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ORGANIZED FOR "THE INCREASE AND DIFFUSION OF GEOGRAPHIC KNOWLEDGE"

To carry out the purposes for which it was founded fifty-six years ago, the National Geographic Society publishes this Magazine monthly. All receipts are invested in The Magazine itself or expended directly to promote geographic knowledge.

Articles and photographs are desired. For material The Magazine uses, generous remuneration is made.

In addition to the editorial and photographic surveys constantly being made, The Society has sponsored more than 100 scientific expeditions, some of which required years of field work to achieve their objectives.

The Society's notable expeditions have pushed back the historic horizons of the southwestern United States to a period nearly eight centuries before Columbus crossed the Atlantic. By dating the ruins of the vast communal dwellings in that region, The Society's researches solved secrets that had puzzled historians for three hundred years.

In Mexico, The Society and the Smithsonian Institution, January 16, 1939, discovered the oldest work of man in the Americas for which we have a date. This slab of stone is engraved in Mayan characters with a date which means November 4, 291 B. C. (Spinden Correlation). It antedates by 200 years anything heretofore dated in America, and reveals a great center of early American culture, previously unknown.

On November 11, 1935, in a flight sponsored jointly by the National Geographic Society and the U. S. Army Air Corps, the world's largest balloon, *Explorer II*, ascended to the world altitude record of 72,395 feet. Capt. Albert W. Stevens and Capt. Orvil A. Anderson took aloft in the gondola nearly a ton of scientific instruments, and obtained results of extraordinary value.

The National Geographic Society–U. S. Navy Expedition camped on desert Canton Island in mid-Pacific and successfully photographed and observed the solar eclipse of 1937. The Society has taken part in many projects to increase knowledge of the sun.

The Society coöperated with Dr. William Beebe in deep-sea explorations off Bermuda, during which a world record depth of 3,028 feet was attained.

The Society granted $25,000, and in addition $75,000 was given by individual members, to the Government when the congressional appropriation for the purpose was insufficient, and the finest of the giant sequoia trees in the Giant Forest of Sequoia National Park of California were thereby saved for the American people.

One of the world's largest icefields and glacial systems outside the polar regions was discovered in Alaska and Yukon by Bradford Washburn while exploring for The Society and the Harvard Institute of Exploration, 1938.

Women at Work

By La Verne Bradley

THE balance of power rests in women's hands. Literally.

Behind the whine of sawmills and roar of blast furnaces, the hammer of arsenals and thunder of machine shops—in shipyards, factories, foundries, slaughterhouses, and laboratories—women are manipulating the machinery of war.

They work the giant hydropresses and stamping mills whose heavy weights are constantly pounding, pressing, shaping, disgorging the materials of battle. They operate drop hammers, punch presses, turret lathes, milling machines. They hold rivet guns, blowtorches, drills, files, micrometers, templates, and test tubes.

For three years they have laid down blueprints, welded seams, and picked up battle gear, put it on wheels, and carried it for proving. Then they've inspected, tested, proved it, and delivered it for war.

At the same time, they've worked to keep their homes or set up new ones under makeshift conditions in strange places.

About a third of America's manpower today is womanpower. That's more than one out of every three women of working age in the United States. Of the millions handling the big tools and machines of industry, one-half are estimated to be there only because of the war.

Approximately one-fourth of the 16,500,000 women holding jobs in the spring of this year were not even interested in such work in 1940! Many had never seen a factory, never hammered a tack, never worked before at anything outside the home.

Reports of the Women's Bureau, Department of Labor, disclose the amazing variety of jobs women hold.

In Aircraft Production

A week before Pearl Harbor you could walk through the factory rooms of any aircraft company in the country and rarely find a woman on the production line. They were a fraction of one percent of the total labor force.

Two years later, 475,000 women made up nearly 35 percent of the industry. More than 45 percent of the workers for Douglas Aircraft are women. And in the first 12 months that the output of B-17's was doubled, nearly half the men at Boeing necessarily were replaced by completely inexperienced women.

"Long before there was a manpower shortage we began to employ women on the assembly line," said Glenn L. Martin, builder of famous fighting and patrol bombers. "We were one of the first aircraft companies to employ women in mechanical capacities.

"However, it was an eminently successful experiment. There will always be a place for the skilled woman worker in the aircraft industry. Many jobs she performs as well as men, and some she performs better.

"Today, approximately 35 percent of the productive workers building Martin combat ships are women. Soon we look forward to seeing this number vastly increased, as more and more of our younger men are called up for military duty.

"We have women helping design our planes in the Engineering Department, building them on the production line, operating almost every conceivable type of machinery, from rivet guns to giant stamp presses.

"The presence of so many women has had an excellent effect upon production. They have set production records that are a challenge to men, and there's something about a woman beating a man at his own machine that he just cannot stand" (page 198).

"Bombs Away, Beautiful!"

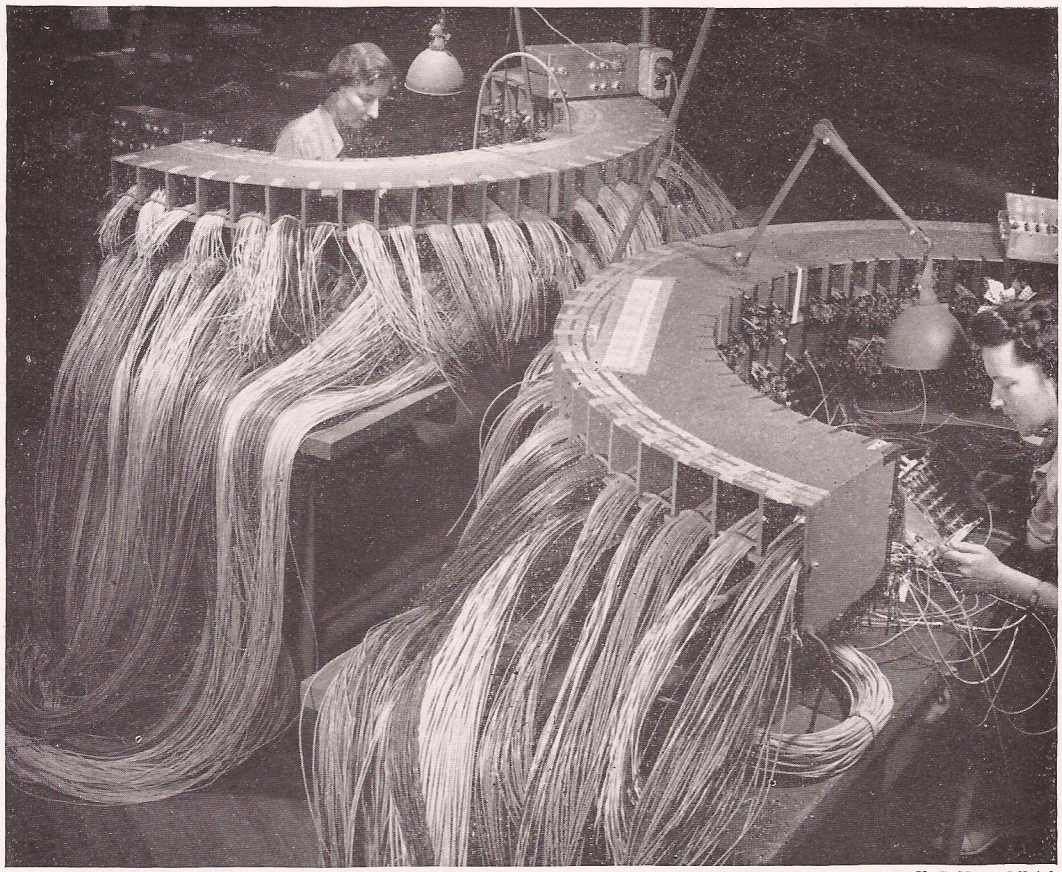
As I walked into the shop where the giant *Mars* was built and where great PBM-3's were lined up for final assembly, I heard a man's voice calling out from the cavern of a huge wing, "Bombs away, beautiful!"

