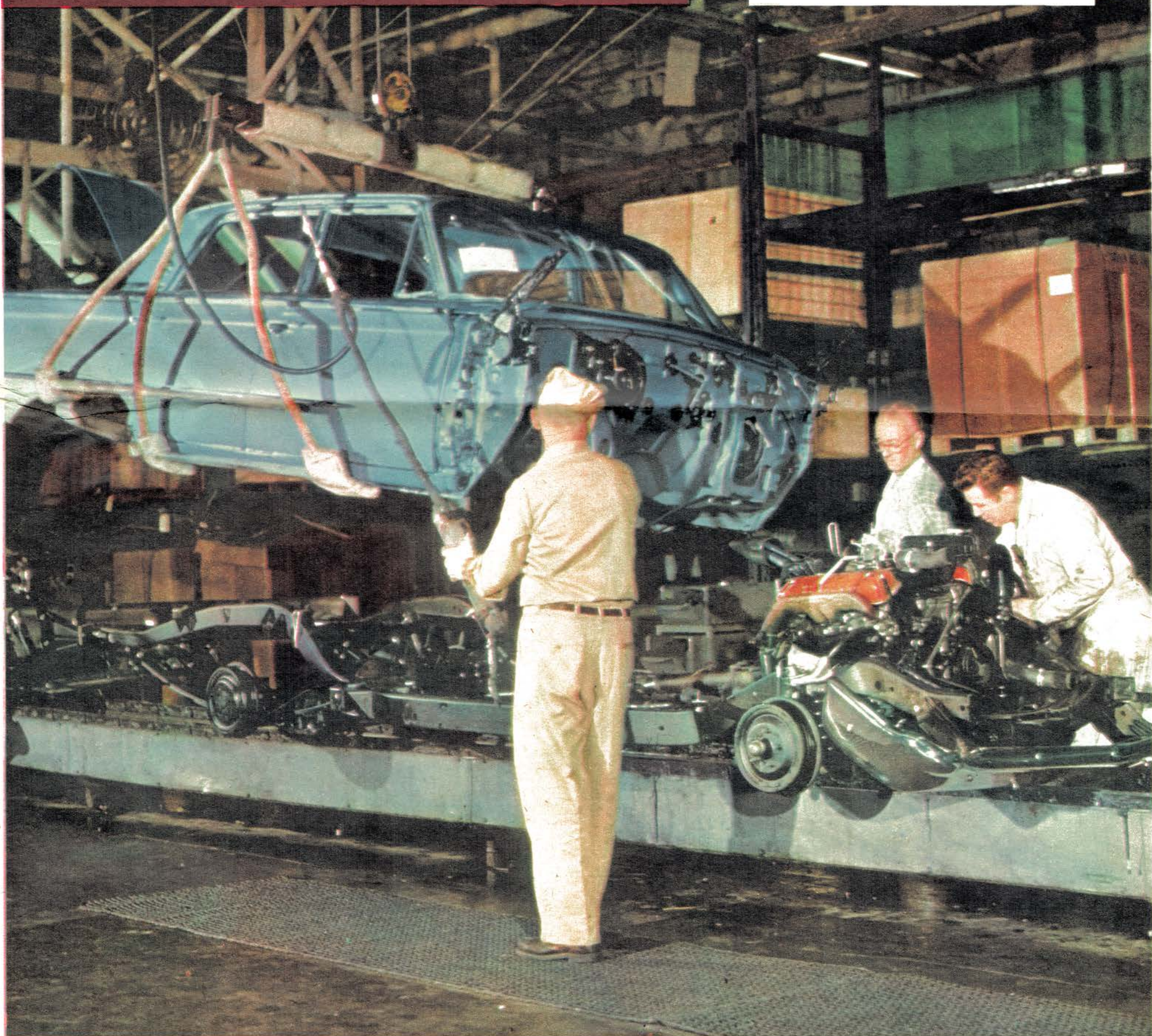


The Courier-Journal MAGAZINE

FEBRUARY 7, 1960

**FORD MOTOR CO.
LOUISVILLE, KY.
ASSEMBLY PLANT**



Courier-Journal Color Photo

Additional Copies of This Reprint May be Obtained by Writing the Research and Information Department, Ford Motor Company, The American Road, Dearborn, Michigan.

Hot Off The Assembly Line

Forty-six autos each hour roll out of the Ford Motor Company plant here

By GORDON ENGLEHART, Courier-Journal Staff Writer

IT'S AN 8,000-part jig-saw puzzle, solved 46 times every hour. The solving looks effortless. But it's a sure-enough miracle of technology.

This is the Ford Motor Company's Louisville assembly plant—equal in size to 32 football fields—at Fern Valley Road and Grade Lane.

Every hour of the work day, 46 Ford cars are driven away from the end of the Final Assembly Line. Into each car has gone some 8,000 separate items ranging from tiny rivets to ponderous steel frames.

None of these parts is made in the Louisville plant. They come by rail and truck from 22 Ford manufacturing plants and outside firms all over the country.

Rail shipments are unloaded on a dock area bordering two railroad tracks that run right through the plant its full third of a mile length. The tracks can accommodate 70 freight cars. A truck dock can handle 11 trucks.

Once unloaded, the parts begin their journey over the 7-plus miles of floor and overhead conveyors leading to final assembly.

Eight major lines feed into the Final Assembly Line. They are Frame, Engine, Trim, Paint, Body, Tires and Wheels, Cushions, and Small Parts Paint (which includes the hood and front fenders).

On these feeder lines, parts are washed, sanded, painted, screwed, bolted, riveted, hammered, welded, wired, inflated, oiled, taped, sprayed. The air in the mammoth building almost shimmers with noise. Always the parts are on the move.

Big as the plant is—1,561,000 square feet of work area—there is little room to pile up semi-finished parts. A specific part must get to the right spot at the right time. A scheduling system takes care of that.

The scheduling system is built around 19 teletype machines at key

Specifications as to body type and exterior and interior colors are marked on the front cowl—the first section of the body to go on the assembly line. A metal tag with the same information is placed on the cowl.

This information will guide workers ahead who will assemble and paint the body.

Meantime, orders on body type, color, and trim have gone out by teletype from the scheduling office to Small Parts, Paint and Door-Hanging Operation.

When the assembled and painted body reaches Trim Line No. 1, the master card is inserted in the machine there. It transfers the specifications on the card to a tape. This tape, put into a sending machine, operates tele-

types farther down the assembly line.

At Trim Line No. 4, the card goes into a second electronic machine, another tape is cut, and teletyped orders go out to more teletypes ahead.

The orders are sent with a sufficient time lag so that the specified part, 1, will be ready when needed for assembly on that particular line, or 2, can be placed on an overhead conveyor to reach the Final Assembly Line just in time to be joined to the oncoming frame and body.

When the completed car rolls off the Final Assembly Line, it still must undergo tests for brakes, gears, front-end alignment, head-light adjustment, leaks, etc., before delivery.

