of motor-driven auxiliaries in the boiler house and in both compressor stations, various large motors, such as five 200-hp motors in the water pumping house, the motors in the gasoline plant and the lighting load.

The generator building, 78 ft x 44 ft, is of rigid frame construction with brick facing and glazed tile interior up to the second floor window sills, with transite siding above. The building is designed so that it can be extended and an additional tur-



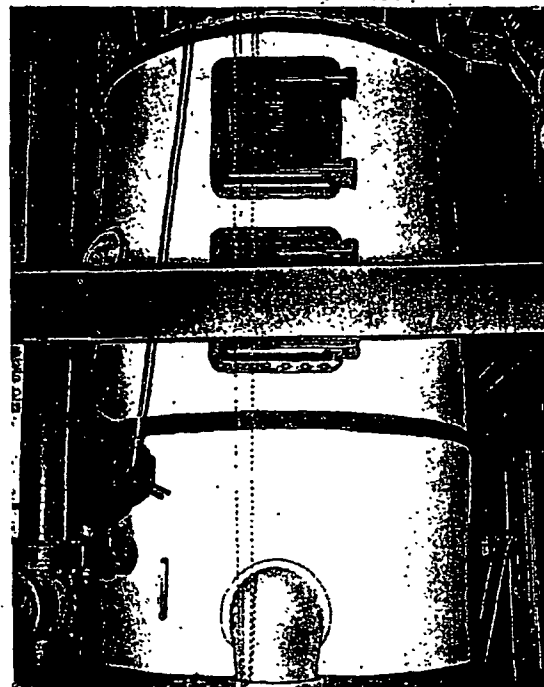
bine-generator unit may be installed when needed.

As a part of the same program, the natural gasoline plant on the outlet of the station was completely rebuilt. It is now an ultramodern gasoline and petroleum by-products plant, capable of turning out under peak load flows of over 150,000 gal per day of gasoline, butane, propane, and ethane. At the same time, the dehydration plant on the outlet of the gasoline plant was enlarged so that all gas going into the distribution lines is thoroughly dry.

It has been necessary to build a complete community to house part of the men who run the plant, as there is no large town within 20 miles of Hastings. So with the plant itself has grown up a community of about 67 houses, complete with its own water, gas, electric, ice, and sewage systems. Normal operations at Hastings regularly require about 175 men. During the recent construction work a camp housed more than 200 employees.

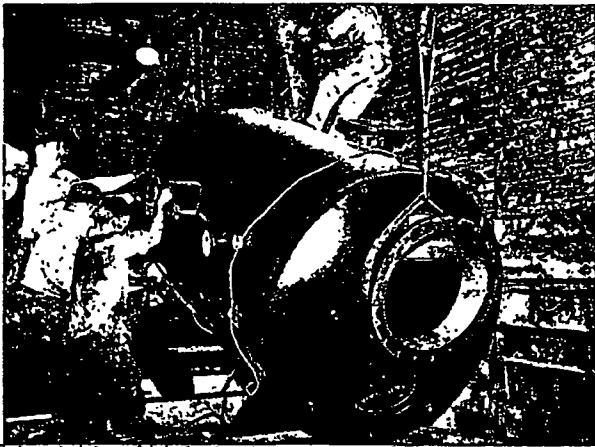
The final result of all this expansion program is a station almost completely rebuilt since 1940, with No. 1 plant discharging into the older pipe line system at 400 psi pressure and No. 2 plant discharging into the new high-pressure line system at 1300 psi. In spite of this increase the new plant has fewer buildings than the old plant and from all angles is more modern and efficient.

In the boiler plant are three Elliott 375,000-lb-per-hr deaerating feedwater heaters. These units were installed at various times during the expansion of the boiler plant, the latest one going in last year.



● The photographs show how an Elliott 100,000-lb-per-hr horizontal deaerating feedwater heater was manipulated in through a window to replace an older heater in the plant of the Western Massachusetts Electric Company, Pittsfield, Mass.

This company, organized in 1906, operated for a few years as a Diesel plant. In 1910 they installed two boilers and a 750-kw turbine-generator unit. In 1913, a 1000-kw turbine-generator unit was added, and in 1917 a 2500-kw unit and additional steam generating capacity. In 1922, a 5000-kw condensing turbine-generator was added and is still available for service to supplement power generation capacity at other stations in the system.