Straddled over a truss in the bomb bay, he was checking shackle releases as a girl down in the depths of the ship fired an electric gun and kept tab on the panel flashing salvo signals —single bombs, bombs in sequence, wham, bombs away.

Usually two girls do this alone, calling back and forth by interphone from one remote end of the ship to the other. I watched them swing up through compartment hatches and scramble over spars and beams like cats.

Martin has also an all-girl test crew, which went into action for the first time on an icy morning this last December. They had put in months of training for one of the most crucial jobs in the business, the final ground testing and adjusting of every functioning part of a patrol bomber. Engine, instruments, controls—theirs is the final check before men take it aloft.

Through acres of bombers and chopped-up parts of bombers, silver, brown, and green, we made our way from one roaring assembly line to another. At one point we stopped



U. S. Navy, Official

Benches Like Pipe-organ Consoles Help Women Make Up Wiring Systems for Trainers

Consolidated Vultee uses this system for sorting and classifying the hundreds of lengths of wire required in the modern plane. Other workers place the wires in pigeonholes according to length and color. Then these women number the terminals and send them to the assembly line.

to speak to a small taffy blonde, wearing a blue hair ribbon and sitting in the midst of hammering machinery, her feet propped up on a bench, reading a book.

It was her lunch hour and the manual, *Pneudraulic Power Machine and Riveters*. One of half a million housewives who had never been in a factory, she suddenly figured a couple of years ago that maybe the talents of her toolmaker father might be developed in her. They were.

Occasionally you find a woman such as Anne Hollman, and you don't forget that she is 46 and helps make one of the hottest fighter planes in the Army. She is the only woman flash welder in the East. And she is an Amazon.

In the last war she was a machine operator in a knitting mill; then she did housework for 20 years. Now she is back, master of a difficult trade and proud of her skill, towering over her bench by the hour as she stands welding ends onto control rods for Republic Thunderbolts.

In one section the foreman had said, "When the first woman is sent to my shop, send my release with her."

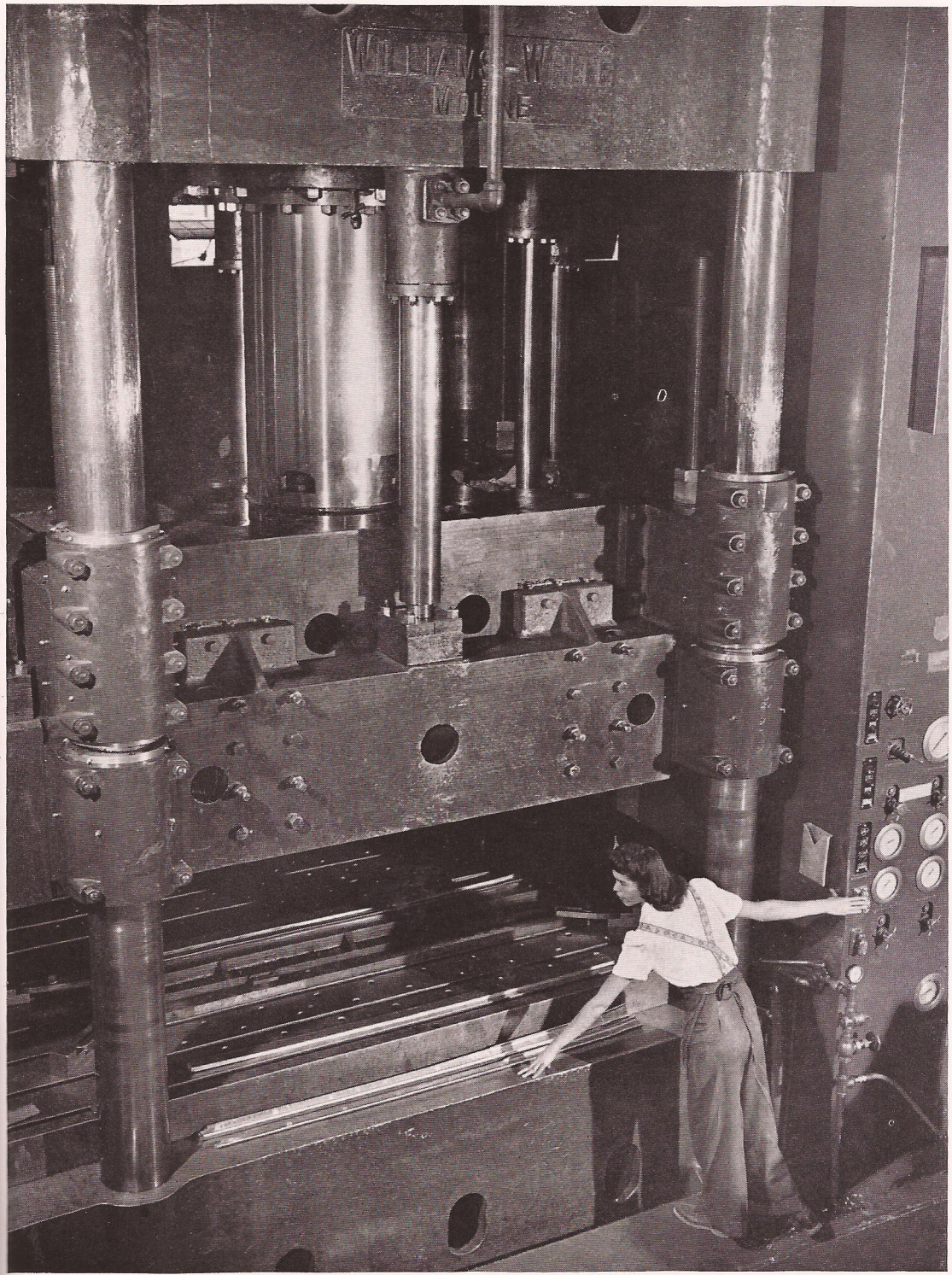
Some months later, I mentioned a few of the usual objections to women in industry—57 percent of man's strength, 68 percent of his resistance to fatigue, etc.—and this same foreman defended them hotly.