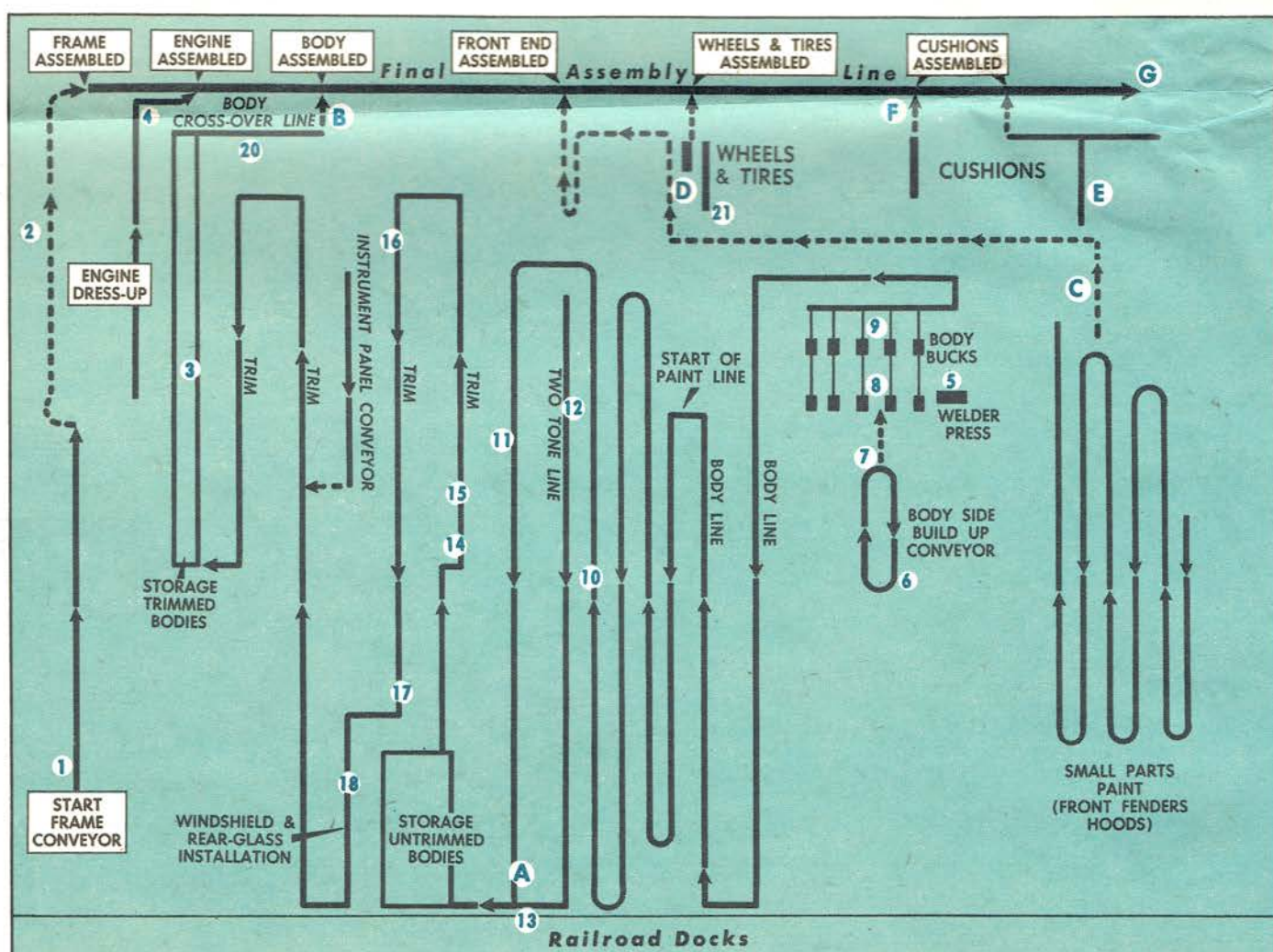
At all of its 13 assembly plants in January, Ford turned out 123,000 Ford

passenger cars. The Louisville plant accounted for 10,672 of these—8.7 per cent.

Marvelous as the machines are in these plants, they cannot operate without men. Present employment here is 2,704—including 2,241 hourly paid workers and 511 salaried workers.

Actually, the Louisville plant has two separate assembly operations—cars and trucks. Fifteen trucks are assembled every hour. The Louisville plant is the only one of Ford's assembly plants now turning out heavy and extra-heavy-duty Ford trucks.

Car-assembly employees here are working one 10-hour shift five days a week, and an 8-hour shift on Saturday. Truck-assembly workers have a 9-hour shift five days a week.



Here's the automobile-assembly section of the Ford plant. Solid black lines are floor conveyors; dotted black lines are the overhead conveyors. Numbers are operations shown in photos on following pages. Letters are color photos.

Color photos for this story were taken by H. Harold Davis, chief color photographer. Black-and-white photos were taken by Thomas V. Miller, Jr., staff photographer. Diagram at right was made by staff artist Ben Ramsey.

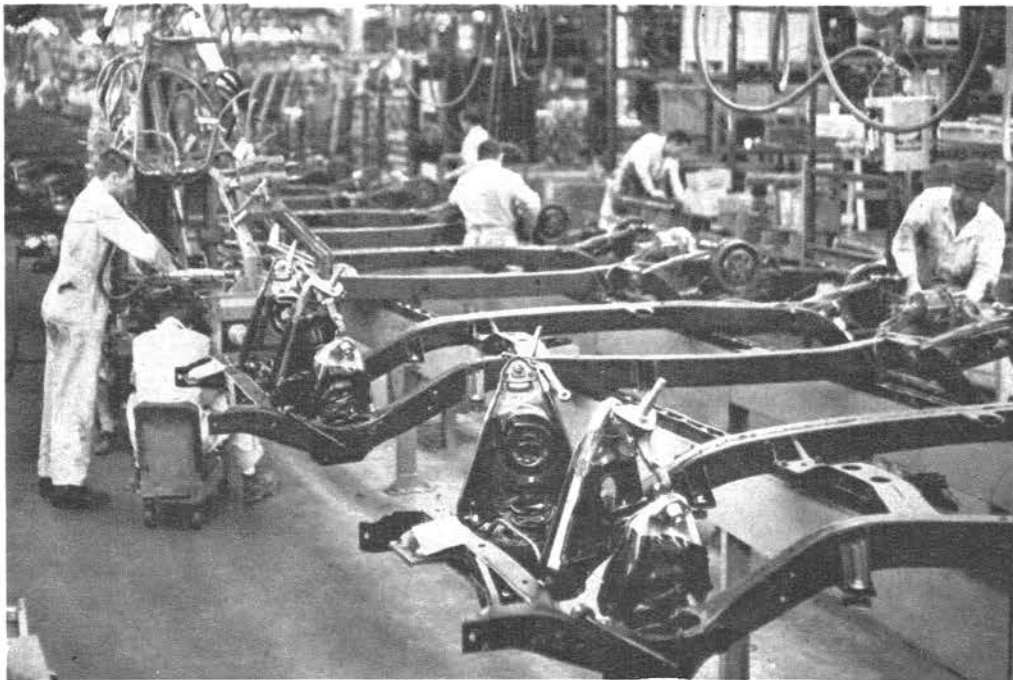
points throughout the plant, and two electronic machines in scheduling offices.

