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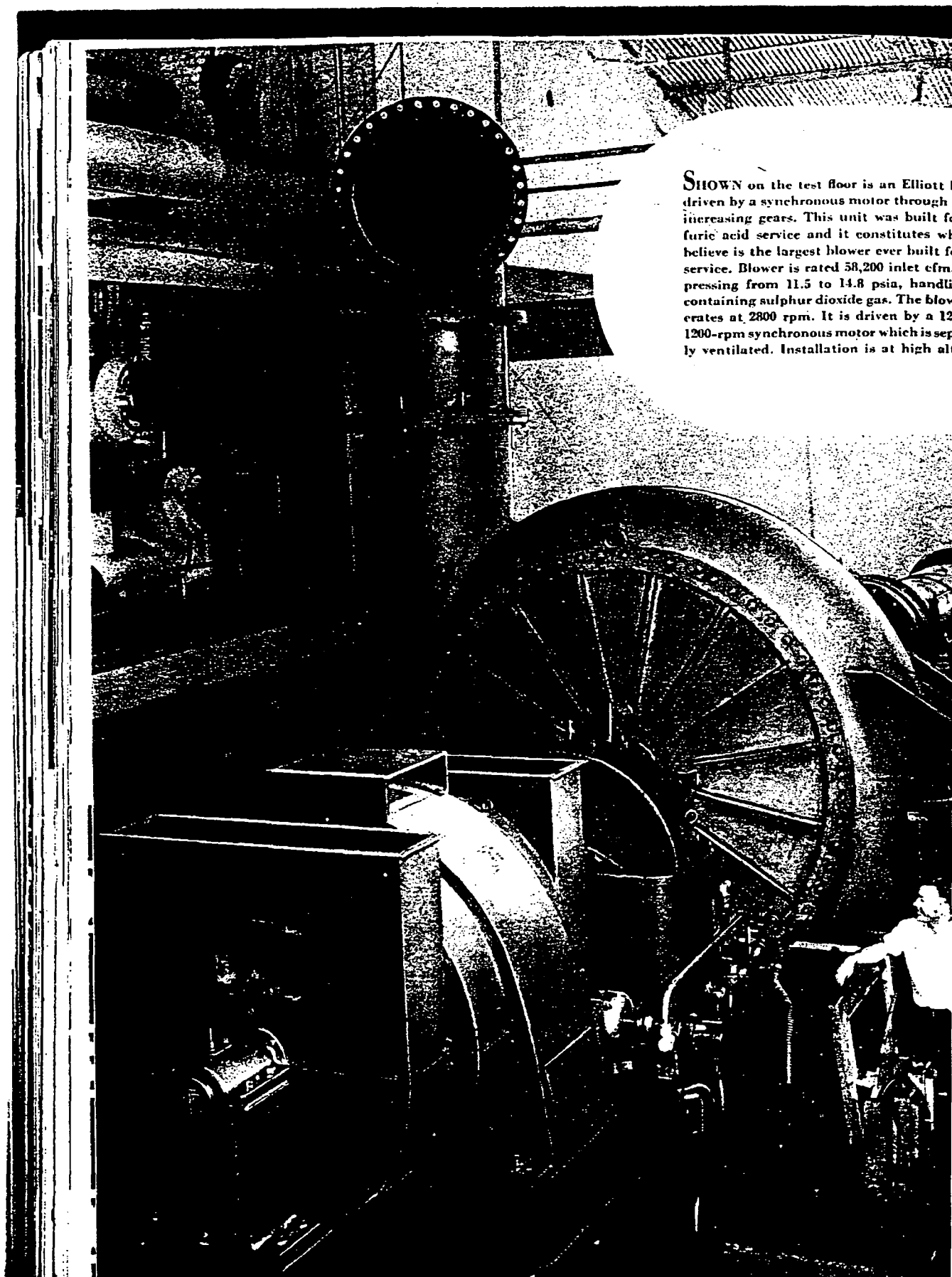
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powerfax



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SC-ETM-2280



SHOWN on the test floor is an Elliott 1 driven by a synchronous motor through increasing gears. This unit was built for sulfuric acid service and it constitutes what is believed to be the largest blower ever built for service. Blower is rated 58,200 inlet cfm, pressing from 11.5 to 14.8 psia, handling containing sulphur dioxide gas. The blower crates at 2800 rpm. It is driven by a 12,1200-rpm synchronous motor which is separately ventilated. Installation is at high alt

SPRING, 1955

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Engineers' President



J. H. Strickler, Elliott Company vice president, and Pittsburgh district manager for many years, is the new president of the Engineers' Society of Western Pennsylvania. This society, founded in 1880, today has an active membership of 1839, its own club rooms in the lower lobby floor of the William Penn Hotel including a spacious lounge room, offices, and dining room. During his 30 years' membership in the society, he has held many offices: director, junior vice president, and senior vice president.

Lester O. Gregg



Mr. Gregg, now retired, has been responsible for many *Powerfax* articles. See pages 18 and 20, this issue. With an electrical engineering education and experience as superintendent of a utility plant, and electrical engineer for mining companies, he joined Ridgway Dynamo and Engine Company in 1916. After working on the test floor, he did field service work, and became a sales engineer at Ridgway. He was transferred as sales engineer to the Pittsburgh district office in 1927 (after Elliott took over Ridgway) and has been there until he retired on December 31, 1953.

Humphrey moves up



F. L. Humphrey, Jr., who a year ago was appointed assistant district manager of the Atlanta territory, has now been made district manager. Mr. Humphrey has been with Elliott since 1938.

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Powerfax, published by Elliott Company since 1923, is primarily a record of the development of Elliott products and their application in industry. Over 35,000 copies are distributed quarterly to Elliott customers and friends. Address correspondence to C. W. Kalbfus, Editor, Elliott Company, Jeannette, Pa.

Talks

E. H. Gautier, of our industry engineering department in Pittsburgh, presented a paper, "Electrical Aspects of Adjustable Voltage Ore Bridges," at a meeting of the Chicago section of the Association of Iron and Steel Engineers, at Phil Smidt's Restaurant in Hammond, Indiana, on January 4.

Richard F. Miaskiewicz, chief engineer, turbocharger division, was on a panel discussion on the subject of turbocharging two-cycle internal combustion engines at the ASME meeting at the Statler Hotel in New York, last winter.

Dr. M. E. Talaat, engineering department Ridgway works, presented a paper before the AIEE Winter General Meeting in New York February 3, entitled "A New Approach to the Calculation of Synchronous Machine Reactances, Part 1."

Askey Talks Insulation

John S. Askey, assistant works manager of Elliott Company's Ridgway works, presented a paper on January 26 at Boston, Mass., entitled "Design and Application of Insulation for A-C Rotating Machinery" before the Twenty-Second Annual Conference of Doble clients. The week-long meeting was attended primarily by several hundred men representing utility companies from all over the United States who take advantage of the services of Doble Engineering Company. Doble has developed specialized equipment for testing and also acts as a clearing house for information which has proved most valuable to industry consultants and manufacturers.

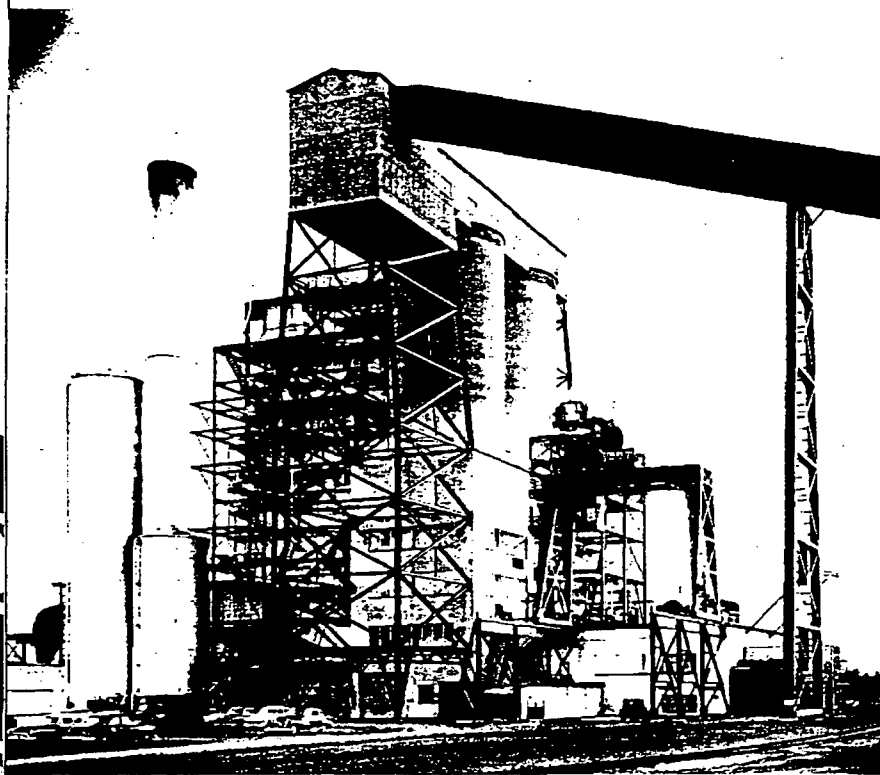


SPRING 1955

Elliott Company, Jeannette, Pa.

Martins Creek steam-electric station of Pennsylvania Power & Light features—

**outdoor construction, quick
start-up, low load factor**



This view of the station shows to the right the open-air installation of the turbine-generator unit and above it the Elliott deaerating feedwater heater. Coal silos in center. Filtered water standpipe left of stack.

Foundations for No. 2 unit. On the right is the turbine auxiliary bay and turbine pedestal; in center, mill room; on left, a portion of boiler area showing construction track and seal well.

THE service area of the Pennsylvania Power & Light Company and its subsidiary, The Scranton Electric Company, comprises about 10,000 sq mi in central eastern Pennsylvania. After installing about 425,000 kw of effective generating capacity at its Sunbury steam-electric station during the past five years, the need was felt for new generating capacity in the eastern portion of the system to operate less than 4000 hours per year. Planning for the new Martins Creek station began in 1951. Ground was broken for the initial unit on June 19, 1952, and its 132,500-kw turbine-generator unit was synchronized with the system on August 13, 1954. Construction of a duplicate unit was started in July of 1954 and this unit will be ready for operation in 1956.





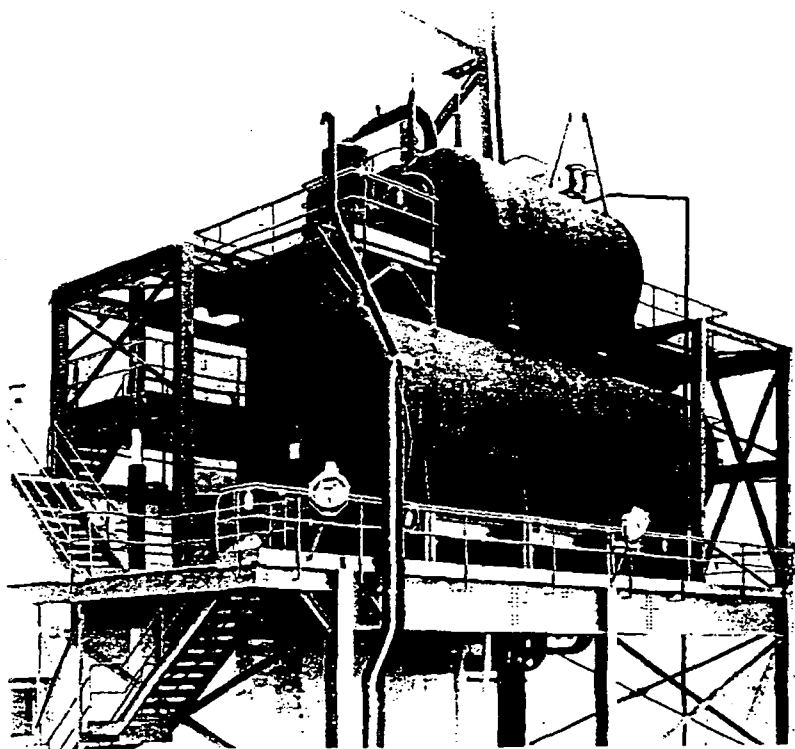
General view of station, taken just before nightfall. Office and service station in middle foreground.

A close-up of one of the Elliott 1,000,000-lb-per-hr deaerating feedwater heaters. It consists of a horizontal heater mounted on a horizontal storage tank with 200,000 lb capacity. The deaerating heater unit is mounted outside the building structure. Elliott also furnished 52,020-lb-per-hr evaporator preheaters.

At Martins Creek was found a site offering many advantages. Existing 66-kv transmission nearby had capacity to absorb the first 132,500-kw unit's output. The second unit will require only a 24-mile, 220-kv transmission extension. The Delaware River provides ample cooling water for a large generating station. A natural dam maintains a storage pool, and water discharged below it cannot recirculate. There is ample space for station expansion, switchyards, fuel storage, and ash disposal.

The Martins Creek Station was officially dedicated last fall. Located on a 485-acre site on the west bank of the Delaware River near the village of Martins Creek, about 18 miles below Stroudsburg, Pa., the station is of outdoor design with only the principal operating areas being enclosed. Each turbine is supplied by one 1,200,000-lb-per-hr steam generator using pulverized bituminous coal as fuel. Steam conditions at the throttle are 1250 psig and 950 F.

Although located near the anthracite region, and despite the company's very favorable experience in other plants burning small-size anthracite, Martins Creek uses bituminous coal since the fuel consumption of existing anthracite-fired plants exceeds the foreseeable supply



of steam sizes of anthracite on the system, and investment in the additional facilities required to burn anthracite or a mixture of bituminous and anthracite could not be justified for the first two units.