He specifically pointed out the girl who was turning out five assembly units to her male predecessor's two.

Womanpower in Shipyards

In 1939 there were 36 women employed in American shipyards.

Two years ago when I saw women working on destroyers and submarines and in the machine shops at the Mare Island Navy Yard and on tankers and other ships around San Francisco Bay, I was told that there were



At the Touch of Her Finger, This Monster Hydropress Molds Metal Liberator Parts

The inside underpart of the huge hydraulic press is hard rubber. As it comes slowly down, the rubber pad presses and shapes sheets of metal to the die at the bottom. The press is used only for mass-production jobs and can stamp out several different small parts at once.

The Distaff Arts Are Not Out of Place in the War Effort

Making sand cores, or molds, for magnesium castings is "easy as pie" for women used to kneading pastry dough at home. Fine, flourlike sand is painstakingly molded into precision forms, sprayed with oil, and baked. Pistonlike forms in background are finished molds of airplane parts (page 215).

jobs which women could never do—shipfitting, for instance, and chipping, and handling the big cranes.*

Kaiser put them on the big cranes and now they handle them with ease, swinging giant steel arms out over yards to pick up whole bulkheads or afterpeaks and lift them to the ways. Shipfitting and chipping, along with dozens of other all-male jobs, they've taken in stride (page 204).

Thousands of women are doing such things as welding and riveting. About the only thing they do not do is heavy lifting.

It is illegal in some States. But in many cases, even these operations have been broken down to permit women to handle them.

It took 175 tons of blueprint, 4,300,000 feet of welding, and 3,830,000 man-and-woman days to build the U.S.S. *Missouri*. Every Navy craft produced takes proportional figures. And enough preliminary and supplementary work to make you wonder if anything else is going on anywhere.

At the David Taylor Model Basin in Maryland, where the Navy experiments with new ship designs and tests scale models of both Army and Navy craft, I found Dr. Avis Borden working in the structural mechanics division developing methods of calibrating underwater explosion gages. She had received her degree in physics from the University of Michigan in 1938, but she had never had a chance to use it in such important work. Now her findings have been put to official use.

In another section women were taking readings on marine propellers in a variable-pressure water tunnel. In engineering and drafting rooms they were making drawings, calculating water and pressure effects, and performing intricate mathematical computations connected with naval architecture.

A Delicate Aquatic Test

Out in the damp, cavernous chamber which holds the 963-foot-long water basin, we boarded the big carriage which hauls ship models through the water channel at speeds from 18 to only 0.03 knots (page 203).

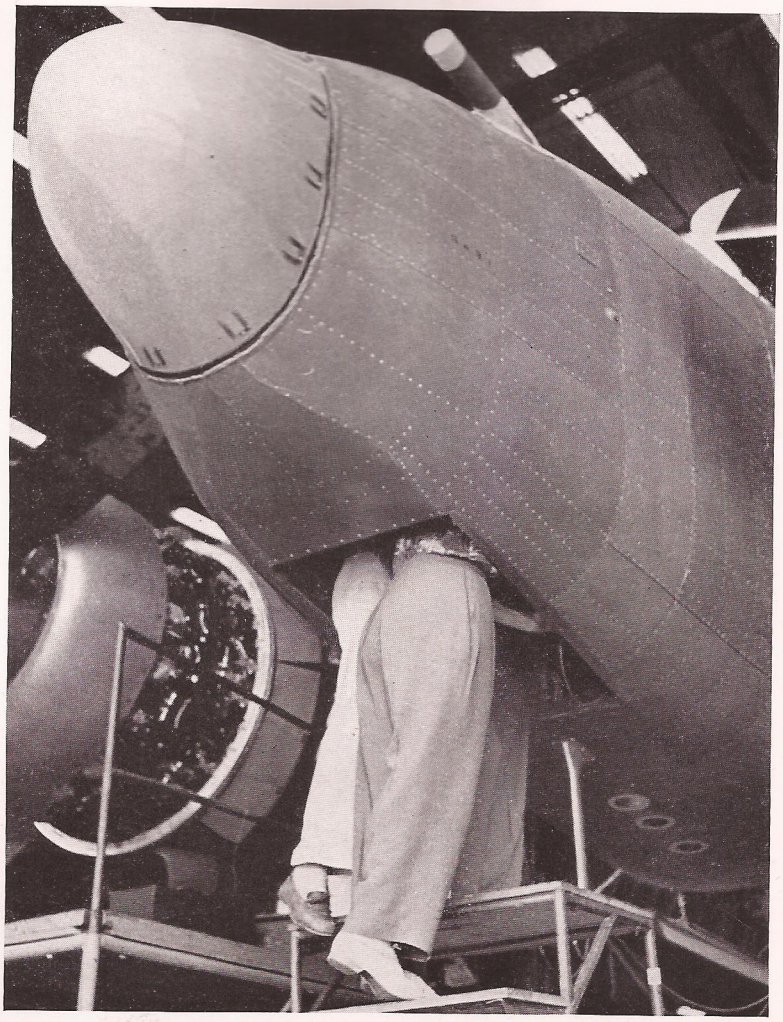
It looks like a small cantilever bridge moving through the air, but it is so delicately built that it can maintain any desired speed at a

* See, in the National Geographic Magazine, March, 1943, "San Francisco: Gibralter of the West Coast," by La Verne Bradley.

constant value within one-hundredth of a knot while following the actual curvature of the earth. Two girls in blue jeans were driving it.

Results of runs for the 20-foot model of an aircraft carrier being tested were recorded on dynamometers and translated onto charts being plotted by other women at desks which ride with the carriage. These women aren't scientists. They are just average girls, trained swiftly to do vital jobs.

At a naval gun factory women at big profiling machines were turning out rotating pans for 16-inch guns. They were working light and heavy lathes, milling machines, drill presses, thread grinders; making sears, breechblocks, and hundreds of other gun mechanisms. They were greasing giant gun barrels and painting others for battle.