A card, listing all specifications, is punched for each car ordered by a dealer. The card goes to the scheduling office at the start of the body line.

1.

The final assembly line in an automobile factory is like a mechanical stream, small at the source and fed constantly by tributaries until the completed automobile rolls off the line under its own power.

At the beginning of the final line, automobile frames are



moved into position from the storage area and placed at intervals, upside down, on the moving conveyor.

First step is the addition of the front-end suspension system and the heavy coil springs. Visible in the background (upper left in the photograph) is the "octopus", a complicated monster which depresses the coil springs so they may be secured in place, and gauges the play in the suspension system so the variation may be corrected later.

In the meantime, other workers are attaching rear springs, axle and the rear shock absorbers.

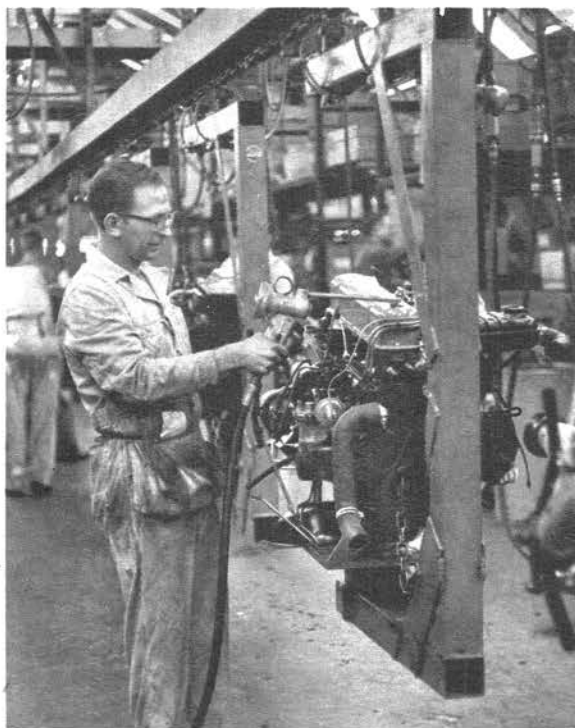
Then come the front brake drums; and while these are being installed, workmen on the other side of the conveyor are fitting the tail-pipe and attaching the drive shaft at the rear.

At the next point, the front shock absorbers are installed, after which comes the steering linkage. At the rear end of the frame, assemblers are installing the muffler and rear bumper arms. All fittings are lubricated and the axle is filled with heavy grease.

Now the frame is flipped over mechanically and continues on its way, right side up. The front bumper is installed and the frame is picked up by an overhead conveyor. The fuel line is installed; the frame is carried through the paint booths where the springs, tail-pipe and other unpainted parts are sprayed, and on through the drying ovens. The remainder of the exhaust system is attached.

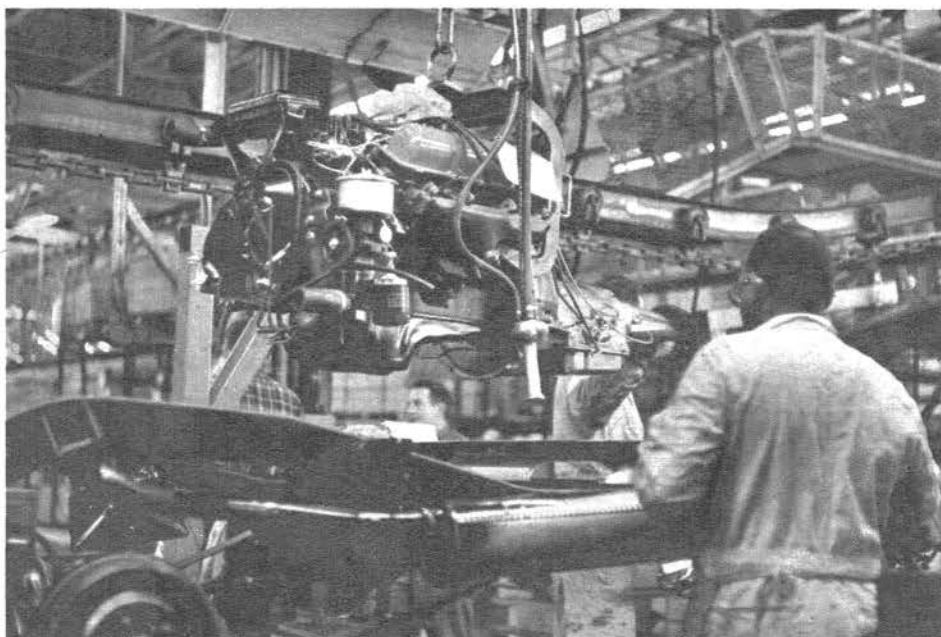
2.

Here, the steering column is attached, and as the frame moves forward the "pucks" are installed. These are thick, rubber washers which absorb frame vibrations to prevent them from reaching the automobile body. At this station the car's serial number is stamped at three different places on the frame.



3.

In the meantime, the automobile engine has been moving toward its final destiny. Cast in one of the company foundries, it has been assembled and tested before reaching its "tributary"—the conveyor system which carries it along the dress-up line on its way to the correct chassis. On its way the engine gets the fuel pump, and accelerator linkage, and the power steering reservoir and pump (if the power steering option has been ordered). Then comes the generator, transmission, fan, water hose connections and electric starter, the fan belt and oil dip-stick. Last item to go on the engine is the windshield washer assembly. At the station shown here, the engine gets a final shot of lubricating oil. Most of the 580 pounds of iron castings that go into the average Ford passenger car are represented in the engine.



4.

The completed engine reaches the final assembly line and is dropped carefully into place. It is bolted to the frame, and at the same time the steering column is secured. At the next station the clutch arm and linkage are added, if the car is to have a standard transmission. The fuel pump is primed to insure easier and faster starting at the end of the line. The rear bumper is attached, hydraulic brake fluid is pumped into the master cylinder, the brake system is checked for leaks under 400 pounds of pressure, and the entire assembly now enters an inspection area. Every component is examined thoroughly and the flaws, if any, are relayed ahead to a repair crew which will make the necessary corrections. Next comes the shim gauge—a heavy, steel framework which, in its weight distribution and points of contact with the frame, simulates an actual automobile body. Any gaps at the fitting points between frame and body are shimmed up so that the body, once it is bolted to the frame, is straight and level. This is the last check point before the body drop operation. (Shown on the front cover.)

