Nash GREAT CARS

Since 1902

An Action Story of the
Nash Kenosha Plant Operations

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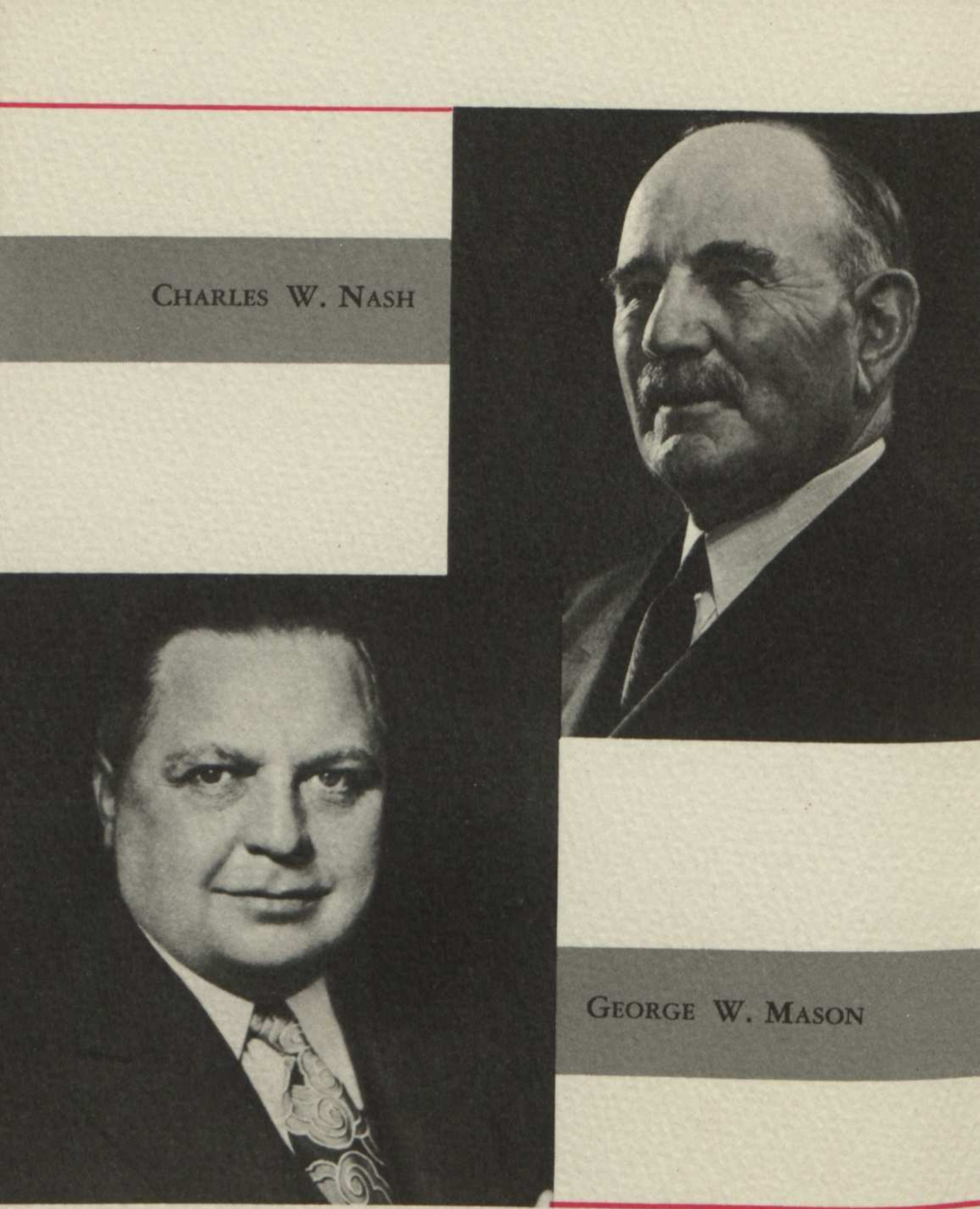


CHARLES W. NASH

GEORGE W. MASON

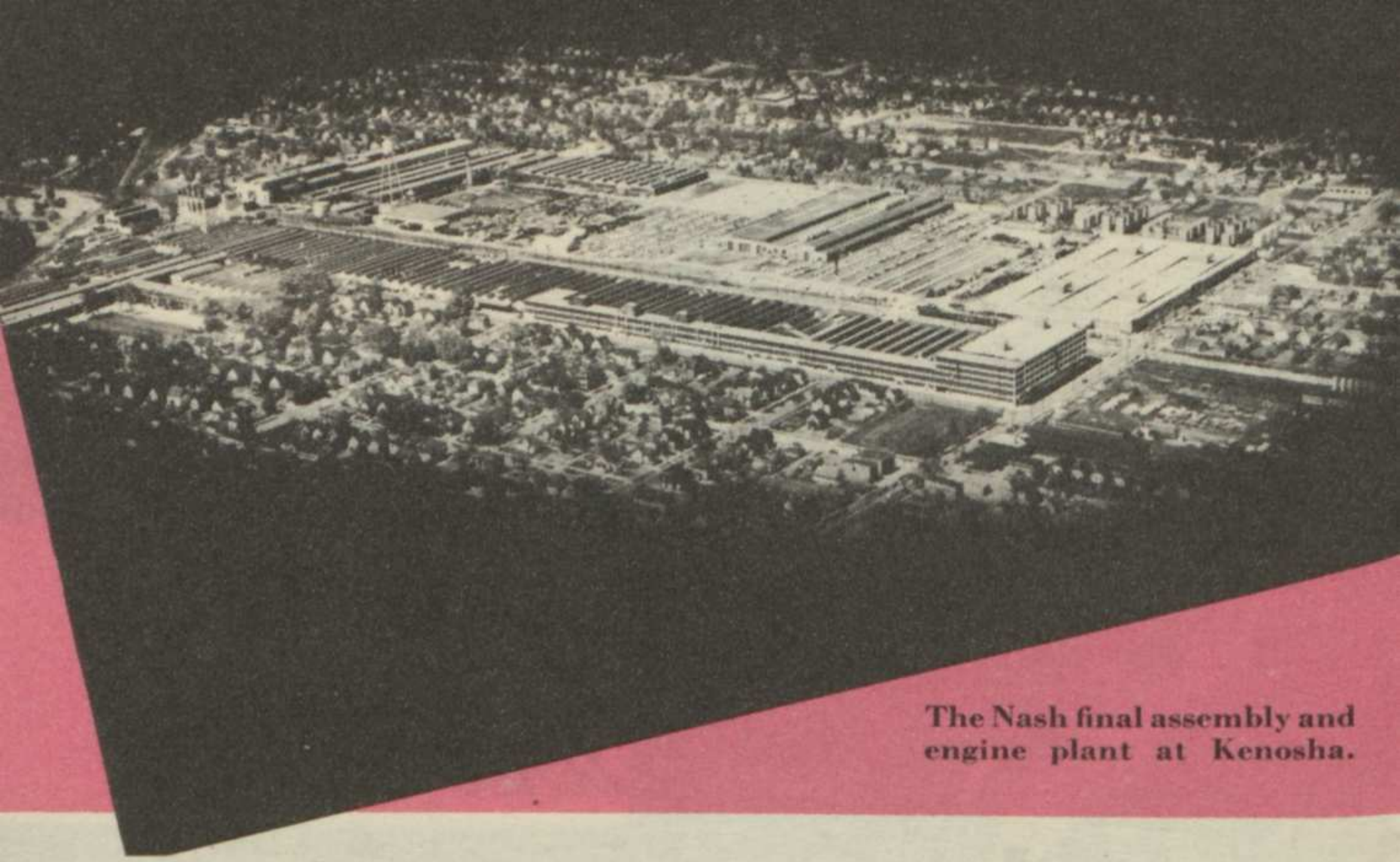
GREAT CARS

Since 1902

KENOSHA, traditional home of Nash Motors Division of Nash-Kelvinator Corporation, has been the automotive capital of Wisconsin since 1902, when the first Rambler, forerunner of Nash, was built.