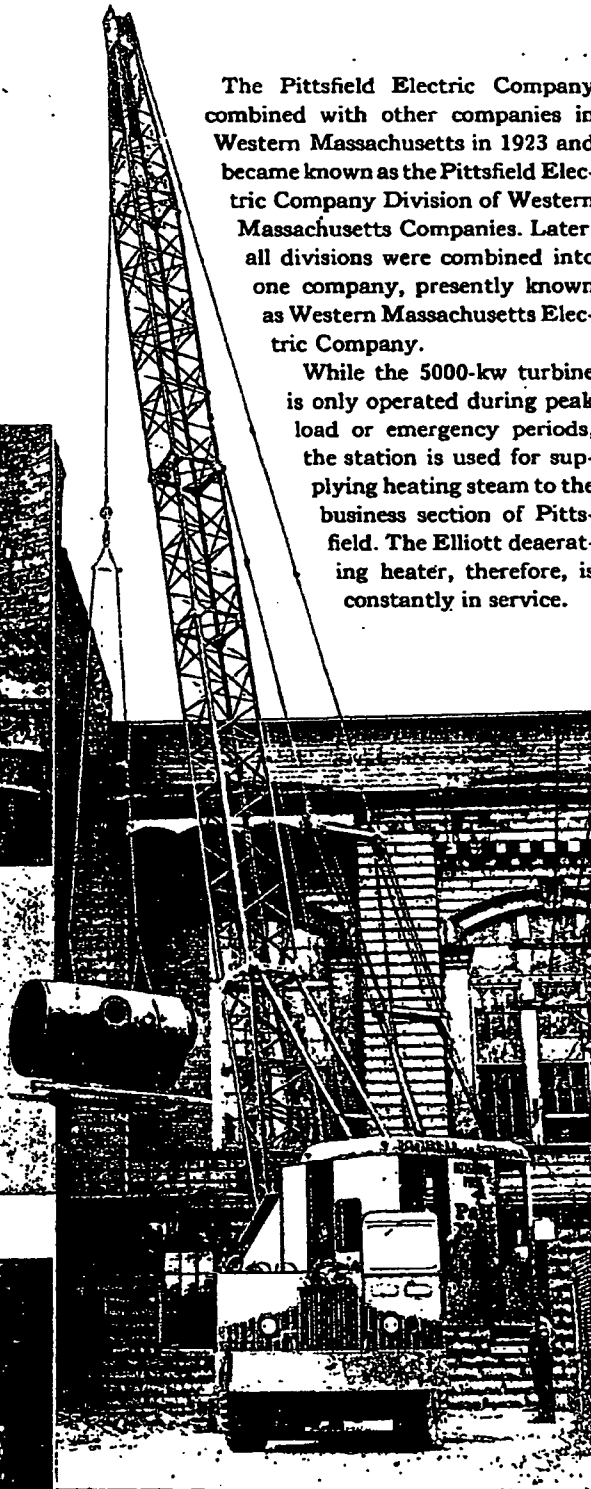


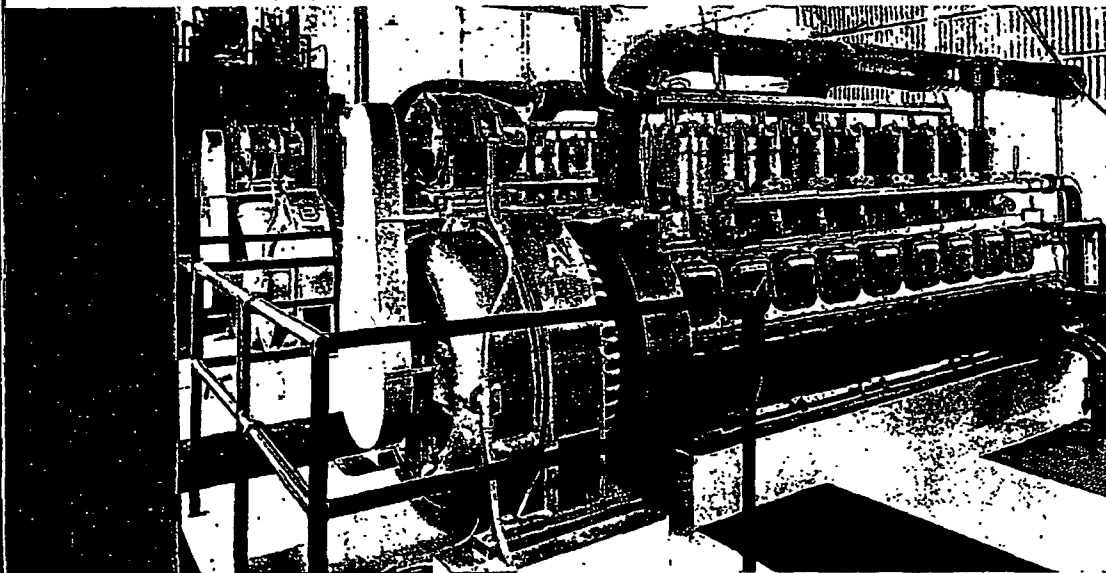
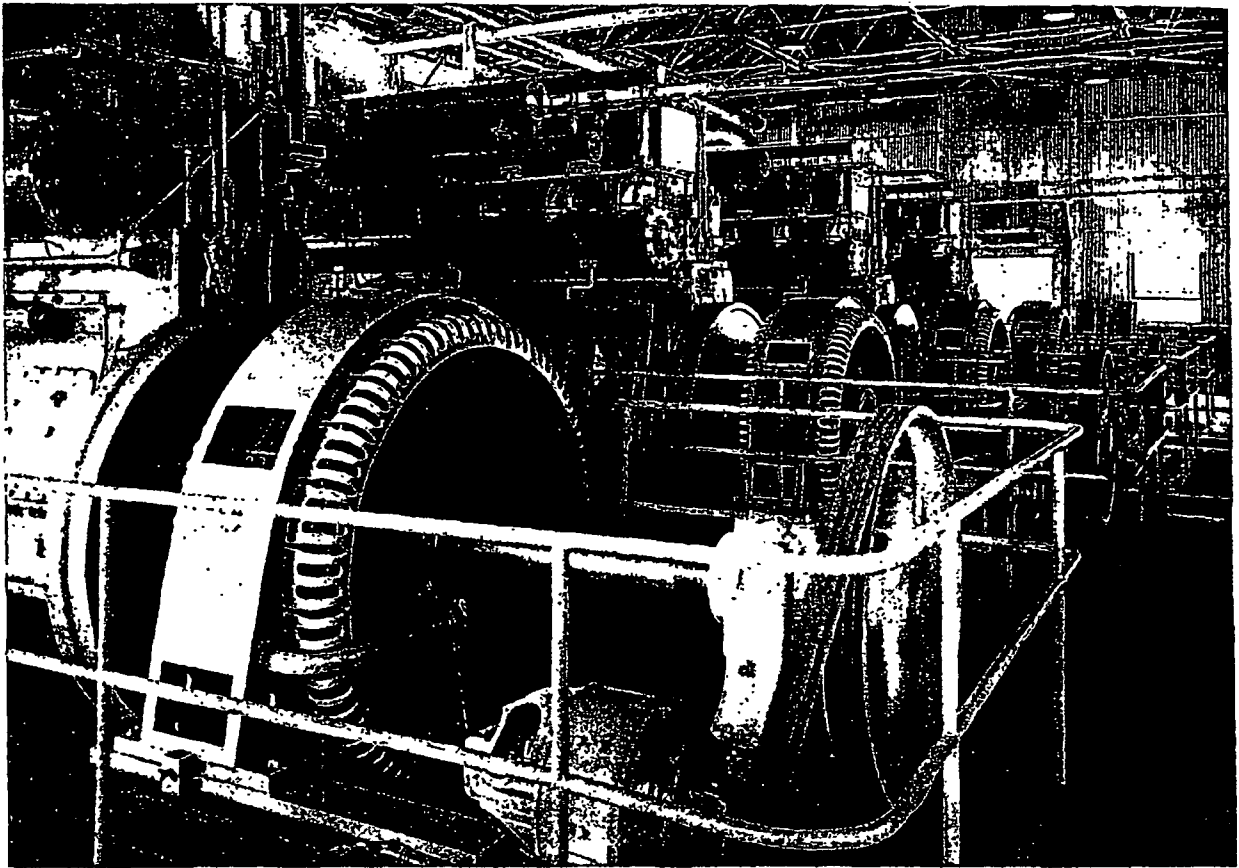
Installing a deaerating heater



The Pittsfield Electric Company combined with other companies in Western Massachusetts in 1923 and became known as the Pittsfield Electric Company Division of Western Massachusetts Companies. Later, all divisions were combined into one company, presently known as Western Massachusetts Electric Company.

While the 5000-kw turbine is only operated during peak load or emergency periods, the station is used for supplying heating steam to the business section of Pittsfield. The Elliott deaerating heater, therefore, is constantly in service.





● This photograph shows two Elliott 187-kva, 480-volt, 514-rpm, self-ventilated, synchronous motors coupled to Clark gas engines in the recently completed recycling plant of Plymouth Oil Company at Sinton, Texas. The generators have V-belt driven top-mounted exciters. These units generate the electrical power required by the plant.

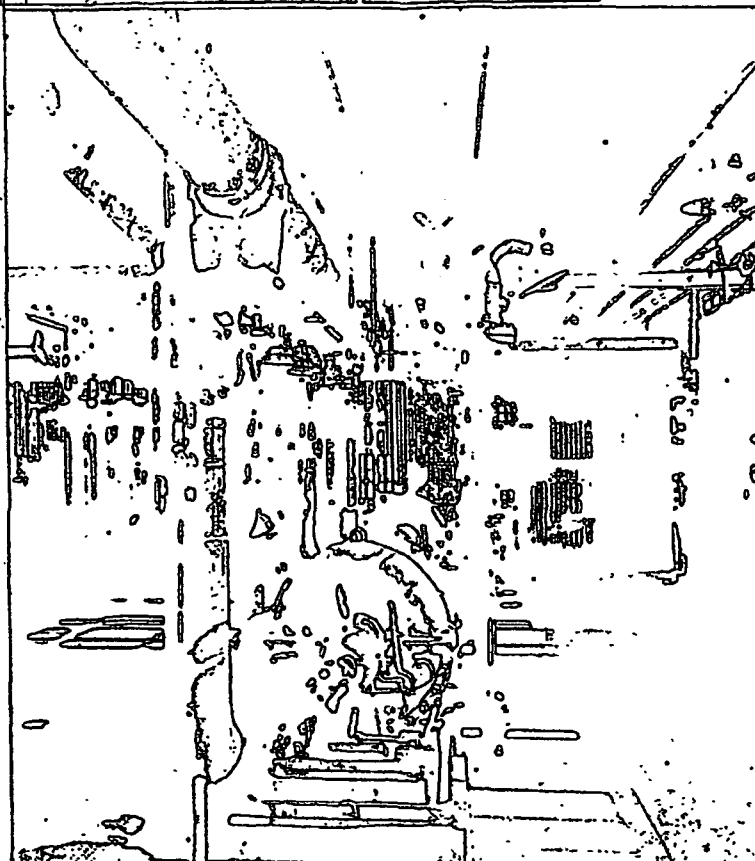
○ Approximately 85,000,000 cu ft daily of casing-head gas is being put to economic use as a result of the recent completion by Shell Oil Co., Inc., of two major projects in the west Texas area. Largest is the new gasoline plant of 45,000,000 cu ft daily capacity serving TXL and Wheeler Fields in Ector and Winkler Counties. The Texas Company is a partner with Shell in this plant. The plant provides the first casing-head gas outlet for operators