The car bottom is welded together

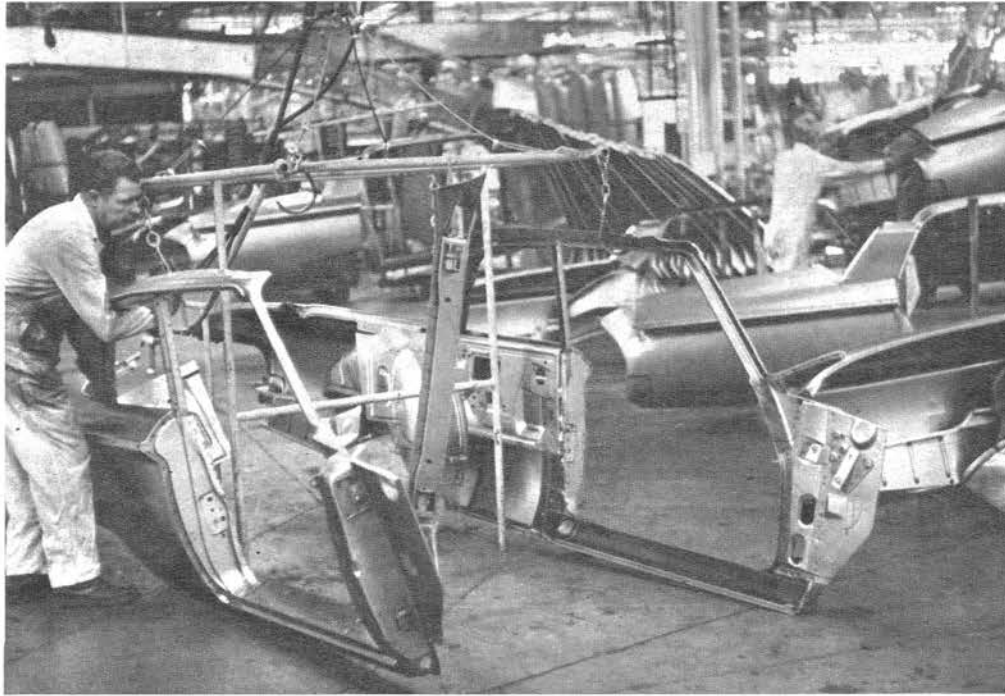
5.

The automobile body, meanwhile, has also been growing, step by step. The component parts—side panels, fenders, hood, rear deck lid, floor panels, etc., have been stamped from heavy sheet metal in one of the company stamping plants. Now, in an area near the final assembly line, those parts that are to make up the main body unit are fitted into jigs, and the parts welded together. In this picture, workmen are putting the rear pan, which makes up the bottom of the trunk and adjoining area, into an underbottom press welder. Here, it will be welded to another stamping, the front pan and cowl. Altogether, these make up the floor pan which comprises the bottom of the body.



6.

The body-side build-up conveyor line, where parts are added to the quarter panels (roughly equivalent to the rear fender sections) to form side panels. Here, a workman uses an electric spot-welding gun to weld a rocker panel to a quarter panel. The rocker panel is the door sill or step you use when you get into the car. Separate right hand and left hand panels come off this assembly line. In most body welding operations, electric welding equipment has replaced the acetylene torch because it is faster, more accurate, less dangerous. More than 1,600 pounds of sheet steel are used in the average Ford car.



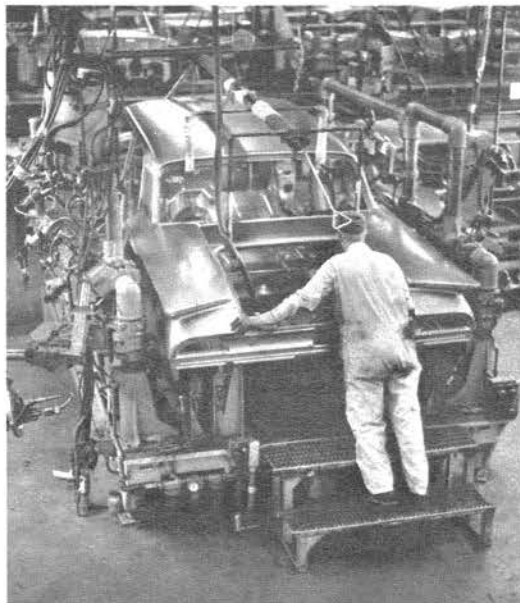
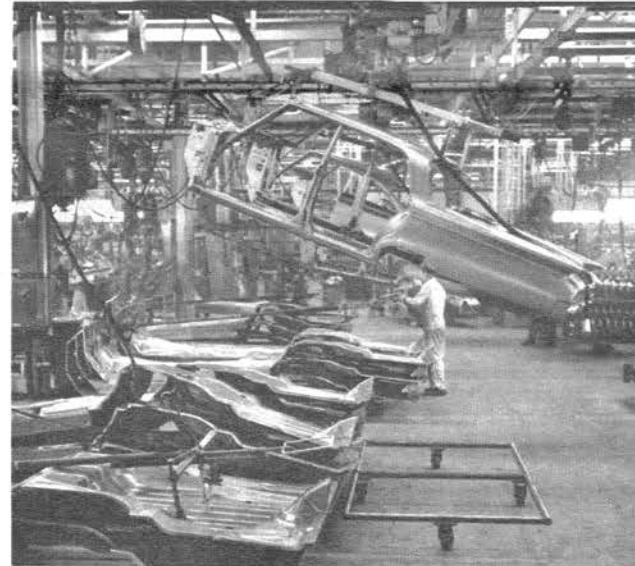
7.

Two completed but separate side panels—right and left—have come off the conveyor. They will be placed on a hoist and taken to a jig, or body buck, to be welded to other parts to form the body shell.

The body parts are then assembled

8.

Body shell, now including the cowl top, windshield header, upper and lower deck panels and a roof panel, is shown on an overhead conveyor. It is now on its way to another buck for welding to a completed floor pan.



9.

The floor pan is now on the buck, and the body shell is being guided into place on top of it. The two units will then be welded together to form a complete body unit, minus the doors, deck lid, front fenders and hood. Virtually all handling of parts is done by automatic machinery, and the transfer operation is done either by floor conveyors or overhead monorail carriers. This body will now go to the paint line.



