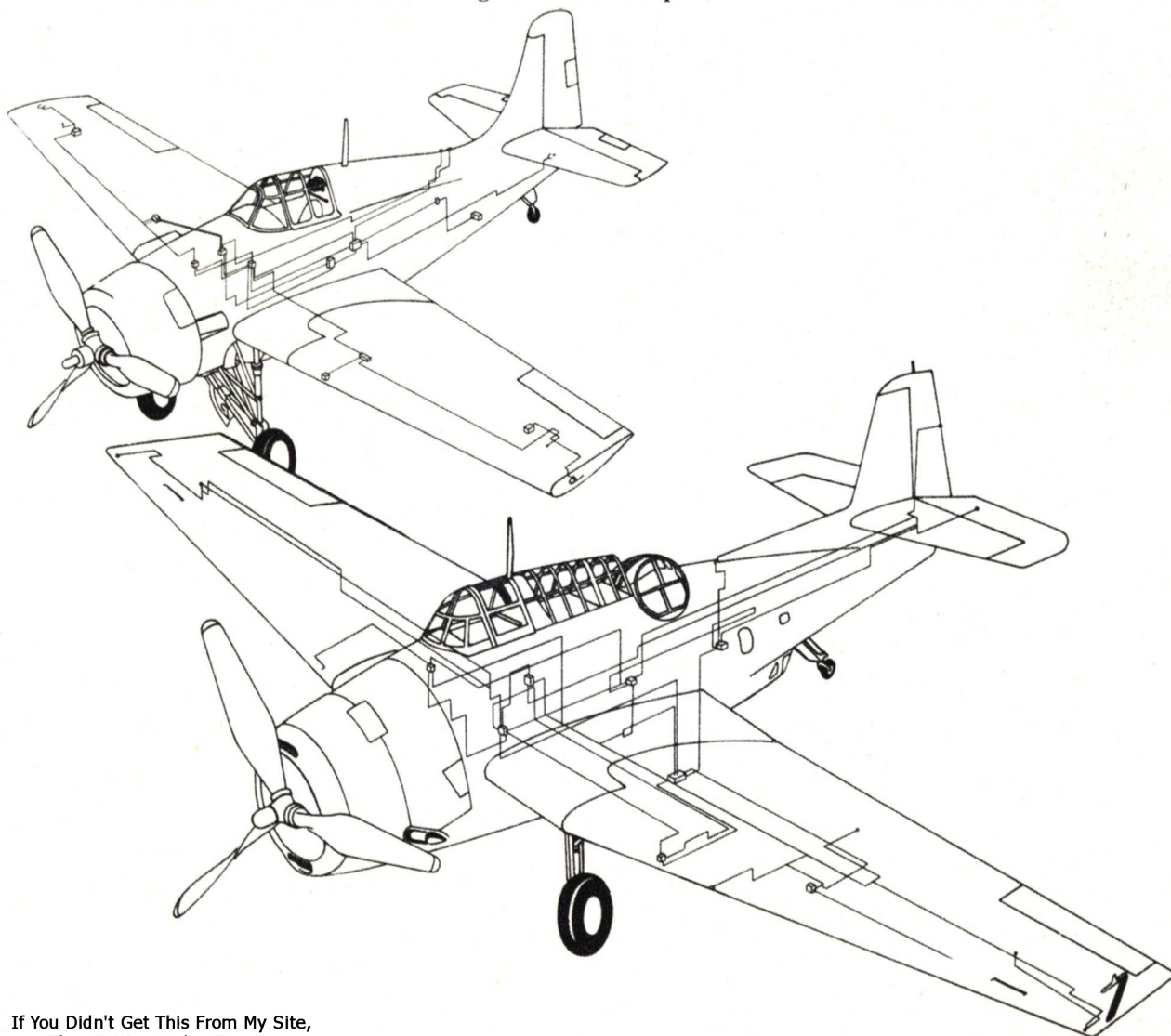


BLOOMFIELD

THE BLOOMFIELD, N. J., plant of the Eastern Aircraft Division produces the many and varied cables, wires, tubes and electrical and hydraulic assemblies for both the Wildcat fighter plane produced at Linden, N. J., and the Avenger torpedo bomber turned out at the Trenton, N. J., plant.

Other parts and assemblies such as the ammunition boxes for both ships, the huge star decals that grace the wing and fuselage of the planes also come from this plant. Only through a visit to the plant or through the medium of the pictures that follow can anyone obtain a conception of the vital contribution being made at this point of the Division.



BLOOMFIELD

A LONE STORAGE BATTERY rests in an office of the Bloomfield plant of Eastern Aircraft Division — symbolic of a past era. Unlike other storage batteries, this one has been painted a light gold, for it was the last one off the line of the Bloomfield Delco-Remy plant.

The announcement of the formation of a new Division — the Eastern Aircraft Division of General Motors — affected this battery plant along with four other General Motors plants on January 21, 1942 — touched them at a time when production was being increased from 2,500 batteries a day to 4,000. The plant was not immediately in need of war work, as were some of the others, but the new Division needed this manufacturing unit and needed it badly, for it was destined to play an important role in the production of not one, but both of the U. S. Navy carrier-based planes — the Avenger torpedo bomber and the Wildcat.

In the plans for the new organization, Bloomfield had been considered as a source of machined parts; but as time went on it was felt that the battery plant could handle the job of the thousands of hydraulic and electrical assemblies for the two planes. Thus, the former battery plant took on a task which was far removed from the manufacture of batteries — and was certain to require complete conversion.

Plans in Bloomfield progressed efficiently and well. As the last thousand batteries passed through the plant, workmen proceeded with the transition, and new departments took shape. Machinery and equipment were removed and stored or disposed of. This was done by Delco-Remy employes rather than outside contractors, in order to provide work for them until aircraft operations started.

While conversion progressed in the plant, supervisors journeyed to the Grumman plants to learn something about aircraft. For weeks these men worked on the Grumman production lines — learned how cables were spliced, parts were fabricated, tubing was bent and fitted, and how complete electrical assemblies were made.

May 1, 1942, found the Bloomfield plant entering the new Division completely.

Few tools used in the manufacture of batteries could be used in the new work, so it was necessary to order new tooling and pray for quick deliveries — and to make many other tools within the plant. A tool design and manufacturing department was established in August, 1942. Other highly important departments, unknown in peacetime, were already underway. The plant now had a product and process engineering staff. The person-

nel department took on new sections with new and various functions. In effect Bloomfield was shaping into something new and alive.

Employees trained in the plant by supervisors returning from the Grumman plants learned their jobs quickly, and in turn gave of their knowledge to the new employees. There were exceptions to this — steel and aluminum welders were trained in a shop school prior to taking their newly acquired skill into production. Blueprint readers were not to be found readily, but a tool designer offered a course outside of working hours for interested employees. Management also stepped into the classroom to learn something of the new work — and the training program throughout the plant continued hand-in-hand with conversion and production.

Actual production of aircraft parts began at the Bloomfield plant in June, 1942, only six weeks after the former battery factory had officially become a part of the new Division. The first shipment of Navy-inspected and approved parts left for the Linden plant and installation in the Wildcat fighter plane on July 4, 1942 — to be followed by the first set of torpedo bomber assemblies sent to Trenton on August 4, 1942. True, they were mainly assemblies made of purchased parts, but the plant had made a start.

Production increased by leaps and bounds in 1943 — yet some parts were still being made by hand, for engineering data was being unwound, and blueprints and tooling were still lacking. Navy increases and additions to the bomber and fighter contracts were frequent and brought about an acceleration of schedules

at Bloomfield even before the effects were felt in other plants.

The plant itself was almost doubled in size to house many new offices and a new cafeteria, and as the months rolled by additional manufacturing area was a must.

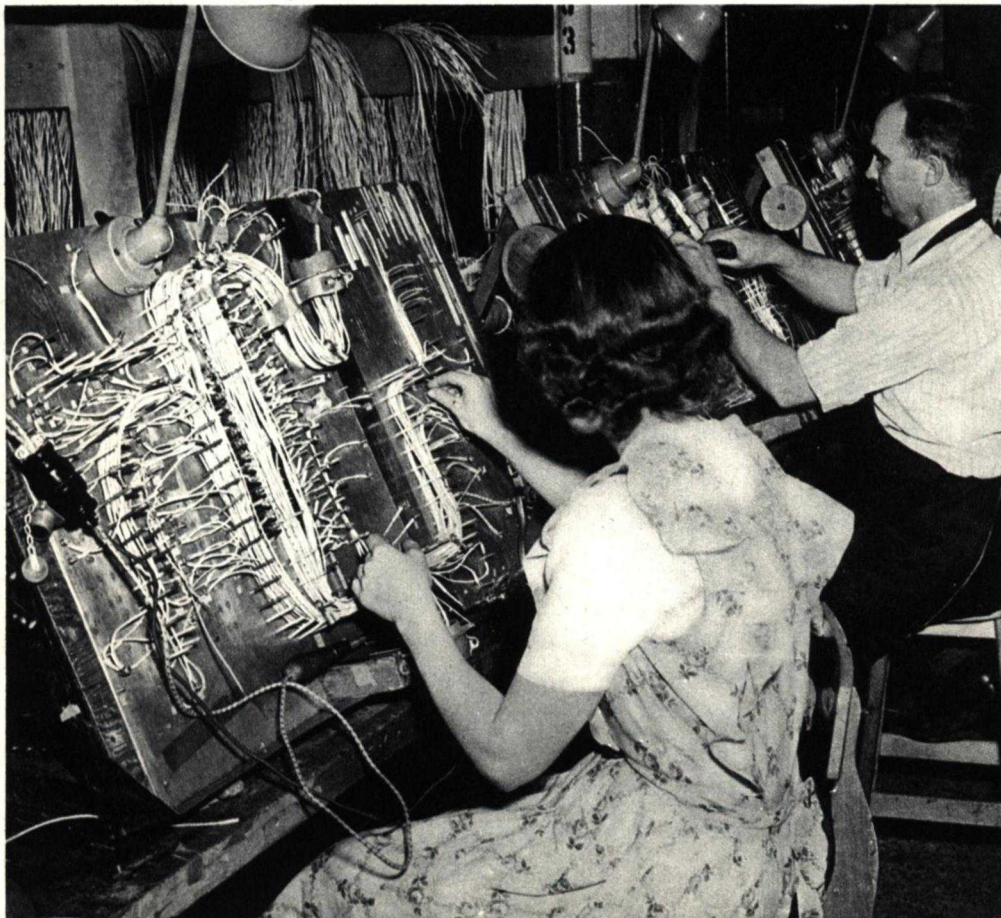
At first the problem seemed almost insurmountable. This time an addition could not be made. A new building had to be found. A search was made for some time, and late in 1943 a building used by a large baking company, complete with horse stables, was acquired by Bloomfield. Although badly laid out for the planned operations, this building — called the Ampere plant — had the necessary floor space. In a matter of a few months engineers and workmen turned it into a modern manufacturing unit which relieved a cramped situation at the main plant one mile away, and allowed Bloomfield to take on additional work from the other plants.

Early in 1944 Bloomfield was in a position to help other plants already struggling under a staggering burden. A portion of the anodizing operation was temporarily taken over from Tarrytown. The silk-screening department came to the aid of Trenton when Trenton ran short of Navy star decals which appear on the wings and fuselage of all aircraft. Other work, too numerous to mention, flowed into the plant and was taken up quickly and efficiently.

Bloomfield's war history has been a story of continuous change and expansion — of transition beyond human conception. But this will continue as long as the war continues. It will never stop until peace becomes a reality and the Navy no longer requires fighting aircraft to defeat an implacable foe.



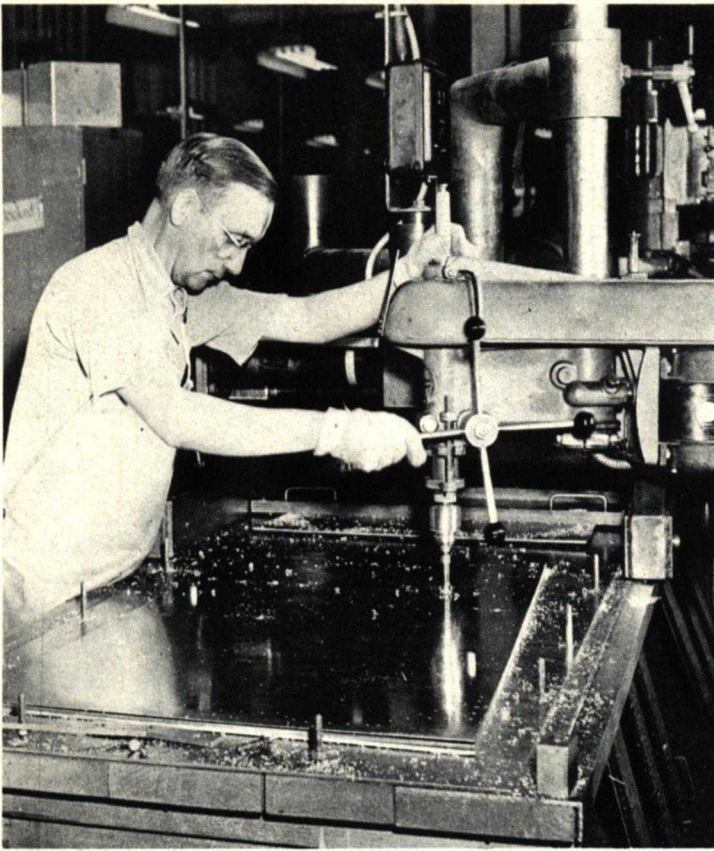
A rhythmic pattern of wires and cables frames a Bloomfield employe, working on an assembly for an Eastern ship.