U. S. Navy, Official

Perhaps They Are Movie Extras Doing Their Bit on Swing Shift

Here girls in the Lockheed plant at Burbank, California, work in the bombardier's hatch of a Ventura. The bomb bay is farther back. This twin-engined bomber hunts subs, bombs ships and shore installations, and patrols vast ocean reaches for the Navy.

A Beauty Operator Takes to Machines

Dressed in blue safety slacks and caps and stepping over huge guns lying about on the floor, or linking arms together to go to lunch, they looked almost like Rockettes against a supercolossal stage set.

The shop supervisor, who has been with the big guns since 1912, had to be shown that slight girls, such as the former beauty operator on the Keller profiler, could handle these machines.

They are trained on the job here, and trained fast. One girl had two hours' instruction on a machine, went to work, and the next day in an emergency broke in another girl. There is little difference between an inexperienced woman and an inexperienced man in this work.

And there *are* some "natural" women mechanics. "Like Joan," said the supervisor, pointing to a girl working over a big hydraulic shaper, "who should have been a boy. Except that she's better than most of them." Joan was trimming a bore for a 6-inch anti-aircraft gun to a tolerance of .001. She said she had always loved machines, but never had had a chance to get her hands on anything like *this* before.

Women physicists and engineers in the Acoustics and Special Problems Division of the Naval Ordnance Laboratory at the Washington Navy Yard have come about as close as any women to going to sea with the Navy.

They've worked on ships tied at docks. They have also gone with officers and men on field

U. S. Navy, Official

No Time to Prink in the Mirrorlike Tail Assembly of a Liberator

About a third of the country's aircraft workers are women. Many jobs they do as well as men; some they do better (page 193). Riveting, a kind of needle point in metals, is one of women's standout operations.

assignments to Key West, New London, and Miami. They've knocked down many precedents, and their male co-workers have discovered an important thing—they get through red tape faster.

One yard officer almost let a girl go to sea to take recordings, but the ship's skipper wouldn't break precedent.

At Narragansett Bay two girls worked on the water front in a trailer laboratory, but for their offshore tests the Army had to take them to sea in Coast Artillery boats. At the Key West Sound School, Navy men would go out by day to make sea tests, and the girl physicist they took down from the Washington research group would wait and work with them over analyses at the base by night.

You Wash My Shirt, I'll Iron Yours

When they first reported to different naval stations for scientific research, listed, the way the Navy does, as A. Axon or G. Irish, women were usually met with astonishment. It was a crisis of accommodations unless there were WAVES * aboard. At one base A. Axon finally agreed to iron an officer's shirts if he would wash hers in the all-male laundry room.

* See "Women in Uniform," by La Verne Bradley in the NATIONAL GEOGRAPHIC MAGAZINE, October, 1943.

Women working in high explosives is not new, but it is still an electrifying thing to watch. At the Bellevue Naval Magazine, a healthy distance downriver from the Navy Yard, we found women in steel-barricaded rooms measuring and loading pom-pom mix, lead azide, TNT, tetryl, and fulminate of mercury.

Most of them were colored. They seemed delightfully blasé as they passed the stuff along. Some would wink or give a big grin as we poked in their booths. But they treat powder with respect. They know by training that any snip of it could blow them to flinders.

I asked the officer if their temperament—their lack of nerves, say—had anything to do with their being here in such numbers.

"No," he said, "they like that extra six cents an hour hazard pay. This is one of the few jobs in industry which has a waiting list of applications."

Different loading operations were strung along different weirdly grouped assembly lines. On one line they would be loading tetryl lead-ins for bomb fuses, or delay elements containing small cells of black powder, or mercury fulminate and lead azide for detonators.

In small steel booths others would receive an element through a hole in the wall, put in the measured milligrams of powder and pass it quietly through an opposite hole to the next booth for another cautious twist, or tap, or turn.

The workers are frisked every morning for matches. During smoking periods they walk way off from danger areas to where electric cigarette lighters are provided in safety zones.

The *Iowa* and women were launched the same day at the Brooklyn Navy Yard, when the first 19 came in as "mechanic learners." There are several thousand now, and many are rated machine operators, skilled welders, shipfitters, and supervisors.

One of the first 19 heads them all today. She took us through mold loft, fabricating sections, and shipfitting departments with the air of an old hand.

"It's really simple to build a ship," she explained. "You get your plan, cut out your pattern, prefabricate it, fit it together, and launch it. Men have always made such a job of it!"

She knew what each yellow streak on the big steel sheets indicated, where they would go, how they should be fitted. She explained air hammers, calking tools, and electrodes; how they burned out holes for pipes, cables, hatches; how they chipped off excess stock from steel plates, welded seams, flushed rivets.

Beginning in the mold loft, she had climbed around on hands and knees, working over blueprints, laying out templates, tracing patterns along body plans on the floor; then on through riveting, welding, shipfitting.

They used mostly college girls in the mold loft at first, until they found that almost any average girl has aptitude for pattern making. They're all over the place now, bending over plotting tables, crawling over loft decks, moving about in similar clothes like blue beetles.

In the great shipfitting department we walked in a world of giants. Everything was big—noise, and space, and parts of ships.

Blue oxygen flashes would light up remote corners to outline human figures bent like small parentheses around huge steel plates; or golden sparks would suddenly sheer out from a chipper's gun; or sprays of silvery molten metal would touch off another dark section until you could feel the very depth and height of it.

Stooped over acetylene torches or hidden behind steel helmets visored to protect them from the intense light of arcs, women in bulky leather pants and jackets labored feverishly over welds and seams.

A Variety of Army Jobs

Women are doing men's jobs for the Army, too.

For the Air Forces they teach cadets to fly, dispatch bombers and fighters at busy air bases, repair planes, and do sheet-metal work.