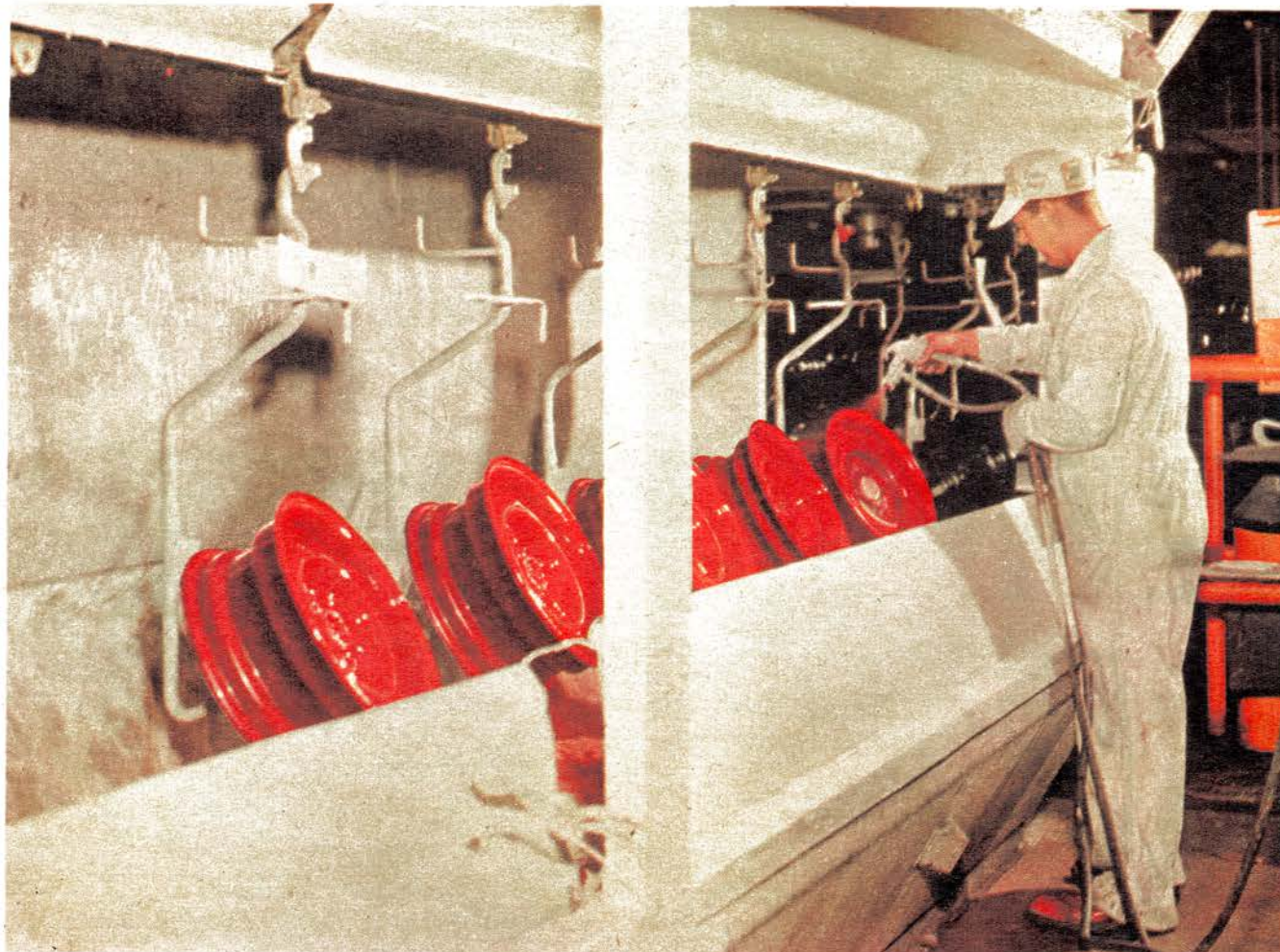
C

The operation of the entire plant is controlled by a network of teletype machines through which delivery of needed parts is scheduled. The workman here is checking an order. If the code letter is "J", he will follow the chart above him and place the red fender on the conveyor for delivery to the final line.



A

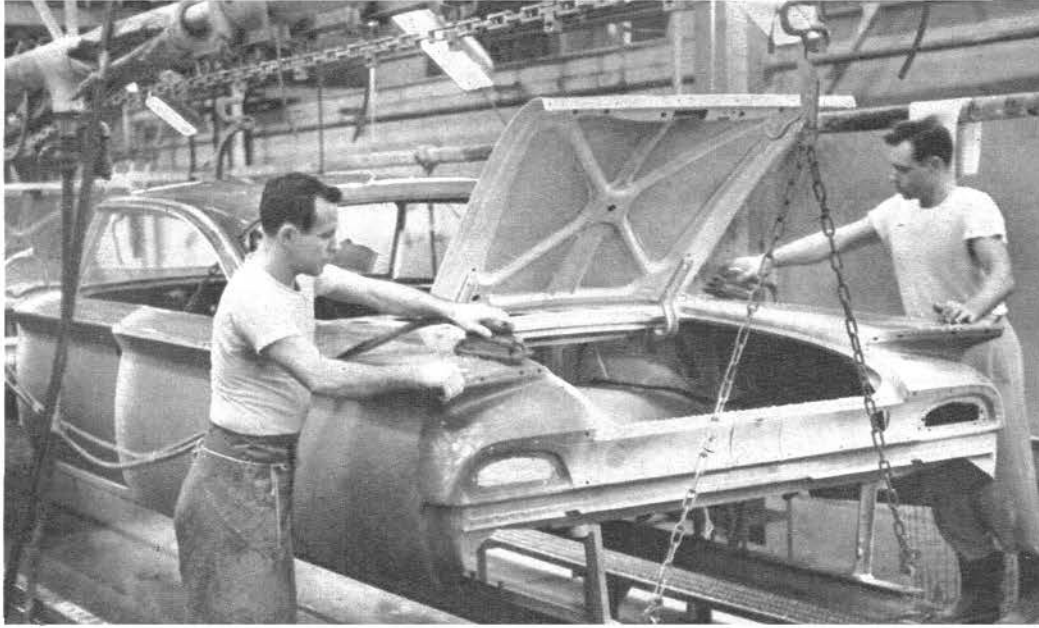
Above—After a body has been painted the first time and has been through the baking oven, it comes to this paint checking station where the quality of work is passed upon. The men in checkered shirts are inspectors.



D

At left—Workman spray paints a set of five wheels. In some assembly plants the spraying equipment is automatic, but in any case the painter can get any color he wants by turning the right spigot. Wheels, like all other parts of the automobile, are sent to the Louisville assembly plant unpainted. After spraying, the parts go through a baking oven to harden the finish.

Paint, bake, sand, paint, bake again

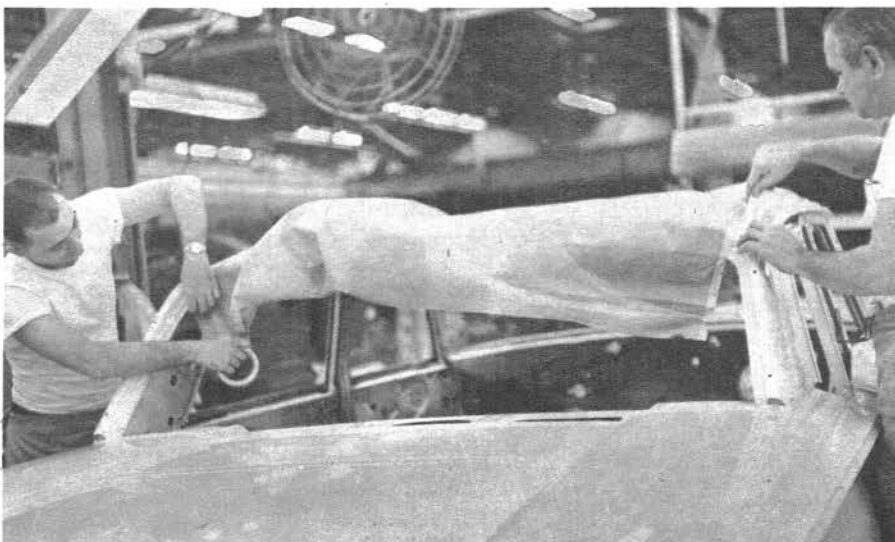


10.