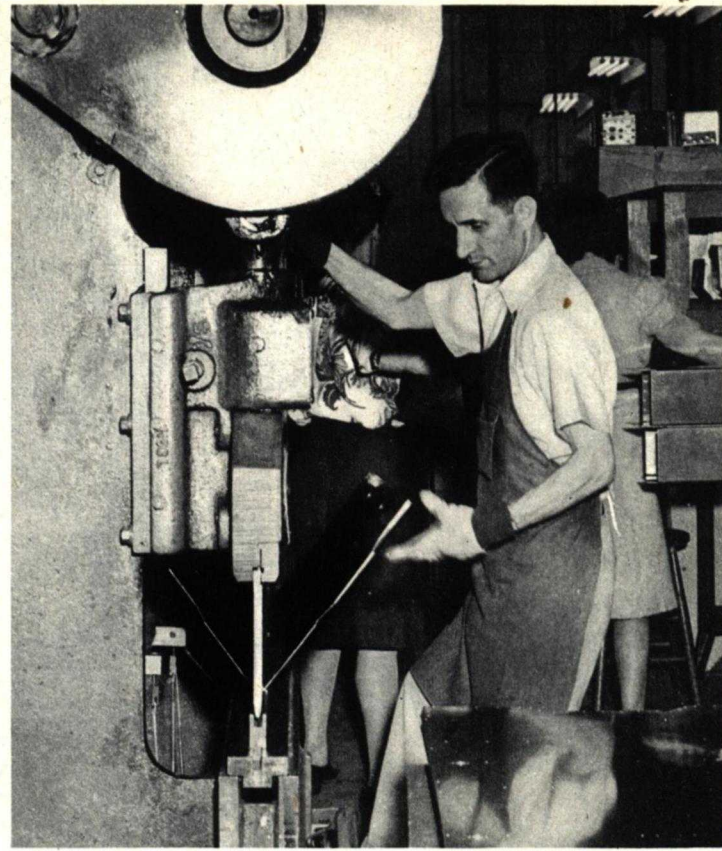
Many small wires compose "nerve" centers in an Eastern ship. Bloomfield workers lay them out with skill.



Air under pressure is shot through each tube to check for obstructions or imperfections. The ends are then taped, and the parts shipped to assembly plants. Many hundreds of these tubes go into each plane.



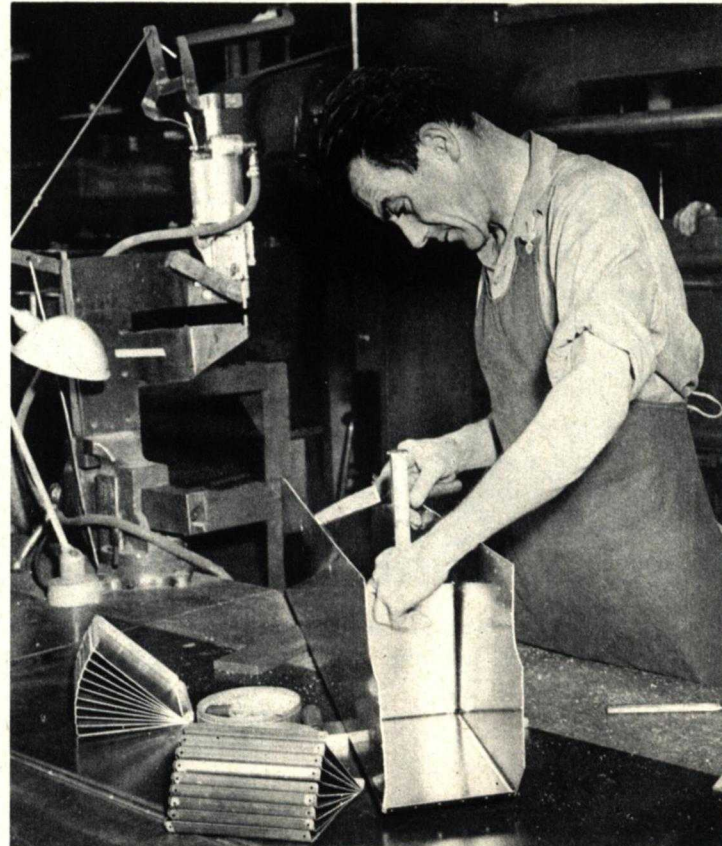
Ammunition boxes come to life at Bloomfield's plant. An employe countersinks holes in the metal shell of a box.



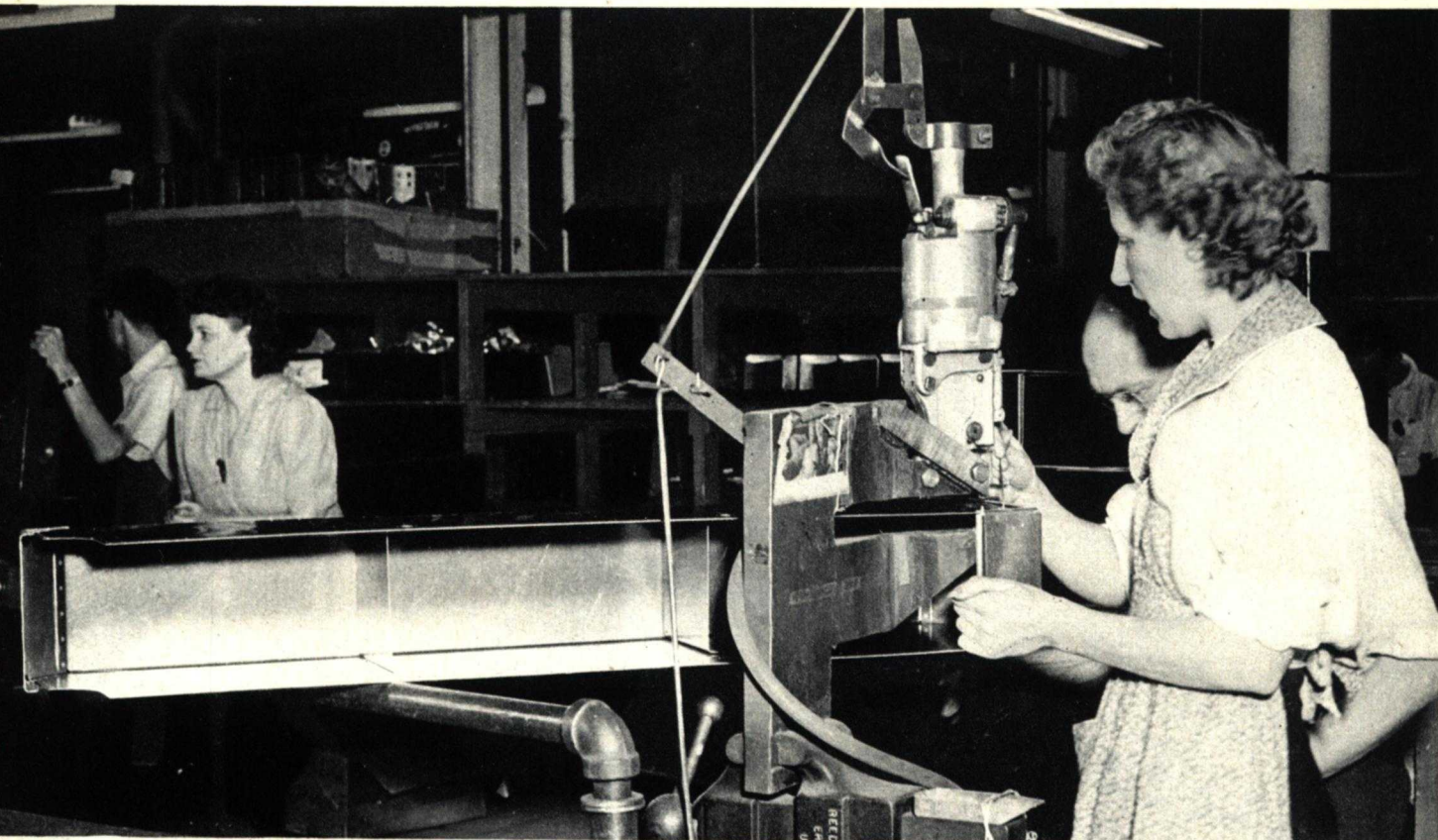
Later the shell box takes shape under the pressure of a power brake operated by a skilled Bloomfield worker.



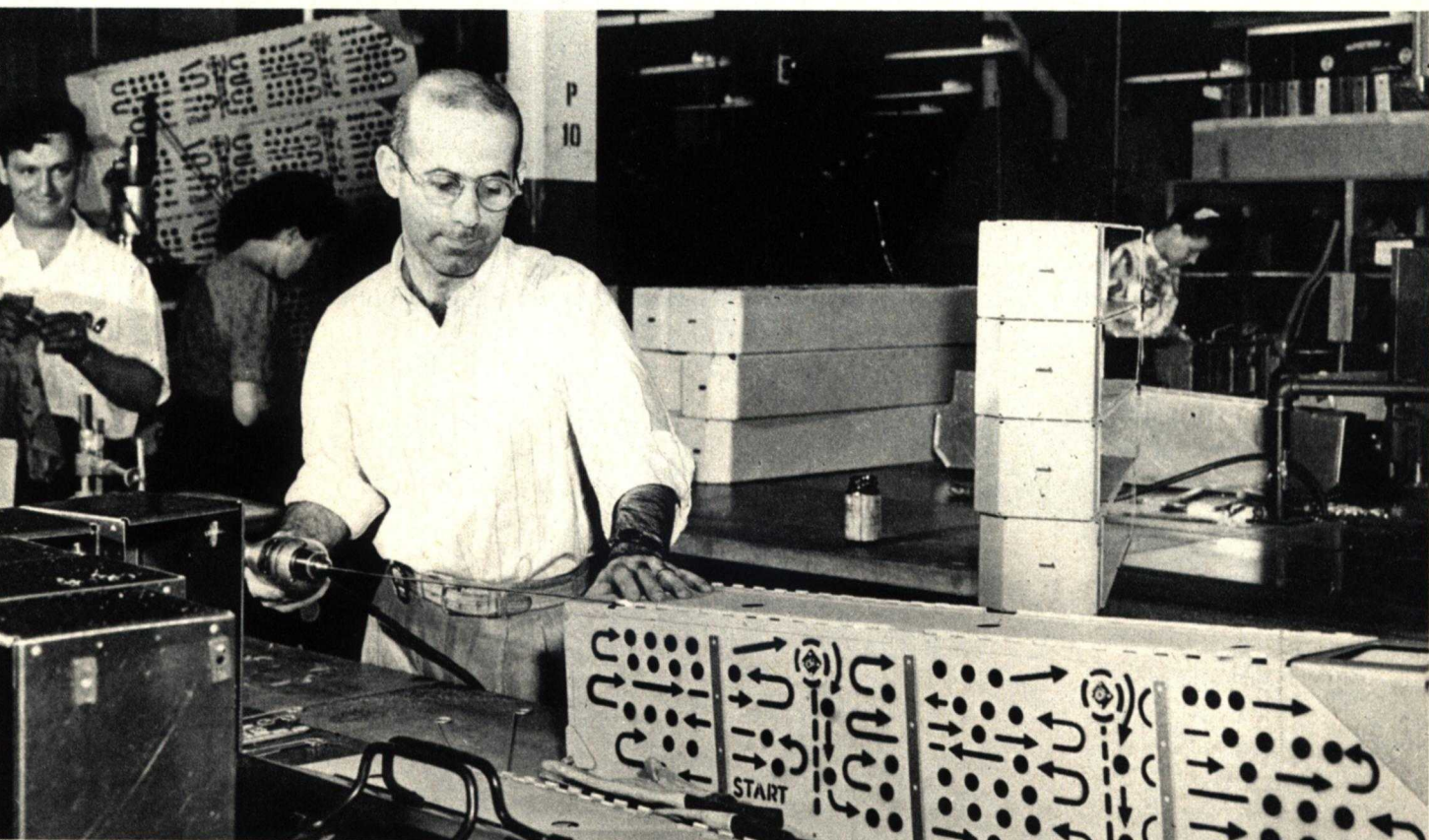
Holes are pierced in the partitions of each new box on an intricate "whistler" die at the Bloomfield plant.



The partition then becomes a part of the ammunition box. The operator is seen riveting it to the base.



Next comes the installation of partitions, and the two ends of the box become a complete unit. Here workers operate a compression riveter to fasten the sides to the partition. Final operations will follow.