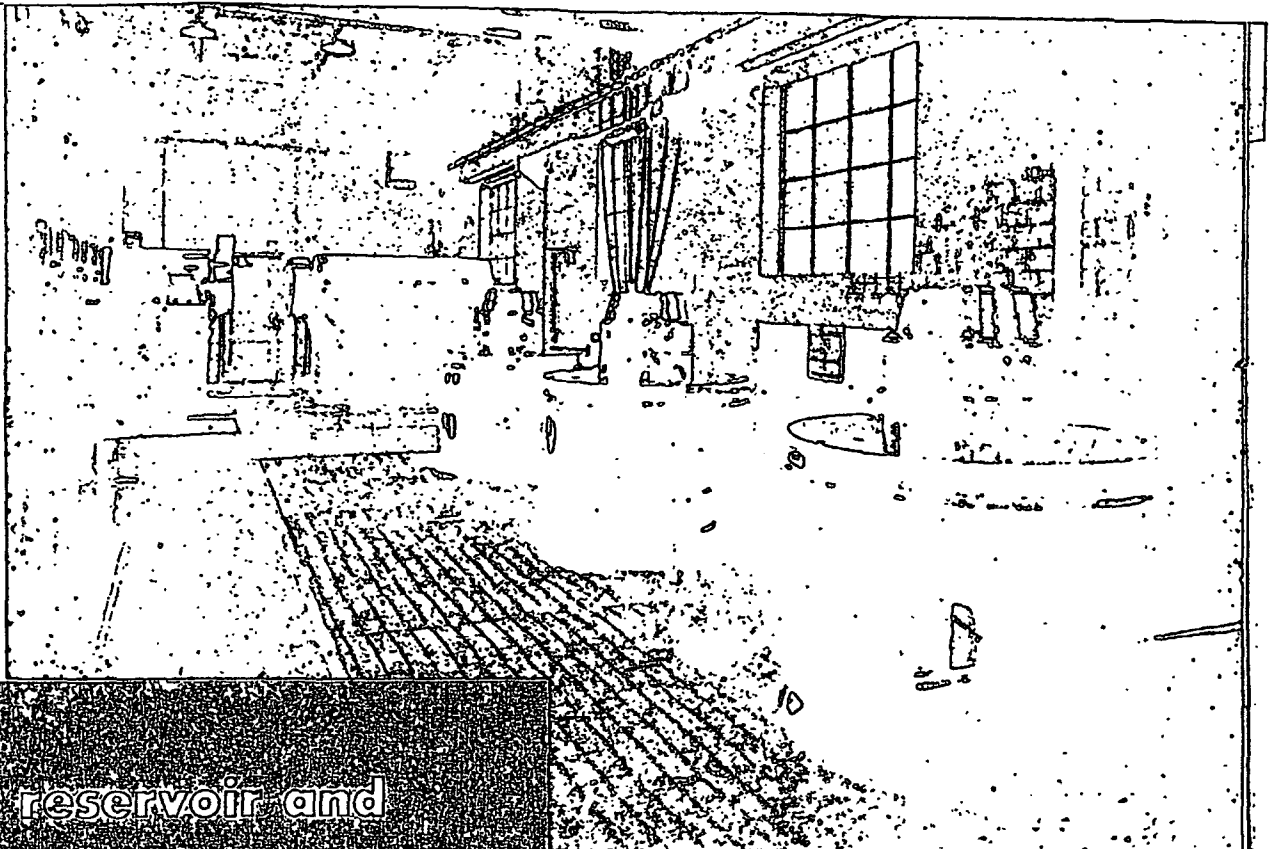
Left—This generating station in the TXL plant of Shell Oil Company in Ector County, Texas, includes four Elliott 656-kva generators driven by gas engines. The generators are equipped with V-belt driven exciters. Three more exactly similar units will soon be added, making a nice line of seven.

generators and turbines in Two New Shell Oil Plants

in these fields. It is now connected to about 175 wells. The other project is the expansion and addition of new facilities which have doubled the processing capacity of Shell's existing Wasson No. 2 plant. The expansion was accomplished in approximately eight months' construction time. Coltex Corp. is a partner with Shell in this plant. So reported "The Oil and Gas Journal" recently. They also took these pictures of some of the Elliott generators and turbines on these projects.

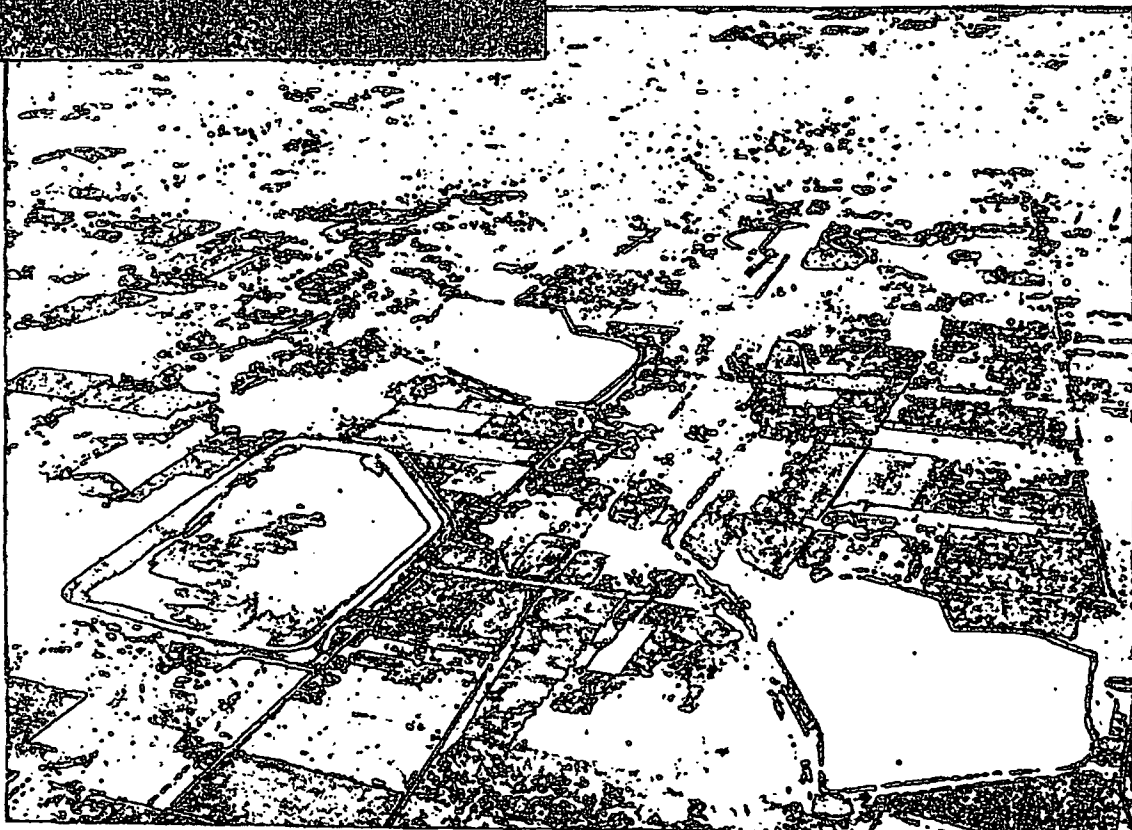
Right—These Elliott turbines are among many installed in Shell Oil Company's Wasson No. 2 Plant at Denver City, Texas. The upper photograph shows a line of three geared turbines driving "jacket water pumps" in the compressor room. The photograph at the right shows turbines driving processing pumps.