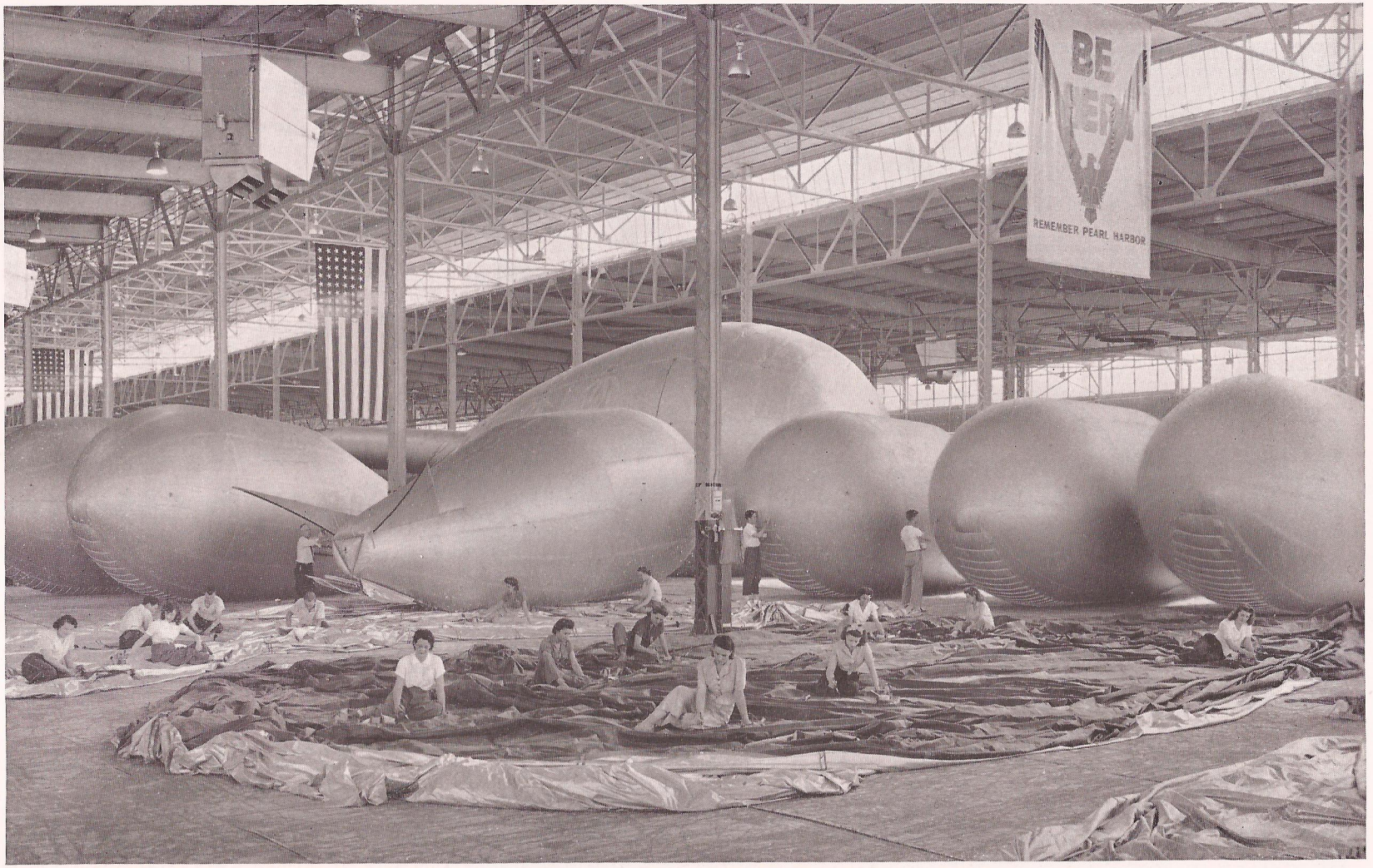
For the Army Service Forces, which alone employs more civilian industrial labor than any economic empire in the country, they manufacture explosives, load bombs, test parachutes, inspect war plants, and handle giant tooling machines, cranes, tractors, furnaces, compressors.

They mend shoes and tanks. They drive convoy trucks for the Signal Corps and locomotives for the Ordnance Department; they make uniforms for the Quartermaster Corps, and count fish for the Army Engineers.

They are laborers, machinists, electricians, tinsmiths, pipe fitters, architects, chemists, surveyors, attorneys.

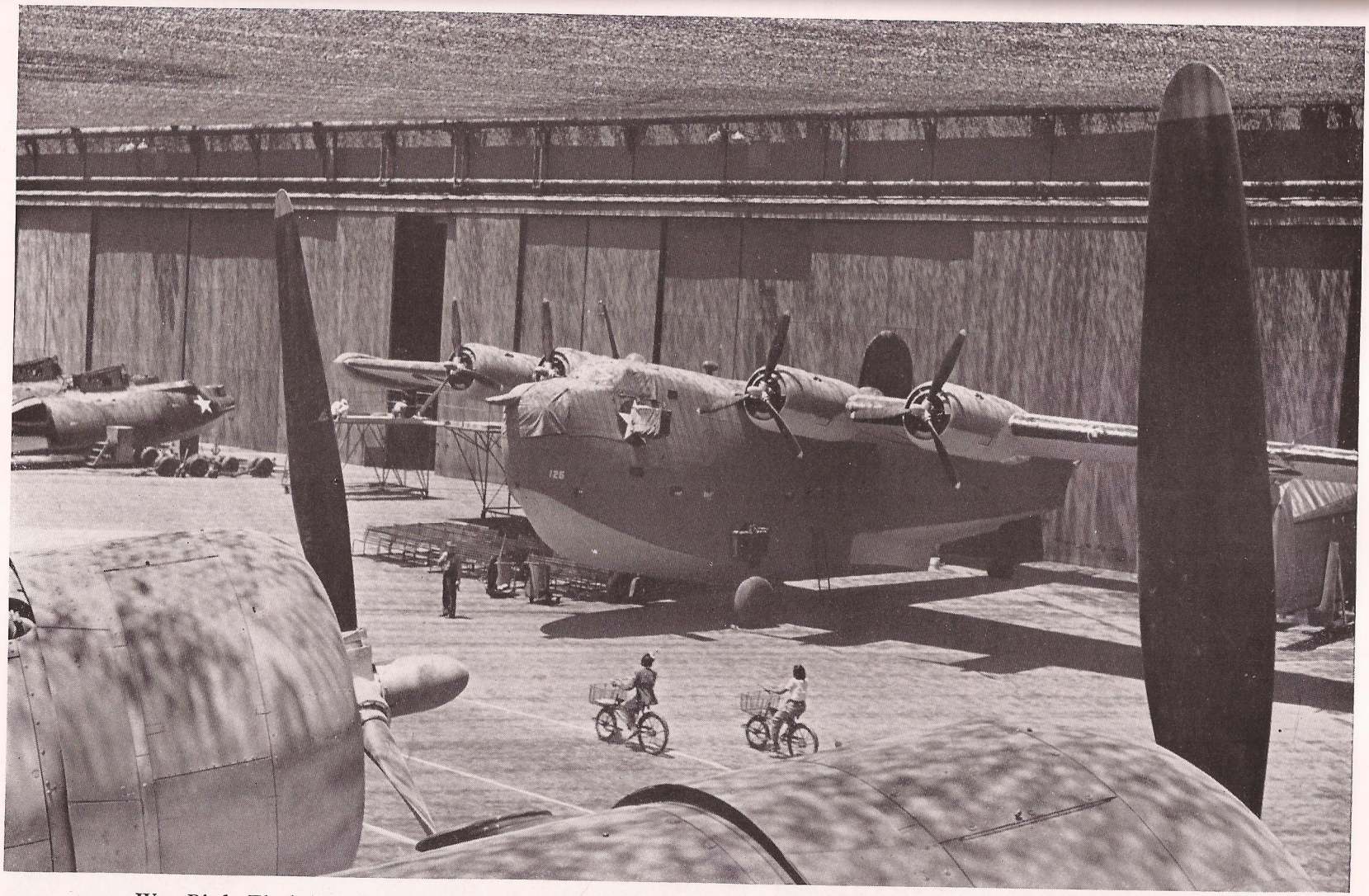
As the Army Engineers moved into combat work, thousands of women poured in to help with the jobs left behind—river and harbor work, navigation and flood control, surveying, designing, building—jobs formerly done only by Army engineers or their civilian male assistants. Today 29 percent of the 84,000 civilians behind the Army Engineers are women.