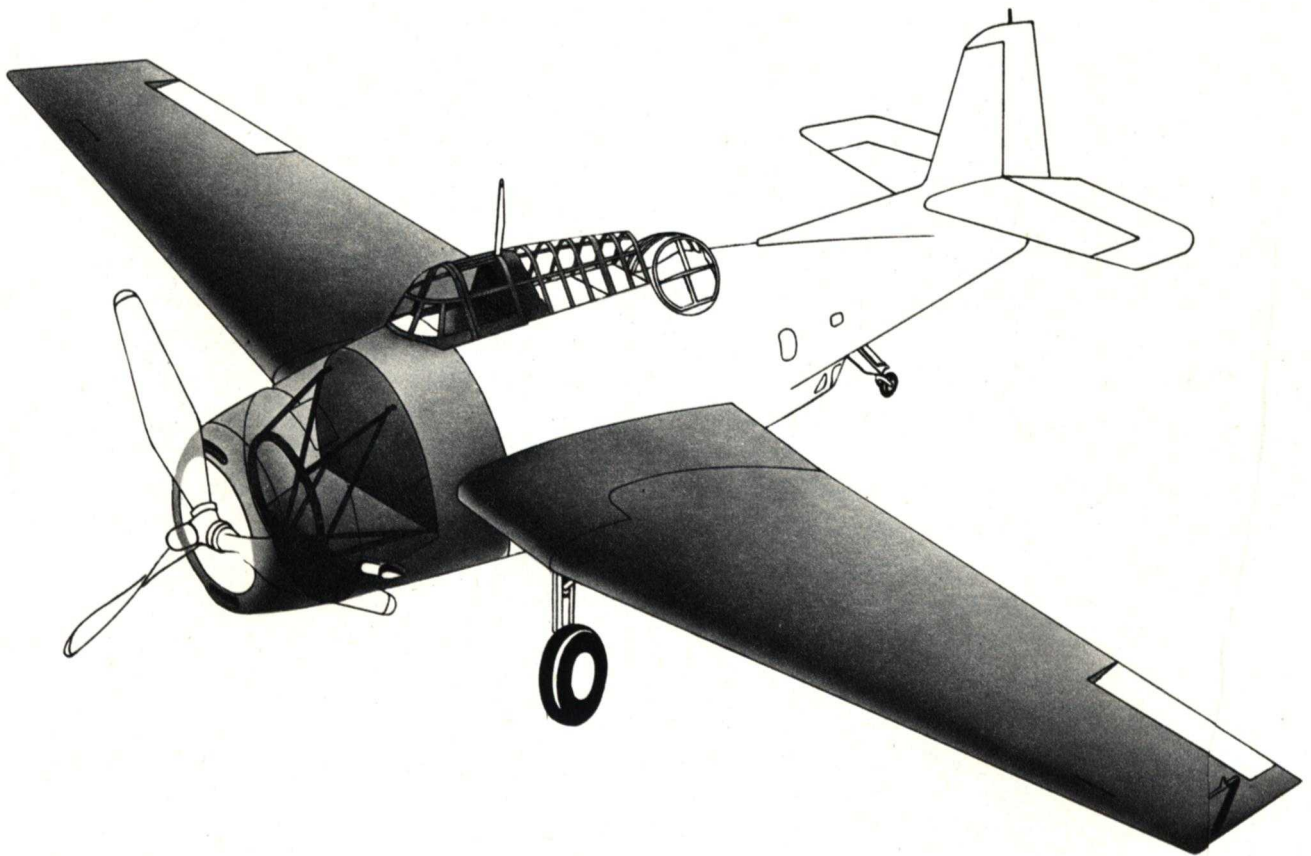
After the box is painted to show the location of the belts of ammunition, a worker performs a de-burring operation so that the inner wall of each hinge will be smooth. This is a special de-burring tool.



The boxes are finally stamped for proper installation in the plane. They are now ready to carry a load of ammunition into battle against the enemy. These boxes feed an even flow of bullets to the plane's guns.

TARRYTOWN

ORIGINALLY delegated to produce wings and several other large assemblies for the Avenger torpedo bomber, the Tarrytown plant of the Eastern Aircraft Division has taken on one additional assignment after another. In practically every case the assembly has been a major one, a big part of the bomber. In all cases, difficulties were encountered, but overcome, and production continued without interruption.



TARRYTOWN

TARRYTOWN, N. Y., was well known to Chevrolet dealers in the great metropolitan areas of Boston, New York and Philadelphia before the war. In the late 20's and early 30's they had traveled to this town on the east bank of the Hudson River to pick up new cars and trucks from the huge Chevrolet plant. Bodies for the cars were produced in quantity at the adjacent plant of the Fisher Body Division of General Motors.

During the last few months of 1941, government curtailment orders felt throughout the entire automotive industry slowed up production in Tarrytown. Finally the Federal Government ordered all automobile production halted, with the exception of trucks used by the Army, Navy and other government agencies. The Fisher Body plant, facing the future without a government contract (Chevrolet was to continue producing trucks) waited with bated breath for a decision.

It came one morning early in January when Fisher Body employes read with astonishment in the papers that they had become an integral part of a new General Motors Division — Eastern Aircraft. Within the space of a few days the new Eastern Aircraft plant learned that it would be expected to provide wings, cabins, motor mounts and several other assemblies for

the Navy's deadly carrier-based Avenger torpedo bomber, one of two planes Eastern had agreed to produce.

Then came the task of preparing for the new job.

A program of dismantling automotive equipment was put into effect almost immediately. Plant engineering, which in the beginning consisted of precisely three experienced men, directed the removal of every piece of machinery not usable in aircraft production — every one of the hundreds of jigs and fixtures employed to construct automobile bodies, tagged them for identification, had rust-resistant grease applied and stored them in an empty North Tarrytown building. Yet forty per cent of the old stuff was eventually used on the aircraft job.

Meanwhile new employes were hired, and training schools were set up anywhere and everywhere throughout the plant. A factory which normally employed some 1,300 persons had 2,890 on its payroll by the end of 1942; 4,026 by the middle of 1943, and more than 9,000 early in 1944.

Top supervision visited the Grumman Aircraft Engineering Corporation on Long Island to study the construction of the Avenger assemblies which Tarrytown was to build.

Foremen were sent to an aircraft school in Yonkers, N. Y., for grounding in the fundamentals of airplane construction. A 400-hour welding course leading to a Navy certificate was organized at a local trade school.

Three thousand four hundred forty-three employes were given in-plant courses of various types designed to acquaint them with the intricacies of building airplanes.

While men were badly needed, by far the most important new source of labor at Tarrytown was women. Early in 1943 more than 2,900 women had been put on the payroll, as compared to a peacetime total of 120. A qualified number of these were selected to take the junior engineering course at Rutgers University.

With a skeleton plant layout pretty well completed and some employes trained, the first set of wings was completed and shipped to the Trenton plant for final assembly in an Avenger torpedo bomber on October 1, 1942. But miracles had to be performed before Tarrytown could feed Trenton a steady diet of assemblies.

During the spring of 1942, orders were placed for 375 new pieces of machinery and 2,155 new tools. Men scoured the country for firms which could deliver these items in time to get the productive machine rolling. Large hydraulic presses were badly needed, and Tarrytown searched the nation from coast to coast before one of these was found and installed in December of 1942.

Engineering data was spotty and unreliable for many months. Eventually, in order to bring some order out of chaos, a "PK" (fastened temporarily with Parker-Kalon screws) section of the plane was secured from Grumman so that Tarrytown engineers could go ahead with some specifications to work on. At one time six different sets of specifications were being used; but as time went on this was corrected.

Then Tarrytown learned that the original estimate of its monthly schedule had been upped beyond the capacity of the plant. Luckily the adjoining Tarrytown, N. Y., plant of Chevrolet, which had been manufacturing trucks and ambulances for the Army, found that cut-backs in its contracts would allow Eastern to take over some of its floor space. Later the whole Chevrolet plant was taken over by Eastern when the Army discontinued Chevrolet's production.

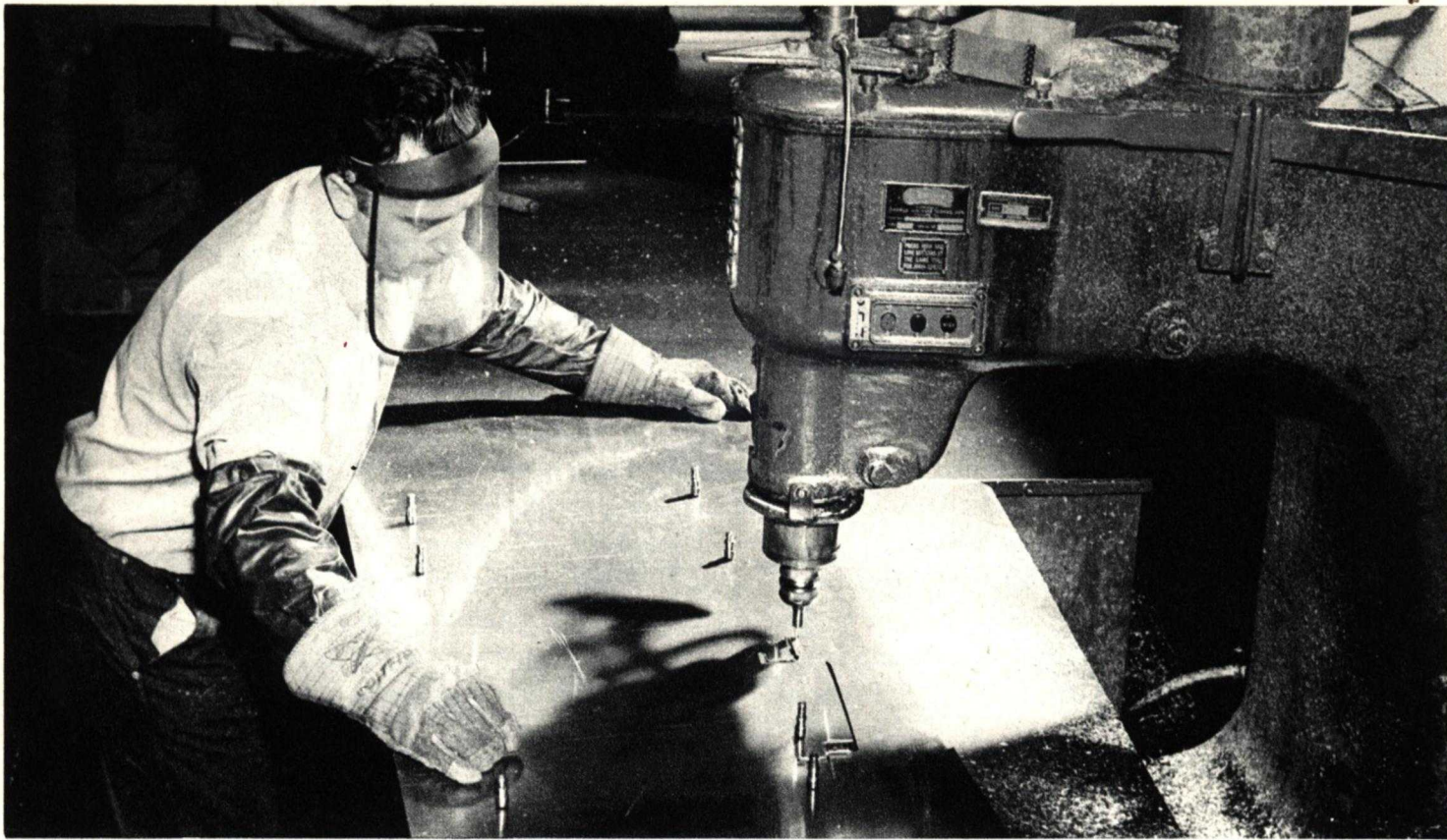
Tarrytown settled down to the job of upping monthly production figures and ironing out production bugs as 1943 opened. Constant improvements were made in operations. Time was cut here and there through new methods.

Then, with its available manpower and floor space, Tarrytown was able to take on 176 more assemblies from the Trenton plant during this first half of 1943.

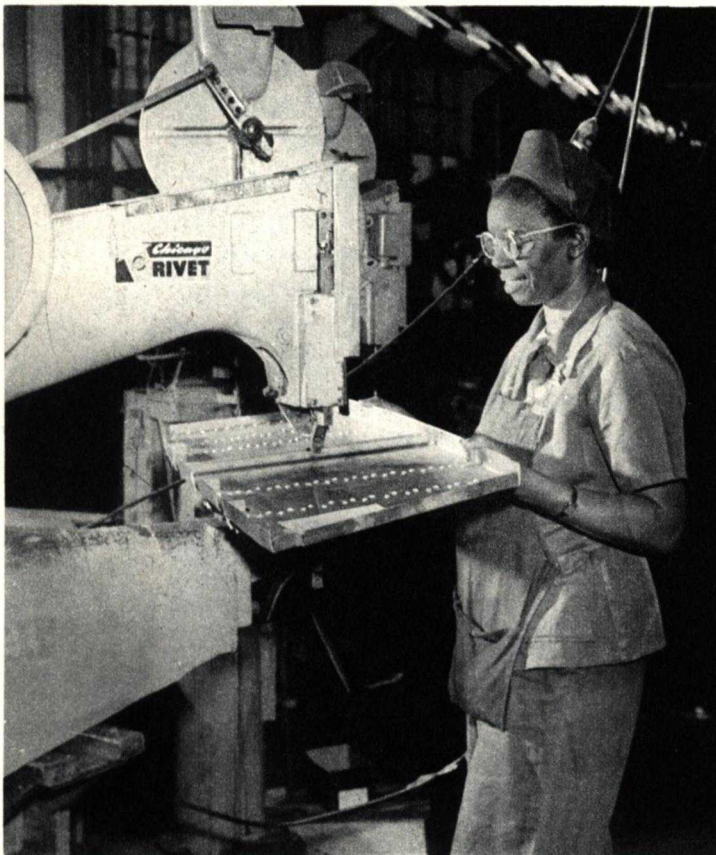
By April of the year Tarrytown had installed a wing conveyor line — an example of automotive technique applied to aircraft production — which increased productive efficiency. It is believed to be one of the longest of its type in the nation, stretching 1,223 feet on the delivery line, and 1,345 feet on the return line.

During the late summer of the year, Tarrytown incorporated a major design change into the Avenger's wings. Fifty-calibre machine guns had to be installed, and monthly schedules still maintained. After six weeks of heart-breaking difficulties the job was done, and once again Tarrytown rolled smoothly. In peacetime this would have meant shutting down to incorporate a major design change in an automobile.

Through the months the plant on the Hudson surmounted many problems, yet kept abreast of its portion of the Avenger's requirements.