Today one of the most completely integrated automobile manufacturing plants in the world, the Kenosha plant is the center of Nash car production. In modern buildings containing more than 2,200,000 square feet of floor space spanning 100 acres, the company can turn out nearly 1,000 cars and trucks in a single day.

Nash automobile engines are built here, and the plant is the principal center of final assembly, product engineering and testing. Nash Motors also has three other plants in the United States, and one in Canada. Its body plant, one of the industry's finest, is located in Milwaukee, the home also of the Nash Motors parts and service plant. To supplement production in Kenosha, the company



The Nash final assembly and engine plant at Kenosha.

recently acquired assembly plants in El Segundo, California, near Los Angeles, and in Toronto, Canada. Administrative headquarters, research laboratories and the company's general sales departments are in Detroit.

Nash Motors' distribution is worldwide. In addition to sales offices in 62 countries, Nash expanded its export program after World War II to include assembly plants in Mexico, Brazil, Argentina and Sweden. They are owned and operated by financial interests in those countries.

For comprehensive testing of all vehicles, Nash Motors maintains a modern proving ground near Burlington, Wisconsin, 30 miles from Kenosha.

The story of the beginning of Nash Motors in many respects is the story of the famous Rambler automobile, which still brings nostalgic memories. In December, 1899, Thomas B. Jeffery, who had made a name for himself in the bicycle business with his

development of the Rambler bicycle and the pneumatic clincher tire, came to Wisconsin in search of a plant in which to build a new automobile.

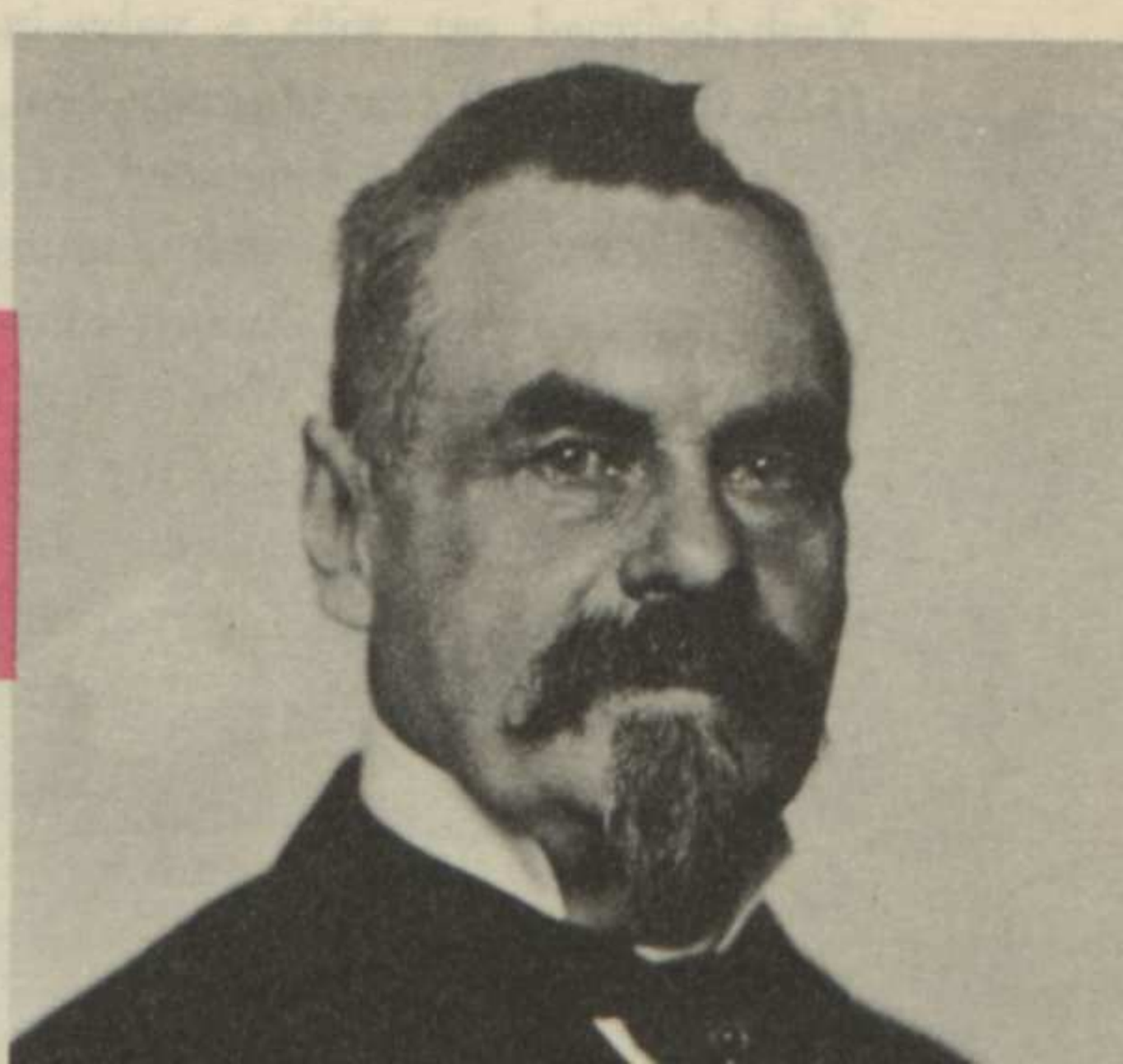
In the spring of 1900, he purchased the old Sterling Bicycle Company factory in Kenosha, on the site of the present Nash plant. Jeffery's son, Charles, who became interested in automobiles during the world's first automobile race in Chicago in 1895, first developed a one-cylinder car which he called the "G & J." Because of its "radical" design, this car was scrapped in favor of a conventional buggy-type runabout. This, despite the fact that young Charles showed unusual foresight in building a car in 1900 with a steering wheel on the left instead of a tiller on the right, and a motor in front instead of in the rear.