These units are designed to operate at relatively low capacity factor. The moderate steam pressure and temper-

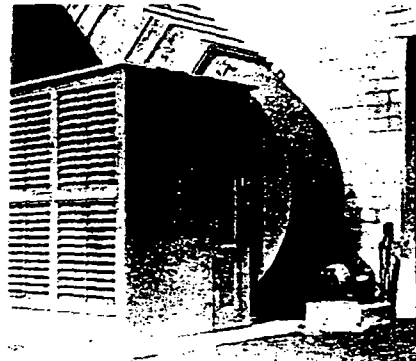
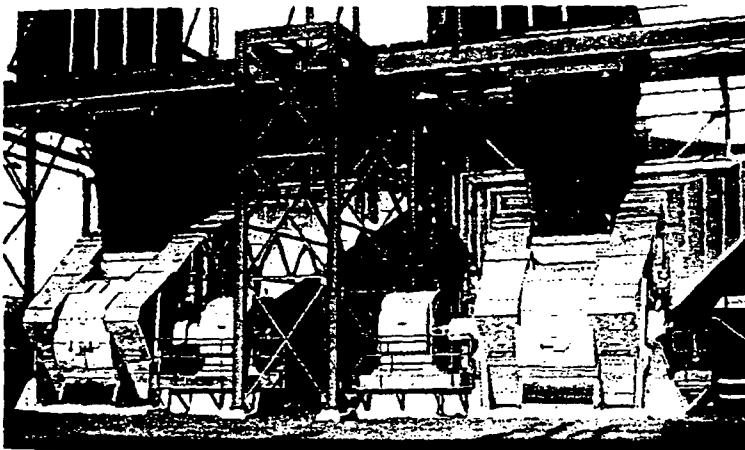
ature, the absence of reheat, the small size condenser, etc., were all dictated by this factor. Furthermore, these two units are designed and instrumented so that they may be shut down each night and over week ends and started quickly when required for the interconnected system load.

The station has been designed for

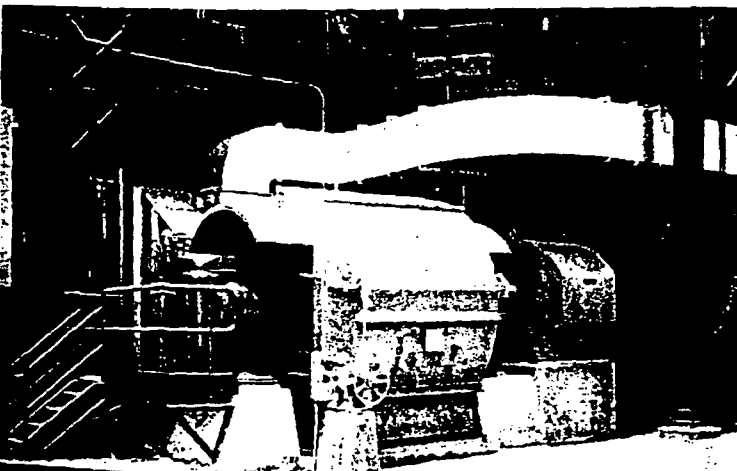


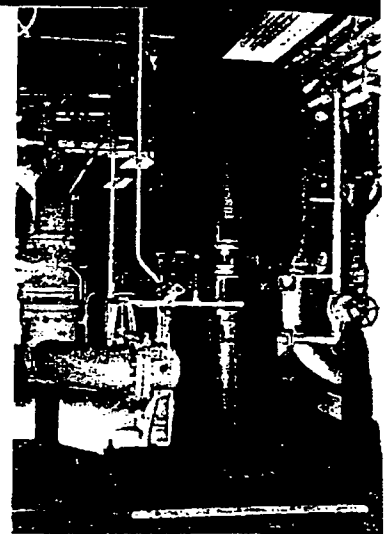
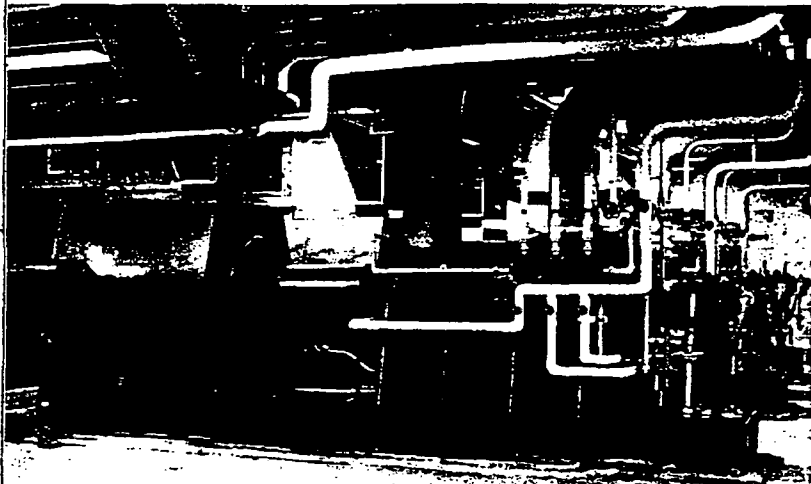
Exhausters and feeders driven by 150-hp motors. Two exhausters per mill.

The two pictures below show draft-fan installations. There are two induced-draft and two forced-draft fans per unit—constant speed, vane control. Motors are weatherprotected; the photograph of the forced-draft fan was taken in a snowstorm. Motor characteristics: for the induced-draft fans, 1250 hp, 900 rpm; for the forced-draft fans, 700 hp, 1200 rpm.



This big ventilating fan is one of four driven by Elliott C-W 20-hp, 1800-rpm motors. Below are station air compressors driven by 75-hp, 1200-rpm motor and two air control compressors driven by 20-hp, 400-rpm motors.





Elliott 350-hp, 1200-rpm vertical motors drive the hot well pumps located in the turbine room basement.

at the principal operating locations.

Since the first two units are to operate at low capacity factor, a number of mechanical features are somewhat different than would be found in a station designed for high capacity factor operation. For instance, duplication of auxiliary supply to guard against plant shutdown was held to a minimum.

The condenser basement is only 5 ft below grade to save excavation and subsurface construction costs. Further savings were achieved by using unusually small condensers.

Two vertical circulating water pumps are provided at the intake structure for each condenser. Both will operate normally, but one can handle the turbine at full load except in the warmest weather.

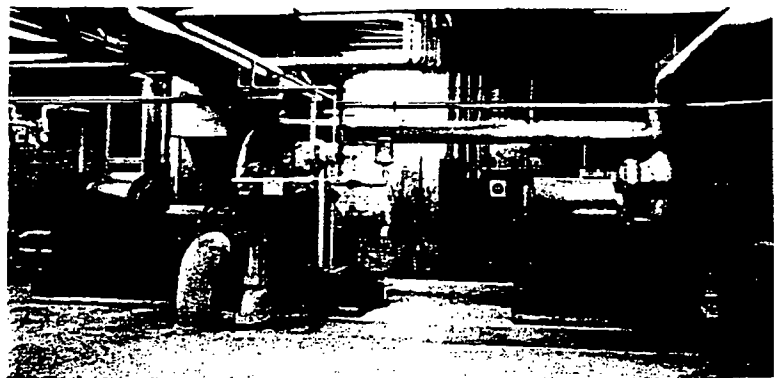
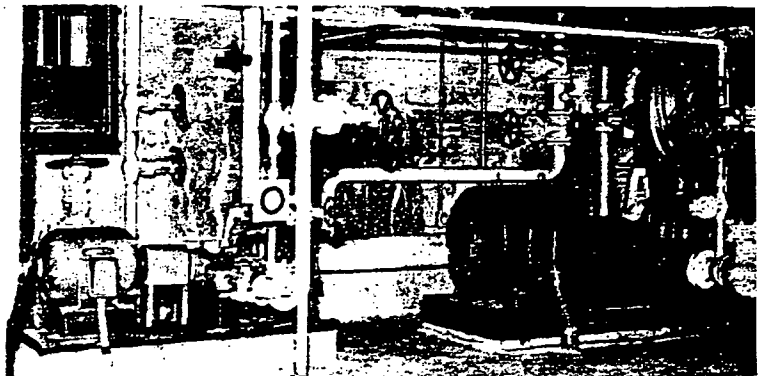
Two vertical hot well pumps are provided, each adequate for full turbine load.

Cooling water for pulverizer bearings, boiler-feed pump oil coolers, and compressor jackets and after-coolers is taken from the filtered water standpipe and returned to the same standpipe.

A motor-driven compressor provides air for general station use. A portable gasoline-engine-driven com-

Very important pumps located in the turbine room basement are the three boiler-feed pumps for No. 1 unit driven by Elliott 2500-hp, 3600-rpm induction motors. There are many pumps of various kinds installed at this location.

In the turbine room basement are the pumps shown below -- make-up pumps are driven by Elliott 40-hp, 3600-rpm and 150-hp, 1800-rpm motors. The ash water pumps, shown in the lower photograph, are driven by two Elliott 500-hp, 1800-rpm motors.





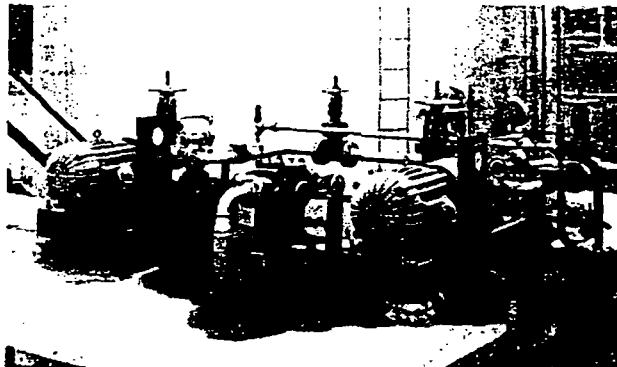
Caught in a snowstorm are the two Elliott 500-hp, 440-rpm, vertical weather-protected motors which drive the circulating water pumps for unit No. 1. The location is at the river.

pressor is available as a spare. Compressed air for actuating the numerous pneumatic control devices is supplied by motor-driven carbon ring compressors.

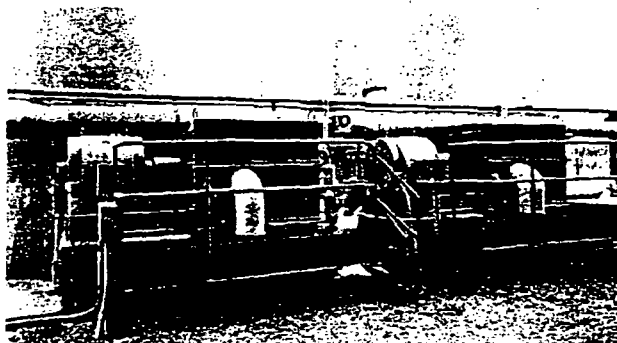
Due to the outdoor design of the station, the heating and ventilating problem is very much simplified. The control room and the office and service building offices and laboratory are air conditioned. Separate fans provide forced ventilation to the enclosed spaces in the turbine basement below the operating deck, the pulverizer room, and the feeder and burner room floor. Heating in these spaces is provided by unit heaters taking steam normally from the extraction steam line to the deaerator or from an oil-fired package boiler when the steam generating unit is shut down.

Normal operation of screens and wash pumps at the intake is time-clock controlled with supplementary starting actuated by a pressure drop across the screens. Abnormal make-up water required for frequent start-ups is provided by one 40,000-lb-per-hr evaporator for each unit and a 150,000-gal condensate storage standpipe.

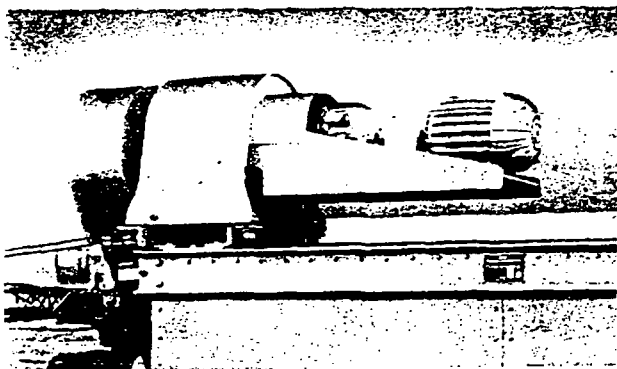
As shown by the photographs on pages 4 and 5 the Elliott open-type deaerating feedwater heater is installed outdoors above the turbine-generator unit. The unit consists of a horizontal tray-type deaerating heater with internal spray-type vent condenser, mounted and supported on a horizontal storage tank which provides approximately ten minutes of storage at maximum continuous boiler output at normal level. The deaerating



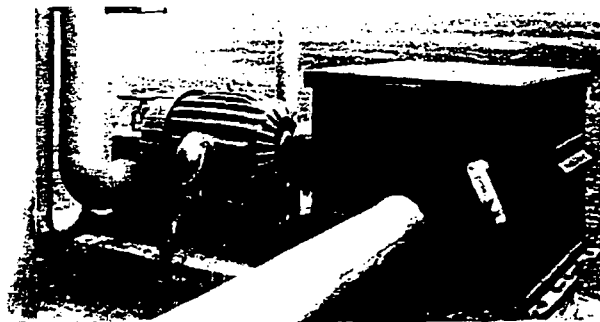
Motors driving fuel oil pumps with twin strainer between.



Two motors drive filtered water pumps (outdoors).



Above—Closeup of Elliott C-W motor driving traveling water screens. Below—20-hp, 3600-rpm motor driving cleanwell water pump outside water treatment building.



Elliott motors driving lube oil filter pump, right, and lube oil transfer pump, center, with Elliott lube oil twin strainer shown at the left.



heater is one of five feedwater heaters in the cycle, receiving steam from the 14th extraction stage of the turbine. The water level in the deaerating heater storage tank is maintained by by-passing part of the hot well pump discharge to the condensate storage standpipe whenever the level in the deaerator storage tank is above normal, and returning condensate from the condensate standpipe by means of make-up pumps whenever the water level in the deaerator storage tank is below normal.

Make-up water is deaerated by an Elliott evaporator preheater located below the deaerating heater.

Controls for boilers, turbine-generators, and auxiliaries are centralized in one control room. Supervisory control of the switchyard is also brought in to the control room.

Exceptions are coal handling controlled from the crusher house, ash and dust handling from the pulverizer room, and electrostatic precipitators from separate buildings near the precipitators. Water treating plant controls are located near the equipment. Placing these controls at strategic locations spreads the functions more logically among operating personnel and reduces the cost by a considerable amount.

Coal is delivered by rail and unloaded into a 160-ton hopper. A "car shakeout" expedites the unloading, assisted by oil-fired, car-thaw pits when conditions require. A belt conveyor moves the coal to bunkers or to the storage area. Coal from storage is reclaimed by bulldozing to the same hopper.