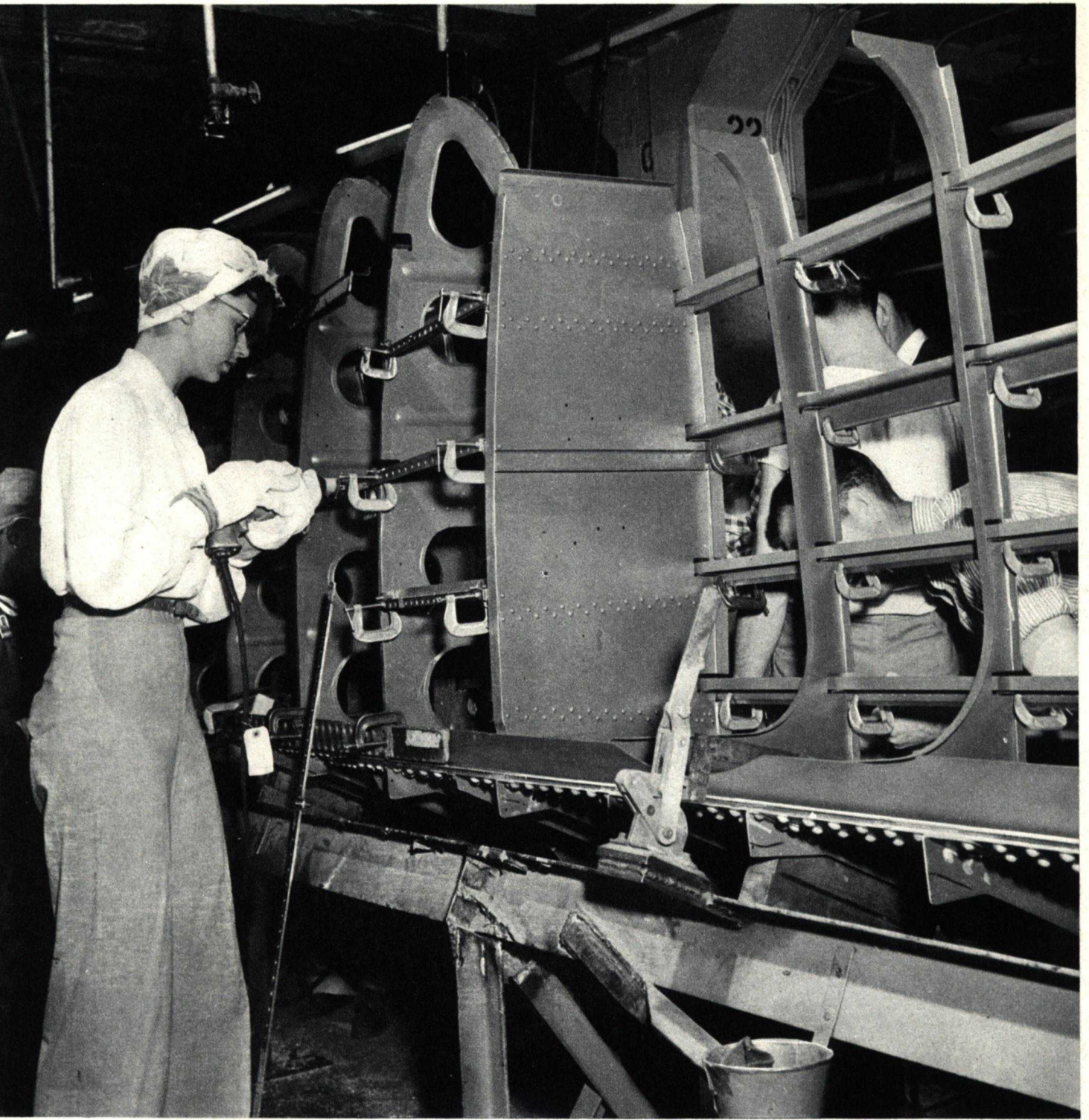
Many small subassemblies are knit together into the giant wings that are made in Tarrytown for the Avenger. Operator routs a piece of metal which will eventually take shape into a subassembly known as the "77" beam.



After the flat piece is formed, pierced, de-burred, etc., a pre-drilled channel is riveted to "77" at Tarrytown.



Other channels meet and become part of the whole beam which is very carefully inspected before moving along.



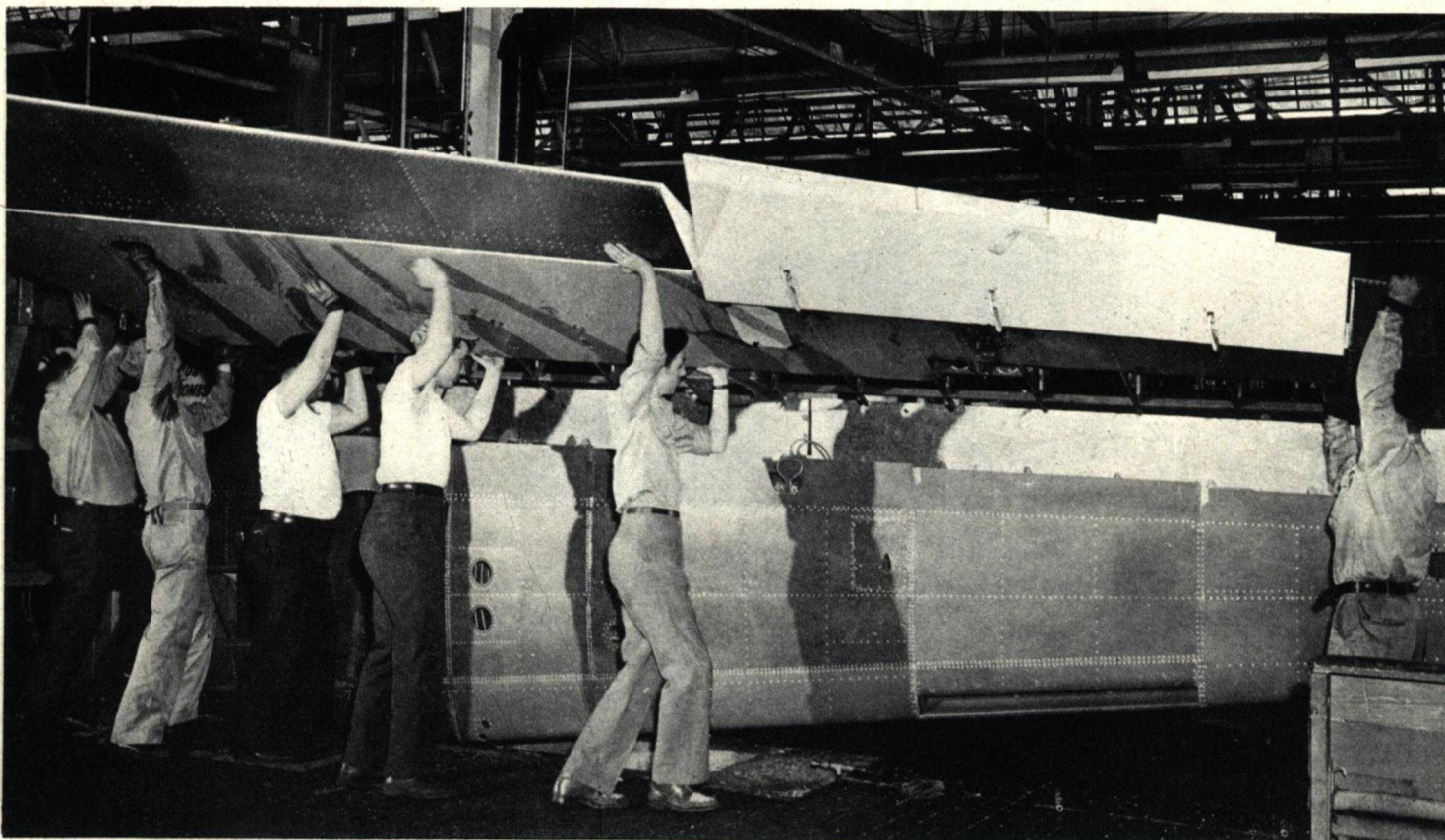
Covered and colored by the application of zinc-chromate (which prevents corrosion) "77" now becomes an integral part of the wing's leading edge. A girl operator rivets another assembly to the main structure.



As the leading edge takes form, the rounded outline of the wheel well can be seen circling assembly "77."



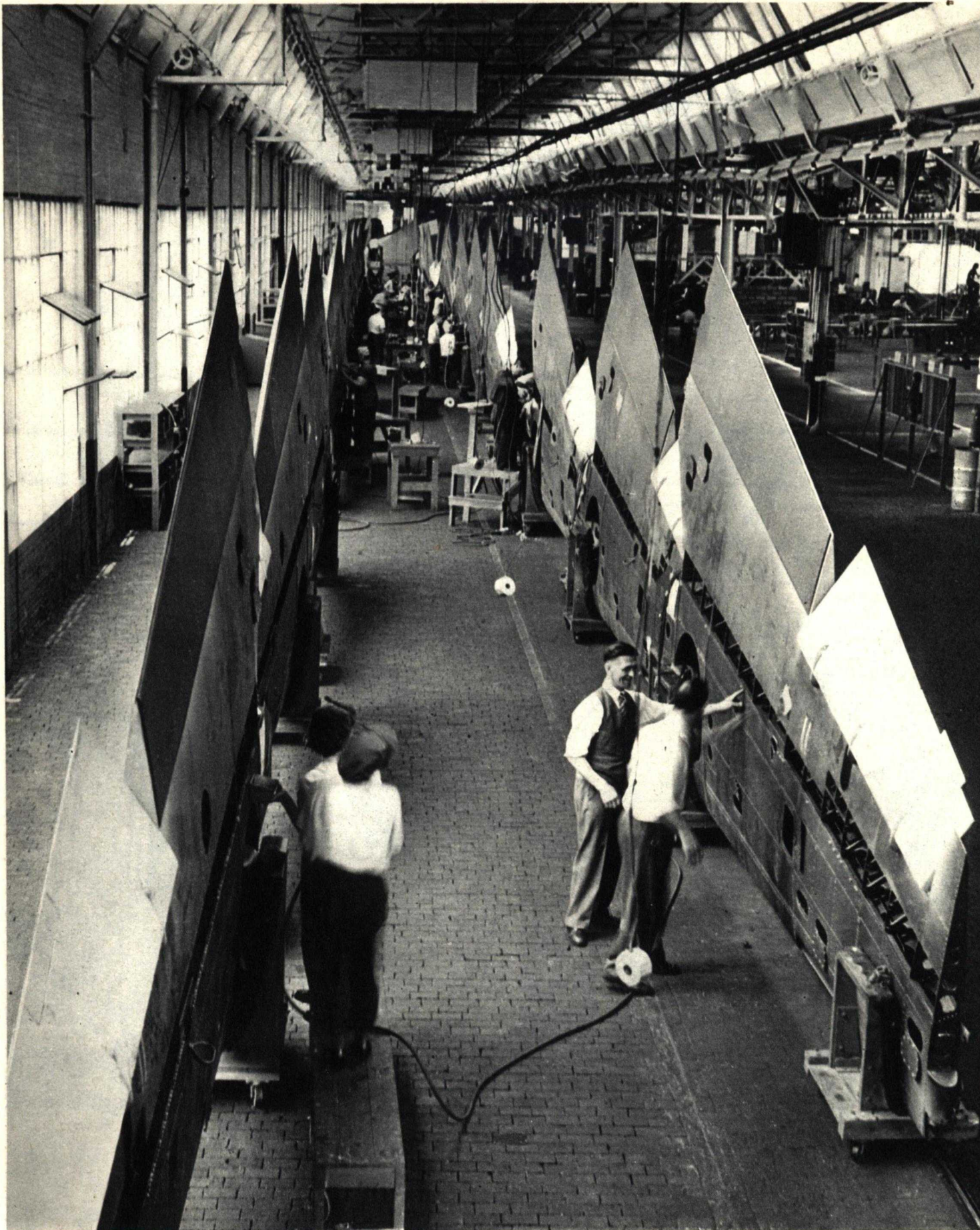
Now covered with "skin" (aluminum covering) the beam begins a long straight trip down the assembly line.



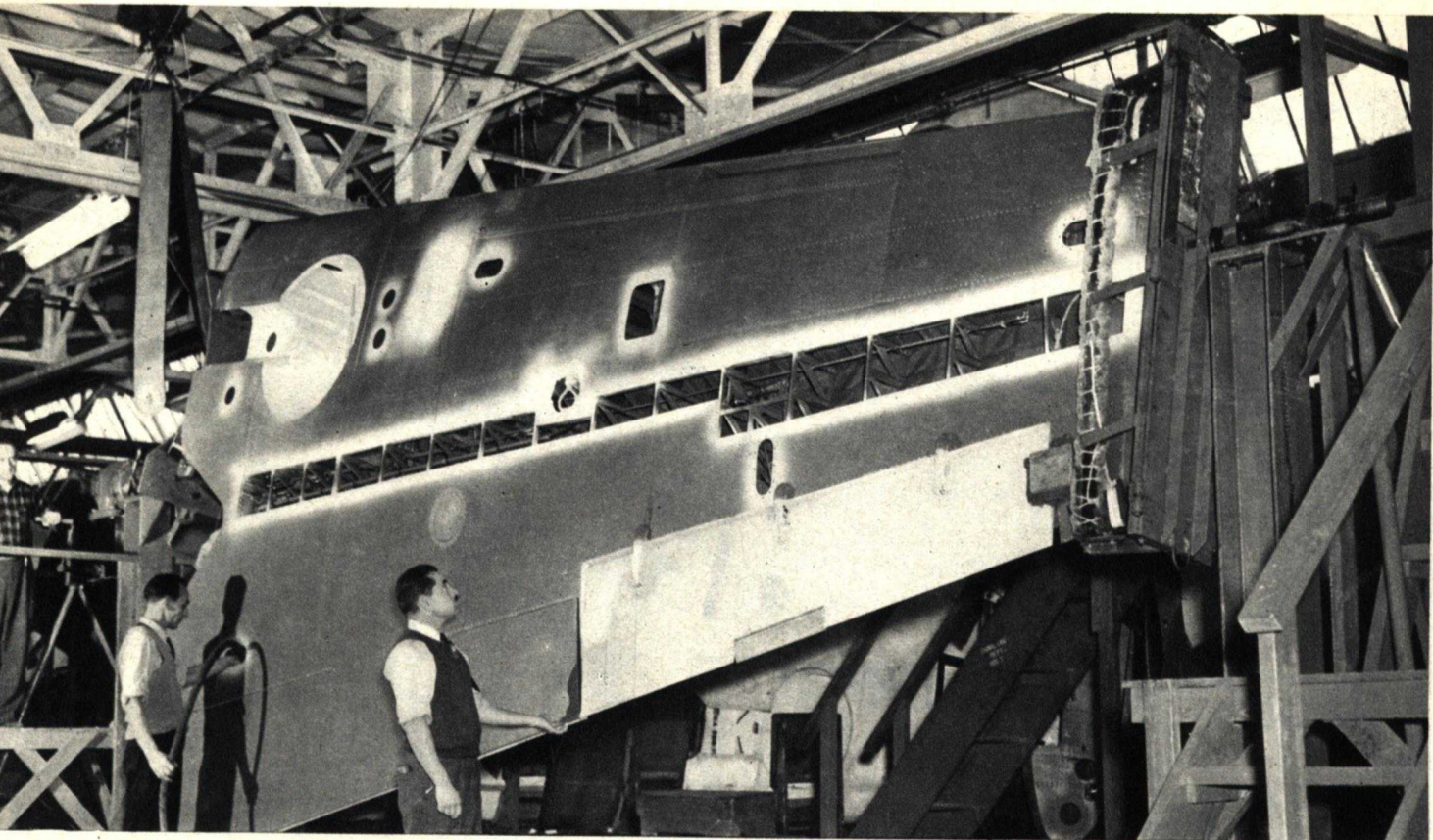
The trailing edge of the bomber wing, which has taken a similar trip through the plant, meets up with the leading edge, and the two are wedged to form the wide, powerful Avenger wing. "77" now fades from sight.