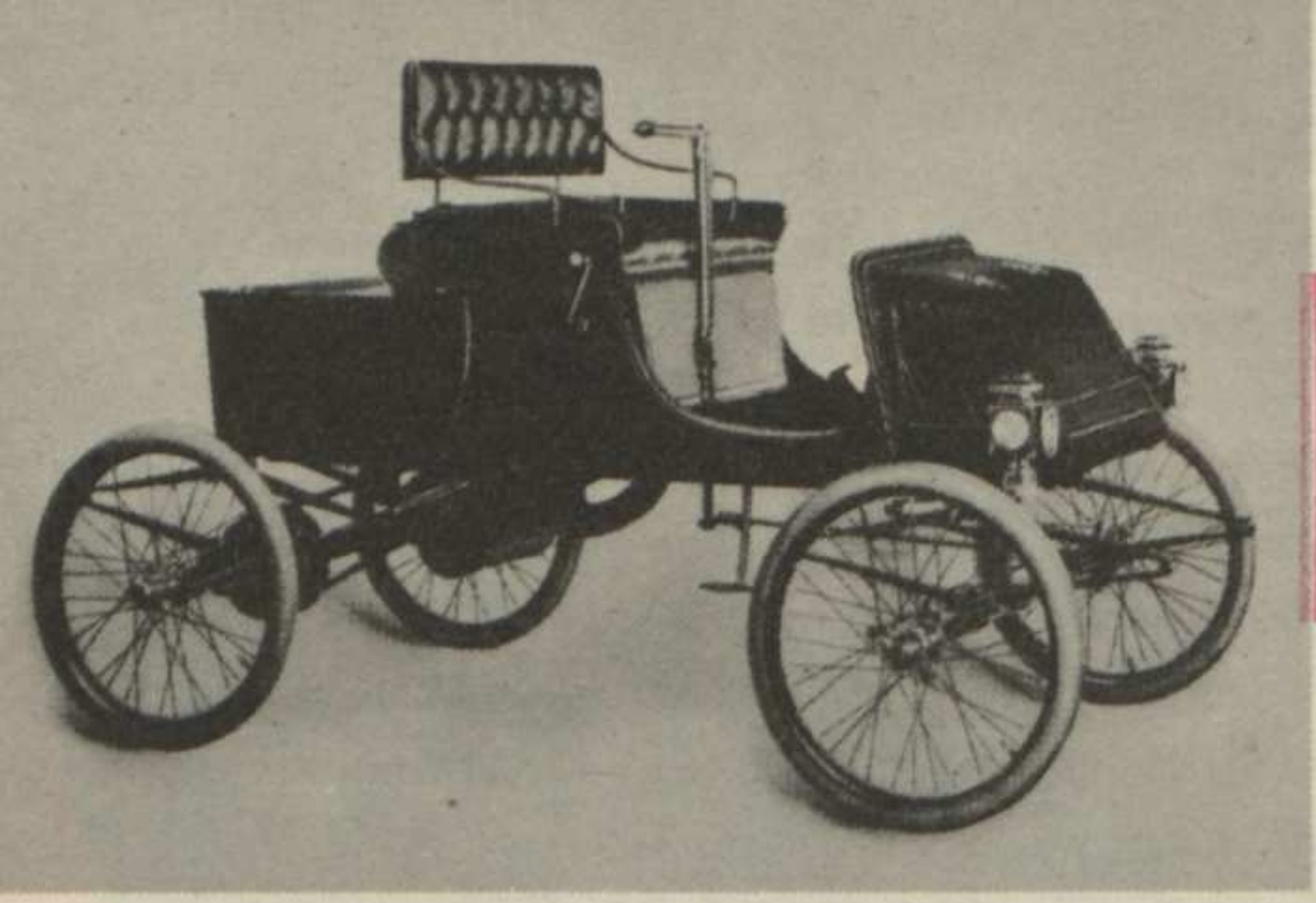
Jeffery then developed the Rambler which was placed on the market in March, 1902. Priced at $750 and $825, with acetylene gas lamps, mud guards and back seat extra, these cars had one-cylinder, 12-horsepower motors with top speed of 25 miles per hour.

In its first year, the Thomas B. Jeffery Company built and sold 1,500 Ramblers—establishing Jeffery as the world's second mass-producer of motor cars . . . second to Olds and a year ahead of Ford. The product was an immediate success, one owner writing the company: "It is truly a wonderful piece of mechanism. It starts

1901

Thomas B. Jeffery, who brought automobile manufacturing to Kenosha at the turn of the century, made the Rambler name famous.





The famous Model C Rambler, offered for sale in 1902, followed two experimental models built in 1901.

1902

immediately, runs like a jack-rabbit and stops only at our will."

Within the next few years, gradual improvements were made on the car. By 1905, total floor space of the Rambler factory was 14 acres, with another 33½ acres available for expansion.

In 1910, Thomas B. Jeffery, industrial genius and inventor, died at 65, leaving behind him 35 years of important contributions to American transportation. To honor him, his heirs four years later changed the name of their car to "Jeffery."

In 1916, the owners retired and sold their business in August of that year to Charles W. Nash, who resigned as president of General Motors to build a car under his own name.

A year later the new Nash Motors Company produced its first Nash-designed car with a valve-in-head six-cylinder engine. In 1918, the first full year of production, 10,000 of these cars were sold.

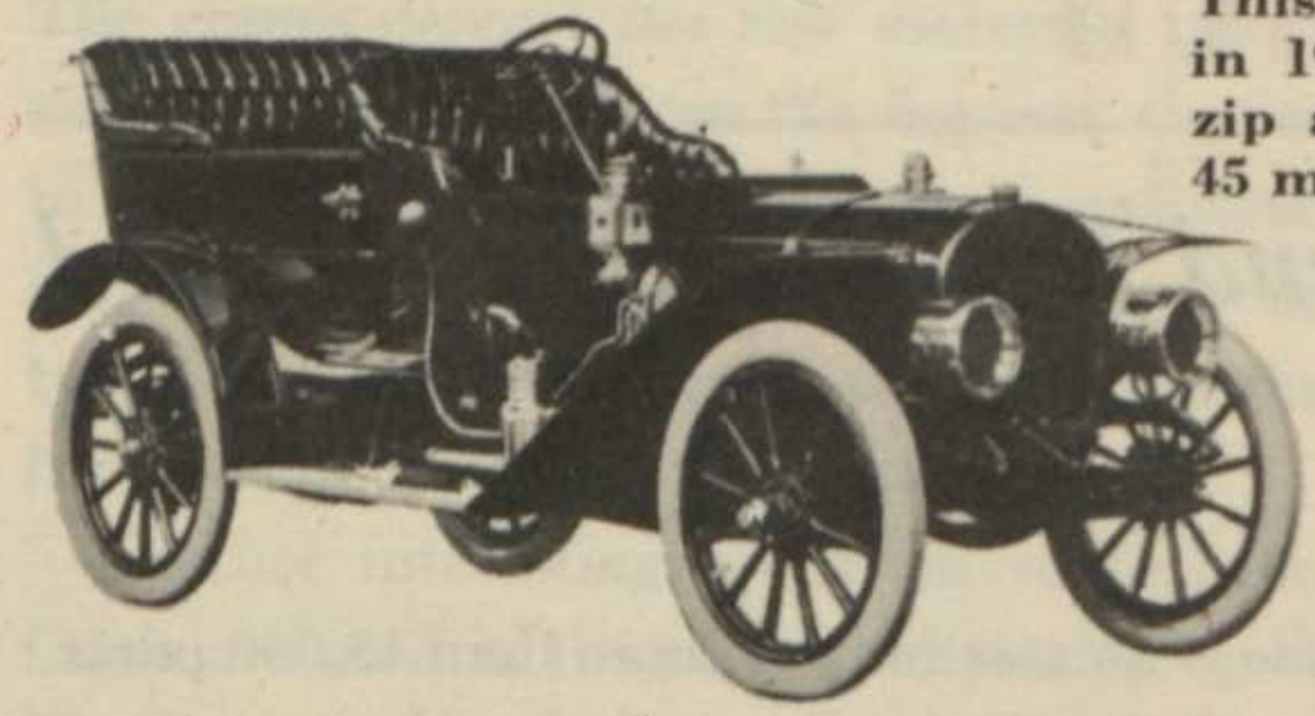
Nash Motors also produced 11,490 trucks in 1918, a record unequaled by any other manufacturer prior to that time. Most of these trucks were the famous four-wheel-drive Quads which did such a creditable job in World War I.