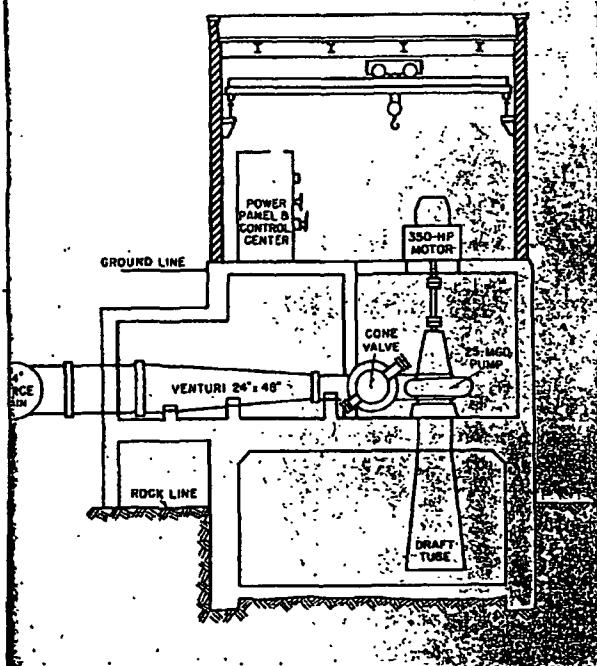




new reservoir and
pumping station feature
Lima Water Works Expansion

The three Elliott synchronous motors which drive the 25-mgd pumps at Metzger Lake Station are rated 350 hp, 514 rpm, three phase, 60 cycle, 4000 volts. They are suitable for full voltage starting. Thrust bearings are designed to withstand a thrust of 1000 lb, in addition to the normal rotor weight. Motors are equipped with flanged shaft and supplied with base rings. Direct-connected exciters are used.





Showing arrangement of the vertical pumps in the Metzger Lake Station.

● Since 1832, when a post office was first established in Lima, Ohio, this community has shown steady, persistent growth. Water supply adequate to meet the needs of a growing city has been a problem and at times supply has lagged behind demand.

Serious water shortages, recorded at six different times, have served to spur development of additional facilities. The last such occasion occurred in January 1945, when, for a period of several weeks the reservoirs were practically empty and a restricted supply was drawn from industrial wells through emergency connections, and from an abandoned stone quarry which happened to be full of water. The emergency had arisen as the result of long continued drought, coupled with greatly increased demand of industries in war production.

Outcome of this latest emergency was the construction of a new storage reservoir and pumping station, practically doubling the existing capacity.

Lima obtains its water supply from the Ottawa River, a small stream with very small flow through most of the year, but which carries considerable water in wet seasons. Water is pumped from the river into upground storage reservoirs, and with-

drawn therefrom for treatment and distribution as needed. Three principal reservoirs now are in use. The first, Lima Lake, was constructed in 1902 and has a capacity of 430 million gal. The second, Lost Creek Reservoir, holds about 860 million gal., and dates from 1920. The newest unit was put into service in the fall of 1947. It has been named Metzger Lake in honor of the late William E. Metzger, Jr., a hero of World War II, who was awarded the Congressional Medal of Honor during the campaign in Italy. Capacity of Metzger Lake is 1200 million gal.

Each reservoir is served by a pumping station. The largest of these is, of course, the Metzger Lake Station, built to serve the new reservoir. Metzger Lake Station is equipped with three vertical centrifugal pumps, each with capacity of 25 mgd against a total head of 70 ft, and each driven by an Elliott 350-hp synchronous motor.

The pumps discharge through individual venturi meters into a 54-in. steel cylinder reinforced concrete force main leading to the reservoir about 3000 ft distant. Pump controls are either manual or automatic in relation to the elevation of water in the pump suction well and the reservoir. Automatic cone valves, in the discharge piping of each pump, open when the pump comes up to speed after starting, and, through electrical interlocks, close before current to the motor is interrupted on the stopping cycle. Speed of opening and closing is regulated to prevent building up excessive surge pressures.

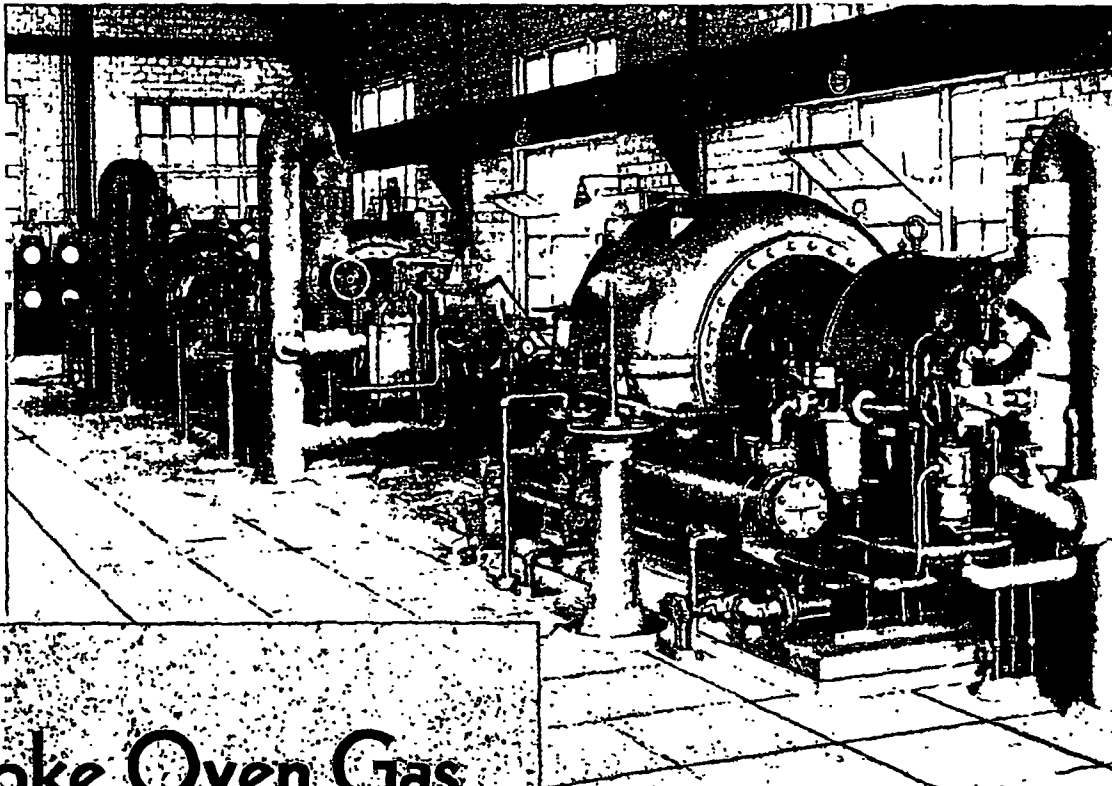
Pumps are protected from entrance of debris by two mechanically cleaned bar screens. Screen rakes may be operated manually, or automatically by time clock, with an over-riding control actuated by head loss through the screen.