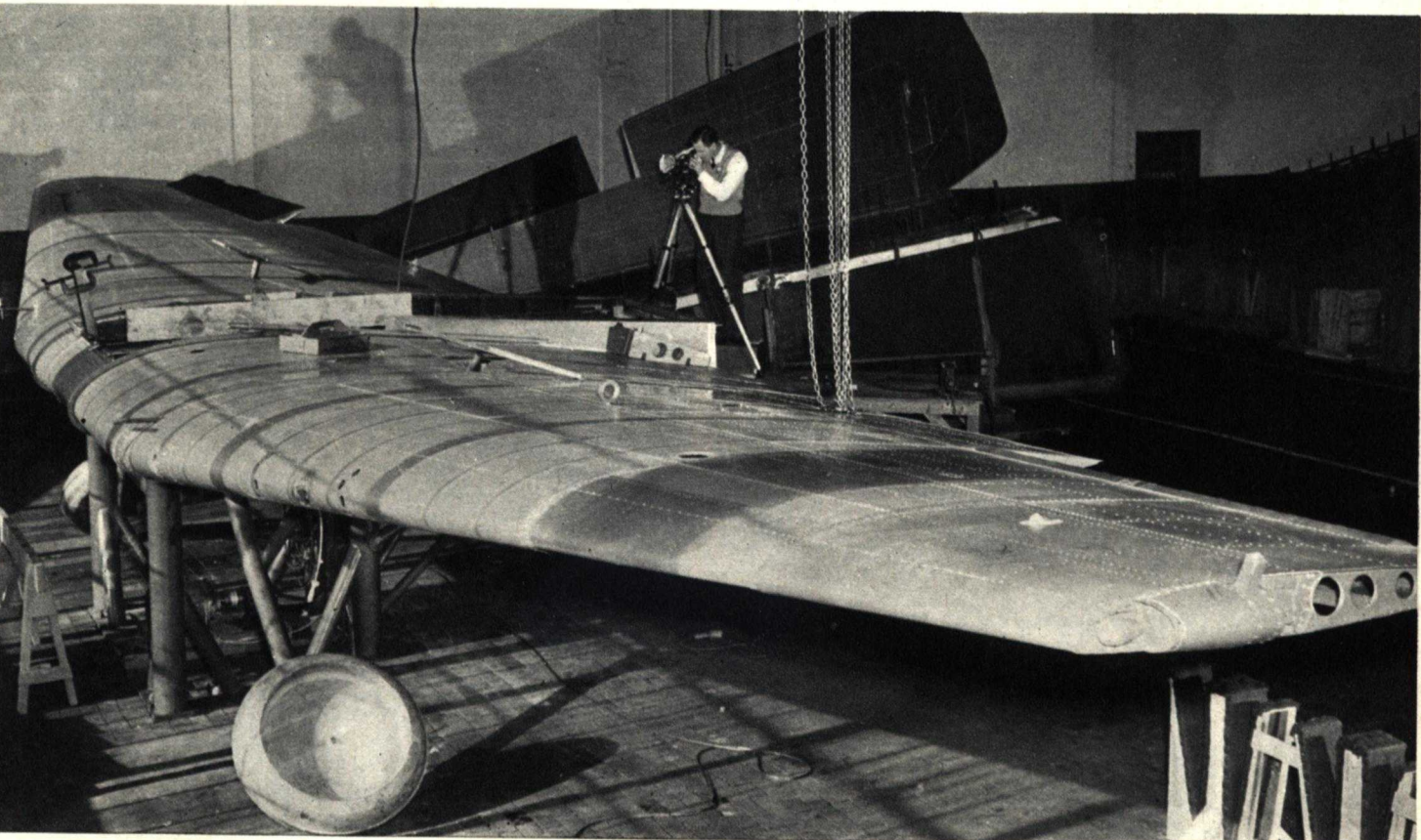
By using this ingenious upper-deck work platform, employes on the wing conveyor line are able to quickly put final touches to one of the largest of bomber assemblies. Width of the wing requires this unique apparatus.



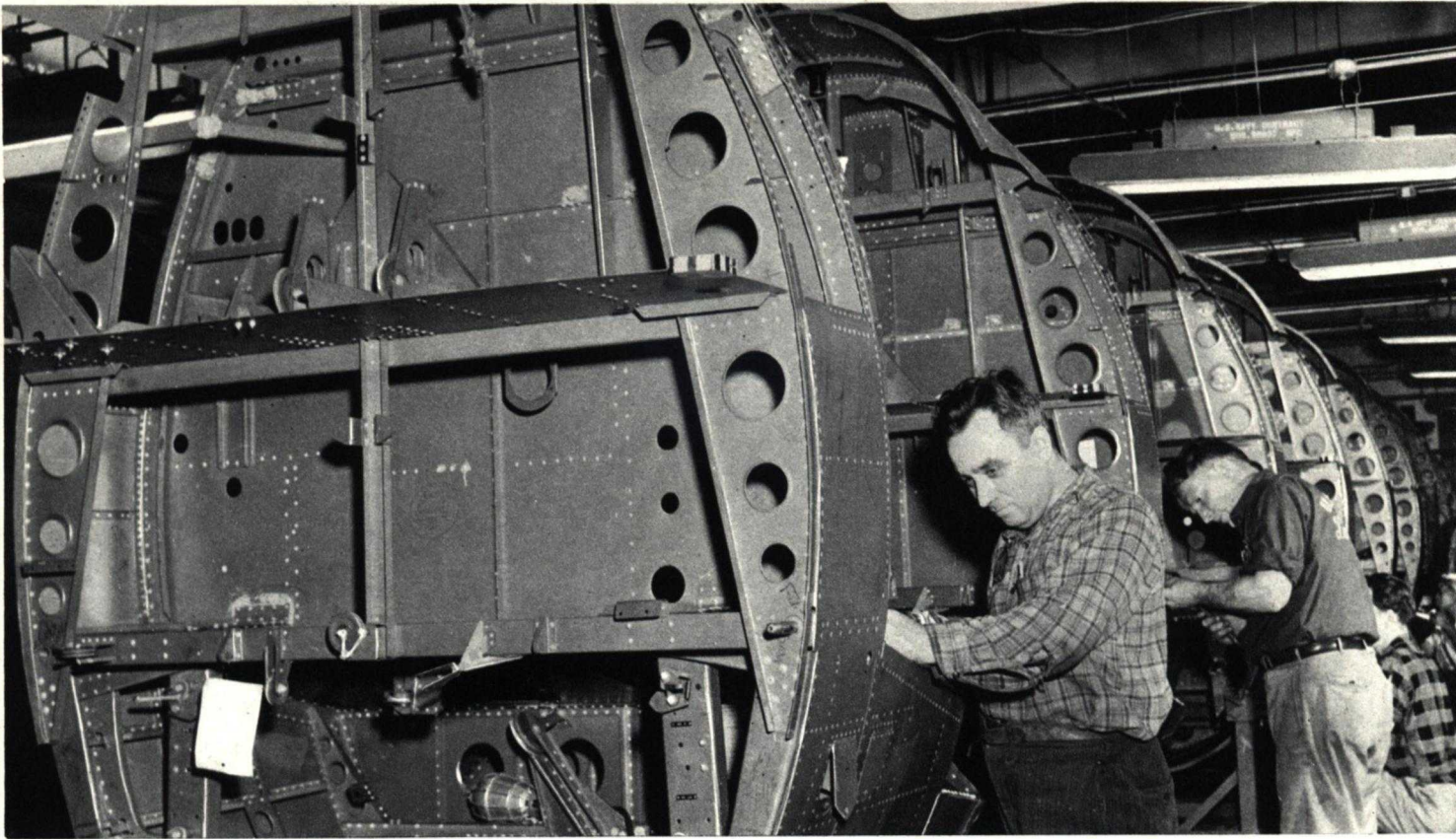
Two wing lines parallel through the rest of the plant where the final operations of connecting installations and closing up the two sections are completed. Many Bloomfield cable assemblies are in each wing.



It must be clean and free of foreign matter, so the giant wing is turned on a tumbler to shake each particle loose. Vacuum cleaning is also used in the process before the wing leaves spotless for Trenton.



Boresighting in preparation for the installation of guns is a job requiring accuracy, and blast tubes and guns must be accurate to a fraction of an inch. Note dummy wheels used for checking wheel well fit.



Tarrytown took over many assemblies from the Trenton plant as the bomber schedule increased. One of the major ones was the gill and firewall, seen here in the final stages of completion prior to shipment.



Canopy which covers cockpit of the giant Avenger torpedo bomber is also assembled in the Tarrytown plant.



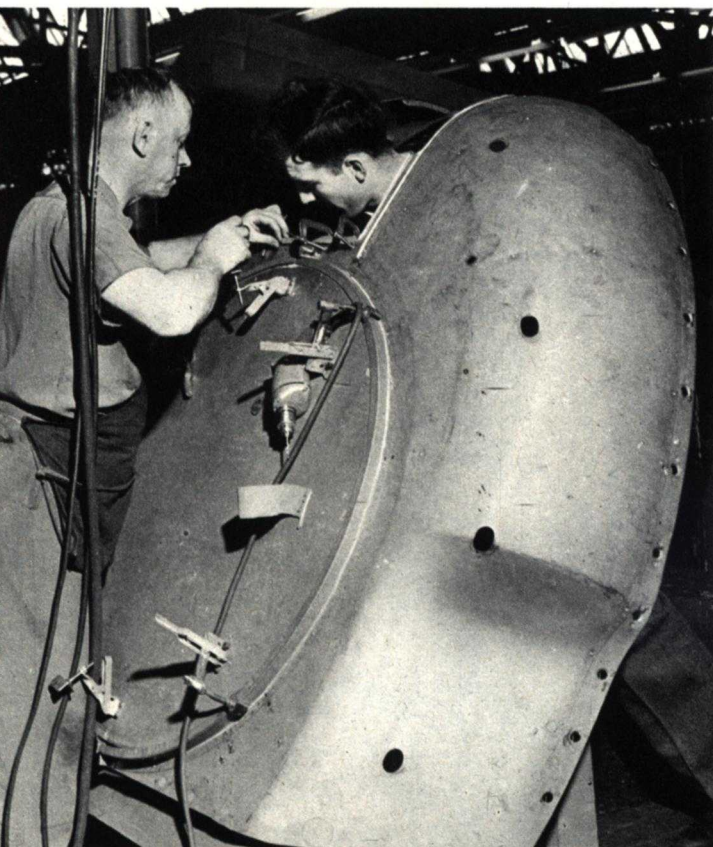
An inspector puts his OK on a completed canopy . . . this is known to many Navy fighter pilots as the "greenhouse."



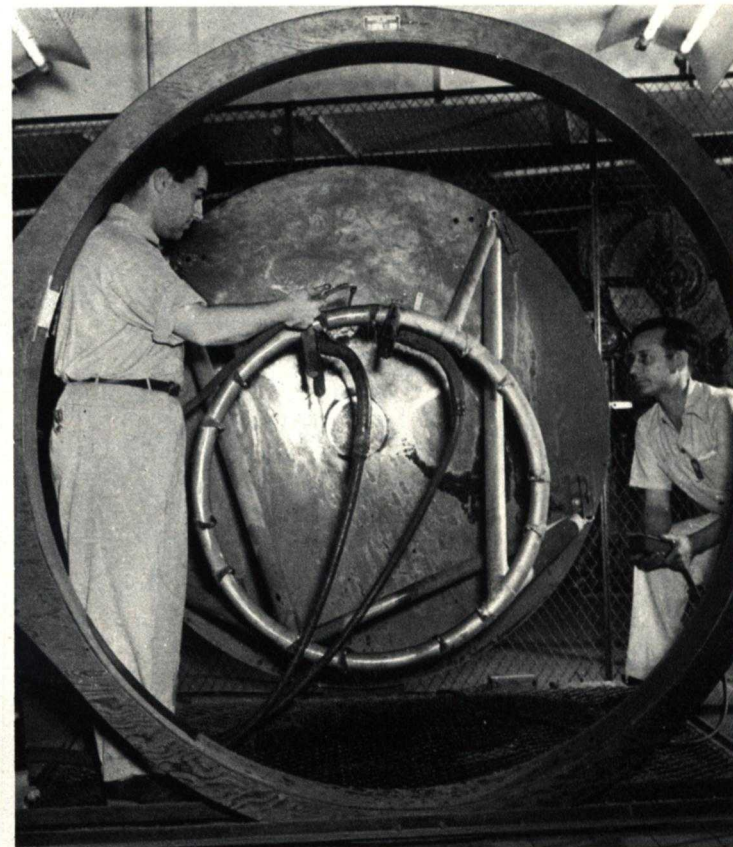
Covers are made in Tarrytown to protect the big wings from the elements. Sewing skill is put to good use.