Bunkers are concrete silos, two for

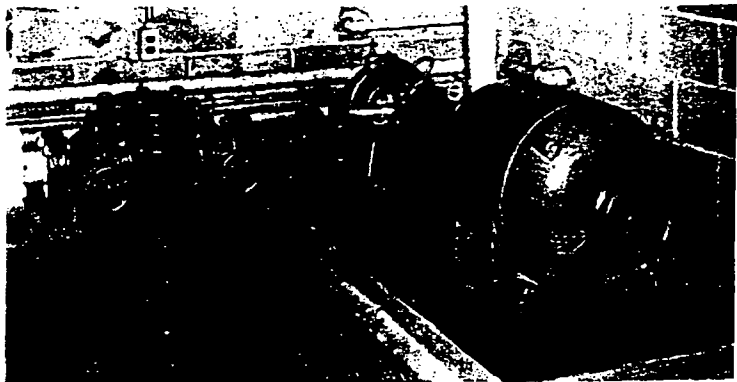
Below—Elliott raw water strainer; driven by two 40-hp, 1200-rpm motors driving hydrogen and lube oil cooling water pumps.



Twin strainer in water line to ash hopper.



Chlorine booster pump, in water treatment plant, with Elliott motor and twin strainer.



each generating unit. These are 36 ft in diameter, 75 ft high, and hold 1200 tons, each. Two silos hold enough coal to operate their generating unit 40 hours at full load. Thirty-inch vertical pipes drop coal from these silos to the coal feeders. After pulverizing, coal burns in 12 horizontal burners per boiler.

Coal is pulverized by two 10-ft inside diameter by 11-ft long ball tube mill type pulverizers, fed at each end by a table feeder automatically controlled by the coal level in the pulverizer. Two exhausters per pulverizer supply pulverized coal to 12 horizontal turbulent burners mounted in two rows in the front wall of the furnace.

The freeze protection system for this plant is more elaborate than is found in the usual outdoor plant because the plant is designed to be shut down at night and over week ends. It is, therefore, more susceptible to freezing than a plant operating "round-the-clock."

Protection against freezing during

shutdown is achieved by placing most vital equipment within enclosed space where heat is provided. Removable enclosures not normally heated are held above freezing by electric heaters. Outdoor pipelines have heating cables beneath the thermal insulation.

Elliott motors, ranging in size from 1½ to 2500 hp, drive pumps, fans, compressors, and other auxiliaries in the station. Many of these are shown in the photographs reproduced here.

All motors 250 hp and larger are supplied direct from the 4-kv bus. Other motors down to 75 hp are connected to one of the three 480-volt load centers, each load center being supplied by a 1000/1350-kva dry-type transformer. One of these load centers is located in each of the turbine, boiler, and coal crusher house areas. Motors smaller than 75 hp are supplied from any one of the 13 conveniently located 480-volt contactor cabinets. All motors, except for a few special types, are induction motors

with across-the-line starting. Motors located indoors are standard drip-proof; outdoor motors are completely-enclosed or weather-protected.

Pennsylvania Power & Light Company published two excellent books on the Martins Creek station which were available at the time of the station dedication. Both books were of 9 in. x 12 in. page size, printed in two colors. One 20-page book told the story of the plant simply for the general public. It carried a dramatic story emphasizing employees which the book called the "company's biggest asset"; it indicates the pride of the company in its more than 86,000 stockholders. The other book, 32 pages and cover, gave a more complete and technical story of the plant and is illustrated by drawings showing arrangement of the equipment, heat balance, wiring diagrams, as well as numerous photographs, and a big centerspread aerial view. It gives a detailed list of equipment, as well as maps of the company system.



Credit Union Handles Big Money

These men, the officers, directors, and committeemen of the Elliott Company Employees Credit Union, Jeannette Works, have the responsibility of handling a considerable amount of money. Members pay in \$50,000 monthly by payroll deduction.

Chartered in 1935 with 25 members and \$125 in assets, the Credit Union now has 1500 members and \$562,717 in assets. Almost \$2,000,000 in loans have been made.

Thomas A. Smith, Jr., seated at left, is serving his tenth year as treasurer. R. E. Wurthner, standing third from left, is serving his 20th year as an official on the credit committee.

Elliott men engage in various group activities

Councilman Honefenger

This is a meeting of the City Council of University City, suburb of St. Louis, Mo. Councilman at extreme left is none other than H. W. Honefenger, Elliott district manager, who, besides being very active in engineering circles, as noted recently in *Powerfax*, also finds time to serve his community in this way.



Elliott Men at Tappi Meeting

This photograph of Elliott Company men in attendance at the ninth engineering conference of the Technical Association of the Pulp and Paper Industry, in Philadelphia last fall, was run in the December issue of *Pulp & Paper*. Shown, left to right, are J. R. Lemmon, district manager, Philadelphia; H. W. Kinsel, district manager, Boston; H. D. Moll, H. S. Mills, and W. M. Morley, Philadelphia; C. L. Harvey, Ridgway; C. L. Hoebel, New York.



Richfield Oil Corporation's new 40 million d

A major expansion program at the Richfield Oil Corporation's Watson Refinery, Los Angeles, Calif., was completed in mid-1954 when a new 63,000-bbl-per-day fluid catalytic-cracking unit was brought on stream. Almost five years of intensive study, detailed engineering, and, finally, actual construction went into this program.

The catalytic-cracking unit, largest of its kind on the West Coast, represents the heart of a \$40,000,000 expansion and modernization program which affected almost every operat-

ing and service unit at the Watson refinery. While some units of the refinery are new, some were expanded and others modernized; so that the result is practically a new refinery.

All reduced crude is fed to the new 60,000-bbl-per-day vacuum still for separation into a distillate feed stock for the new fluid catalytic-cracking unit and an asphalt which is thermally vis-broken in combination unit heaters. Thus, a large portion of the refinery's stocks which previously were converted into gasoline and fuel oil by thermal cracking have now

been diverted to conversion catalytic-cracking processes with resultant increase in gasoline yield and quality.

Another significant change in "new refinery" as compared to "old" is the diligence with which light gases previously lost to fuel have been recovered and converted to high quality gasoline components. The gas plant of the new fluid not only efficiently recovers cracked gases, but all other cracked gases in the refinery are routed to unit for final processing. To fur-

Close-up showing a good portion of Richfield Oil Corporation's Watson, California, refinery



refinery

process the recovered gaseous constituents, a new 2000-bbl-per-day catalytic polymerization unit was included as a part of the refinery expansion. Alkylation unit capacity for the production of the chief constituent of aviation gasoline from recovered gases was increased by 50 percent.

In addition to these changes in basic processing and the new units involved, another major change involved re-vamping the combination units to increase their crude charging capacity by a total of 20,000 bbl per day.

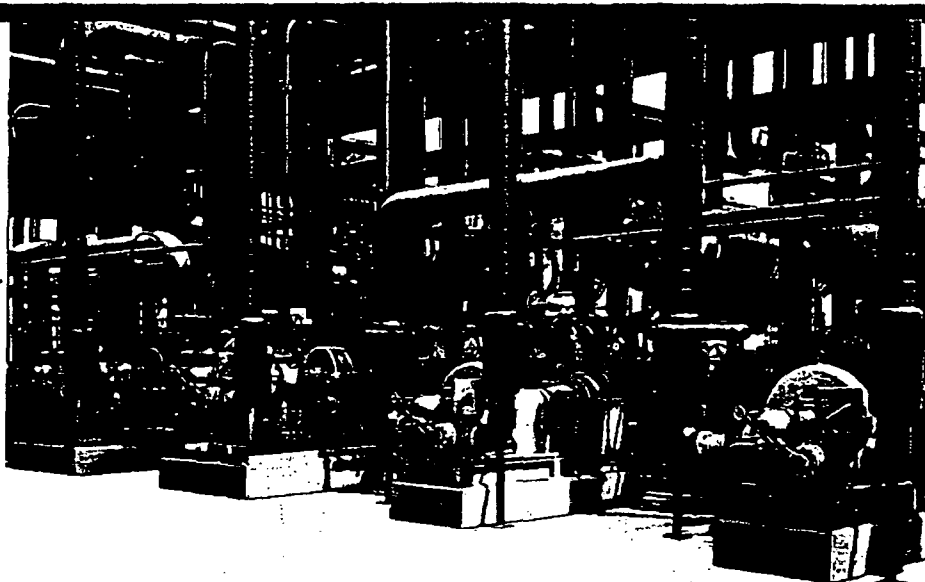
With the construction of any new processing units or redesign and modernization of existing units, a great deal of new and expanded auxiliary services are required. Richfield's recent refinery expansion program required large expenditures for these added auxiliary services. In addition to utilities, field piping, storage and related items, new shops, and a warehouse were provided to service and maintain the facilities.

Elliott steam turbines in sizes from 2 hp to 600 hp drive all sorts of pumps, fans, and compressors around the Watson refinery. A typical line of these turbines is illustrated. Turbines in the plant operate at three steam pressures. Some take steam at 600 psig from the newest boilers, exhausting at 150 psig. Many use 150-psig steam, exhausting at 25 psig. Some operate on this 25-psig steam.

Fans for the new cooling towers are driven by 36 Elliott C-W 60-hp, four-pole, explosion-proof motors.

EDITOR'S NOTE: Above is practically a reproduction from *Petroleum World and Oil*.

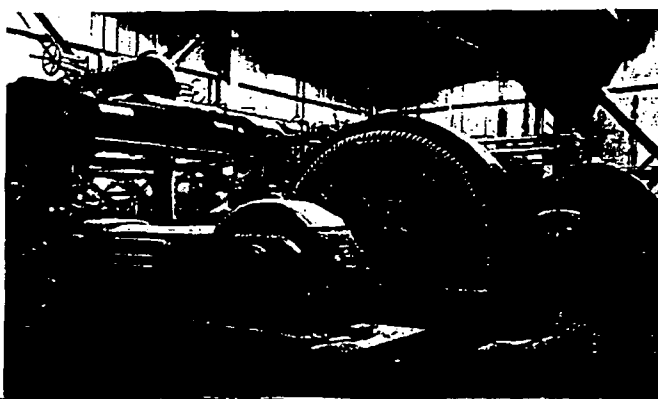
POWERFAX, SPRING 1955



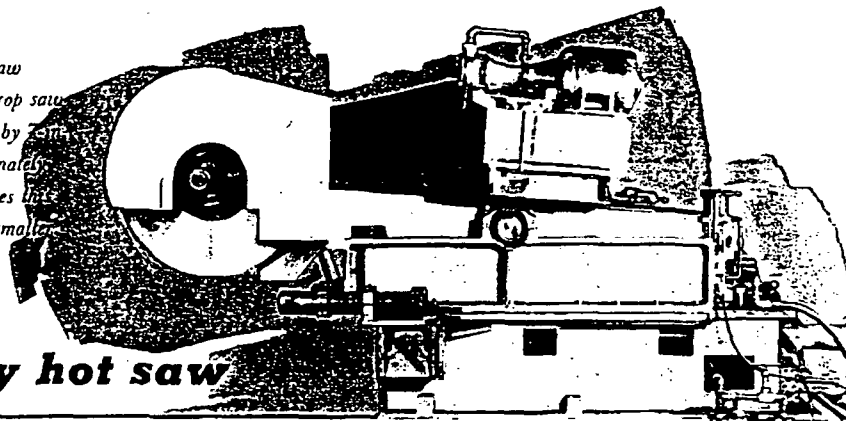
More than 100 Elliott steam turbines ranging in size from 2 hp to 600 hp are on the job at Richfield Oil Corporation's new Watson refinery driving process and water pumps, also fans and compressors.

Steel mill compressors

THE installation below shows two Elliott 800-hp, 180-rpm synchronous motors driving Ingersoll-Rand duplex air compressors in the Indiana Harbor Works of The Youngstown Sheet & Tube Company at East Chicago, Indiana. The two air compressors supply the general air requirements for a new cold-reduced sheet mill which cold-rolls sheet steel at the rate of 40,000 tons per month. The compressors also may supply emergency air supply to a nearby tin mill. With both compressors operating, the complete requirements of both tin mill and sheet mill may be supplied, the tonnage capacity of both plants being 120,000 tons per month. Air requirements include air cylinders, air hoists, air lifts, also emergency cooling and cleaning of equipment.



This new automatic 48-in. hot saw is a combination crosscut and drop saw capable of cutting two 7-in. by 7-in. billets side by side in approximately nine seconds. York-Gillespie makes this saw in sizes both larger and smaller.



Double-duty hot saw

IN 1948 James and Charles MacGregor founded the York Engineering & Construction Company of Pittsburgh on not much more than the proverbial shoestring. Both MacGregors had had experience in the steel industry, and the new company specialized in designing and building steel mill equipment. Their premise was that millions are spent on high-speed production mills, and yet the intermediate equipment leading to or from these mills is too often left in antiquated form. Since standard equipment would not usually solve these problems, there was an opportunity for a company that would specialize in the building of automatic handling equipment to meet the needs of individual plants.

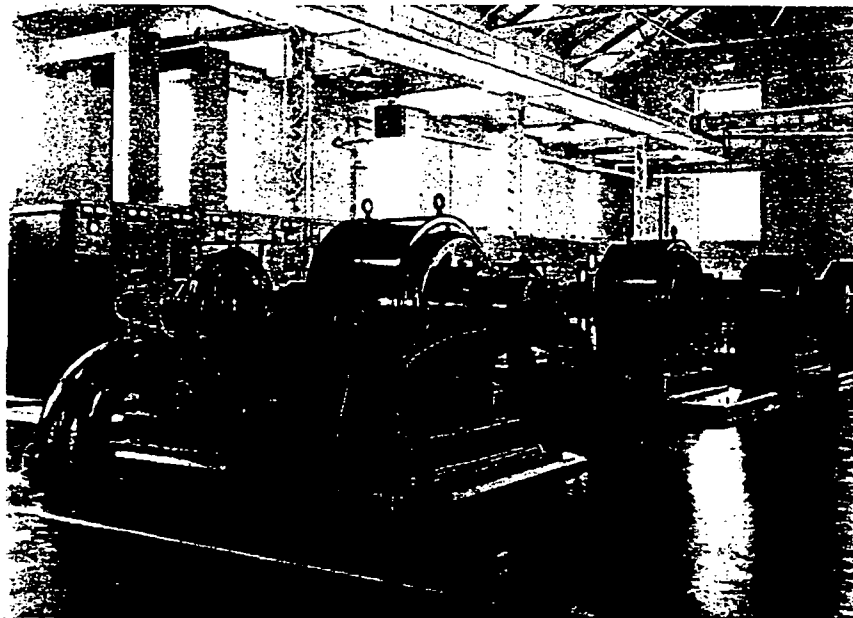
As business grew the company expanded and in 1951 the Gillespie Manufacturing Company was purchased and York-Gillespie Manufacturing Company formed. In the six years of the firm's existence their family of intermediate steel mill equipment has grown to include automatic or semi-automatic manipulators for round, flat, and square products, billet feeders, cooling-bed straightening combinations, billet, slab, and strip grinding machinery, coil handling, loading, and weighing equipment for rod and bar mills. Standard basic-steel equipment such as hot saws, shear gages, scrap balers, ingot cars, cinder ladles, and rolling mill tables are also products manufactured by York-Gillespie.