On the paint line. The body is first treated with chemicals to remove all grease, the chemicals are rinsed off and the body is dried. Next comes the bonderite, or anti-rust spray, after which follows a second spray to neutralize the acid in the metal. The body then goes through a glazing operation to smooth out any file marks or scuffs in the metal. The first coat of paint is the red primer which is baked on; the body is wet sanded and thoroughly dried, and moves to the spray booth for the finish coat of enamel. During the process, the underneath parts of the body are automatically sprayed with black paint. The body again goes through the baking oven. Automobile hoods are painted and baked in another area and will reach the car near the end of the final assembly line.

11.

Interior metal areas which will not be exposed get a coat of anti-rust paint. Exposed portions, such as the door jambs, are given the same paint treatment as the exterior of the car. The current popularity of two-tone cars in a wide choice of color combinations makes it necessary to have from 15 to 20 pipelines of different color enamels.



12.

All cars are painted the necessary solid color. If the order calls for a two-tone job, that part of the body that is to remain unchanged is masked off, the remainder is sanded and re-sprayed with the required contrasting color. Once more the body makes a trip through the drying oven. If re-touching is later necessary, there will be still another such journey.



13.

Fully painted bodies are placed on a floor conveyor and moved into the storage and inspection area. After a thorough, last-minute inspection they will enter the tributary known as the trim line. At the station shown here, the body, insofar as the welded joints, interior and exterior paint and general appearance are concerned, is finished. Any corrections needed on door and deck lid fittings will be made on the final assembly line.

Painted bodies get trim and glass

14.

On the trim line, one of the first operations is the attachment of ornaments. Such decorative pieces, like the door handles and some of the name plates, are usually made of die-cast zinc alloy. Sometimes such ornaments and name plates, as well as other exterior hardware, are made of anodized aluminum.



15.

Farther along the trim line another man installs a moulding made of highly polished stainless steel, on the quarter panel. As the body progresses it will acquire weather stripping, hardware, head lining and glass windows. Later, it will get the heater, instrument panel, dome lights, hand brake and door trim panels. All these jobs, like others in an assembly operation, are performed while the body moves steadily forward on the conveyors. The line stops only at lunch time and during the shift changes, or on those rare occasions when something goes wrong.



16.

Still on the trim line, the body moves to the glass installation area. At the point shown here, the car is receiving the front door glass. Ford Motor Company makes a major portion of the plate glass used in its cars.

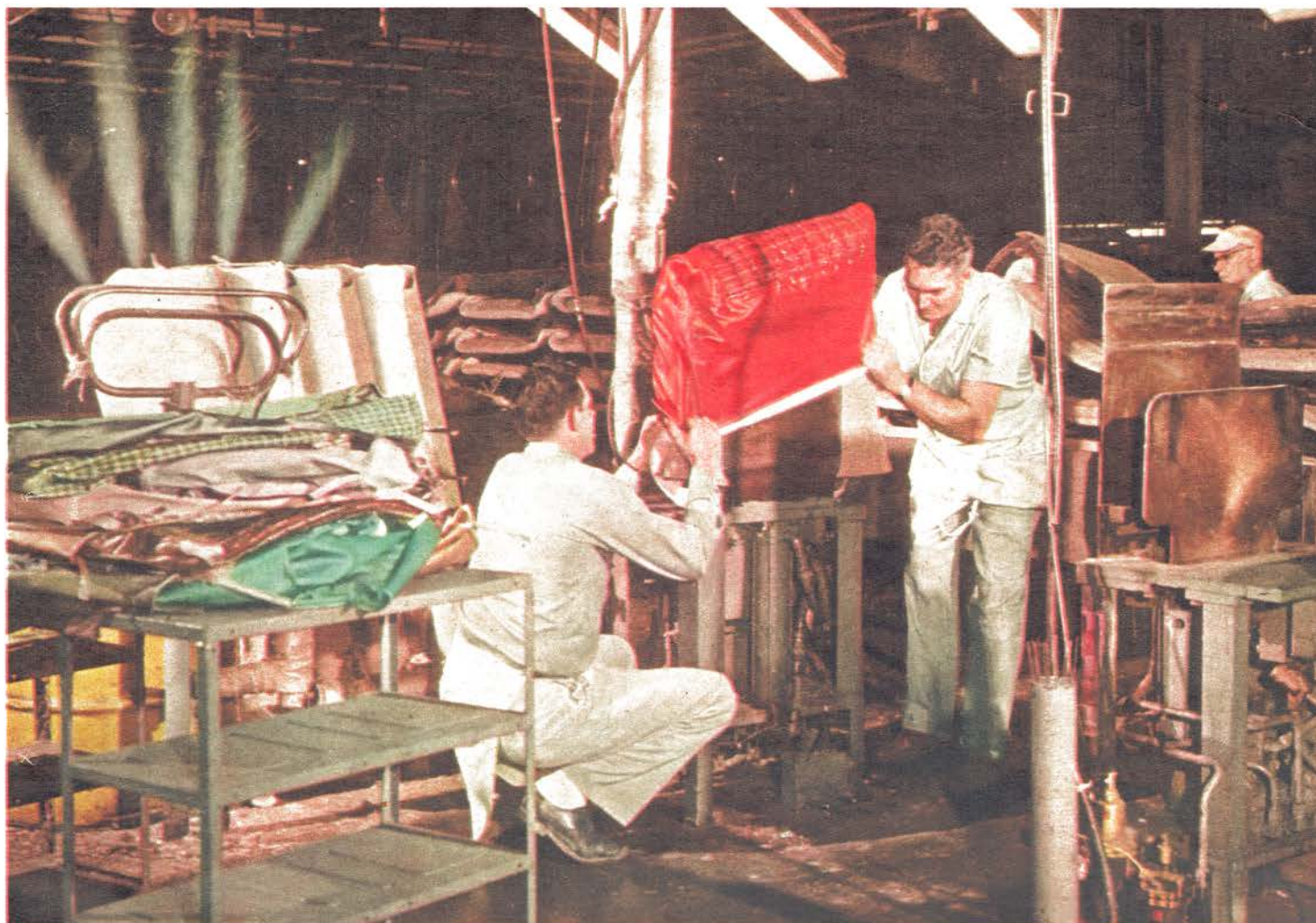
17.

Wires from the central ignition system are strung back through the trunk to hook up the tail lights and back-up lights, which are being connected here.



18.