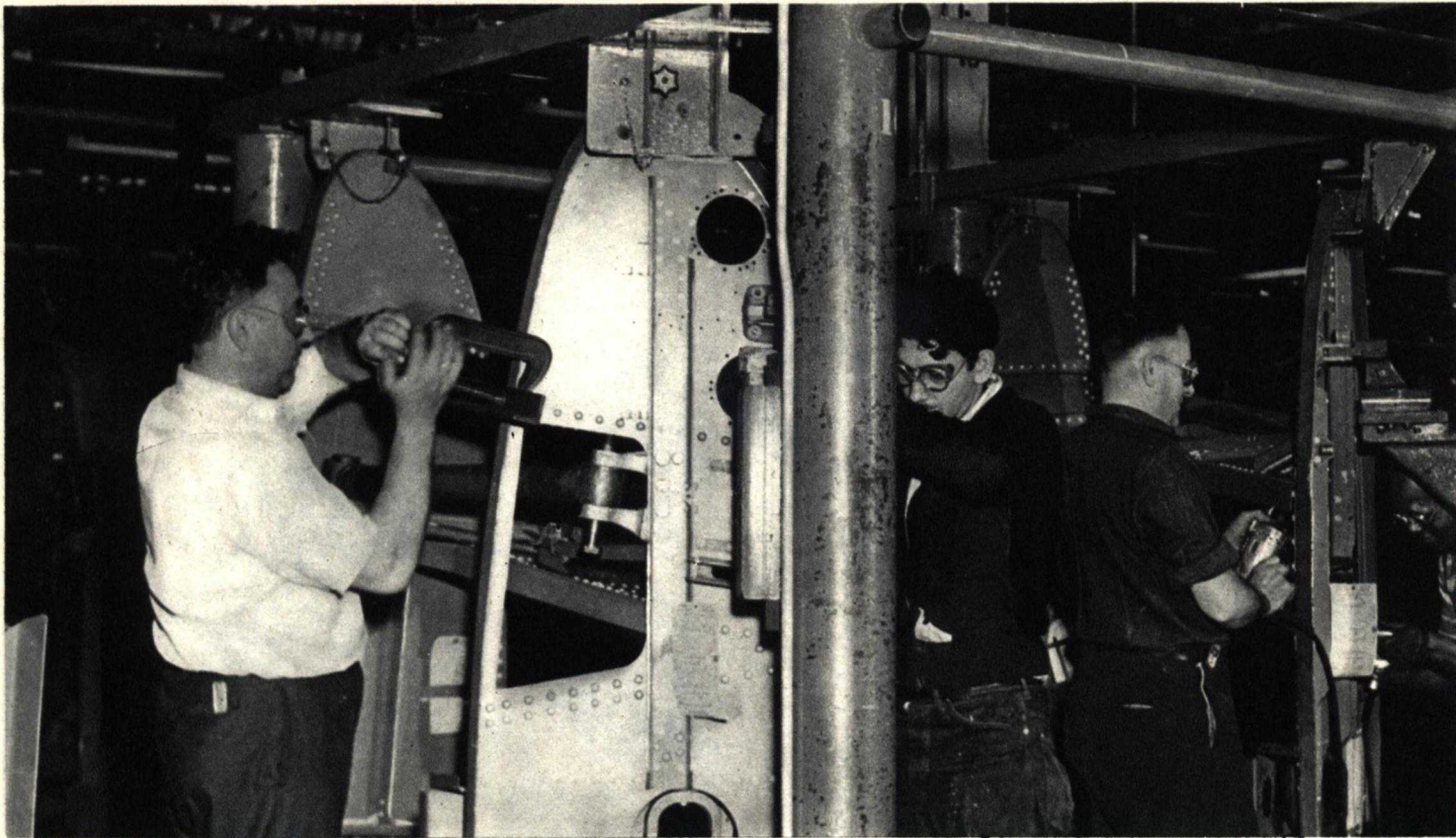
The bomber requires a certain amount of upholstery for cabin installation. This, too, is prepared at Tarrytown.



Tarrytown employes finish up the cowling for another Avenger torpedo bomber — a large, important assembly.



An Avenger motor mount is carefully tested for possible unseen structural weaknesses by the Magnaflux method.



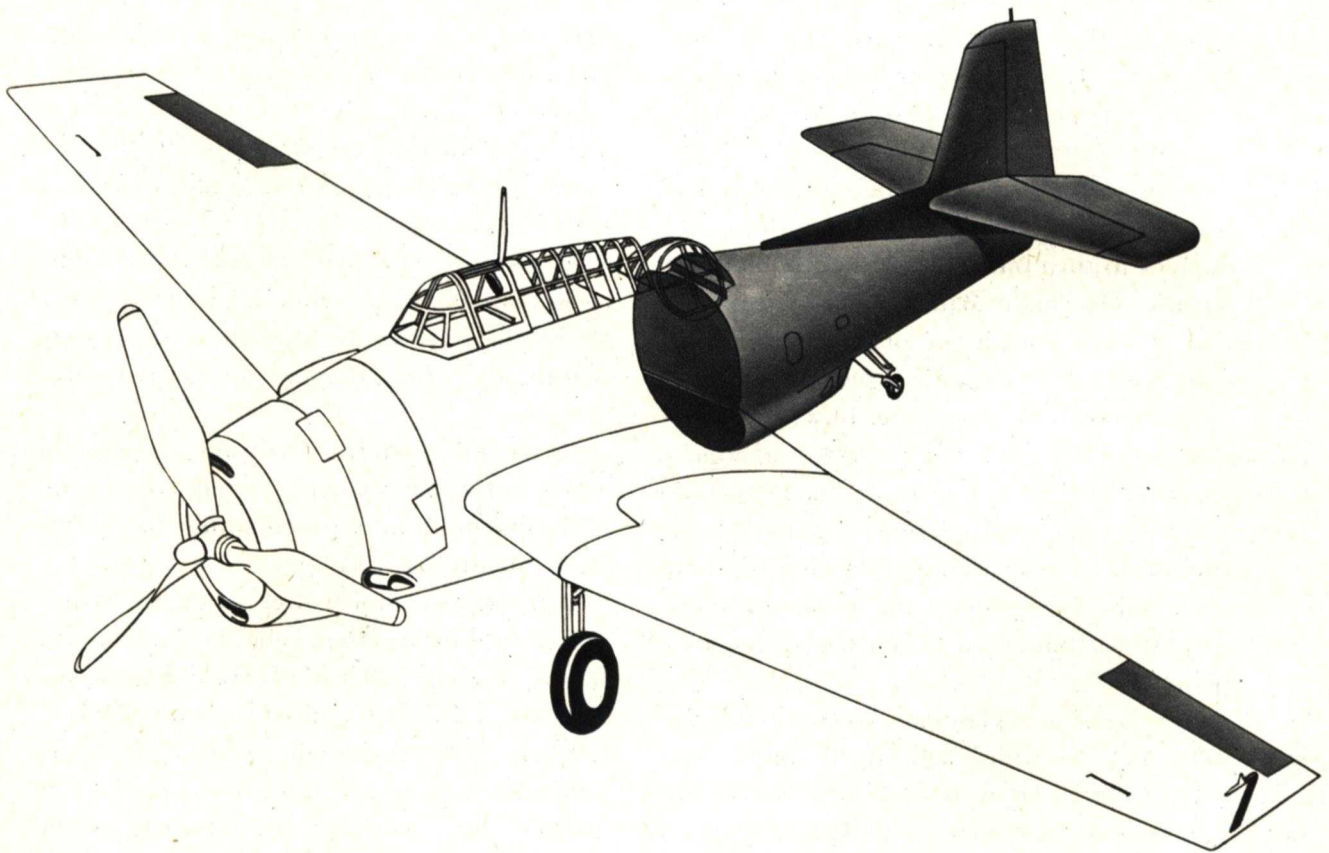
A clamp is removed from a job taken over recently from Trenton by Tarrytown — the stub-wing assembly.



Tarrytown later shared honors with Trenton for the job of producing the center section of the Avenger.

BALTIMORE

IN THE BEGINNING the Baltimore, Md., plant of the Eastern Aircraft Division took on the aft-section of the bomber. Additions have been made to their initial assignment until now the aft-section takes in all that area of the bomber back from the center of the turret to the tip end of the ship. Here too, the main assembly is developed skillfully by the fabrication and assembly of many small parts and subassemblies.



BALTIMORE

A TELEGRAM BROUGHT the exciting news to the Baltimore plant of Fisher Body Division of General Motors. A group of automobile men read it and tried to picture the future of their plant — the date was January 21, 1942. Overnight their factory had been named part of the new Eastern Aircraft Division of General Motors.

Here was a manufacturing unit that had been geared through years of peacetime development to turn out one automobile body per minute. Overnight Baltimore was instructed that it was to begin the manufacture of aircraft as quickly as circumstances would permit.

Baltimore wasted no time. In a few days it was decided that the rear fuselage and control surfaces for the Navy's 'Avenger' torpedo bomber would be the plant's assignment. Some consideration had been given to letting Baltimore build the wings for the bomber, but several factors influenced the change in tentative plans.

The Baltimore plant was located in a large industrial city which had already been designated a critical labor shortage area. No encouragement was given to Eastern's Baltimore plant to expand its personnel greatly. Also, because in Fisher Body days the plant had had considerable experience with fabrics, it was thought

advisable to assign control surfaces here.

Top supervision from Baltimore immediately left for the Grumman Aircraft Engineering Corporation on Long Island, designers of the Avenger, to learn some of the fundamental problems involved in aircraft construction.

Almost immediately, machinery, equipment and a host of jigs and fixtures were carefully taken apart, tagged, greased and stored for future use or sale.

A complete new plant layout was designed to accommodate operations involved in building airplanes, so vastly different — as they were shaping up — from those in automotive manufacture.

Meanwhile, men from Baltimore fanned out all over the nation, seeking out equipment, tools and machinery which would be needed in the months to come.

Baltimore's engineers were at the same time trying to put together reliable data on the nature of the product itself. Here the task was Herculean and required the patience of Job.

Little by little, though, some order was assembled out of chaos. Jigs for the aft tail sub-assembly were set up; then came those for the rear section fuselage assembly. In the ensuing weeks jigs for the following minor assemblies took shape: fin, stabilizer, elevator, rudder, and

aileron. Advice was sought from aircraft concerns all over the nation in designing these delicately balanced tools.

But the lack of information caused so much of Baltimore's early trouble that the plant took the same path as the other Eastern plants and secured for temporary use a PK (secured with Parker-Kalon removable screws) model of their major assembly. This provided at least some sort of a sample toward which Baltimore could work.

Personnel expanded at an unprecedented rate during those first months. A whole new engineering department was organized, composed of tool designers, and tool and process men. A purchasing department was placed in the plant to take care of the pressing needs of the expanding aircraft plant; and in order to cover specification requirements, the production engineering department was set up. Three other departments — plant protection, inspection standards, and production — were enlarged many times over.

Baltimore's seasoned employes began to demonstrate that you can teach an old automotive dog new tricks. Completely unfamiliar with aircraft on January 21, 1942, they turned to books, and absorbed a whole new set of rules and lessons. They studied mathematics and blueprint reading, they analyzed the nature and strength of aluminum alloys, and some continued to Johns Hopkins University for advanced training.

Hourly employes were given in-plant training as they started to produce. Along with the rest of Eastern Aircraft, Baltimore was given very few breaks in the acquisition of experienced aircraft workers. Other plants simply could not spare help, and so Baltimore was forced to train old automotive employes or green help. Women, of course, provided by

far the greatest single source of additional help.

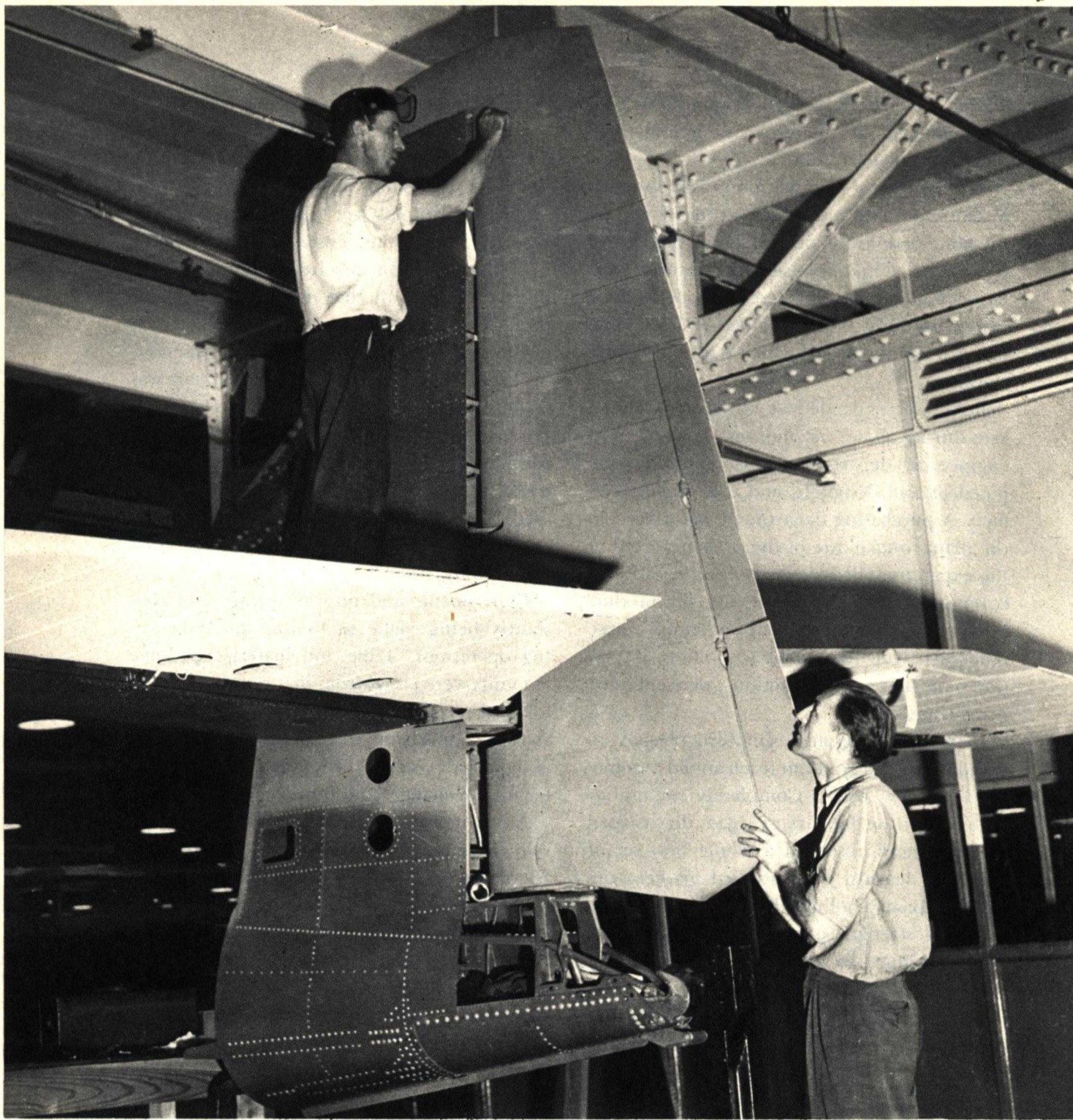
On July 16, 1942, Baltimore employes produced their first airplane part. It was a nose rib. But this was only an appetizer to what was on the way. On July 29, 1942, the first aft fuselage was turned out. Posed in final assembly in solitary splendor, excited employes passed by it in review all that day — pointing with professional nonchalance to features which would escape the eye of the untutored observer.