They have measured the depth of the Columbia River for charting and dredging; they operate radios to Mississippi River boats.



Soon These Barrage Balloons Will Float Above Invasion Fleets to Foil Enemy Air Attack

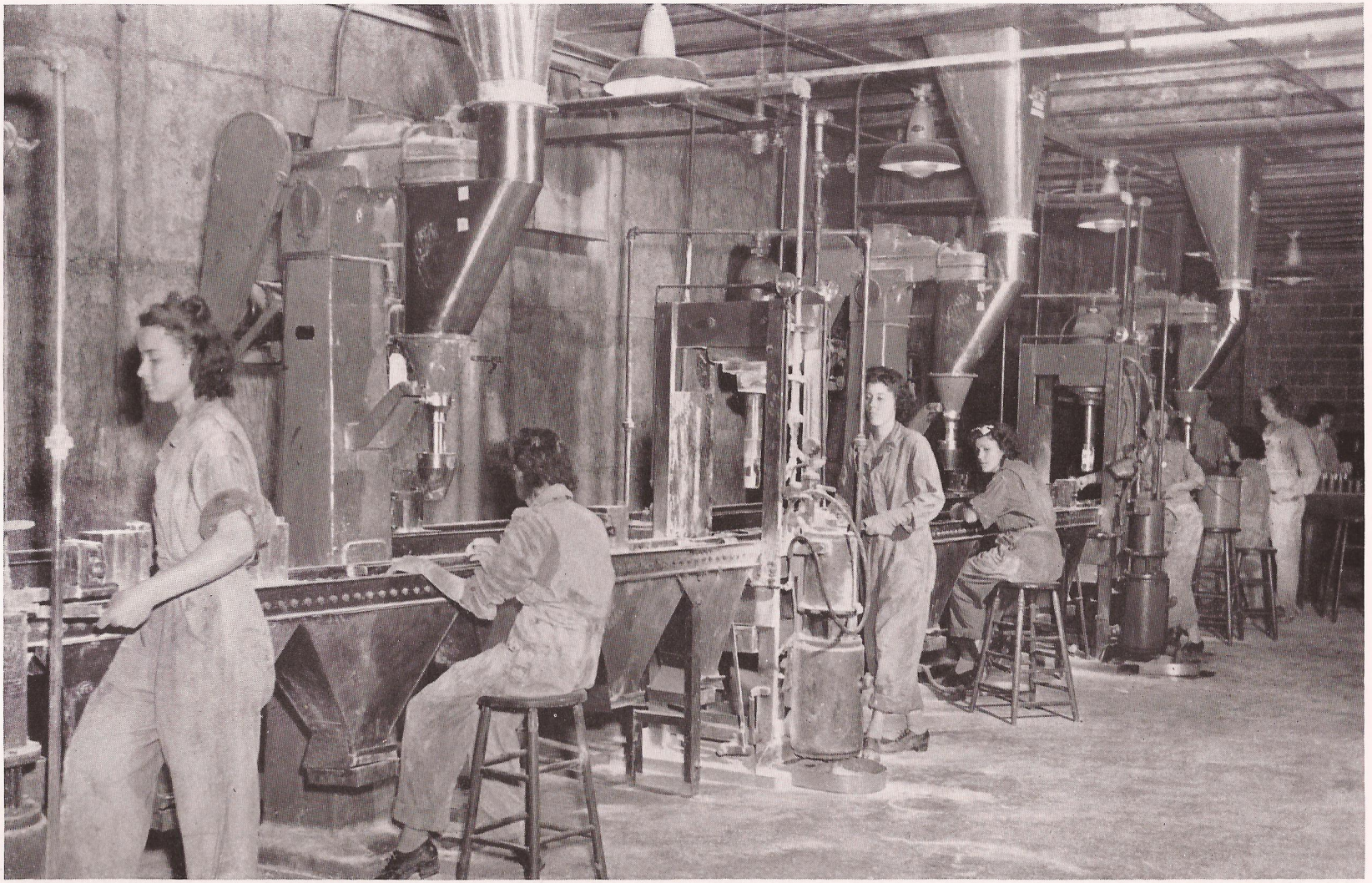
The new-type shipdeck barrage balloon is effective against dive bombers, yet a small crew can operate them. Here girls on the floor are cementing seams and checking for blisters. The six small bags are being test-inflated for leaks, as is the larger one in the background. These balloons can be flown with or without tails, depending upon the flight action desired. They give air protection for ships, beachheads, factories, and cities.



War Birds Flock Together Under a Chicken-feather Camouflage Net at Consolidated Vultee's San Diego Plant