In the succeeding years, the rapidly expanding Nash Motors Company kept pace with the rest of the automobile industry, acquiring new plants and introducing new manufacturing methods.

Although Charles W. Nash retired in 1930 as president of the

company to become chairman of the board, he continued active management until 1936. Then, at 72, seeking young leadership for his business, he asked George W. Mason to become president of Nash Motors. Mason, then president of the Kelvinator Corporation of Detroit, had a distinguished automobile background. Negotiations finally resulted in a merger of Nash and Kelvinator, with Mason as president and Nash as chairman of the board of the new Nash-Kelvinator Corporation. The merger took effect January 4, 1937.

Plans were soon under way for Nash to enter the low-priced automobile field with a strong contender for large volume sales. This new car was to be light and durable, offering greatly increased economy of operation. After four years of research and development, the company introduced the Nash "600," an automobile with "unitized" body construction, eliminating a sub-frame and 500

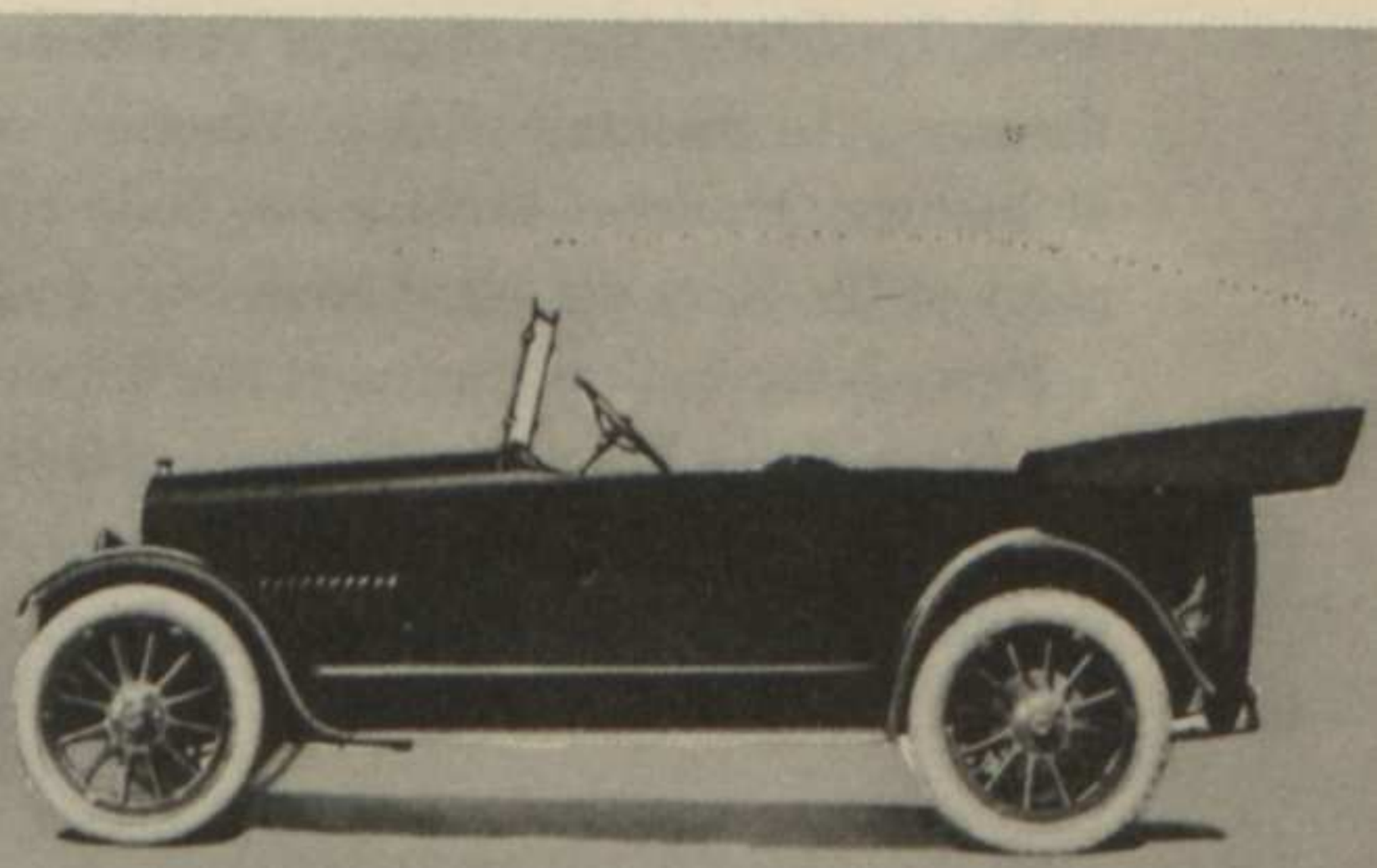


This $2,500 Rambler, built in 1909 in Kenosha, could zip along the highways at 45 miles per hour.

1909

1918

Model 681, the first car designed by the new Nash Motors Company—introduced in 1918.



pounds of unsprung weight. It offered more than 25 miles to a gallon of gasoline, at moderate highway speeds.

World War II interrupted the development of the Nash program. The last automobile rolled from the assembly lines in February, 1942, and the Kenosha plant in the next four and a half years turned out more than $300,000,000 worth of 2,000-horsepower Pratt and Whitney aircraft engines and parts for the Army and Navy.

Nash car production was resumed in October, 1945, six weeks after the war's end. Nearly 7,000 machines used before the war for automobile manufacturing were relocated in the plant.

MATERIALS

—and how they are handled

Every Nash automobile is an assembly of more than 13,000 parts. This assembly operation obviously involves production on a huge scale. To deliver the volume of raw materials and purchased parts necessary to maintain this production, about 25 freight cars and 40 highway trailers—exclusive of body trailers—enter the receiving gates of the Kenosha plant each day.