One of their latest developments is an automatic hot saw designed and built for high-speed, high-production cutting of steel products. The saw is a combination crosscut and drop saw for cutting billets, slab structural products, etc. It has automatic hydraulically-operated saw feed, and special feedback controls that provide constant use of maximum horsepower regardless of the varying thickness of the material being cut. The 48-in. saw, shown above, with a 150-hp motor drive is capable of cutting two 7-in. by 7-in. billets side by side in approximately nine seconds. All the motors and control equipment for the saw, were furnished by Elliott Company's Industrial Motor Division.

This photograph of the shop test set-up of the hot saw gives an excellent view of the Elliott C-W motors that power the saw. The large 150-hp 1200-rpm motor in the upper right is the saw drive. In the lower right is the 20-hp 1200-rpm hydraulic feed pump motor. In between these is a 3/4-hp 1200-rpm motor driving the lube oil pump, and at the left is a 20-hp 3600-rpm motor driving the water spray pump.



In the remodeled high-service pumping room, the two Elliott 600-hp, 1200-rpm motors are driving the 10-mgd pumps. The next two in line are Elliott 500-hp, 1200-rpm motors driving the 8-mgd pumps. The 5-kw overhung exciters protrude like noses from each motor.



Elliott motors in modernization program at Decatur Water Works

by Gerald L. Davis

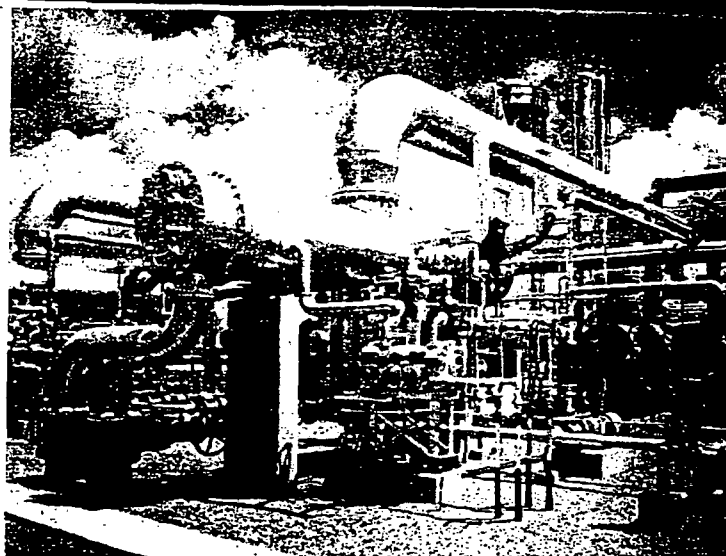
*Plant Superintendent
Decatur, Illinois, Water Works*

THE city of Decatur, located about 175 miles southwest of Chicago in the midst of Illinois' famous corn belt, has a population of approximately 66,000. Its citizens together with its industrial plants, consume an average of 10 million gallons of water daily, which is supplied by the Decatur Water Works.

The city has had its own steam-generating plant and water works station since 1871. Following the trend of modernizing facilities for more efficient plant operation, in 1950 the water works was fully electrified using purchased power. This meant the end of the large old steam-driven reciprocating pumping equipment which had been in operation for 40 years. Installed in its stead were two 8-mgd and two 10-mgd high-service Ingersoll-Rand centrifugal pumps driven respectively by two 500-hp and two 600-hp, 1200-rpm Elliott synchronous motors. For low-service pumping two 12-mgd I-R pumps were installed, each driven by Elliott 75-hp 600-rpm motors. An emergency stand-by diesel generator was purchased.

This new equipment has been in operation approximately four years and has shown a great saving in pumping costs. Manpower needed for plant operation has been more than halved, and the cost of purchased power, plus fuel oil for heating the buildings, is still less than the plant's former coal bill. The motor-driven pumps have now been in use more than 25,000 hours with no repairs necessary to the motors and only replacement of packing in the pumps.

This view features the Elliott 1100-sq ft surface condensers serving the turbines driving the lean oil pumps. The twin two-stage steam jet ejector is neatly mounted on a table in the foreground and below it is the dual trap. Condensate pumps may be seen at the right.



New Pledger gasoline plant recovers five liquid products

THE Southern Production Company, Inc., recently put into service a natural gasoline plant in the Pledger field, some 60 miles southwest of Houston, Texas, to take care of increased gas production in that area.

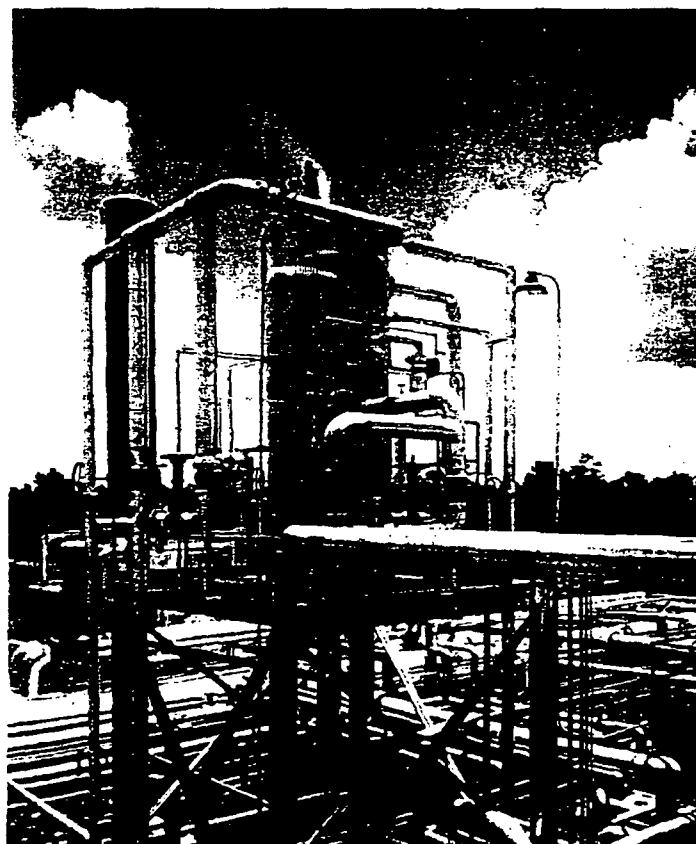
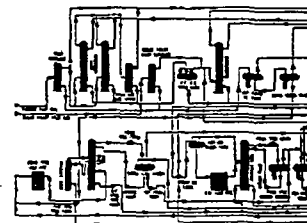
The new Pledger gasoline plant, which replaced an older one, is one of the largest absorption plants in the country, capable of processing more than 190,000,000 cu ft of wet natural gas per day. From this amount of gas, the following approximate quantities are obtainable: 81,335 gpd of 10 rvp gasoline, 91,070 gpd of LPG products, 14,150 gpd of isobutane, 11,310 gpd of kerosine, and 1910 gpd of fuel oil, leaving 184,773,000 std cu ft per day of sales gas.

The plant was engineered and constructed by Stearns-Roger Manufacturing Company.

Wet Pledger gas, directly from the wells, arrives at the plant at a flowing pressure of 2000 psig and at a temperature of 115 F. From the Sugar Valley field, a second stream of wet gas arrives at the plant at a pressure of approximately 600 psig.

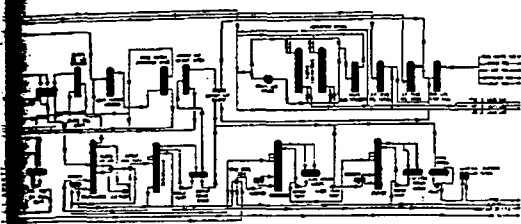
In the gas-processing portion of

This Elliott 100,000-lb-per-hr deaerating feedwater heater in the steam plant uses steam from the 600-psig exhaust system and takes water from condenser hot wells.



Another view of one of the Elliott 2100-hp multistage turbines driving the lean oil pumps. The turbines exhaust upward to Elliott 1100-sq ft surface condensers shown in the background.

Simplified flow chart of the Pledger plant, below, shows process routine, products made, and the various refining steps. This cut is used courtesy of The Petroleum Engineer which, in its February issue, chose this plant as an example of the very best and most modern design and construction.

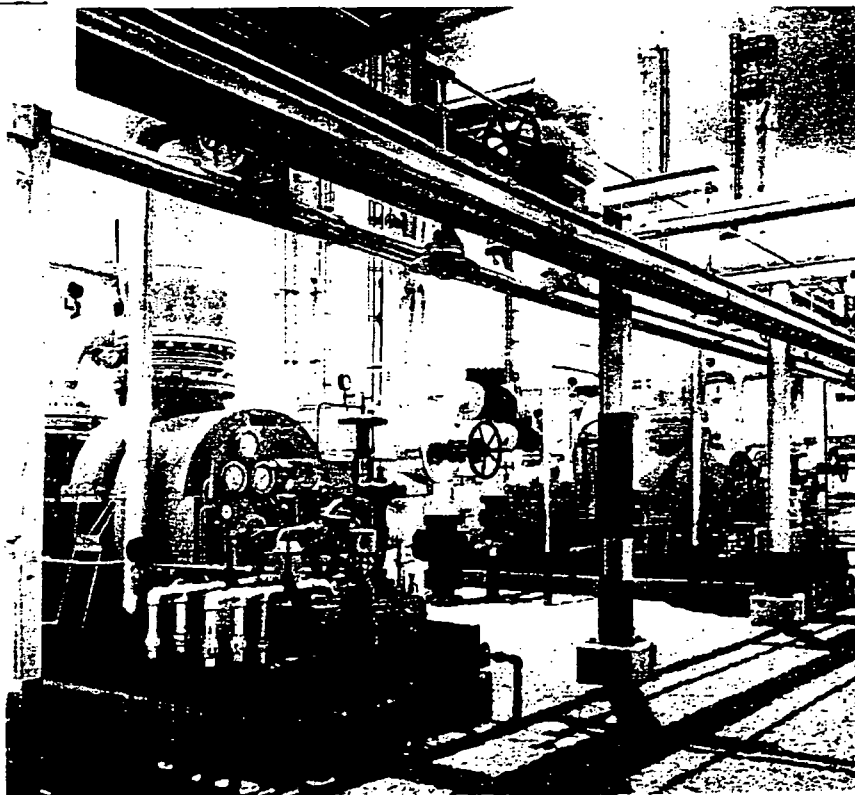
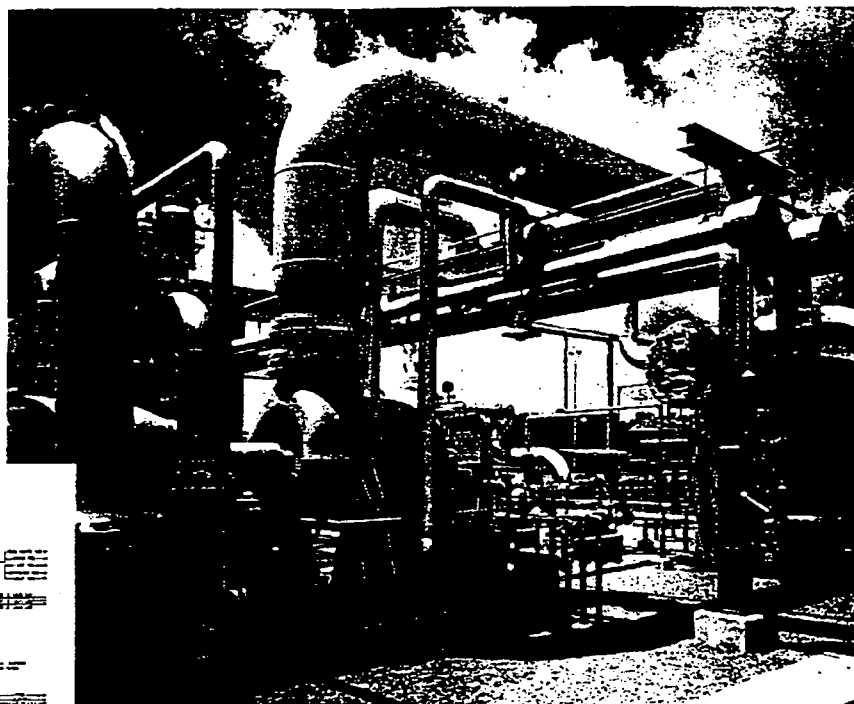


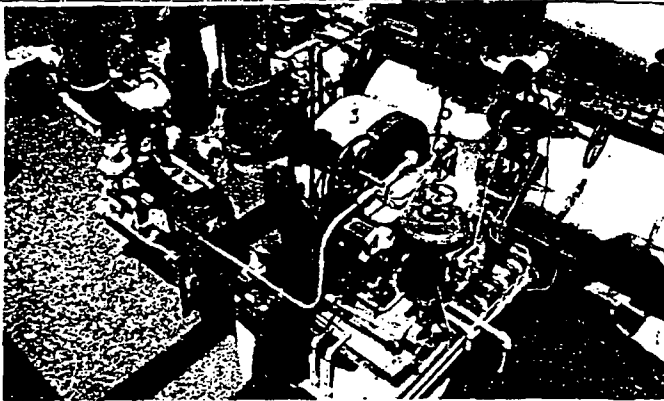
This photograph shows the two Elliott 2100-hp, 4450-rpm, multistage steam turbines which drive the lean oil pumps. These pumps discharge to absorbers at three pressure levels: 400, 700, and 1450 psig. Turbines have variable-speed governors and uncontrolled extraction.

the plant the desirable components of the incoming gas are recovered by the conventional absorption method, the equipment consisting of absorbers, reabsorbers, gas scrubbers, rich oil flash tanks, and a dry-type dehydration plant.