Final tests were conducted on the completed installation in January of this year and the operation of the system was found to be entirely satisfactory. The 25-mgd Delaval pumps delivered from 26.4 mgd to 30.0 mgd at 66-ft total head.

The rate of pumping provided will fill the new 1200-mg reservoir in about two weeks, and the three reservoirs are so interconnected that the two older reservoirs may be filled from this new source. Should either of the old pump stations fail during the short period of draw-off from the Ottawa River, the new pumping station can be used.

The complete program was under the supervision of E. E. Smith, superintendent of the Lima Water and Sewerage Departments. Jones and Henry Co., engineers, of Toledo, Ohio, prepared the plans and specifications and supervised the construction.

This aerial view shows the three reservoirs of the Lima Water Works. Left to right—Metzger Lake, Lost Creek Reservoir, and Lima Lake. New pump house for Metzger Lake is located near Lima Lake at intersection of road to Metzger Lake.



Coke Oven Gas exhausters

Three of the four Elliott coke oven gas exhausters which were installed last summer in a new blower building at the Lorain plant of National Tube Company. These multi-stage blowers are rated 29,750 cfm each at a pressure rise of 95 in. of water. Elliott 600-hp, multi-stage steam turbines drive the blowers at 5000 rpm.

● New coke ovens at the Lorain, Ohio, works of National Tube Company have boosted output by 800,000 net tons annual capacity, bringing the total capacity of the works to 1,850,000 net tons.

The new installation consists of three batteries, each of 59 regenerated ovens, designed for firing with coke oven gas having a calorific value of 500 to 550 Btu per cu ft. Later they may be underfired with blast furnace gas by the installation of suitable auxiliary equipment. Provision has been made for the construction of three additional similar batteries of ovens should conditions warrant.

Coke handling equipment consists of a 240-foot wharf, conveyors from the new wharf and two existing wharfs to a trunk line conveyor, coke scalping, crushing, screening and rail loading facilities, together with car haulage, sized coke surge bins, filling conveyors, motor-operated bin gates for unloading trucks, and motor-operated bin gates for the delivery of furnace and domestic coke to a pro-

posed conveyor system to the blast furnace bins.

Four Elliott turbine-driven exhausters serve the coke ovens at Lorain. These units are rated 29,750 cfm each, with pressure rise from minus 14 in. of water to plus 81 in. of water. Elliott 600-hp turbines drive each blower at 5000 rpm.

The gases generated in the coke ovens are removed by these centrifugal exhausters which, by automatic governor control, maintain a vacuum of 14 in. of water in the ovens. Discharging at a pressure of 81 in. water, they force the gas through the by-product recovery plant and into the main gas holder. Steam turbine drive is used in order to obtain best economy for variable load operation. An important advantage of the centrifugal type of exhauster is its ability to remove a good portion of the tar contained in the gas. The tar is thrown outward by centrifugal force onto the casing and is then drawn off at the bottom. The heat of compression keeps the tar in liquid form.

● The latest addition to the Diesel generating plant at Grand Haven, Mich., was put into operation recently. It marks the sixth Diesel unit in the plant, and the fifth extension since the first two 800-kw units were started in 1931. The plant, with its total of 13,300 installed horsepower, is one of the largest Diesel generating plants in the country.

A manufacturing and resort town on Lake Michigan where Grand River enters it, Grand Haven has generated its own power since 1896. The original steam plant grew until it attained 3000-kw capacity in 1928. Increased loads and high production costs led in 1929 to construction of a Diesel power plant.

In 1931, two 1140-hp Baldwin DeLaVergne four-cycle engines, driving Elliott 800-kw generators,

were installed, followed three years later by a third unit, exactly duplicating the first two units. In 1937 the building was extended and a 2250-hp Nordberg two-cycle Diesel driving a 1600-kw Elliott generator was added. In 1941 a Nordberg two-cycle, 2715-kw engine-generator was placed in the building.

All this time the boiler plant with the 3000-kw of turbine capacity had been maintained as a standby, since firm capacity of the Diesel units (full load with largest unit out) was inadequate to meet peak demand. When one Diesel was out for inspection or overhauling, steam plant boilers were held on bank. This was expensive in fuel and also labor, as Diesel operators cannot readily attend the steam plant.

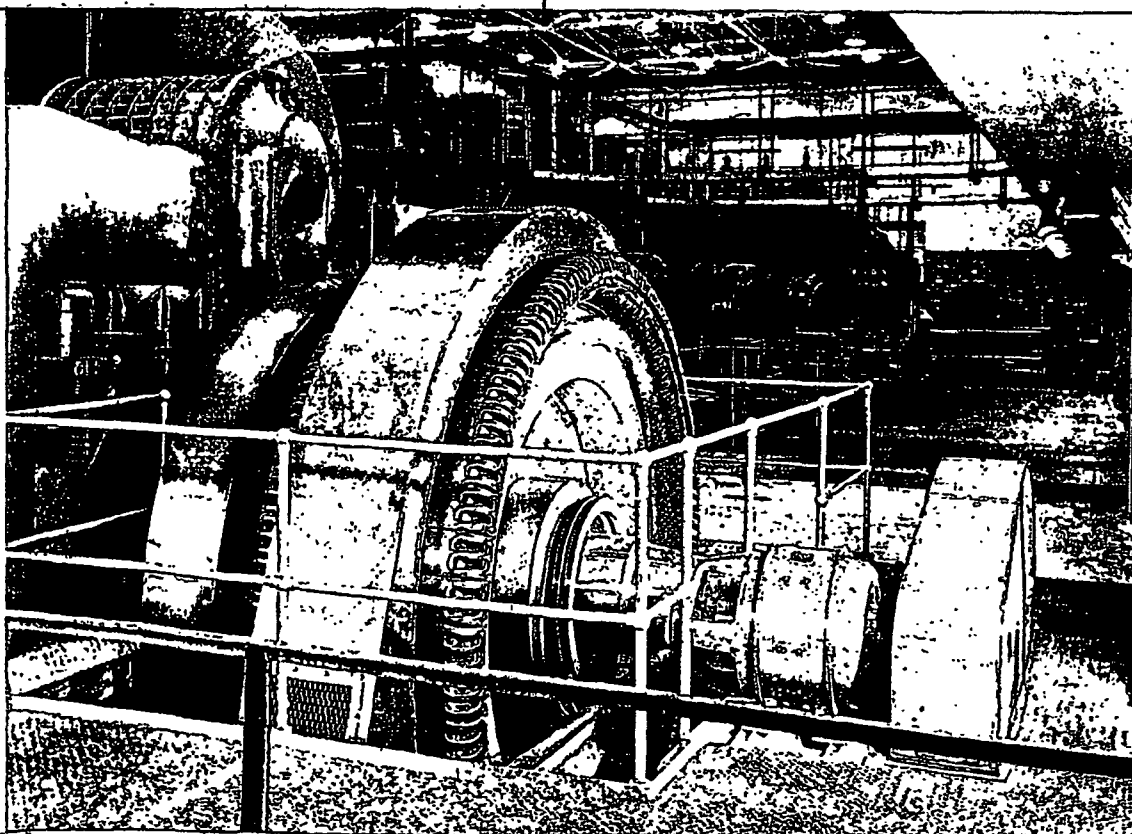
In 1946 an exhaustive study was made of the problem of meeting current and future loads.