U. S. Navy, Official

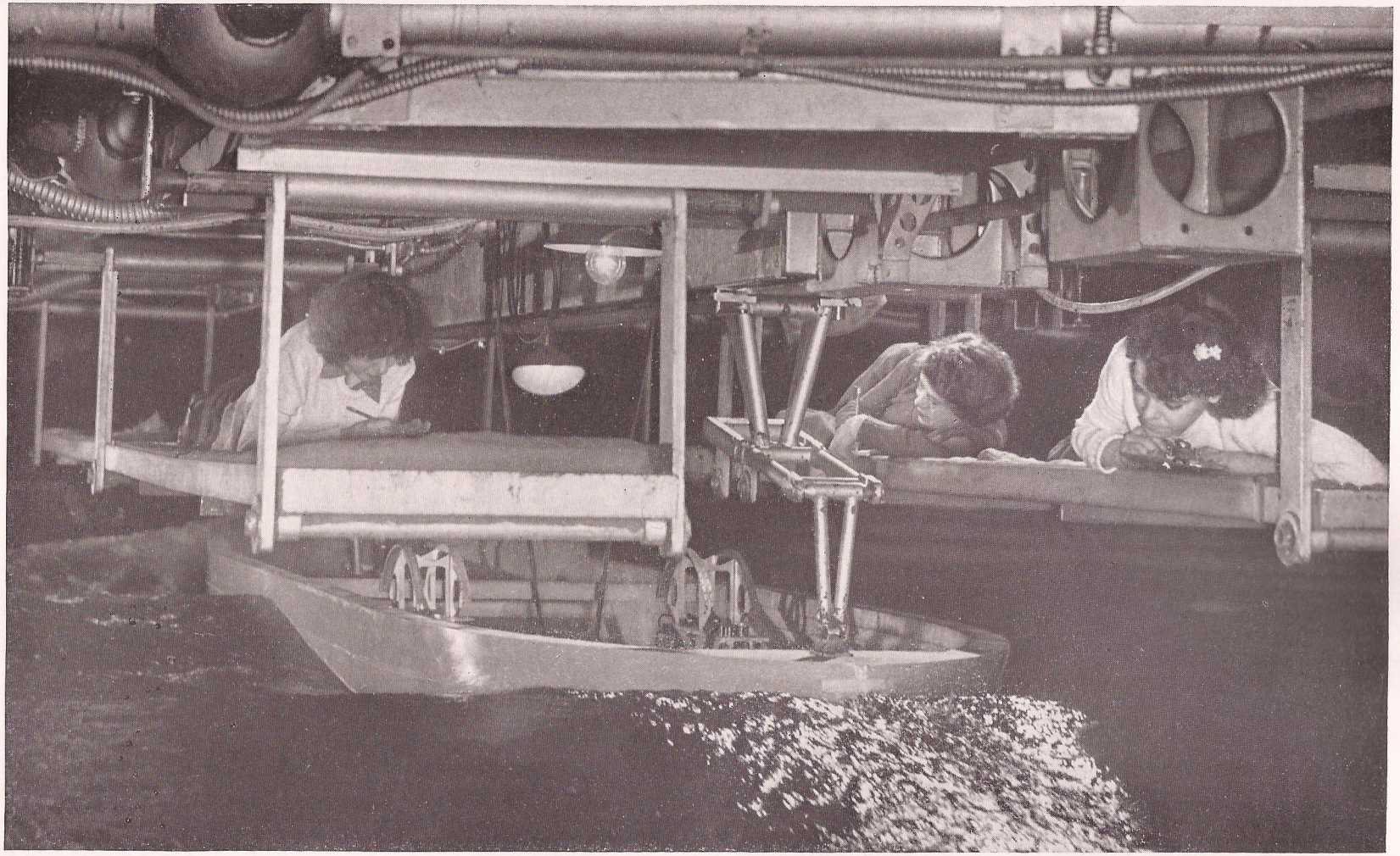
Girl messengers bicycle through the huge plant. The 33-ton Coronado patrol bomber will soon make transoceanic flights for the Navy. Speckled effect is from the camouflage net overhead. Varicolored feathers disguise the plant, making it look like the countryside, with houses and roads.



U. S. Army Service Forces, Official

Southern Belles Man an Assembly Line Turning Out Smoke Screen Powder for Artillery Shells—Huntsville, Alabama, Arsenal

Barrages of these shells hide tank movements and landing operations from the enemy. When the shells explode, moisture in the air turns the chemical into billowing smoke.



Staff Photographer Willard R. Culver

Boys Used to Play with Toy Boats; Now Girls Scientifically Test Warship Models

Here a miniature Maritime Commission tanker runs through the 963-foot-long David Taylor Model Basin, near the Nation's Capital, as girls jot down readings from automatic recorders. The picture, taken from a boat towed behind the testing carriage, shows the stern of the model. Efficient, fast hulls of the Navy's newest battleships were designed from scale models tested in this basin at Carderock, Maryland. Seen in a dry dock, bows of modern ships are hourglass-shaped—bulbous at the bottom, fine or sharp at the water line, and flared out above (page 196).

U. S. Maritime Commission, Official

For Women Scalers, Tin Hats, Respirators, and Coveralls Are Stylish

Here scalers go below decks to scrape rust from the interior plates of a Liberty ship at Sausalito, California. Respirators are needed to cleanse the dust-laden air before it is inhaled. In 1939, only 36 women were employed in American shipyards; today, more than 100,000.

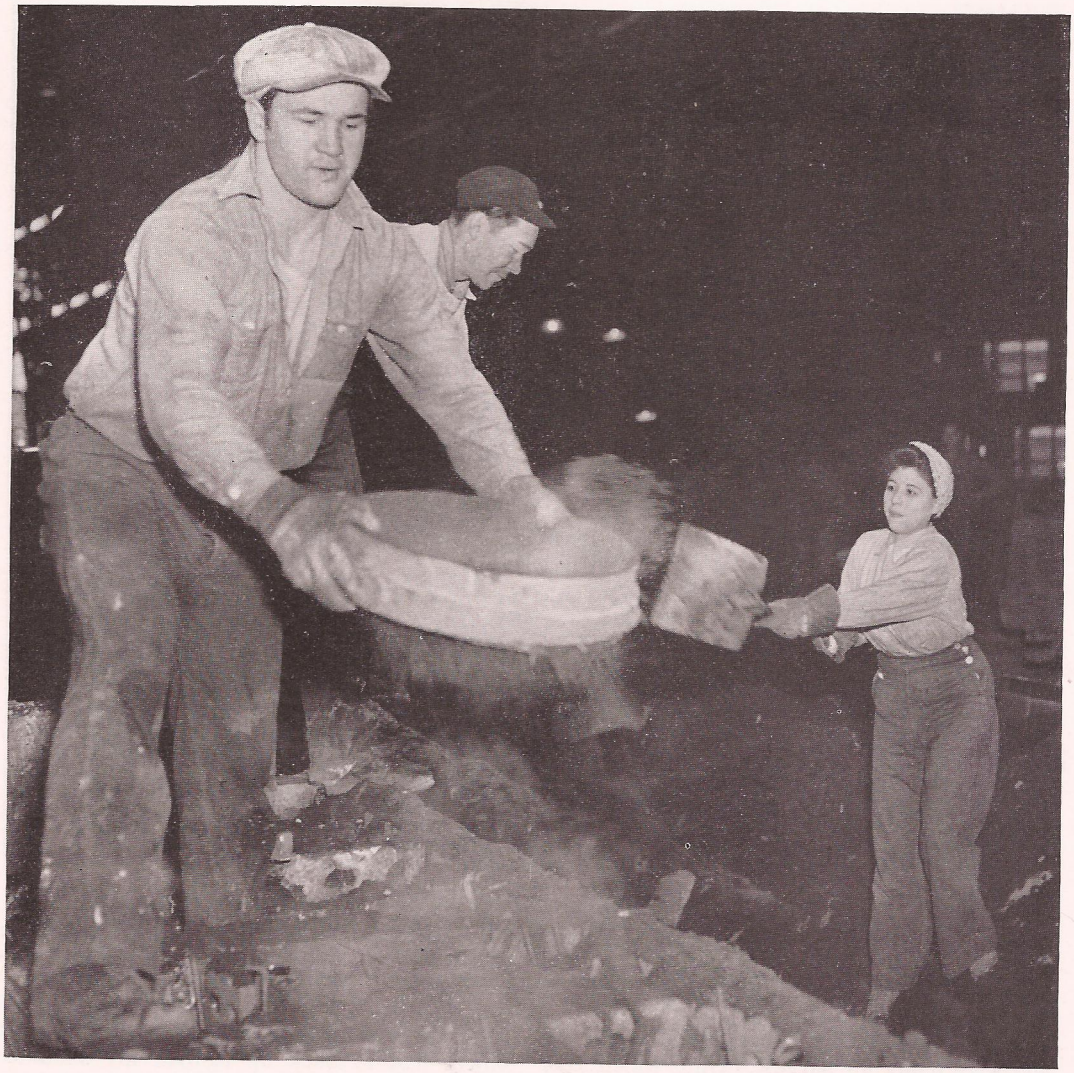
They work with the Army in the field, computing soil erosion, levee seepage, silting; charting evaporation rates and wave action on breakwaters.