The distillation portion of the plant consists of three sections operating in conjunction with one another: the absorption oil distillation system, the condensate system, and the oil purifying system.

The fractionation portion of the plant is where the recovered hydro-





This Elliott 287-hp, 6760-rpm steam turbine drives a centrifugal compressor. Turbine takes steam at 305 psig, 522 F, exhausts at 60-psig back pressure.

carbons are separated and blended to meet final product specifications. Included in this portion are the demethanizer, depropanizer, stabilizer, and butane splitter.

Actually the interaction of the various processes is quite complicated, as shown by the "simplified" flow chart on preceding pages.

The steam-generating system for the plant consists of three integral-furnace-type boilers. Each boiler will produce 42,000 lb per hr of steam at 305 psig and 522 F total temperature at the superheater outlet with an approximate drum pressure of 335 psig. Two boilers take care of the normal steam demand, and there is about one complete boiler for stand-by.

High-pressure steam is used in the primary steam reboilers, turbines

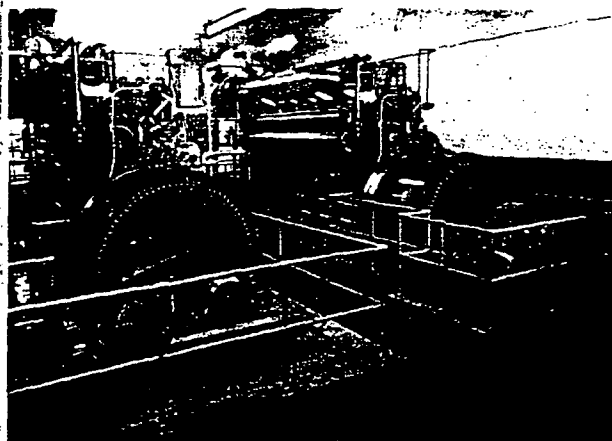
driving the high-pressure lean oil pumps, the air ejectors, and several other pumps. The exhaust system from this high-pressure system is handled by two 60-psig systems, one "clean" and one "dirty." Steam at 60 psig serves as stripping steam for gas heaters and in the deaerating feedwater heater.

The pictures show that the high-pressure lean oil pumps are driven by Elliott multistage steam turbines, which in turn are served by Elliott surface condensers.

Two water condensate systems are employed in this plant, a "clean" and a "dirty" system. Two headers are provided for the clean system, because of the difference in the temperature of the condensates. From the hot well of the surface condenser serv-

ing the high-pressure lean oil pump turbines one header handles only this hot well condensate, which is relatively cool, goes through heat exchangers and directly to the deaerating heater in the boiler plant. Depropanizer reboiler condensate, also condensate from the butane splitter (reboiler), and from the gas heater that regenerates the dehydration agent, all are taken via the second clean header, as a liquid but at a temperature not far below boiling and goes first to the condensate flash tank, next to the condensate skimmer tank after being cooled enroute.

The condensate skimmer tank is a vessel maintained at essentially atmospheric pressure, and the dirty condensate header collects and sends into it condensate from the different still accumulators, the sales gas heater, and the heater on the fuel gas line. Here the hydrocarbons remaining in the condensate are removed, either as liquid or as vapor escaping to the atmosphere. Water from this skimmer tank then goes to the oil removal unit where more oil is removed, the condensate is filtered and goes to the boiler feedwater storage and eventually into the deaerating heater. This boiler feedwater tank also receives the make-up water directly from the water-treating system.



Triplets at Aspinwall

THIS photograph shows two of three Elliott 600-kw, 360-rpm generators installed in the electric plant of the borough of Aspinwall, near Pittsburgh, Pa. The generators are equipped with chain-driven exciters. The engines are Worthington six-cylinder, dual-fuel engines equipped with Elliott turbochargers, one of which may be seen at the rear of the engine on the right. The borough of Aspinwall first operated a steam plant. When it became obsolescent, boilers and steam turbine-generators were removed and replaced by these diesel units. The changeover was done, very ingeniously, without interrupting service.

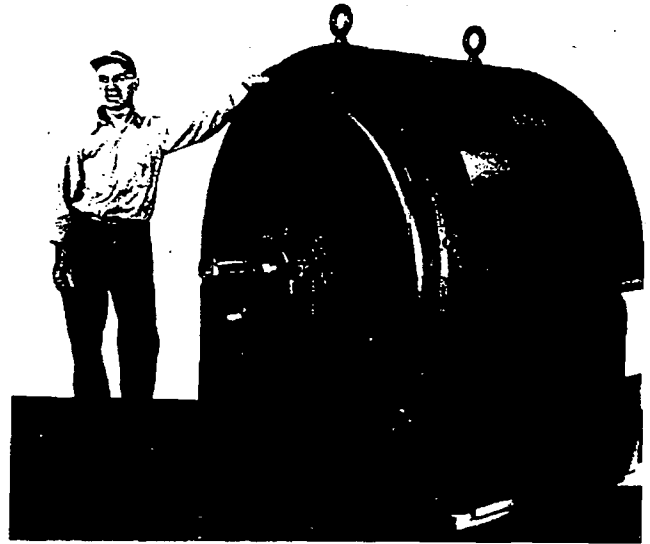
Old motors and new in a modern cement plant

IN the winter of 1926, an article in *Powerfax* stated that eight Elliott synchronous motors had recently been installed in Peerless Cement Corporation's Detroit plant. These included four 500-hp motors driving wet ball mills and four 650-hp motors driving dry ball mills.

Recently, while additional Elliott equipment was being installed in the plant, photographs of these old motors shown here were taken. It can easily be seen from the appearance of these 30-year-old motors that they have been well maintained, and their service record shows that this maintenance has paid dividends. Since 1925, when these motors went into service, only one 500-hp motor has needed any major electrical repairs, even under this difficult service.

The Peerless Cement Corporation was founded in 1897 and has plants in Detroit and Port Huron, Michigan. These two plants produce 4,000,000 barrels of cement clinker annually, approximately half at each plant. Also, the company has just recently purchased land for a new plant in Detroit to produce an additional 1,000,000 barrels. It is interesting to note that while most cement plants are in remote locations because of the difficulty of dust control, one Peerless plant is now located within the city limits of Detroit, and the new plant will also be within the city limits. The plant is subject to a city air pollution ordinance which allows no more than .3 of a grain of dust per cubic foot of exhaust gas from the kilns. An electric precipitator between the kiln exhaust fans and the stack, operating at 95 percent efficiency, is reducing the grain loading well below .3 of a grain per cubic foot.

The kilns, of course, are not the only source of air pollution in a cement plant. Since Peerless uses the wet process in making cement, they do not have any dust problems until the ingredients reach the kilns. However,

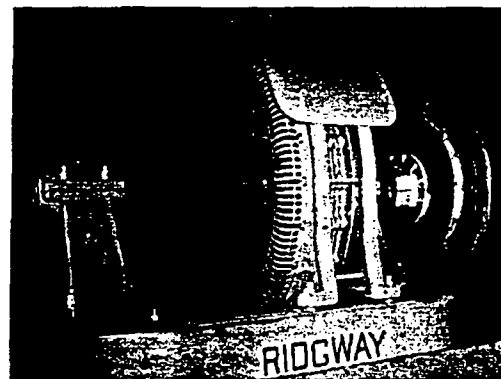
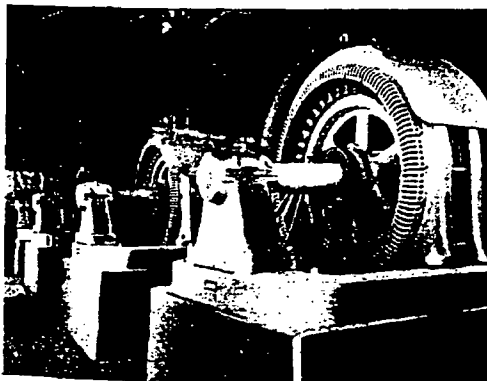


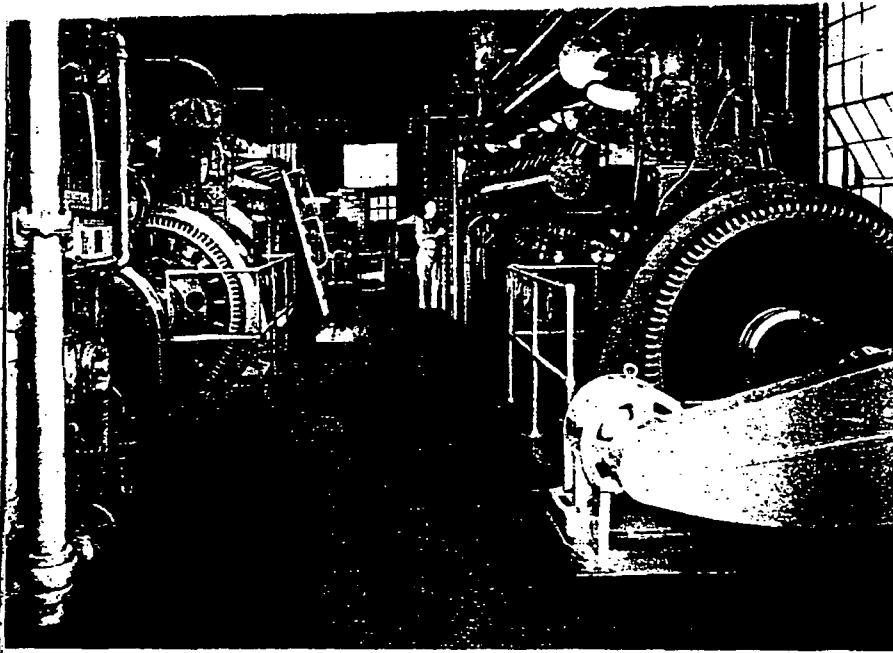
A view of the most recent Elliott 350-hp synchronous motor to be purchased by Peerless, taken in our Ridgway shop prior to shipment. It is the drive for a Bradley Hercules pulverizer mill. Due to the crowded location of this motor in the Peerless plant an installation photograph could not be taken.

from this point on until the cement is finally processed, they have numerous dust collectors to keep dust to a minimum. Today the largest source of dust in the plant is in the storage silos where dust is raised every time cement is put in storage or taken out to the packhouse where bagging machines package the cement for shipment. However, the fact that the city of Detroit has given a permit to the company to build a new plant inside the city limits is proof that Peerless has its dust problem under control.

The largest piece of Elliott equipment to be installed in a Peerless plant recently is a 350-hp, 400-rpm high-torque synchronous motor driving a Bradley Hercules pulverizer mill at Port Huron. There are also a large number of smaller Elliott C-W motors on equipment in the Peerless Detroit and Port Huron plants as well as a surface condenser and deaerating heater.

This line of four Elliott 500-hp, 180-rpm synchronous motors driving the wet ball mills has been in operation since 1925. At right is one of the four 650-hp, 180-rpm synchronous motors that drive the dry ball mills, installed at the same time.

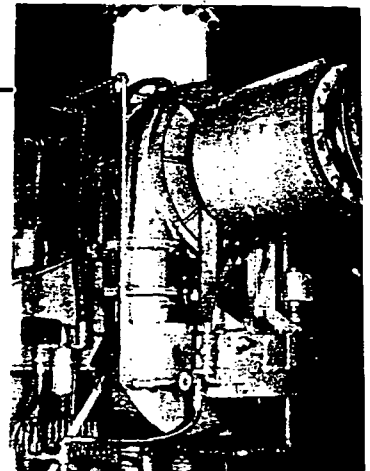




This view in the Ford City plant shows parts of all four generating units. The latest unit installed is the one on the right, also shown in lower photo, opposite page. At extreme left may be seen the piping of a 462-kw unit installed in 1941 (close-up opposite). At left is an Elliott 1085-kw generator driven by Worthington 1540-hp diesel engine, also equipped with Elliott turbo-charger. In the deep background is the Elliott 300-kw generator (also driven by Worthington diesel) which was installed in 1936. Shown standing in the background is Albert M. Mohney, superintendent of the light plant.

Ford City progress

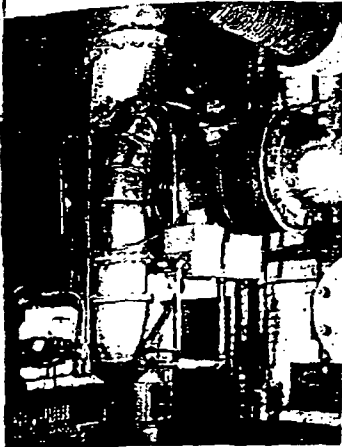
FORD CITY, P.A. is located about 40 miles up the Allegheny River from Pittsburgh. Its light plant began operations in 1900, generating its power entirely with gas engines using natural gas as fuel, since Ford City was located in a natural gas field. The first diesel generators appeared when the gas supply began to dwindle, and at first they were required to operate in parallel with gas-engine-driven generators. At present, four diesel engine generating units are in service, being installed in 1936, 1941, 1948, and the newest one just last year. Pictures on these pages show the units now in service. An article in the Summer 1936 *Powerfax* covered the installation of a 300-kw unit that year.



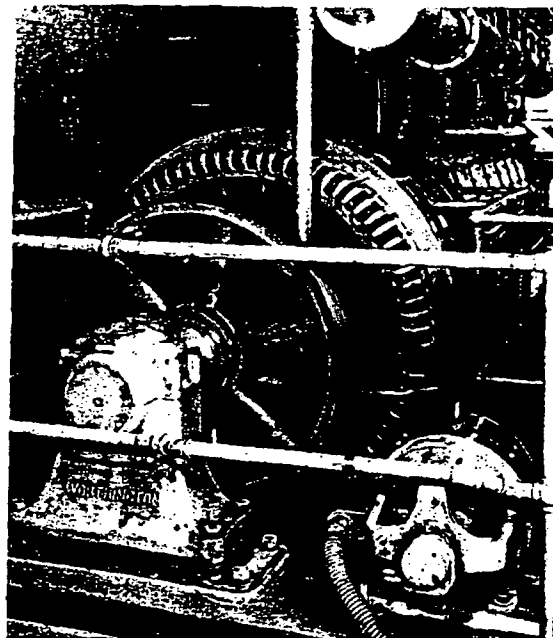
Close-up of the new Elliott design turbocharger serving the latest engine installed in 1951.