So another addition was made to the station building large enough to house two more units of the same size and type as the fifth unit, installed in 1941. The new unit is a Nordberg 21½ x 31 in., 225-rpm, air injection, two-cycle Nordberg engine, direct-connected to an Elliott 3390-kva, 7200 volt, 3-phase, 60-cycle generator.

The Grand Haven power system's own organization handled all engineering and construction of the recent extension.

In the foreground is the new Elliott 2715-kw generator with belted exciter. Immediately behind this new unit are the three Elliott 800-kw generators serving engines installed in 1931 and 1934. In the extreme background, not shown in the picture, is another Elliott 1600-kw generator.

generators at Grand Haven



● Last summer, the twelfth beet sugar factory of the Holly Sugar Corporation, second largest beet sugar producer in the United States, went into operation in the Imperial Valley in southernmost California. This new plant was of such interest to the industry that the magazine "Sugar," in its September issue, carried a nine-page feature article on it, the article being illustrated with 35 photographs. The plant was also featured on the front cover of this magazine. The fine new factory, with a rated daily slicing capacity of 2700 tons of beets, actually reached slightly in excess of 3000 tons, resulting in a daily sugar production of 800,000 lb, has been named in honor of the late A. E. Carlton, formerly president of the Holly Sugar Corporation.

The location of the plant in the Imperial Valley gives rise to problems and advantages not found elsewhere in the world. Carlton is the only beet sugar factory in the world to be located below sea

level. In fact, the lettering "Sea Level" is carried about 90 ft up on the exterior of the bulk sugar storage bins where they face U. S. Highway 99.

The Imperial Valley is proving one of the most fertile and profitable agricultural areas in the United States. With a total rainfall in 1947 of only 0.87 in., the valley depends entirely on irrigation water supplied from the Colorado River by means of the Imperial Dam and the All-American Canal. Some 370,000 acres are now under cultivation for all crops. Growers under contract to Holly had 29,000 acres of beets this year, and Carlton sliced beets from over 12,000 of these acres.

The Imperial Valley is the bed of the ancient Lake Coahuila, which was fed by the mud-laden waters of the Colorado River. The lake slowly decreased in size until it disappeared. Today, however, the shore line of old Lake Coahuila is still visible at several different locations along the edge of the valley. The Salton Sea was formed by a flood of the Colorado River in 1906. The New River was also formed at that time, in addition to the existing Alamo River. Bed rock is covered by an enormous layer of silt and sand, which in some places is 2000 ft thick. The valley is seismically active, earth tremors are not uncommon, and at least fourteen faults extend through the valley—two of them within a mile of the factory. So "earthquake" construction, in conformity with the Pacific Coast Uniform Building Code, was used in the plant's construction. Concrete piling was used under all loaded

modern Sugar Factory in Imperial Valley



CRIMDEBN00000262

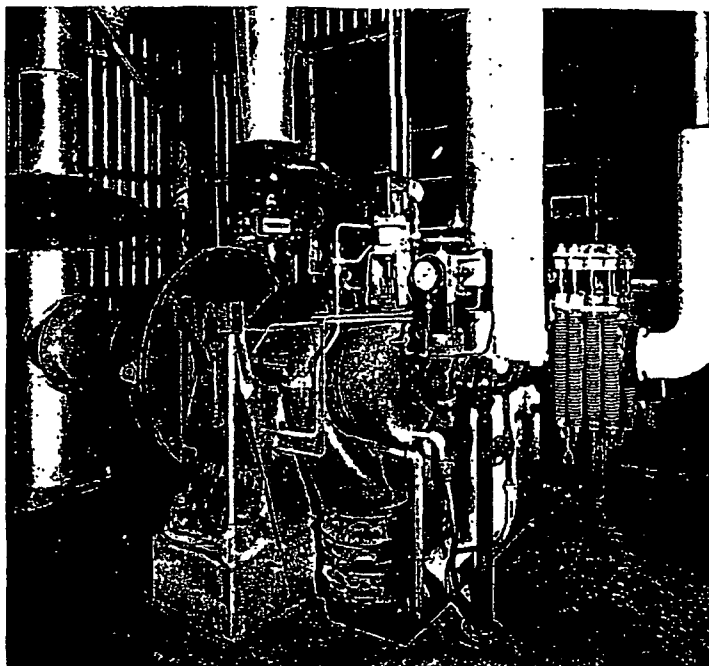
The Elliott turbine-driven single-stage blower which handles kiln gas for carbonation. The blower is rated 5540 cfm and compresses from minus 2 psig to plus 7 psig. The 285-hp turbine operates at 12,500 rpm on 400 psig, 575 F steam. The turbine exhausts at 50 psig to evaporators.

parts of the factory—more than 1500 piles were driven in all, to a depth of 50 feet.

The factory buildings have an elaborate air cooling and ventilating system—330,000 cfm of water-washed air are circulated through the plant for cooling. The low humidity in the valley allows sufficient temperature drop with such a system so that the temperature within the factory is quite moderate. Heavy insulation on all hot juice and steam lines and hot equipment reduces radiation.

Steam at the Carlton plant is generated at 410 psi, 575 F in a single oil-fired boiler. This boiler has a rating of 150,000 lb steam per hour continuously, or 180,000 lb per hour for a four-hour period. At 3,000 tons per day slicing rate, steam requirements are 146,000 lb per hr. Stack gases are used to partially dry the pulp in the pulp dryer. All high-pressure steam is confined to the power house. Steam used for exhaust make-up is reduced to 100 psi and desuperheated, and evaporator vapors only are used for process heating and boiling. A 3000-kw turbine-generator has sufficient reserve capacity for future process installations.

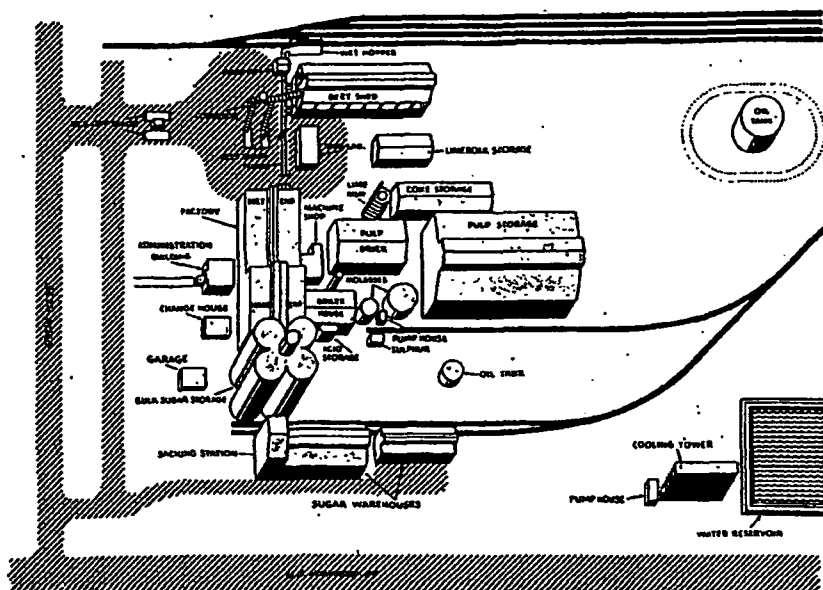
As in all beet sugar plants, purification of the raw juice is accomplished in a carbonation tank where milk of lime is added. The lime is prepared by burn-



ing lime rock and coke in a lime kiln which also produces carbon dioxide gas, which is bubbled through the mixture in order to make the lime insoluble. An Elliott turbine-driven, single-stage centrifugal blower is used to create the draft through the lime kiln and to pump the carbon dioxide gas to the carbonation tanks. For this service a high-speed blower is particularly adapted.