Forty body trailers transport the finished bodies to Kenosha from the Nash Body Plant at Milwaukee. One load of six bodies can be received in six minutes. The trailers on their return trips to Milwaukee carry finished parts to the Parts and Service Plant.

FOUNDRY

The huge Nash foundry averages 42,000 castings per day. This production includes all the major cast iron parts required for automotive manufacture, as well as compressor castings for the electric appliances produced by the Kelvinator Division.

The melting department has four furnaces which, operated alternately, can deliver 250 tons of molten iron per shift. To produce this metal, two 25-ton overhead cranes pick up pig iron, coke, limestone and other raw materials from a long line of stock bins. The cranes deposit the raw materials into hoppers on a platform near the furnaces. From the hoppers the materials are transferred to "charging" buckets which are transported on scale cars. These cars accurately weigh the amounts of raw materials for the desired types of metal. Another overhead crane then drops the materials from the buckets into the furnaces.

Another interesting operation in the foundry is core making. Cores are used in the process of setting up the thousands of molds. They consist of treated sand, pressed and baked into various shapes and forms required in the molding of many intricate automotive castings such as cylinder heads and blocks, transmission cases and water pumps.

Much of the foundry floor area is devoted to the molding department. Each of six molding units is built for a definite job. Two motor cylinder blocks are cast simultaneously in one mold, and five other units produce flywheels, cylinder heads, flywheel housings, transmission cases, Kelvinator castings, etc.

MOTOR MACHINING

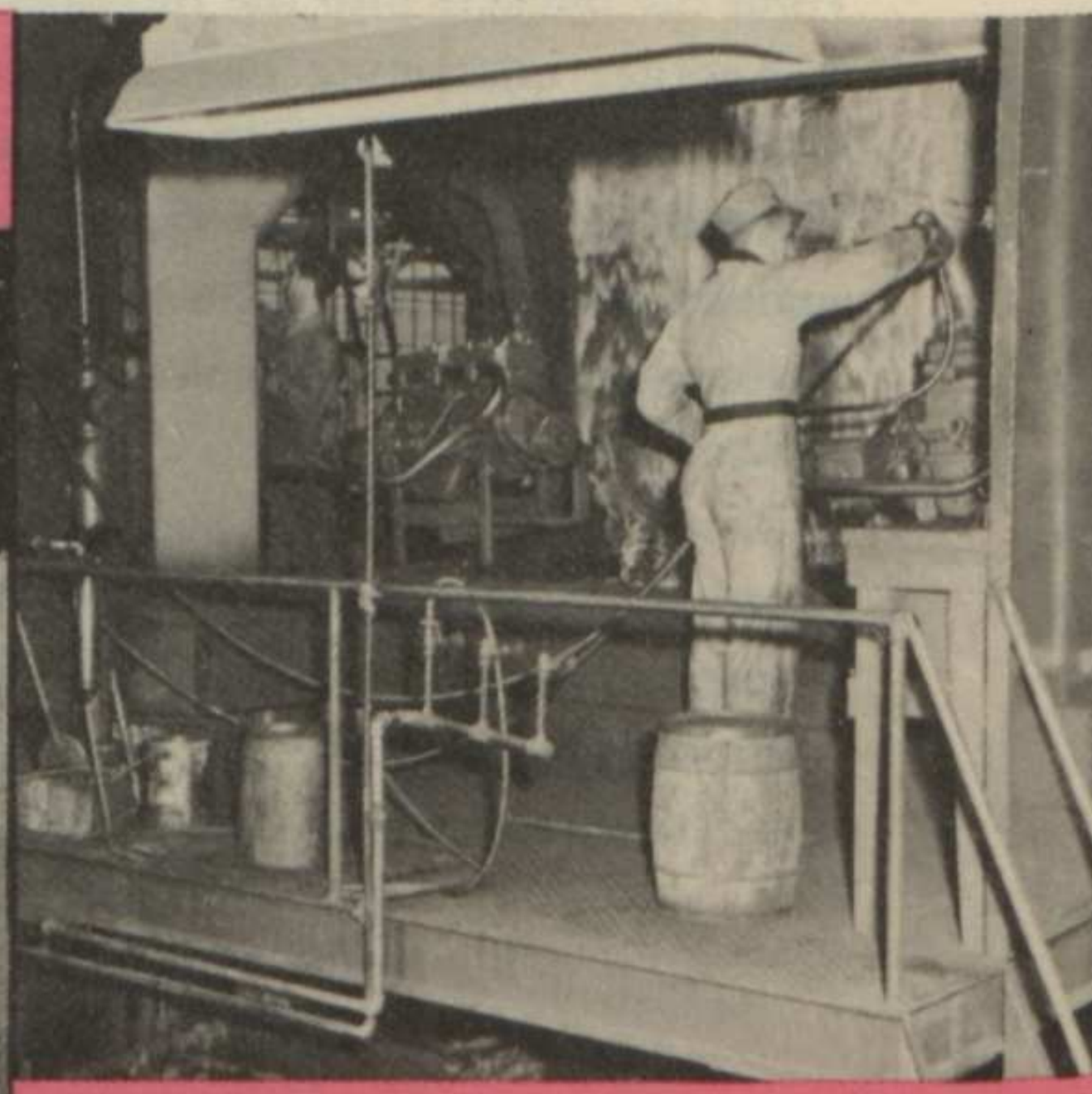
—*Assembly and Test*

From the foundry, an underground conveyor transfers the rough cylinder blocks to two motor machining lines, each 550 feet in length. These lines are among the most efficient in the industry. One large machine in the line, for example, drills, reams and taps 130 holes at one time.

After they have been machined, the motor blocks are transferred to two assembly lines, each 372 feet long, with stations for 93 motors. As the motors move along, component parts are fed to the stations. Several of these conveyors are nearly half a mile long.