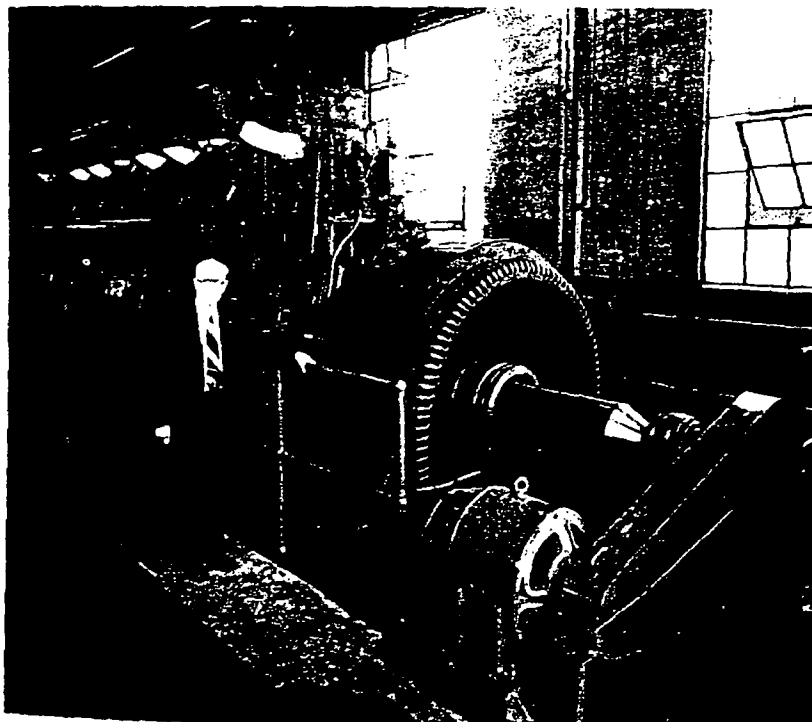
This photograph shows the Fluor-Griscom-Russell Fin-Fan jacket water cooler which serves all four diesel engines. The three circulating pumps shown in the foreground are driven by Elliott Crocker-Wheeler 10-hp, 750-rpm motors.



The Elliott-Buchi turbocharger serving the 1540-hp diesel engine which was installed in 1948.

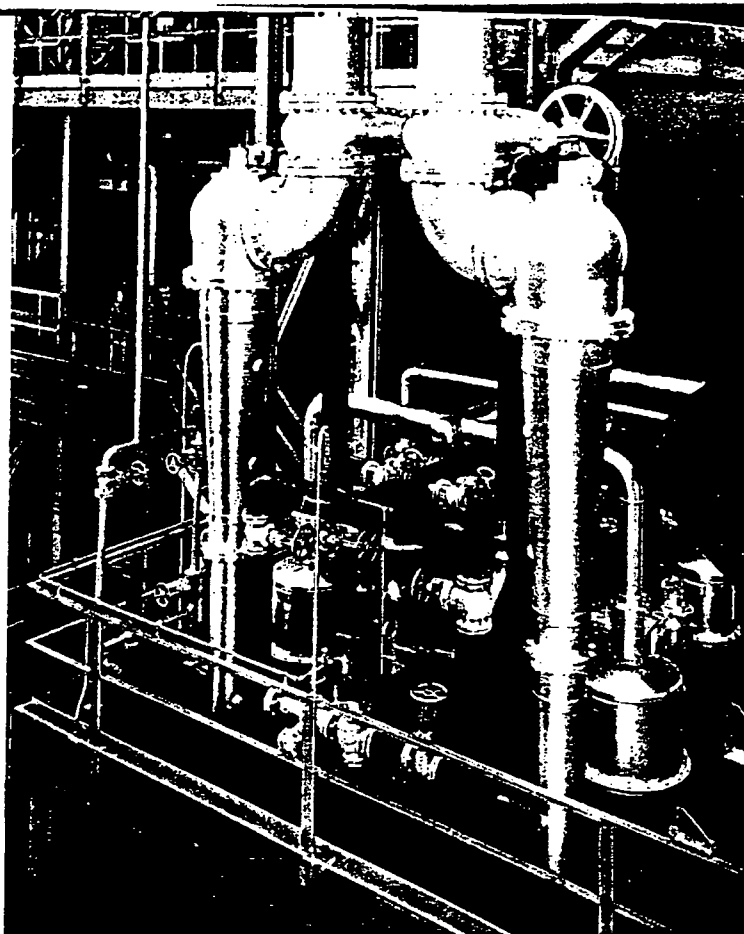


This is a close-up of the Elliott 462-kw generator with V-belt-driven exciter installed in 1947. This unit is tucked in at right angles to the latest units.



Standing beside the latest Elliott generator at Ford City is Lester O. Gregg. Mr. Gregg was retired a year ago but still is on call as a consultant and is very much interested in his jobs. See page 3 for further information about Mr. Gregg. The Elliott generator here is rated 1245 kw, 360 rpm, and has a V-belt-driven exciter. It is driven by a Worthington 1260-hp dual-fuel diesel engine equipped with an Elliott turbocharger. This unit went into service just last year.

These photographs show two of three parallel sets of Elliott three-stage ejectors. These twin three-stage units, serving primary and secondary vacuum towers, operate on 100-psig steam. The ejector units are installed in parallel sets so that, at reduced rates, one set may be shut down for economy in steam consumption. The final stages exhaust to aftercondensers. The photograph on this page features the large first or "booster" stages; photograph on the opposite page shows the final or third-stage end of the ejector units. The ejectors are installed in a neat manner on platforms at an elevation.



Sinclair's Houston refinery expansion

A general expansion program at the Houston refinery of Sinclair Refining Company has included a new 40,000-barrel-per-day fluid catalytic-cracking unit constructed by C. F. Braun and Company and a 35,000-barrel-per-day crude unit constructed by the Fluor Corporation. Both of these contain interesting features which were covered in separate articles in *Oil and Gas Journal* during 1954.

The FCC unit, designed by Sinclair Refining Company engineers, was placed on stream in October 1953. Unit operation provides for recycling 10,000 barrels of stock daily in addition to the 40,000-barrel charge of fresh feed. Incorporating all of the latest improvements in FCC units, this plant is the backbone of Sinclair's

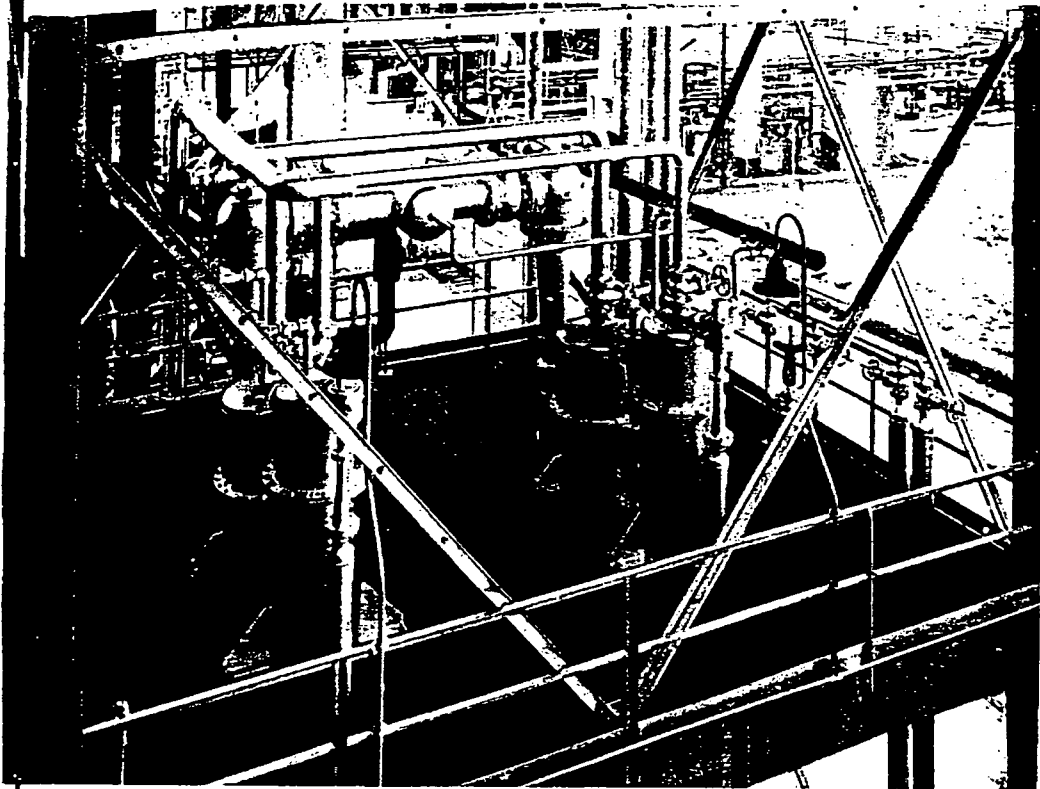
efforts toward economically producing motor fuels which rank high in the competition for quality.

The machine which keeps things moving in the catalyst circulating and regenerating system is the Elliott turbine-driven centrifugal compressor unit illustrated. It is distinctive in that it is the largest unit of its kind which has yet gone into service in this application. Sinclair has made an excellent job of the installation of the equipment. Another view of the same unit was featured on page two of the Autumn 1954 *Powerfax*.

The modern design of Sinclair's new crude unit is an important factor toward accomplishing the production of outstanding motor oils. As shown by the photographs above, Sinclair

has made two very fine installation of Elliott three-stage steam ejector on the crude unit vacuum towers.

Vacuum is maintained on both the primary vacuum tower and the secondary vacuum tower by two parallel sets of Elliott three-stage steam ejectors. Barometric intercondensers are used, with the final ejector stage discharging to surface type condensers, which vent to atmosphere or to the refinery low-pressure gas line. Tower pressure is controlled by recycling gases from the third-stage ejector discharge back ahead of the first-stage ejectors. If the pressure begins to rise, this recycle will begin to shut off and ease the load on the ejectors, allowing them to maintain the desired pressure.

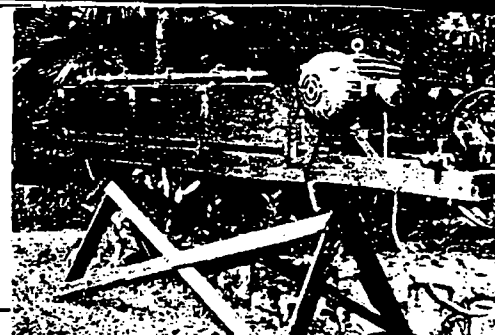


The Elliott turbine-driven centrifugal compressor, which serves the fluid catalytic-cracking unit, is the largest unit so far installed in this service.

The compressor handles 135,500 inlet cfm of air at 22.0 psig discharge pressure. The turbine develops 12,400 hp at 2,000 rpm. The predominantly temperate climate permitted outdoor installation of the equipment, some shelter being provided by an overhead canopy. For year-round comfort, unit control rooms are air conditioned.



Coffee-washing machine developed in Puerto Rico



HERE is an Elliott C-W *Sealedpower* totally-enclosed fan-cooled motor, operating out in the open on the edge of the tropical forest in Puerto Rico, driving a peeler and coffee scrubber. The photograph was run in *Implement & Tractor*, and to give the story, we quote part of the article.

Specialized equipment for harvesting and preparing types of crops grown only outside of the United States is often badly needed but hard to acquire because of lack of financing or American know-how in production. An example of this type of equipment is a coffee-washing machine which was recently developed and installed in Puerto Rico.

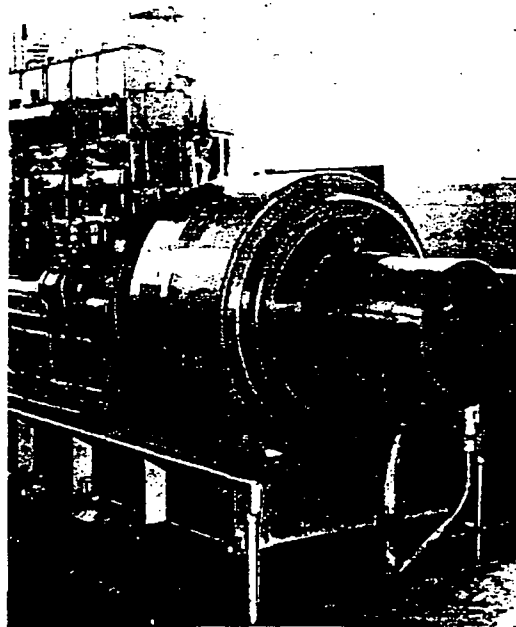
Coffee grows in the form of a berry, which is red when ripe, and about the size of a cherry. When coffee is processed the berries are first put through a peeling machine which crushes the covering of the berry. The big problem, however, is to remove the gelatinous material surrounding the coffee grain.

For centuries this job has been done by fermentation, which turns the material to alcohol. It is then washed and is ready to dry for market. The process, however, is slow and expensive. In cool, mountainous regions fermentation may take 24 hours; in warm sea level areas it may take as little as six hours.

A machine which removes the gelatinous material mechanically has recently been developed. The machine is operated by a 2-hp motor; is 8 ft long, 8½ in. wide, and 16 in. deep. The gelatinous material is collected at the upper end of the machine, next to peeler, without the use of water. At the middle and lower end of the machine several small jets of water are introduced to wash the remaining material from the coffee. It comes out ready to be dried for market. A single man can attend both peeler and coffee scrubber.