The plant was designed by the engineering department of the Holly Sugar Corporation, and was completely constructed under its supervision.

This sketch plan of the new Carlton Factory shows the extensiveness of the operation. This extraordinary plant is located five miles south of Brawley on U.S. Highway 99, which is shown at the bottom of this sketch. The factory is surrounded by fields of sugar beets.



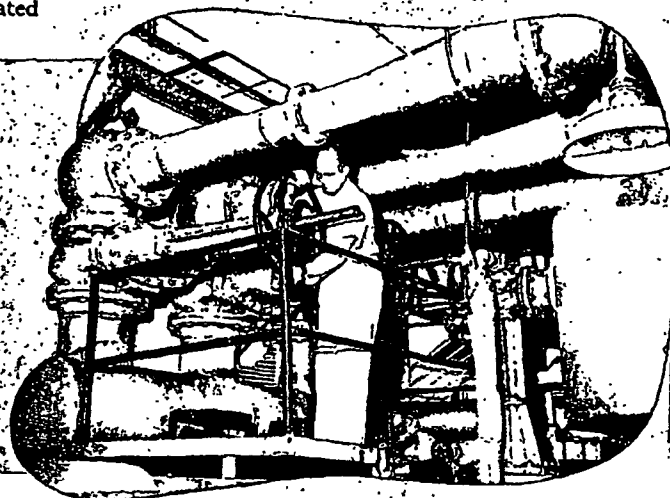
● The plant of Mrs. Tucker's Foods Inc., at Sherman, Texas, produces high-grade, uniform quality margarine and vegetable shortening under rigid standards of purity and quality. The motherly face of the company's trade-mark "Mrs. Tucker" is known throughout the Midwestern and Southwestern states where its Meadolake margarine and Mrs. Tucker's shortening are distributed.

There is a never-ending routine of testing, inspecting and process-controlling in this modern plant. From the time the crude vegetable oil, either cotton seed or soybean, flows from the tank cars, until the products are packaged, there is relentless watchfulness at every step of the process.

The oil arrives in tank cars. It is first treated

The purpose of deodorization is to remove objectionable odors, improve the keeping qualities of the oil, and lighten its natural color. Deodorization is made possible by the fact that neutral fat cannot be vaporized to any appreciable extent, but components of oil which impart flavor and odor can be changed into vapors under high temperature and low absolute pressure, and can be removed from the oils as gases. Steam flowing through the oil acts as a carrier to sweep vapors from the oil; it also absorbs part of the low absolute pressure, so that the absolute pressure of the oil vapor is lowered,

ejectors for deodorizing Margarine and Shortening



with an alkali to neutralize any undesirable natural acids that may be present. These acids are removed in the form of crude soap. The color of the oil is then lightened by contact with a natural clay which absorbs the coloring matter. Hydrogenation then changes the liquid oil to a semisolid which is necessary to produce the finished product. Appropriate mixing is necessary after hardening in order to control firmness. Deodorization is the final step before packaging. This removes any objectionable flavor of the vegetable oils and leaves a bland product. At this point the fat is ready for chilling and packaging in the form of shortening or is mixed with milk solids and other ingredients for use as margarine. Both margarine and shortening are quickly chilled in refrigerating devices similar to ice cream freezers and then packaged in sanitary containers. Margarine is at least 80 per cent fat and about 20 per cent milk solids, salt, and other ingredients. Shortening is 100 per cent fat.

A battery of three Elliott boosters (or first ejector stages) which serve the deodorizers in the plant of Mrs. Tucker's Foods, Inc., Sherman, Texas. The boosters are connected to a manifold through shut-off valves. The second and third ejector stages may be seen at the lower right.

preventing vapors returning to the liquid phase.

In the deodorization process the oil is heated to a high temperature to promote active vaporization of the components which cause unpleasant odors and flavors. Low absolute pressure works with high temperature in this process. The heating is accomplished by circulating the heated vapors of a chemical known as "Dowtherm" through closed coils that are in contact with the oil in the still.

Elliott three-stage ejectors maintain the low absolute pressure required for the deodorization process. These ejectors handle both the undesirable oil vapors flashed from the oil and the steam admitted to the deodorizer. These gases are handled at around 450 F without the slightest difficulty.



"What's wrong with everybody?"
"Oh nothing except you've got your
overalls on backwards!"

How to Cook a Turkey. "Prepare turkey in usual way, place
one bottle good bourbon on kitchen table near stove. Take a
drink each time you baste turkey. With this method you never
forget to baste, so turkey is tender."

Carl: "Don't do any more Christmas shopping today, dear."
His Wife: "Why not?"
Carl: "I can't carry any more bundles."
Wife: "Oh, is that all? I was afraid you were going to say you
had no more money."

Good will, like a good name, is won by many acts and may be
lost by one.

You save a lot of unnecessary conversation if you remember
that people aren't going to take your advice unless you are a
lawyer or a doctor, and charge them for it.

The man had just bought a cigar in a department store and
started to light it.

"Don't you notice the sign?" asked the sales girl.
"What!" exploded the customer. "You sell cigars in here
but you prohibit smoking?"
The sales girl smiled sweetly: "We also sell bath towels."



"Certainly we need that new equip-
ment—but this is a hell of a way to
decide if we get it or not!"

The origin of the saying, "Oh, yeah,"
has been attributed to an unbelieving
bridegroom who upon hearing his bride
say, "Now I lay me down to sleep,"
said to himself: "Oh, yeah!"

If you do not have the capacity for
happiness with a little money, great
wealth will not bring it to you.

First Kangaroo: "Annabelle, where's
the baby?"

Second Kangaroo: "My goodness,
I've had my pocket picked."

New Nursery Rhyme: Mary had a
little wolf and fleeced him white as
snow. . .

Some folks have no respect for age
unless it's bottled.

"That girl frankly admits she is look-
ing for a husband."

"So am I."
"Why, I thought you had one!"
"So I have, and I spend most of my
time looking for him."

"I'm going to get a divorce. My wife
hasn't spoken to me in six months."

"Better think it over. Wives like that
are hard to find."

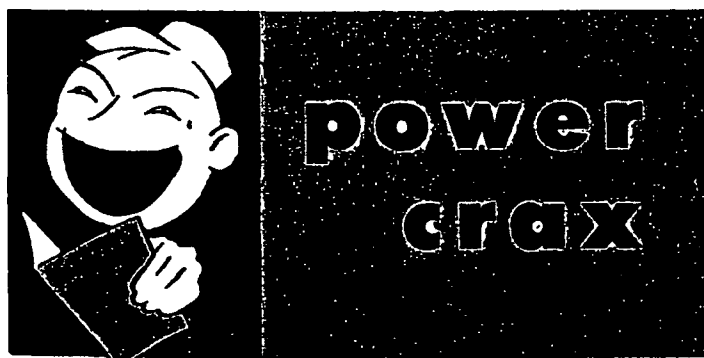
Little Girl: "What happens to Santa
Claus after he hands out all the presents,
sis?"

Big Sister: He's left holding the bag!"

He: "Will you have breakfast with me
tomorrow morning?"

She: "Sure."

He: "Shall I phone you or nudge you?"



The man who found a valuable pearl in his oysters in a night
club the other evening almost broke even.

A lot of guys believe in law and order as long as they can lay
down the law and give the orders.

The farmer had made his regular annual
trip to town to do his Christmas shop-
ping and was hurrying with his arms
full of bundles toward the station to
catch his train. Stumbling over a curb,
a bottle in a brown paper bag slipped
from his arm and splintered on the
sidewalk. Surveying the large area rue-
fully, he gave a heartbroken sigh and
moaned: "Look at that! Christmas has
done come and gone for me this year!"