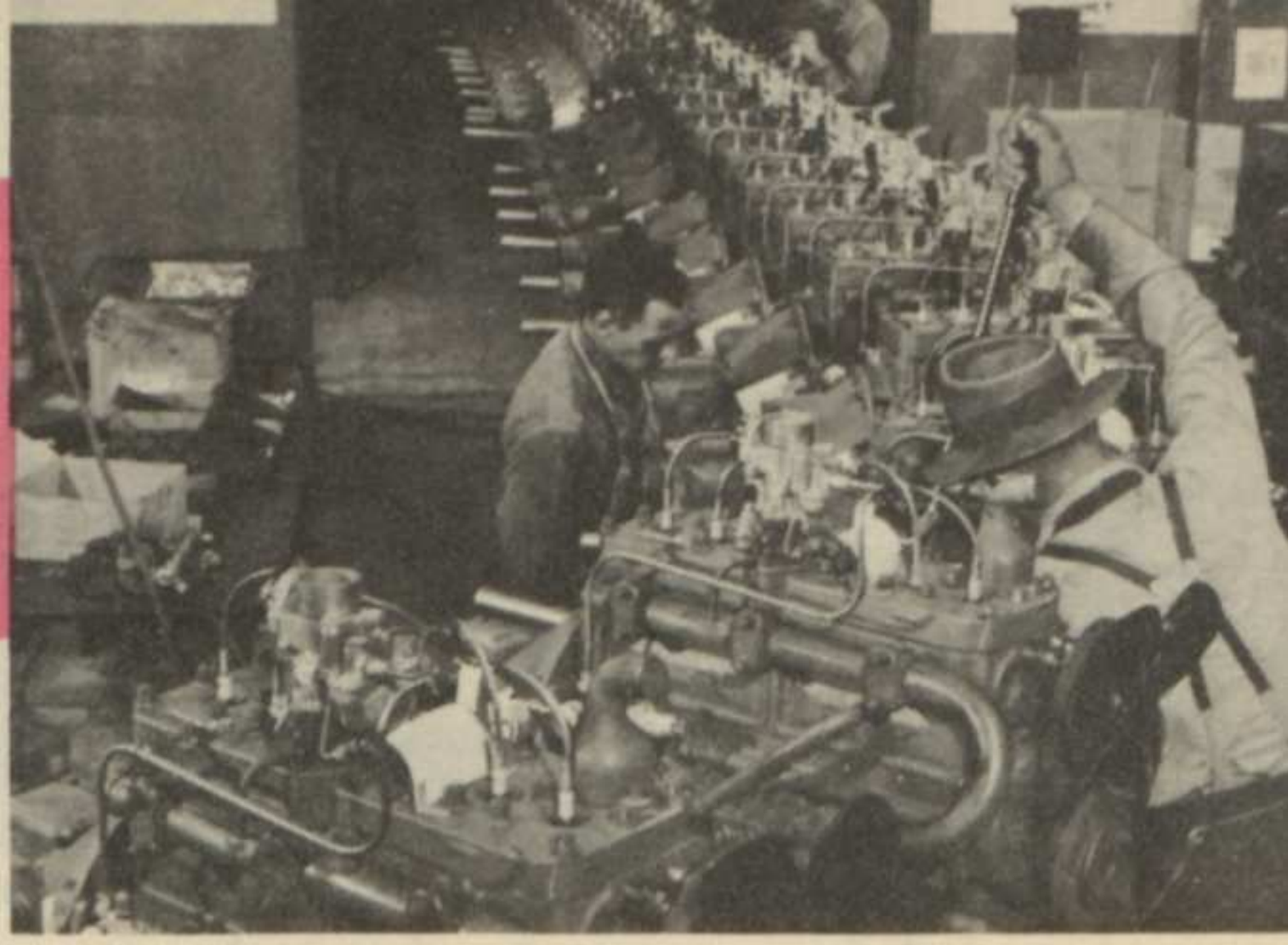
When completed, except for such parts as carburetors, an electric hoist lifts the motors to another conveyor for delivery to the motor test department. While en route they are spray-painted and dried

Paint is sprayed on the engines as they pass along the Nash assembly line. ▶



◀ **Pistons are weighed so they may be matched in perfect sets.**

Nash engines get many and varied inspections as they proceed along the assembly line.



before arrival at final test stations. Here the motors are placed on portable test fixtures, moved by a floor-type conveyor 954 feet long, and carburetors, distributors, starters, water pumps and spark plugs are assembled in the motors before they are tested.

Finished motors get a minimum run-in test at speeds of from 500 to 2,000 revolutions per minute, equal to 10 and 40 miles per hour on the highway. After thorough inspection, the motors are delivered to the final assembly lines.

COMPONENT PARTS

More than 150,000 pounds of steel are used each day in the press room, where hood tops, hood sides, oil pans, upper and lower control arms, gasoline tanks and bumper bar uprights are manufactured. Factory trucks then carry them to other departments for metal finishing, painting, machining or assembly.

The miscellaneous machining department requires 350 machine tools and 38 arc-welding booths to machine 550 different parts. Materials for these components consist largely of forgings from the

company's forge shop and bar stock purchased direct from steel mills at the rate of 400,000 pounds per month.

Machining for rear-axle component parts is a precision operation. Gears must fit perfectly to provide silent power transmission. Parts made here include the differential housing, rear axle case, ring gear, pinion gear, side gears, drive shaft, propeller shaft and torque tube.

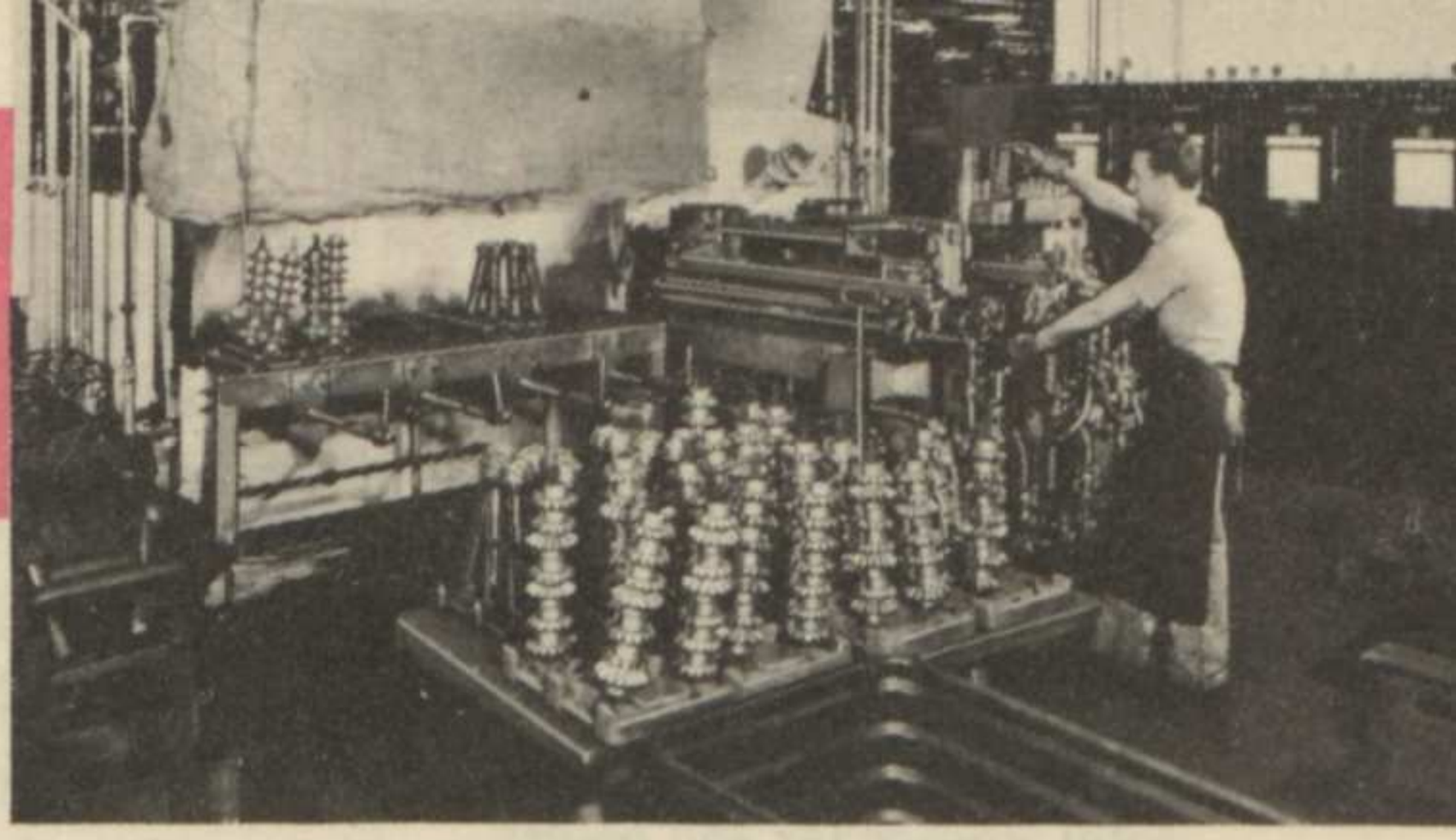
After the gears are heat-treated in a carburizing furnace, the surfaces of the gear teeth are finished to make certain they fit together perfectly. After finishing, the pinion and ring gears are transferred to a "silent test" room where they are mated and tested for accurate bearing and quietness. Each matched set of gears then is kept together and assembled into a rear axle differential. The completed differential is given further inspection in another "silent test" room by special machines which demonstrate actual forward, reverse and brake actions.