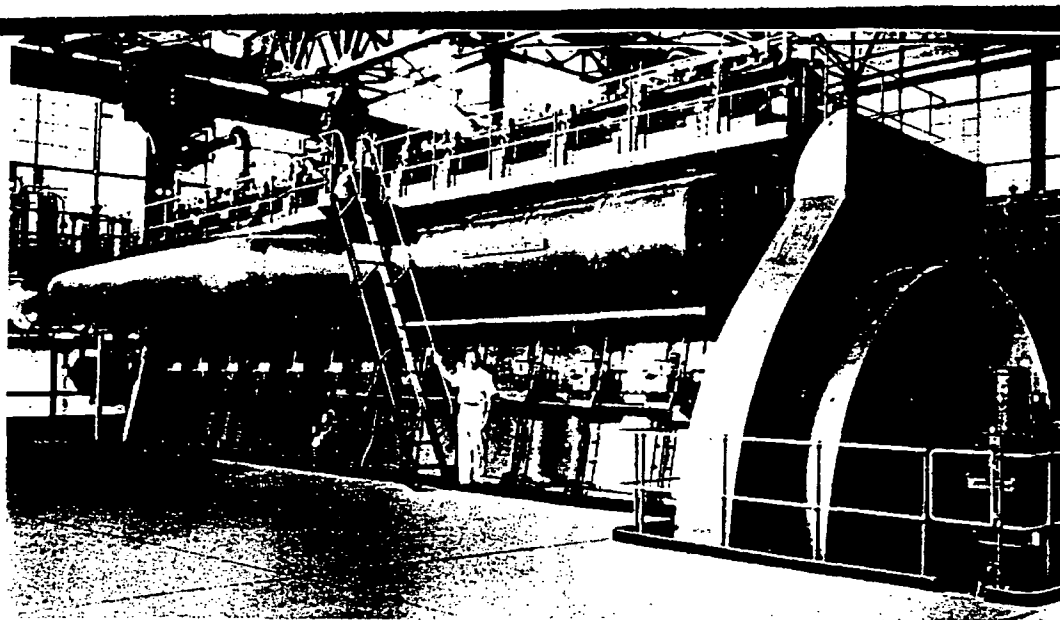
The machine is calculated to wash and clean about 1200 lb of washed wet coffee per hour.

Aircraft plant installs emergency generator



NORTH AMERICAN AVIATION, INC. has installed this Elliott 200-kw 900-rpm generator driven by a Superior 295-hp gas engine to protect its jet-aircraft parts plant in Columbus, Ohio, against power failure. An emergency power source in case of outside power failure was necessary to keep the plant communications system in operation, to maintain a safe level of illumination in the plant, and to supply power to the fire alarm system and stationary fire equipment. Also it was important always to have power for outside floodlighting and for motor-driven sump pumps used to carry away water that might collect on floors during fire fighting or a very heavy rainfall.

An interesting part of the engine-generator setup is the control features which are practically foolproof regardless of the cause of power failure. An emergency control switch provides for either automatic load pickup or manual starting by air motor, gas engine, or batteries. Under automatic control, the engine is started by an air motor if the voltage of the normal supply drops below a predetermined value. When the stand-by generator voltage reaches proper value the normal power breaker opens and the emergency power breaker closes. These operations take place in reverse when the normal power returns.

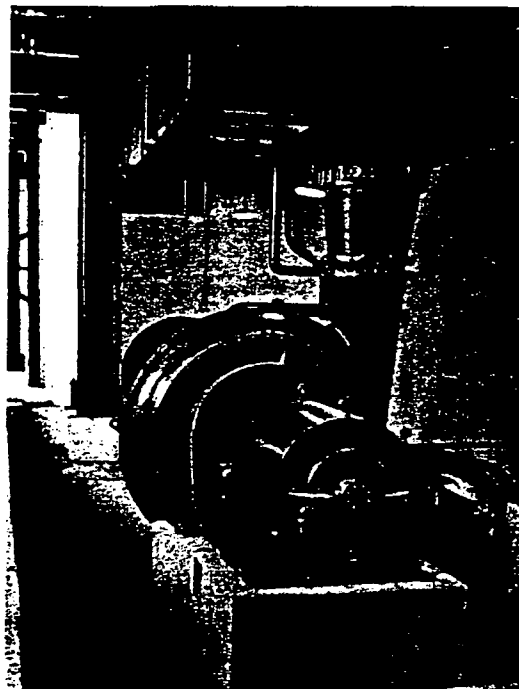


The physical size of this diesel-generator can readily be seen in comparison to the man standing beside it.

Scavenging compressors in Chile

THE Nordberg 12-cylinder, two-cycle diesel engine pictured here is one of two in Anglo-Lautaro Nitrate Corporation's new Coya Sur diesel-generating plant near Tocopilla, Chile. This power plant forms part of a three-plant network, operated by the company, whose combined generating facilities total 46,000 kw. These engines, which are the most powerful single-acting, two-cycle diesel engines in the Western Hemisphere, are both rated at 8950 bhp and 6400 kw at 80 percent power factor. Below each engine, in the basement, is an Elliott 44,200-cfm motor-driven compressor operating as a scavenging blower and requiring 545 kw when running at full load.

The operations of the Anglo-Lautaro Nitrate Corporation cover a large area in the nitrate fields inland from Tocopilla, including a new by-products plant at Coya Sur and two large nitrate-producing plants. In addition to these, the company owns and operates a 45-mile, partially electrified railway between the plants and the port works at Tocopilla.



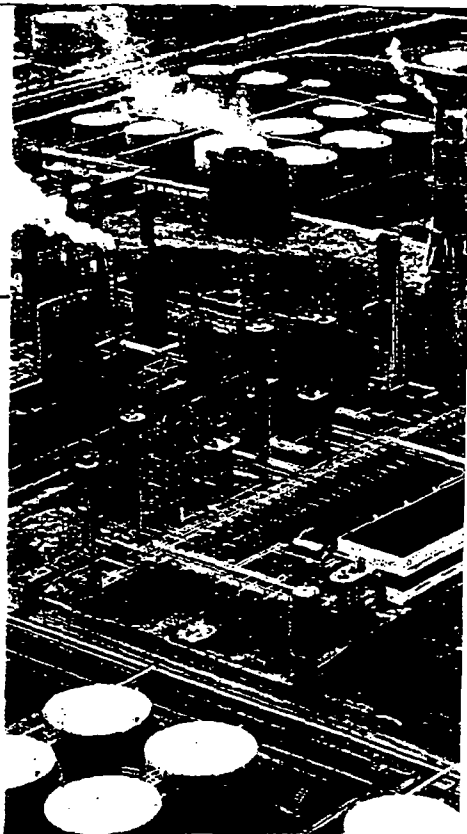
Located below each engine in the basement is an Elliott 44,200 inlet cfm single-stage centrifugal scavenging compressor driven by an Elliott 800-hp induction motor.

New cat cracker

A new fluid catalytic cracking unit went on stream late in 1953 as part of an expansion program by Southwestern Oil & Refining Company at its No. 2 refinery at Corpus Christi, Texas. This unit, engineered and constructed by the Refinery Engineering Company, of Tulsa, Oklahoma, has a design charge of 5740 barrels a day at 50 percent conversion, taking off a naphtha cut, plus light and heavy recycle. Within a short time after the unit went on stream it was charging 8170 barrels a day at 50 percent conversion and is now running at approximately 7600 barrels a day at 58 percent conversion, with no appreciable change in octane number.

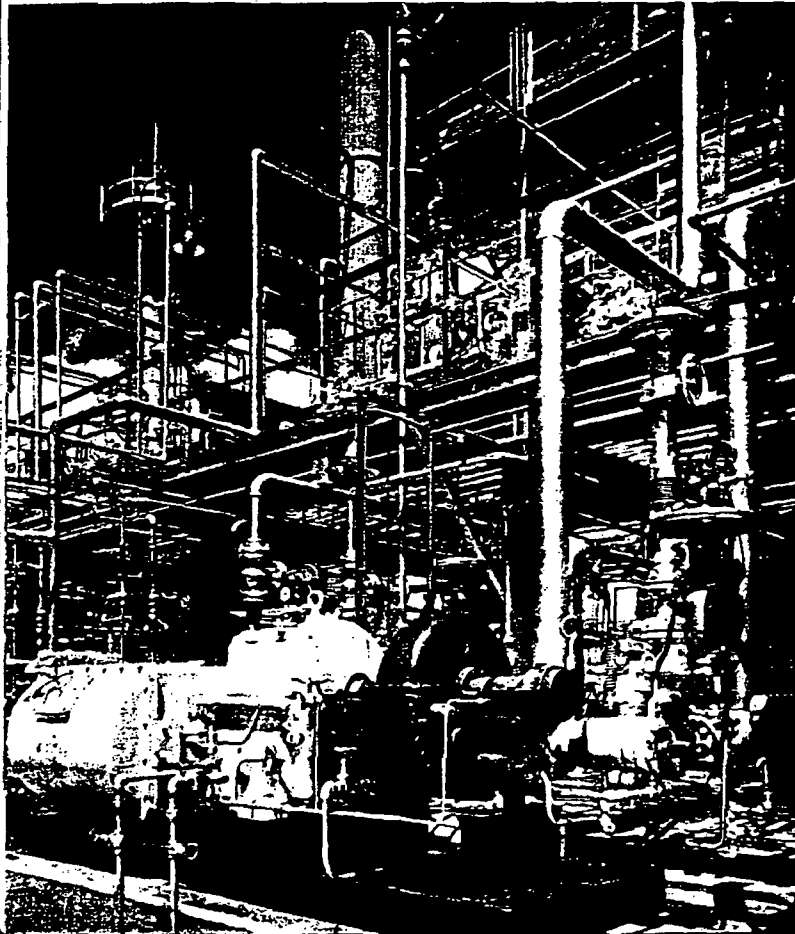
An Elliott centrifugal compressor (illustrated) serves the FCC unit.

There are approximately 75 Elliott steam turbines installed in this plant. The turbines mainly drive centrifugal pumps, although some are used for fan drive and other services.



Aerial view of the new fluid catalytic cracking

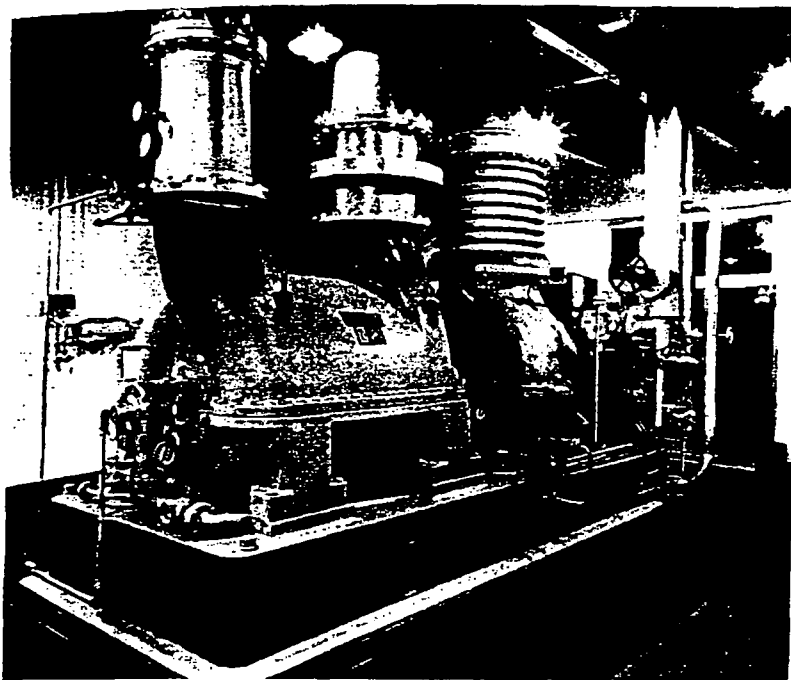
An Elliott 265,000-lb-per-hr deaerating feedwater heater serves the power plant. There is an Elliott 250-hp, 900-rpm motor driving a Quimby pump for Bunker C loading, as well as several Elliott C-W explosion-proof motors driving tank farm transfer pumps.



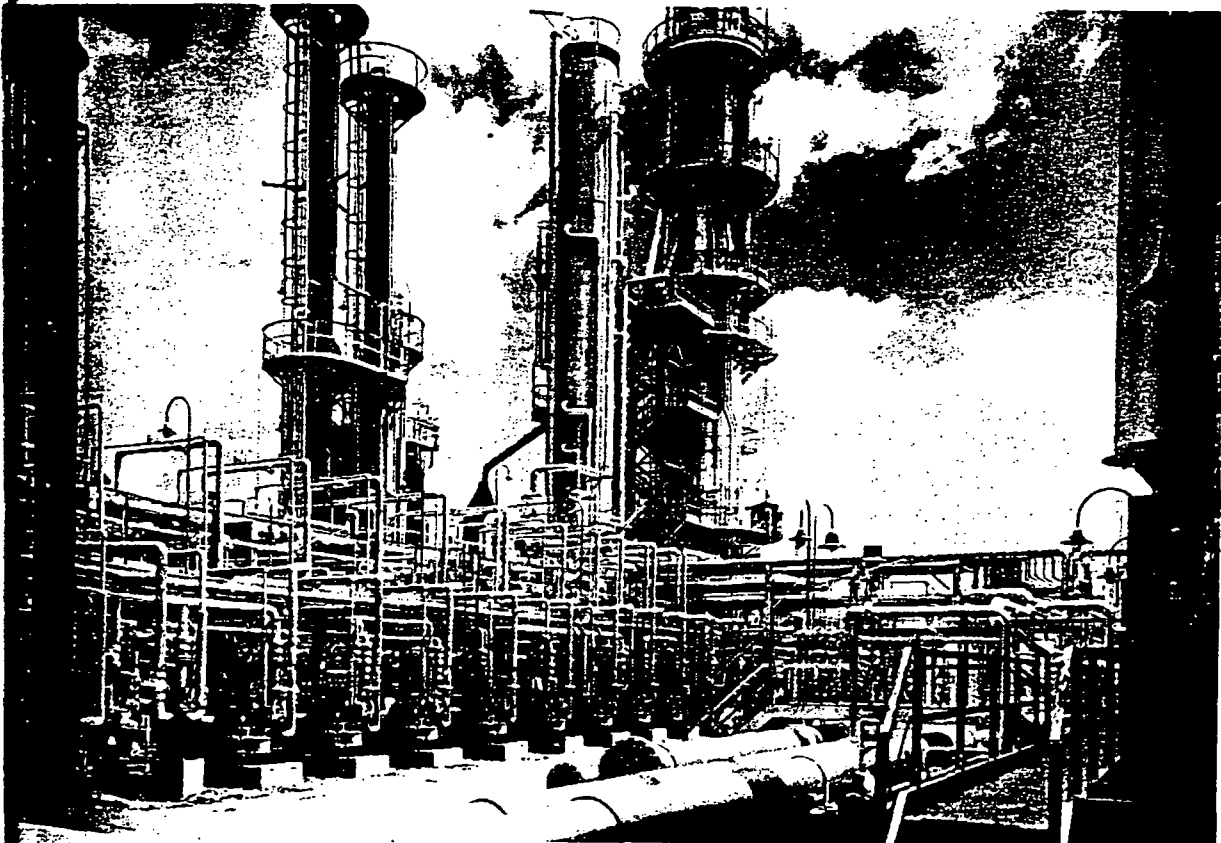
◀ *Close-up of one of the Elliott turbines driving a pump through coupled speed-reduction gear.*

This photograph shows a line of Elliott turbines driving various pumps. Some 7: turbines, ranging in size from 8 to 224, pumps and fans located all around this refinery.