Marybelle: What did you get in your
stocking for Christmas?

Susie: Nothing but a runner.

Marybelle: Well, what did you expect
—a pole vaulter?

A modest girl never pursues a man.
Nor does a mousetrap pursue a mouse.

Prospective Roomer: The window is
very small. It wouldn't be much good
in an emergency.

Landlady: There ain't gonna be none,
mister. My terms are cash in advance.

A human being is a chap who'll split
his sides over the family album and
then look in the mirror without crack-
ing a smile.

To keep young, associate much with
young people. To get old in a hurry, try
keeping up with them.

Wife: Is it true that money talks?

Husband: That's what they say, my
dear.

Wife: Well, I wish you'd leave a little
here to talk to me during the day. I get
so lonely.

Judge (to defendant): You are lying
so clumsily that I would advise you to
get a lawyer.

Pedestrian to newsboy: "Son, can
you direct me to the nearest bank?"

Newsboy: "Yes, sir, for a quarter."

Pedestrian: "Isn't that high pay, my
boy?"

Newsboy: "No sir, not for a bank
director."

ELLIOTT COMPANY MAKES

PRIME MOVERS Steam and Gas Turbines—Turbine-Generator Units

ELECTRICAL EQUIPMENT Generators (all types, A. C. and D. C.)—Motors (Synchronous, Induction, D. C.)—Motor-Generators—Electromagnetic Slip Couplings

HEAT TRANSFER APPARATUS Condensers and Ejectors—Deaerators and Deaerating Heaters—Open Type Feedwater Heaters

INDUSTRIAL PROCESS EQUIPMENT Centrifugal Blowers—Steam Jet Ejectors—Condensing Equipment—Oxygen Plants

POWER PLANT ACCESSORIES Strainers (Twin, Single, Oil, Self-Cleaning)—Filters and Grease Extractors

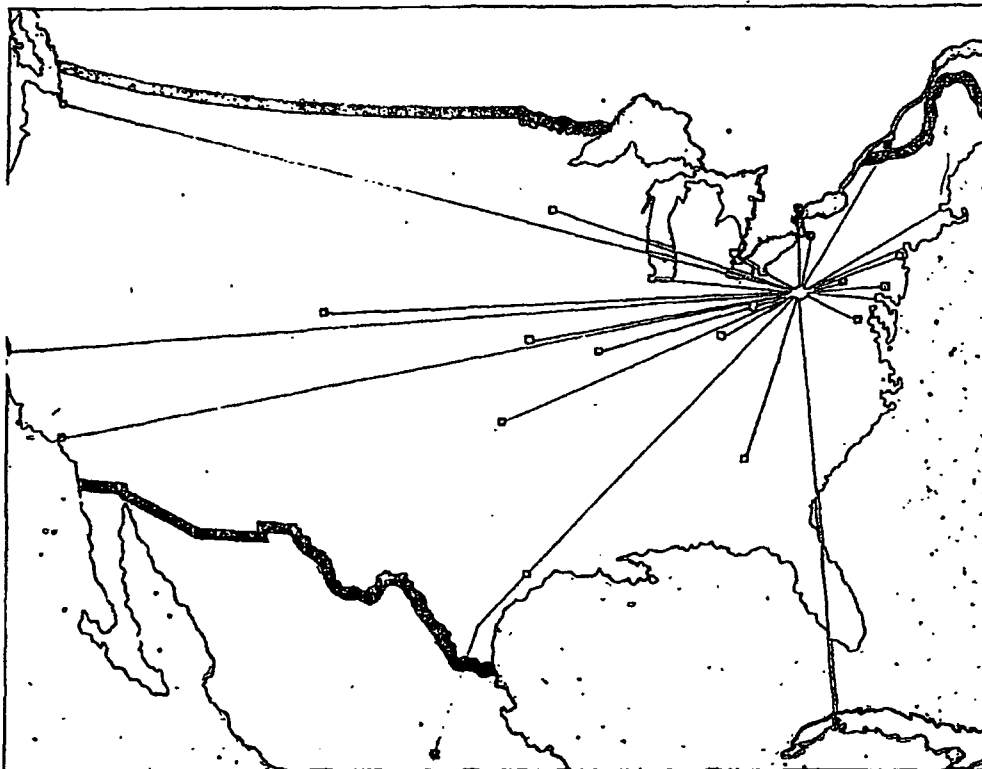
CENTRIFUGAL BLOWERS, COMPRESSORS AND EXPANDERS Air Blowers—Gas Boosters and Exhausters—Blowers and Expanders for Process

SUPERCHARGERS FOR DIESEL ENGINES Elliott-Buchi Turbochargers for Four-Cycle Engines—Centrifugal Type Superchargers

TUBE CLEANERS Cleaners for Tubes in Boilers, Oil Stills, Condensers; for Pipe, etc.

DESCRIPTIVE BULLETINS OF ANY OF THESE PRODUCTS WILL GLADLY BE SENT UPON REQUEST

THESE ARE OUR DISTRICT AND BRANCH OFFICES



Atlanta 3 310 Hess-Howell Building
Boston 10 75 Federal Street
Buffalo 2 807 Crosby Building
Chicago 6 20 N. Wacker Drive
Cincinnati 2 1412 Esquire Building
Cleveland 14 1339 Guardian Building
Denver 2 1921 Blake Street
Detroit 26 1820 Dime Bank Building
Houston 2 713 M & M Building
Kansas City 6 805 Midland Building
Los Angeles 15 714 W. Olympic Boulevard
Minneapolis 2 830 Pillsbury Building
New York 7 225 Broadway
Philadelphia 2 801 Morris Building
Pittsburgh 19 718 Frick Building
San Francisco 4 1504 Russ Building
St. Louis 3 1221 Locust Street
Seattle 4 1101 Vance Building
Tulsa 3 616 McBirney Building
Washington 5, D.C. 1117 Tower Building
Wilmington 7 Industrial Trust Building
Montreal, Que. F. S. B. Howard & Co., Ltd.
New York 7 New York Building
Toronto 5, Ont. F. S. B. Howard & Co., Ltd.
Havana, Cuba Compania Importadora
Skilton, S.A., Tejadillo No. 7
Mexico, D.F. Tecnica y Equipos, S.A.
Monterrey 101, Cuarto Piso
San Juan, Porto Rico Abasco
Warehouses Corp., P.O. Box 2352
Buenos Aires, Argentina Mechanical Works
Engineering Co., Avenida Julio A. Roca 710
Rio de Janeiro, Brazil, S.A. A.E.G.
Compania Sul-Americana de Electricidade
Avenida Rio Branco 45-49
Sao Paulo 1, Brazil A.E.G. Compania
Sul-Americana de Electricidade, Rua
Florescio de Abreu, 484
Santiago, Chile, S.A. Compania Minera y
Comercial Sal Hochschild, S.A., Casilla 3127
China and Siam Wah Chang Trading Corp.
Woolworth Building, New York 7
Maintaining branch offices in Shanghai,
Hongkong, Hankow, Canton, and North-
ern China, also in Bangkok, Siam.



ELLIOTT COMPANY

RIDGWAY, PA.	JEANNETTE, PA.	NEWARK, N.J.	SPRINGFIELD, O.
Division	Headquarters & Main Works	Roto Division	Lagonda Division
Motors, Generators & Electrical Machinery	Turbines, Blowers, Heat Transfer Equipment, Turbochargers, Accessories	Tube Cleaners	Tube Cleaners

Printed in U.S.A.

CRIMDEBN00000266