HEAT-TREATING

—*of Forged Parts*

To heat-treat the thousands of parts manufactured in the Kenosha plant each day, Nash Motors operates 35 furnaces, ranging in size from small "salt pots" measuring 12 by 16 inches to continuous-type units more than 50 feet long.

All forged parts for the front suspension, rear axle and transmission gears are "heat-treated" to permit easier machining and to guarantee longer life. The gears must have a very hard surface for long wear, and the core underneath the surface must be tough and crackproof. To accomplish this, the gears are placed on trays which



This furnace, by carbon penetration, produces a hard case on rear axle gear teeth.

travel automatically and continuously through a furnace known as a "muffle-type carburizer." The gears are surrounded by an atmosphere of high-temperature gas, carefully controlled as to chemical content and temperature. This process increases the carbon content of the gear surfaces to provide a wear-resistant surface.

PAINTING

—and Rustproofing

The next step is "Bonderizing," a process which protects sheet metal against rust by etching the outer surfaces of the steel to permit the paint to adhere firmly. This is done by bathing the sheet metal several times in a chemical solution. All sheet steel used in building Nash cars undergoes this process.

After Bonderizing, the parts are delivered to two prime oven conveyors which carry them through paint dip tanks into ovens where they are baked 30 minutes at 450 degrees. Nash Motors uses a special primer which produces a tough, resilient undercoat to prevent chipping and stone bruises. The parts are then sanded and carried by conveyor through water-washed and lint-proof booths where the paint is applied. The parts are then baked 40 minutes in a color oven at 275 degrees.

FINAL ASSEMBLY

As Nash bodies arrive by trailer from Milwaukee, they are transferred to a 325-foot conveyor which delivers them to the body storage area. In this area of 57,000 square feet, 13 body storage conveyors, each 570 feet long with a capacity of 35 bodies, provide total storage for 455 bodies.

Two transmission stations at the scheduling point broadcast assembly information throughout the plant to the 14 receiving stations required for the Ambassador and "600" models.

So proper component parts may be at their correct stations along the extensive final assembly line, all delivery and subassembly conveyors are loaded according to a timed schedule broadcast every time a body passes from the temporary storage area to the active assembly line.

Bodies are taken from the storage area and placed on the "600" and Ambassador body make-up conveyors running parallel to the final assembly lines. They are then transferred to their respective model chassis and final assembly lines.

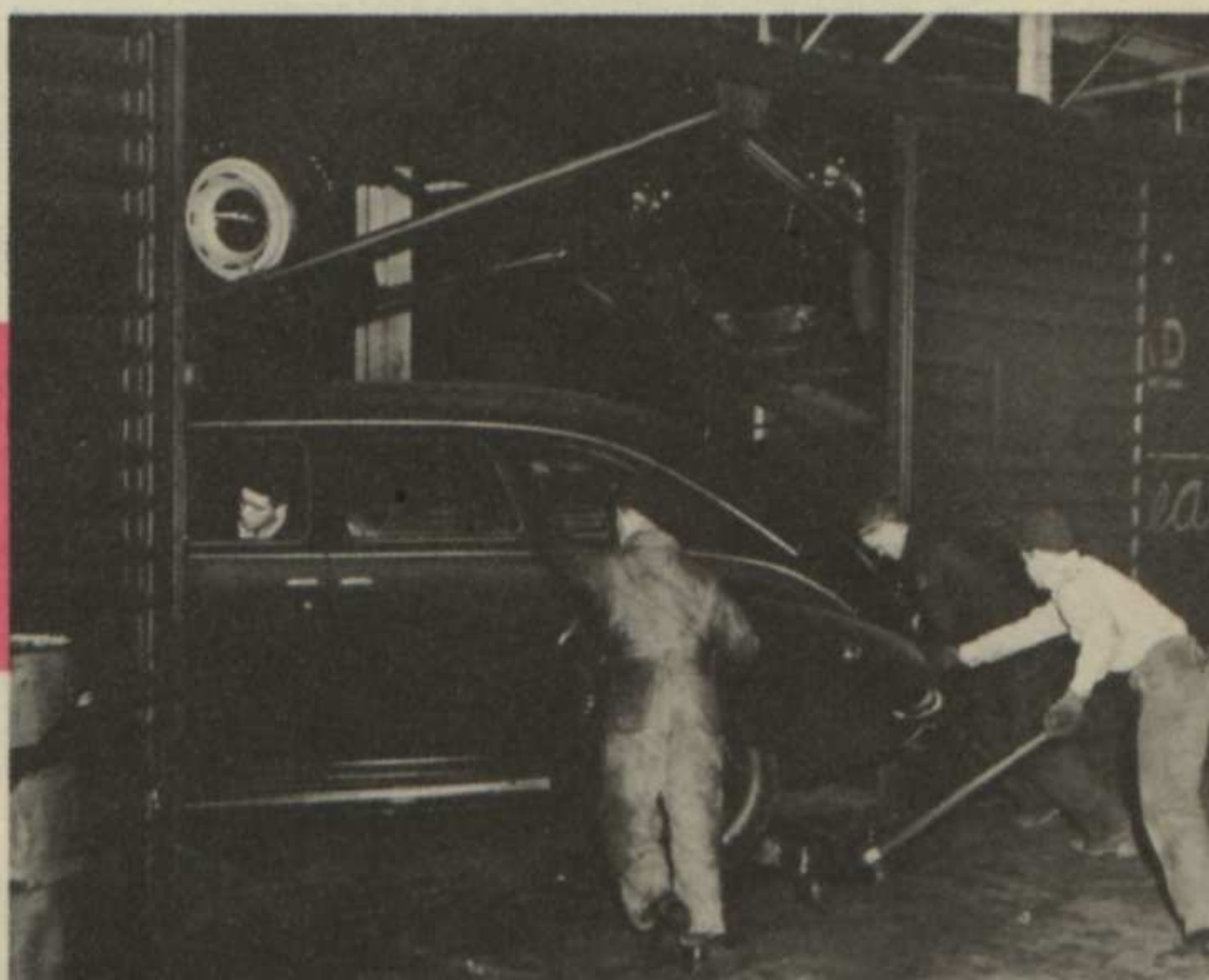
The start of the Nash final assembly line. Bodies enter the line in the foreground.