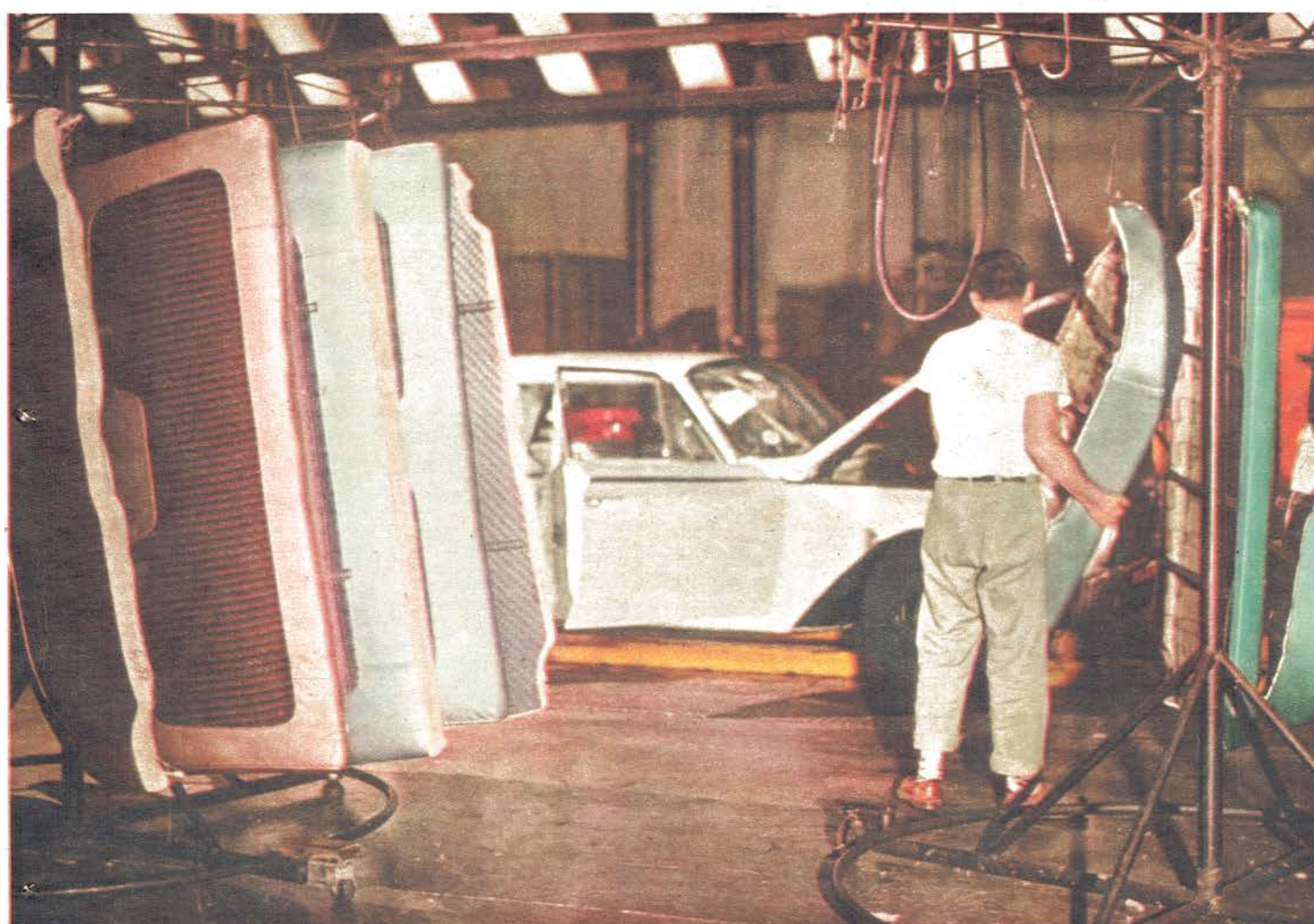
After squirting plastic sealer into a groove in the windshield frame, the workman slips the wraparound glass into place, taps it firmly to be sure it is firmly set. All windshields in Ford cars are made of two sheets of plate glass, each one-eighth of an inch thick, with a sheet of clear, vinyl plastic sandwiched between, to make safety glass. The windshields are bent under heat and pressure to form the wraparound contours.



E

As the car now nears the end of its journey it reaches one of the last of the sub-assembly feeder lines. From this tributary come the completed seats and seat backs which have been upholstered to match the car which the customer ordered.

Seat cushions are selected to match the exterior of car



F

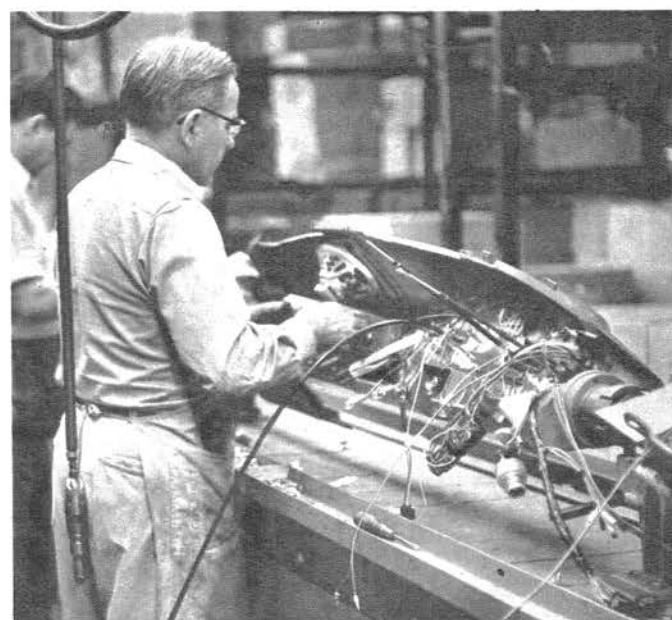
Completed seats have been placed on a merry-go-round device, from which the workers select the equipment to fit their teletyped orders.

Seats and backs are slid into place and fastened down.

The air cleaner is now fitted to the carburetor, the hood is bolted to the hinged brackets and the battery is installed and connected.

19.

On a separate little assembly line, called the instrument panel conveyor, wires are connected for the headlight switch, cigaret lighter, panel lights and other controls. The workman here is installing the car radio. A good portion of the 35 pounds of copper that go into a modern Ford car is represented in the hundreds of feet of copper wire.



The body gets a water-proofing sealer



20.

The cross-over line is the final step before the body goes to the final assembly line to meet the right chassis at exactly the right time. At this point the body is virtually complete, except for steering wheel, gear shift lever, floor mat and seat cushions. The workman shown here is spraying a coat of water-proofing sealer on the front body panel. Immediately after a final inspection, the body will be lowered from the mezzanine floor area onto the chassis which is moving along the conveyor below.

Tires are mounted, inflated by machine

21.