Only a month after this production start was made, the plant was notified that its monthly production schedule was going to be increased considerably. To make sure the new schedule could be met, the plant found additional floor space at the adjacent Chevrolet plant of General Motors, where the Army had just curtailed truck production.

Experiments and improvements were constantly being made in tooling and fabricating operations. Time and material in huge amounts were pared from that required at first to build parts. Baltimore was in one continuous state of conversion throughout the first two and one half years of the war as a result of these technique changes and improvements.

As the months went by, Baltimore, like Tarrytown, took on additional fabrication and assembly work from the Trenton plant (already suffering from the lack of space), including the fabrication of bulkheads.

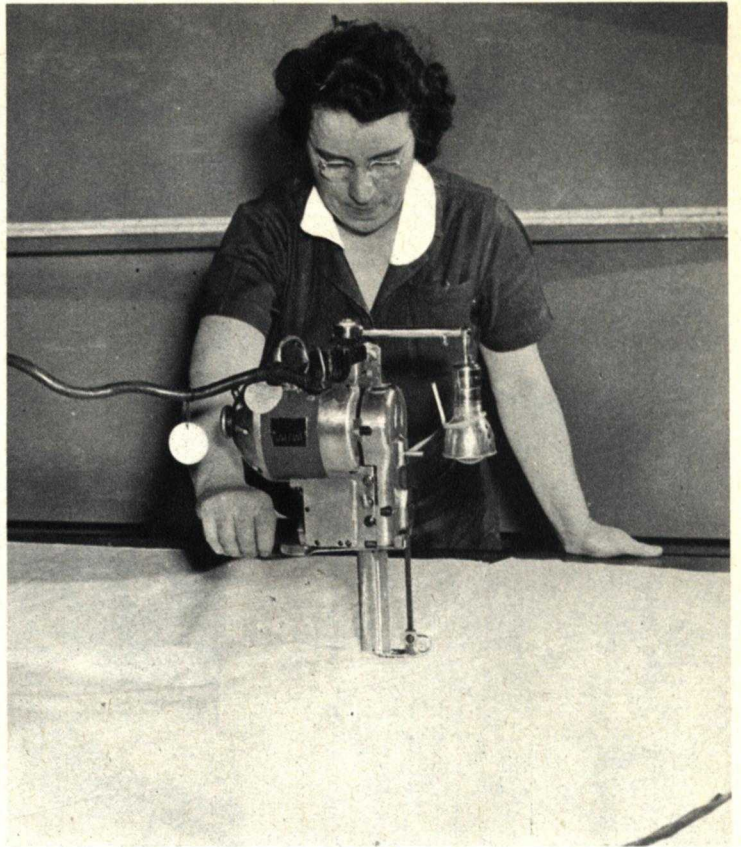
Production-wise Baltimore knew it still faced a big job near the end of summer 1944. But the trying jobs had been done — conversion, experimentation, securing help, getting materials and reliable engineering data. In 1942 preparation had been stressed; in 1943 production; and for 1944 the objective was peak production. The plant set out then to show it owned the drive and tenacity to reach this goal.



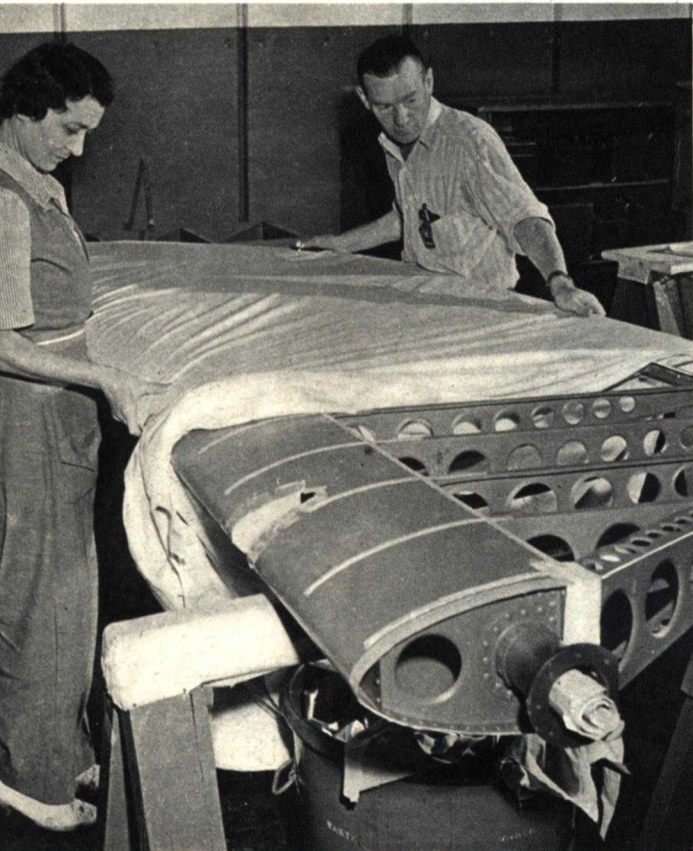
The tail section of the ship is a combination of control surfaces employed to guide the plane in climbs, dives, turns and level flying. Here, at Baltimore, the rudder, elevators and stabilizers are tailored to fit the aft section of the fuselage. This is a testing operation. Later they are shipped to Trenton.



The "skin" (aluminum covering), held in place by skin fasteners, is riveted to the stabilizer by workers.



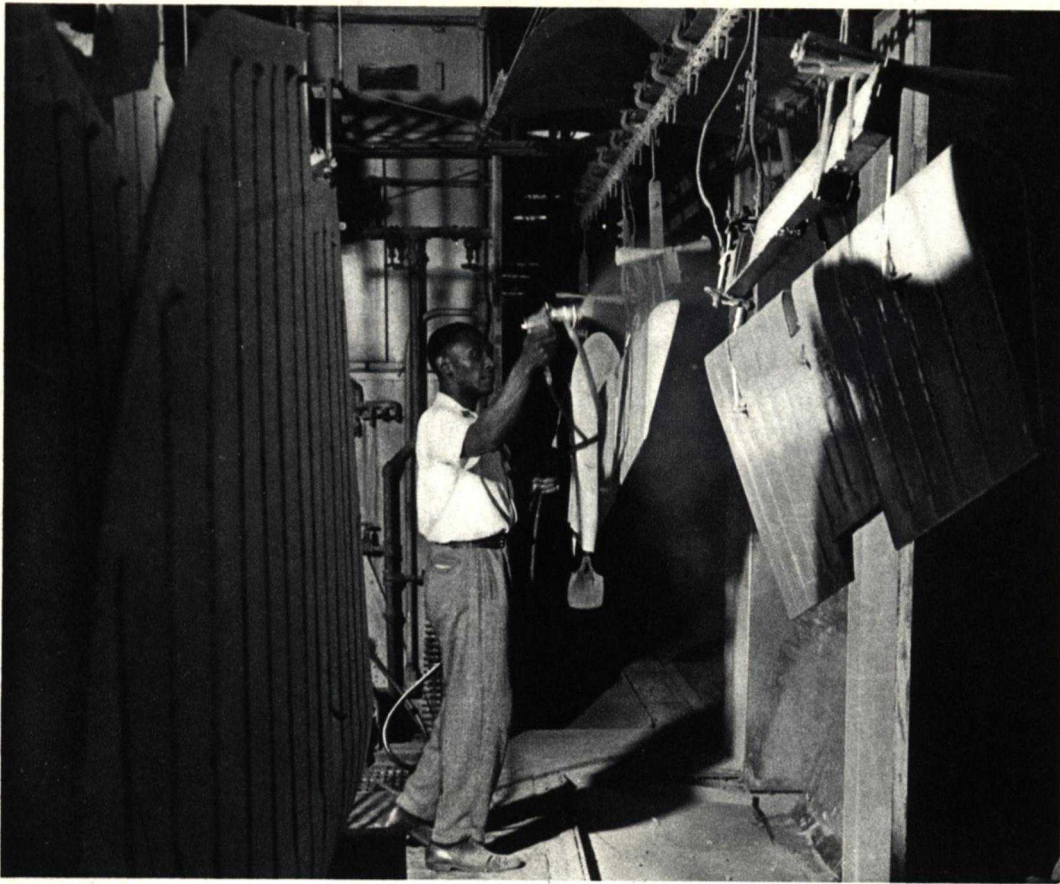
In one of the first operations, strong fabric covering for control surfaces is carefully cut to exact size.



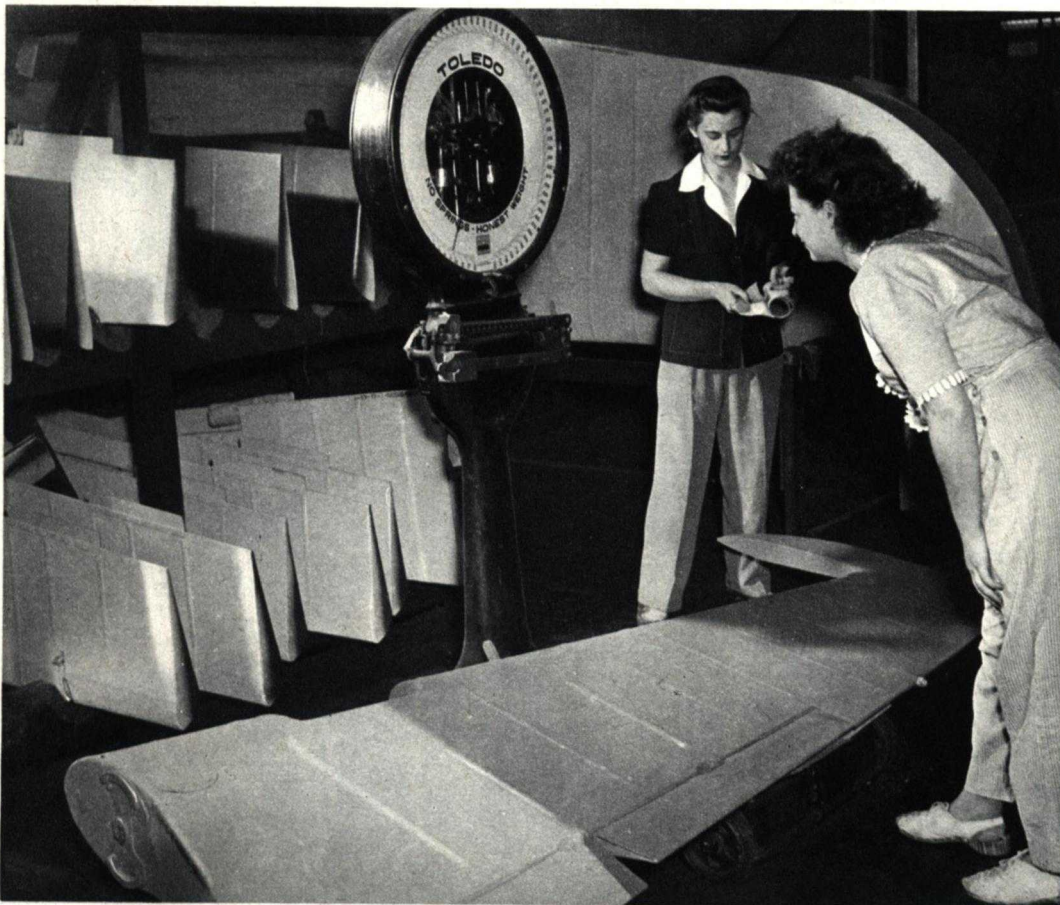
Pre-fitted and pre-sewed so it fits like a kid glove, the fabric is drawn over the large rudder framework.



Four smiling girls, quite skilled in an ancient art, stitch the fabric over the Avenger's stout rudder.