The "600" line is about 750 feet long and the Ambassador line, about 1,075. While the "600" line is 25 per cent shorter than the Ambassador line, it can produce about 25 per cent more automobiles. This is possible because the "600" body employs famous Nash "unitized" construction, providing for more efficient assembly methods in addition to many other advanced engineering features.

As each Nash reaches the end of the assembly line, it is driven under its own power onto a "test roll," then transferred to an "O.K. line." Before leaving the line, each car is thoroughly checked against the customer's order specifications. Front wheel alignment inspection follows, and the cars are driven to parking lots to await shipment.

SHIPPING

Approximately 55 per cent of the cars Nash Motors produces are shipped by rail. One switch of six railroad cars every hour is necessary on one of the five tracks outside the shipping building. In



Four big Nash sedans can be loaded into one freight car. More than 55 per cent go out by rail.

addition, cars are driven to special docks of the Chicago, Milwaukee & St. Paul Railroad at Racine, Wisconsin, 11 miles north.

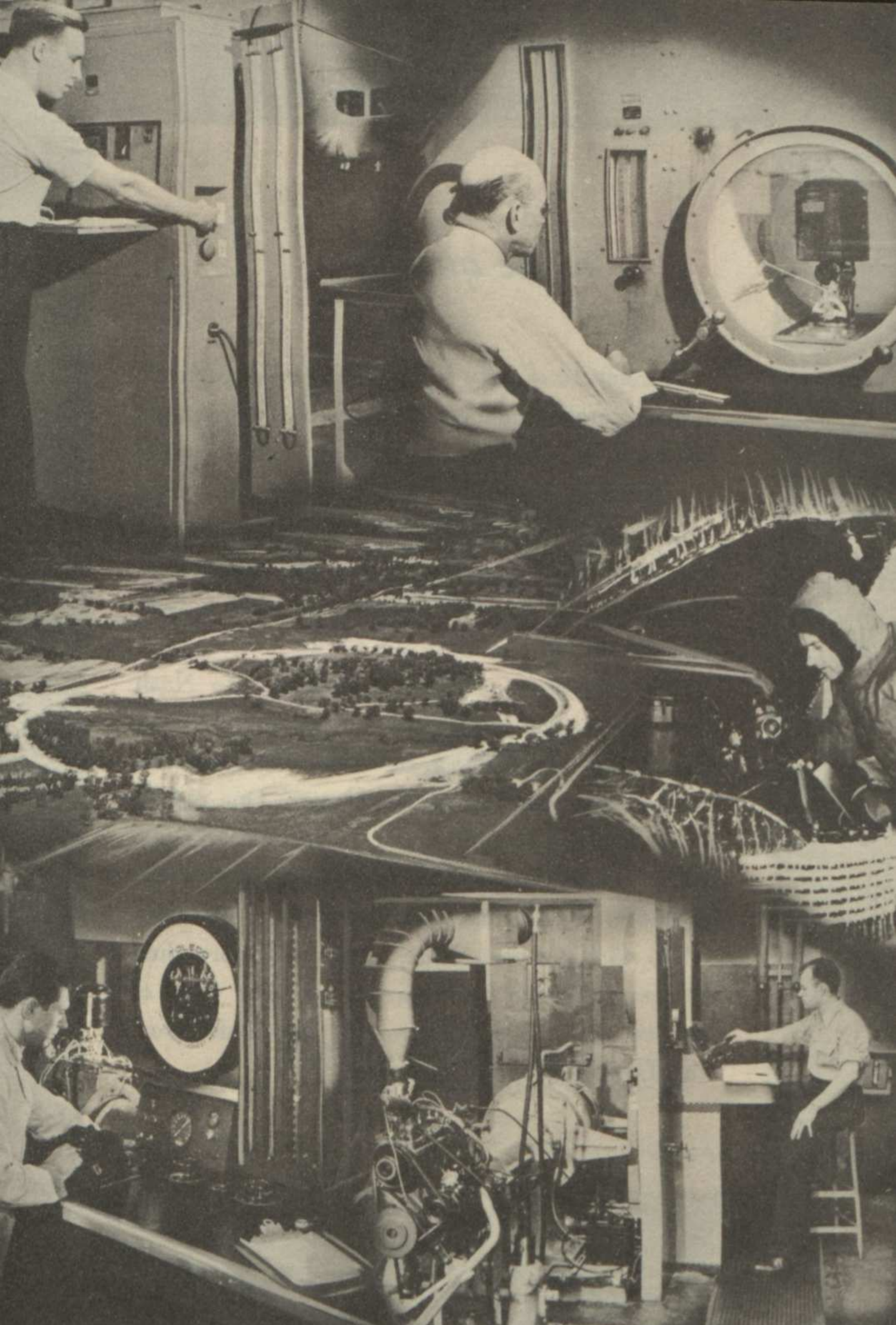
During the "open season" from May 1 to October 31, Nash Motors ships as many as 400 cars weekly on Great Lakes boats. The balance is delivered to dealers throughout the country by the familiar automobile carrier trucks.

ENGINEERING

—*and Research*

Nash Motors' excellent productive engineering facilities and staffs are centered in Kenosha, with an extensive research department in Detroit. A cold test room at Kenosha, insulated by 12 inches of cork, permits rugged tests of Nash cars at temperatures as low as 45 degrees below zero. Seven dynamometer cells test all types of motors and component parts.

In 1942, Nash acquired a 204-acre tract of land near Burlington, Wisconsin, for a modern proving ground. Today, this area includes an outside high-speed black-top oval track 1.22 miles long and several winding dirt roads inside the oval. Other features are a shock absorber test, a rock road on the open track, an ungraded washboard road, unbanked curves, short sharp turns and a 28-degree jump-off grade. The proving ground has its own gravel pit, road equipment and engineering test facilities.



MEN *make quality*

The key to quality is the skill and experience of men. Surely, quality in mass production requires fine tools, excellent manufacturing facilities, good management, capital. Without them, industry would have remained in the handicraft stage, and the everyday things that make our lives better would still be luxuries enjoyed by only a few. But men make quality.

The employees who build quality into Nash cars have an excellent record of long-time service. One out of every three Kenosha employees has worked for Nash 10 years or more. One out of every four is a 15-year employee. More than 1,000 have been working in the Kenosha plant 20 years or more. More than 100 are 30-year veterans, while 45 have been Nash employees more than 35 years. Fifteen men have 40 or more years of service with Nash Motors and its predecessor, the Thomas B. Jeffery Company.

Nash Motors

DIVISION OF NASH-KELVINATOR CORPORATION

Automobile Plants in

Kenosha • Milwaukee • El Segundo, Calif. • Toronto, Canada

Administrative Offices: Detroit