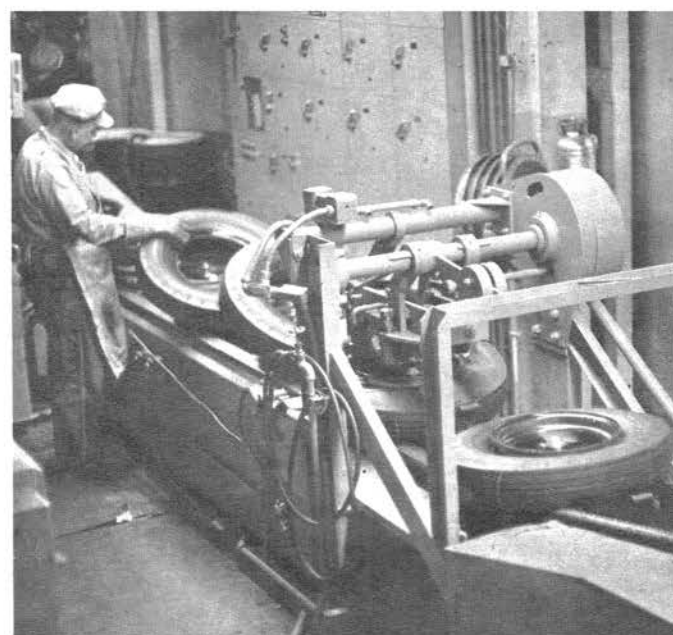
From one sub-assembly line come the wheels, from another the tires, to meet at this point. Tires are mounted mechanically on the wheels, inflated automatically to the right pressure, and moved on to the final line. Ford makes a major portion of its own wheels, buys some from outside suppliers. All tires are purchased from the outside; none are made by Ford.

Now, as chassis passes from underneath the balcony where bodies have been inspected, the body is caught up by giant, padded hooks, swung down, jockeyed into place on the chassis and bolted to the frame. (See front cover) Wires in the electrical system are connected, the various linkages are completed and the steering wheel is installed.

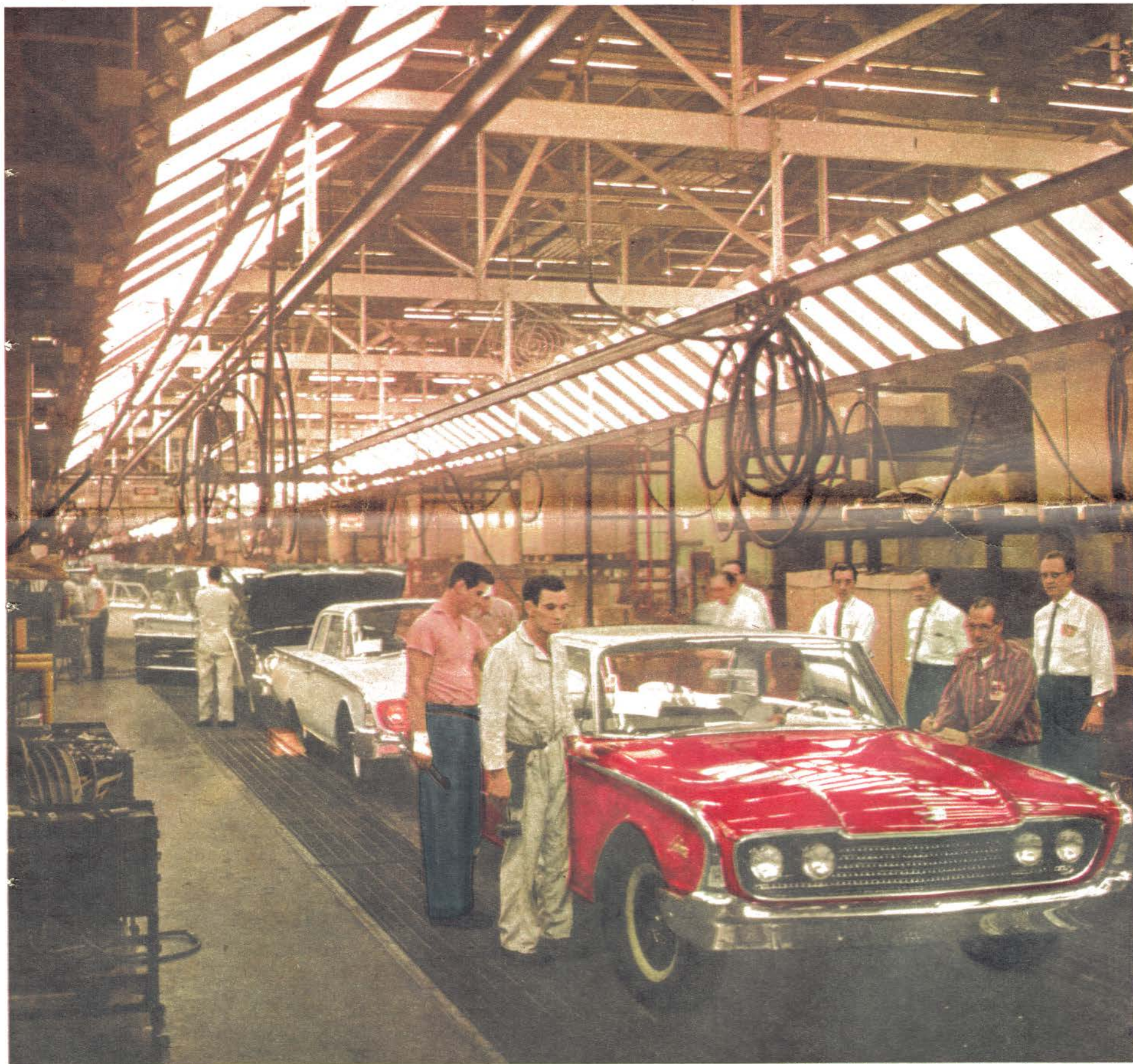
Ahead of this point and to one side, the "merry-go-round" has been running constantly. This is an assembly line which moves in an elliptical circle for the build-up of the front-end assembly: grille, radiator, headlights and parking lights, fenders, battery tray, horn, gravel guards and name plates.

On the main line, the speedometer is hooked up and at this point the front-end assembly is dropped into place and bolted down. The radiator is connected to the cooling system.

As the nearly completed car moves ahead, the wheels are installed and the lug bolts tightened with electric wrenches; hub caps are placed inside the car—never on the wheels. Floor mats and scuff plates are installed.



Last stop on the assembly line, for check and adjustments



Staff Color Photos By Chief Color Photographer H. Harold Davis

G The car then enters another inspection and repair area where any remaining flaws are found and corrected. The radiator is filled with water (anti-freeze is added during the winter months) and the fuel tank gets 10 gallons of gasoline. Then comes the last inspection which the car will get on the assembly line itself. In the above picture, the completed car is leaving the end of the line. From here it will go to another

testing area where a pit mechanic will adjust the wheel alignment while another adjusts the headlight beams and installs the headlamp rims. The windshield wiper blades are hooked into place and the car moves into its final series of inspections and tests before being driven to the haulaway area. The completed car will then be ready for the dealer's show room floor.