POWERFAX, SPRING



This is the Elliott multistage centrifugal compressor which serves the cracking unit. Compressor is rated 19,500 inlet cfm, 14.4 psia inlet pressure, 35.6 psia discharge pressure. The Elliott turbine drive is rated 2035 hp, 5800 rpm, taking steam at 385 psig, 600 F.





General view of Lake Charles refinery

Conoco at Lake Charles, Louisiana

Elliott 117-hp, 3550-rpm turbine driving a boiler-feed pump. This turbine takes steam at 315 psig, exhausting at 150 psig. Other Elliott turbines, 20 to 232 hp drive various pumps.



LAST summer, Continental Oil Company's enlarged 45,000-barrel-a-day refinery at Lake Charles, Louisiana, went into full production.

The original Lake Charles refinery was put on stream in 1941. It was designed to process 10,000 barrels daily of crude and 6000 barrels daily of de-ethanized field condensate containing propane, butane, and casinghead. The process units of the original plant included crude topping; a four-coil combination of visbreaking, thermal-gas oil cracking, thermal reforming, and butane reversion; sulfuric-acid alkylation; thermal polymerization; and casinghead gasoline fractionation. Over the period from 1941 to the time of the recent enlargement, revisions in the processing equipment had increased the crude charging capacity to 12,000 barrels daily. For the last several years the thermal polymerization unit was operated only during the summer months when a surplus of butane existed.

Early in 1951, a decision was made to modernize and enlarge the Lake Charles refinery to a crude capacity of 45,000 barrels per stream day and install facilities to produce special products such as dodecene, benzene

and toluene. In 1953, Continental also began construction of a gas-processing plant at nearby Gillis, Louisiana, which will increase the volume of field condensables to be processed in the refinery.

The plant now contains two atmospheric crude topping units. The original unit was modified slightly to increase its capacity from 12,000 to 16,000 barrels daily.

Two new thermal catalytic-cracking units are contained in a joint structure and feed into a common fractionation system. They are of the modern Socony design employing gas-lift-catalyst circulating systems. The two cat crackers have separate feed preparation facilities; the one feed preparation system being designed to feed only distillate stocks, consists of a charge drum, a vaporizer furnace, and a flash drum. Elliott single-stage centrifugal compressors, illustrated at right, serve the TCC units. Elliott steam turbines also drive other pumps and units around the refinery.

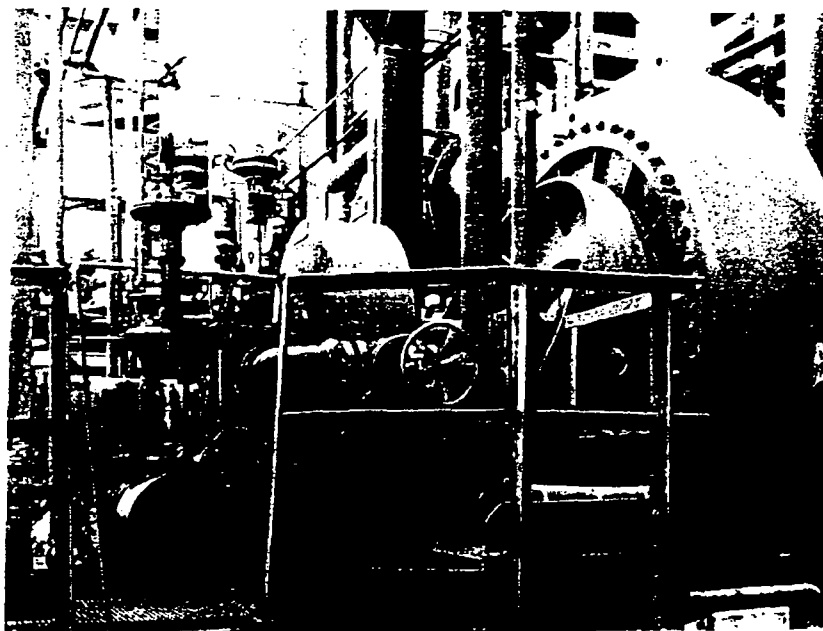
The four water-tube boilers, each with a capacity of 85,000 lb per hr generate steam at 350 psig and 600 F. Considerable steam is generated at 350 psig in the kiln waste-heat boilers at the two cat-cracking units. Steam is available for processing at 350, 150, and 20 psig. Pump-driving turbines were carefully selected to insure maximum power realization from the steam before use in processing. To permit satisfactory balancing of three steam systems under all plant loads, several process turbines were designed to use 350-psi steam and operate condensing; others to use 350-psi steam and exhaust to the 150-psi system; while some units use 350-psi steam and exhaust to the 20-psi system.

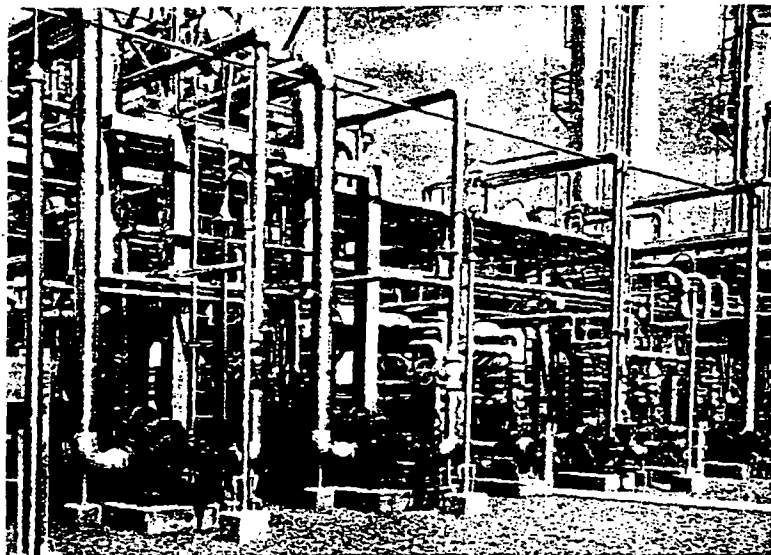
The prime contractors of the new process units, except the platformer, and for the alkyl revamp was the Badger Process Division of Stone and Webster Corporation. The platformer was built by UOP's affiliate, Procon.



One of the Elliott centrifugal compressors serving a cat cracker. The compressor is rated 52,000 inlet cfm, inlet pressure 14.54 psia, discharge pressure, 35.50 psig, speed 4200 rpm. The 1100-hp turbine takes steam at 350 psig, 436 F and discharges to a condenser at 10 in. Hg abs.

This is the other Elliott turbine-driven centrifugal compressor serving a cat cracker. Compressor is rated 36,050 inlet cfm, inlet pressure 14.6 psia, discharge pressure 44.0 psig, speed 3600 rpm. Turbine is rated 800 hp, using 350-psig steam.





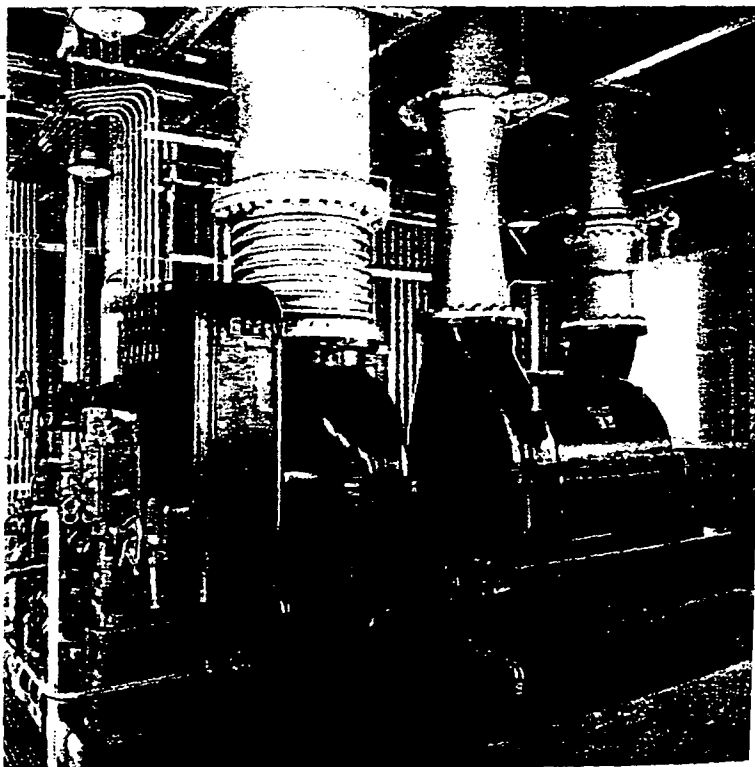
This line of Elliott steam turbines is driving processing pumps in the gas plant which is adjacent to the catalytic-cracking unit.

The Elliott turbine-driven centrifugal compressor serving the catalytic-cracking unit is rated 18,200 inlet cfm, inlet pressure 14.05 psia, discharge 42.5 psia. It is driven at 6100 rpm by a 2272-hp condensing turbine operating on 150-psig steam.

Midland Co-op expansion

THE Midland Co-operative Wholesale refinery at Cushing, Oklahoma, was recently revamped, enlarged, and modernized. Crude oil capacity was increased 70 percent to 10,500 barrels daily along with a 700 percent increase in catalytic polymerization capacity. The refinery was also equipped with a 5000-barrel-per-day U.O.P. fluid catalytic-cracking unit, feed for the new cracker being supplied by a converted thermal unit previously rated at 1800 barrels per day. The cat cracker and poly unit were erected along with some of the auxiliaries by The Refinery Engineering Company of Tulsa.

An Elliott turbine-driven centrifugal compressor serves the cat cracker, and Elliott mechanical drive turbines, 8 to 125 hp, direct-connected and geared, drive pumps around the refinery.



Word to the wives—Get your garden going as soon as the ground, and your husband, can be worked.

Roses are red.
Violets are blue.
Orchids cost \$15.95—
Won't dandelions do?

Those promised tax chops turned out to be little more than cutlets.

The children had all been photographed and the teacher was trying to persuade them each to buy a copy of the group picture.

"Just think how nice it will be to look at it when you are all grown up and say, 'There's Rose, she's married.' 'That's Billy, he's a sailor.'"

A small voice at the back of the room piped up, "And there's teacher, she's dead."

Sue, a four-year-old, was told by her father that if she'd be good he would bring home a little baby, so when twins arrived she asked, "Daddy, was I too good?"

A certain small town needed a preacher badly, back in the early days. When a ministerial-looking fellow rode in on a horse, a committee met him. This conversation followed:

"Preacher?"

"Yep."

"What'll you charge to preach here Sunday?"

"Twenty-five dollars."

"We ain't got that much."

"All right, fifteen dollars."

"We ain't got that much neither."

"How much have you got?"

"Ain't you got a sermon you can give for about five dollars?"

"Yes, I have, but I warn you—it ain't worth a damn."

The strongest objection socialists and communists have against capital is that they don't have any.

The judge looked down at the sweet young thing. "You claim that the defendant stole your money from your stocking?" he asked.

"That's right, your honor," she answered.

"Well, why didn't you resist?" the judge asked.

The girl blushed and lowered her eyes. "I didn't know he was after my money, your honor," she answered.

A certain Western auto dealer sold two cars to the same man in one day. His customer was an Indian suddenly grown rich from oil which had spouted on his land.

The red-man bought a high-powered car, and with a gallon of gin in the front seat, fared forth to see the world. In about an hour, he came back bleeding and bruised, ready to buy another car.

"For heaven's sake, what happened?" the dealer inquired.

"Down road piece," said the red-man, "fences come fast. Telephone poles come fast. Soon bridge come down road. I turn to let go by. Need new car."

Effie: "I'm warning you, he's a wolf. He'll rip the dress right off your back!"

Lulu: "So what—I'll wear an old dress."

We can understand why so many fathers worry about their sons—they used to be one themselves.

Then there was the hillbilly who said he didn't use toothpaste because none of his teeth were loose.

The rich man employs a butler, a valet, a secretary, a laundress, a cook and a housekeeper; the poor man just gets married.



Hotel Clerk: "I'm sorry, but you can't have room service."

Guest: "Oh, that's all right."

Clerk: "You'll have to make your own bed."

Guest: "That's all right."

Clerk: "You'll find hammer, saw, lumber, and nails in the back room."

One vacationer reports seeing this sign in a restaurant on his travels: "Pies like mother use to make before she took up bridge and cigarettes."

The extent of some people's religion is that they know the name of the church they stay away from.

Whether a fellow winds up with a nest egg or a goose egg depends a heap on the kind of chick he married.

In a small town, people will sympathize with you in trouble—and if you haven't any trouble they'll hunt some up for you.

A young lady, telephoning a music store, was connected by mistake with a garage. "Do you have 'Two Red Lips and Seven Kisses'?" she asked. "No," answered the garage. "But we have two tom cats and seven kittens." "Is that a record?" she asked. "Well," said the garage, "we think it is."

A man was standing outside a pawn shop examining the window display of banjos, saxophones, tubas, rifles, shotguns and the like, when the proprietor came to the door.

Man: "Quite a bunch of stuff you've got there. Do you ever sell any of it?"

Proprietor: "Sure. Every week or so somebody comes in and buys a saxophone or tuba. Then a day or so later, a couple of his neighbors come in and buy shotguns."

When telling an alleged funny story, always make it as short as possible. If you build it up and stretch it out, you give your listener time to think of a worse one to tell you.

The amount of sleep required by the average person is about five minutes more.

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