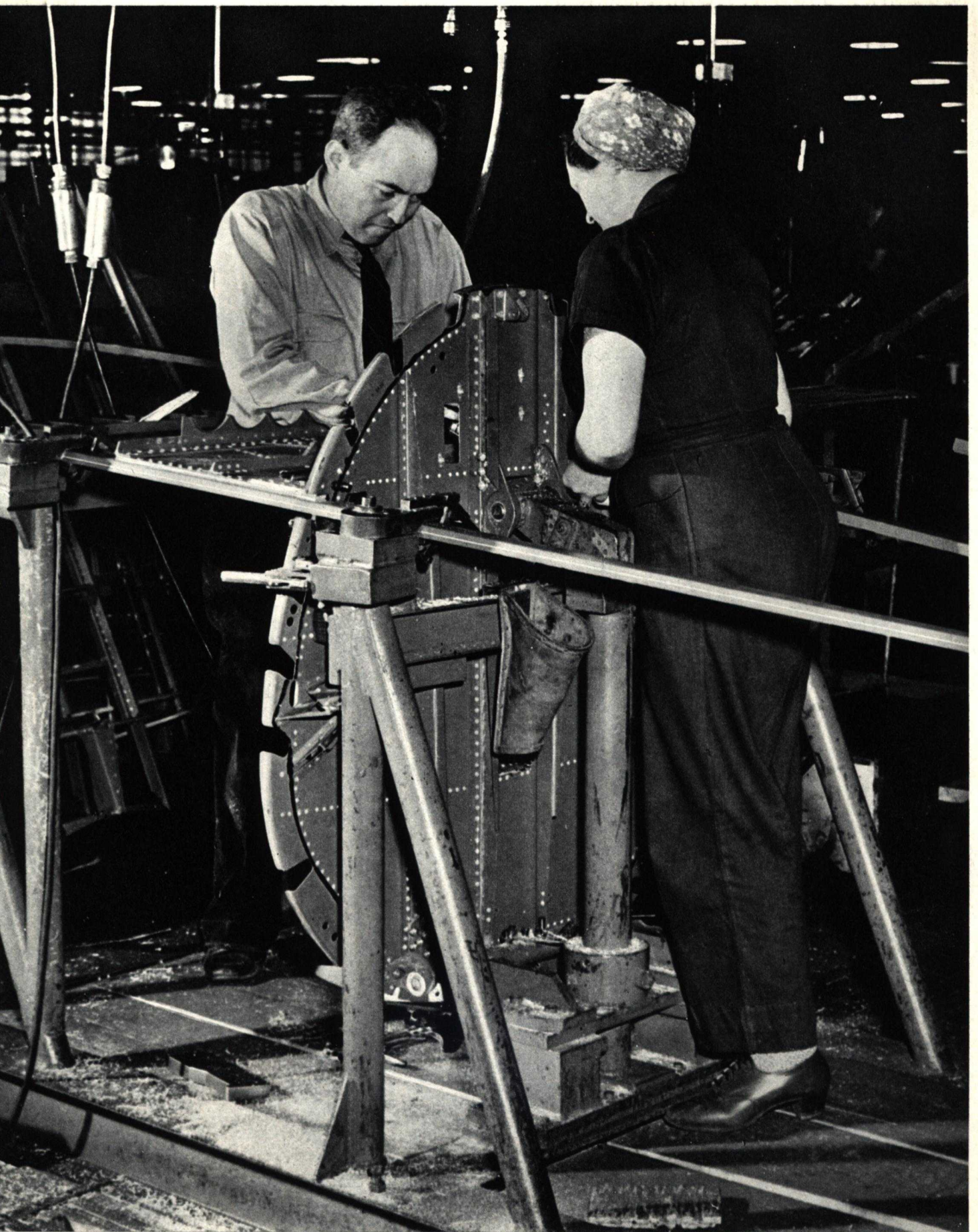
Each subassembly and part receives an even coat of paint as it passes on this long overhead conveyor line.



Weighing in! The Avenger must meet certain weight requirements — each assembly must be checked carefully.

If You Didn't Get This From My Site,
Then It Was Stolen From...

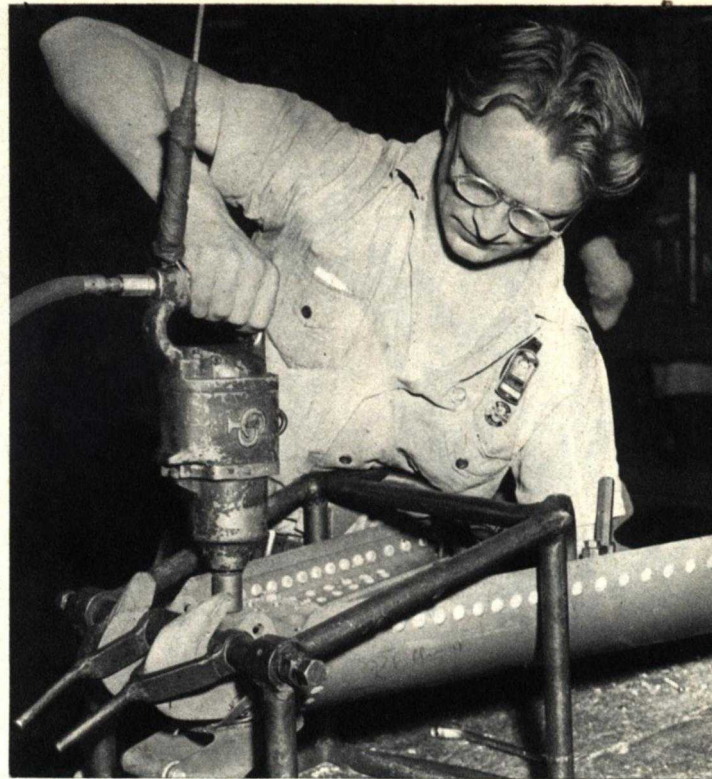
www.SteamPoweredRadio.Com



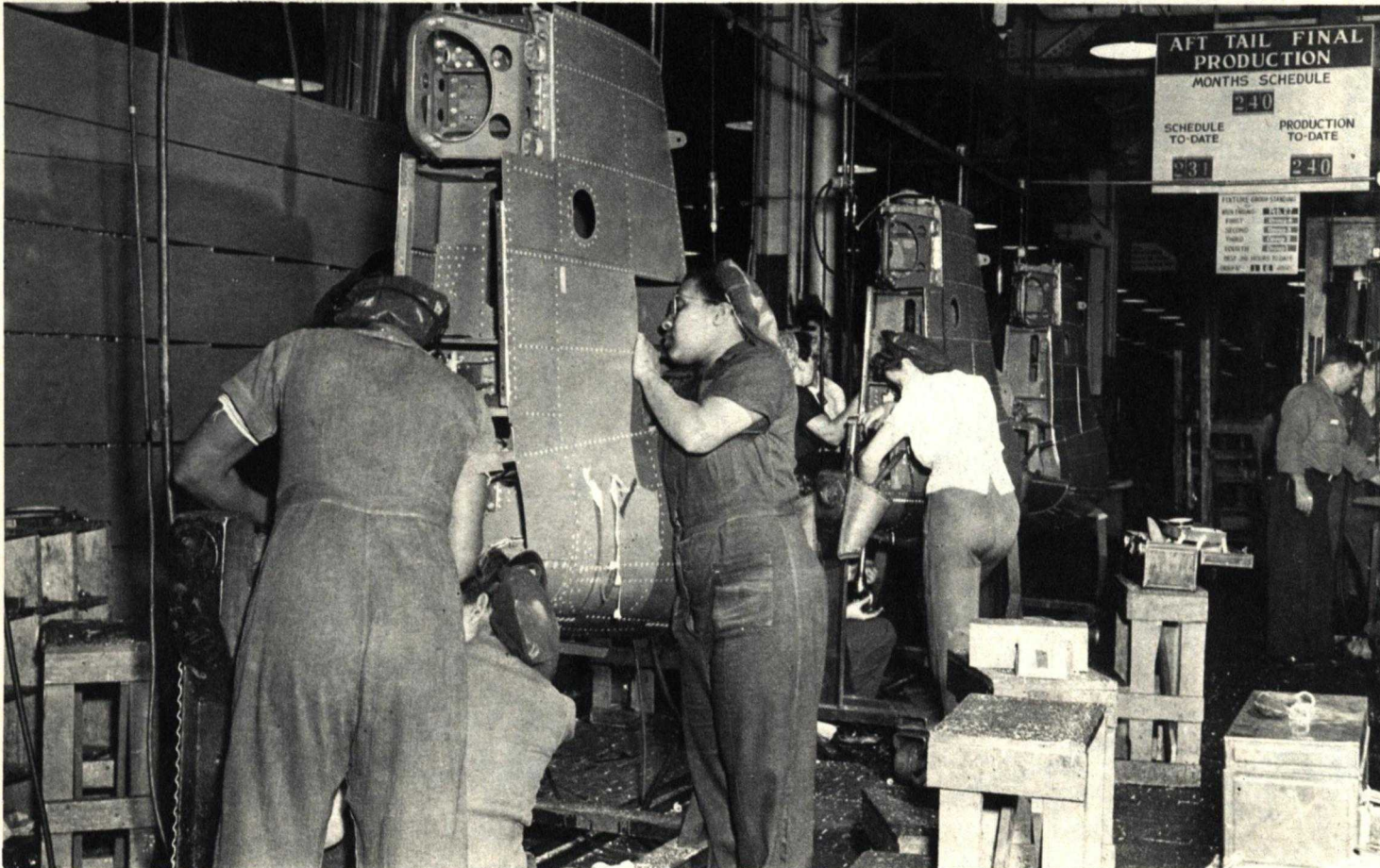
A crack Baltimore riveting team puts the final touches to a rear fuselage bulkhead for the big bomber.



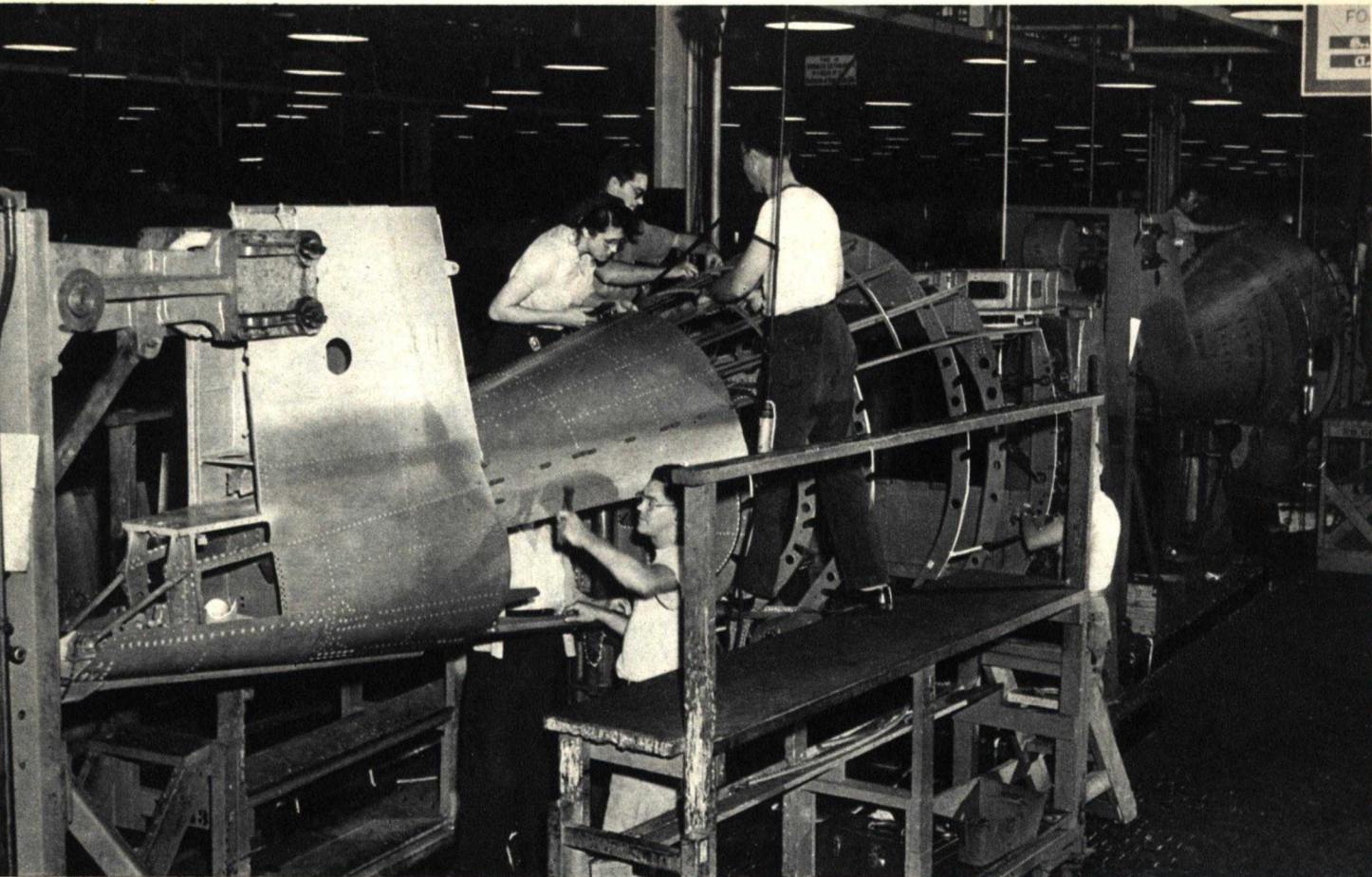
Racking them up! Parts, assemblies go on the dip rack for anodizing. This will retard salt-water corrosion.



A rivet is driven into an assembly which will house the arresting hook, necessary for carrier landings.



Sturdy aft tail sections for the Avenger, made of scores of assemblies, are put together in line operations.



Here the aft tail section is joined to the rear fuselage, and an Avenger takes shape.



The "skin," already fastened, is riveted to the cone-like frame of the rear fuselage.



Final assembly line at shift change. A long line of Avenger tail sections parade through this part day and night. The finished product is whisked away from the end of the line, and shipped to Trenton