They have followed the Engineers almost everywhere except overseas. One girl has driven an Army truck for three years through all kinds of weather to run mail to them in Alaska.

Dr. Mary Engle Pennington, the Quartermaster General's consultant on food handling, has ridden in the caboose of refrigerator trains, in the bottom hold of cargo vessels, and waded knee-deep in eggshells studying improved ways to get food to the Army.

Women of the Transportation Corps handle more than 200 types of Army vehicles at the gigantic shipping pools at ports of embarkation. They check these vehicles mechanically, wash and drain them, pack parts in grease, tape and shellac others against sea spray. And they get the ships in shape to carry them. They weld, clean, paint, carpenter, plumb, and check electric systems.

They help move freight from trains to ships, run trucks down dark narrow passages of warehouses and piers, operate fork lifts to stack and unstack tons of equipment, manipulate big cranes to place tanks and guns in loading position.



Russell C. Aikins

Pinch-hitting for a Man, a California Miss Shovels Sand in a 43-acre Foundry

The sand she and the men are sifting will mold the sternpost for a merchant ship in a Pittsburg, California, subsidiary of the U. S. Steel Corporation.

On a siding at the Aberdeen Proving Ground in Maryland, we found captured German tanks were lined up with other equipment returned from the front for testing. Yellow turrets and hulls were spattered with names, dates, messages from the boys who reached them first—"Cpl. J. Hanson—Naples—November 2, 1943." Then scrawled across a gun mount—"Why the hell don't you boys come over and pick up your own equipment?"

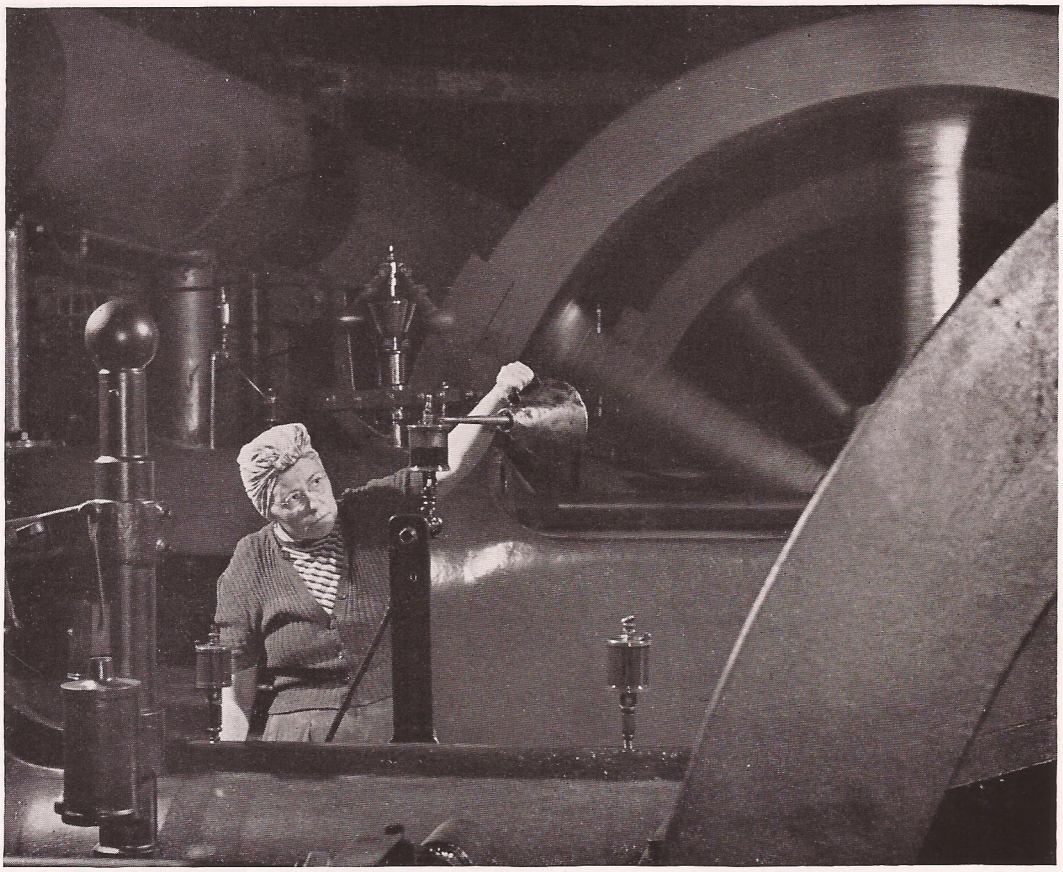
Aberdeen is the world's largest proving ground. All the fighting tools of the Army, and some for the Navy, are put to test here—bombs, shells, guns, bullets, trucks, tanks, even paints and lubricants.

There is a feel of war about it so thick it penetrates. If you forget it for a minute, a giant gun will boom in the distance, windows will rattle and buildings shake, and you'll feel it through the soles of your shoes. And flares will drop over in the next field from test planes whining high overhead.

A Mirror of Invasion

Equipment is lined up in such massive quantities you begin to think the invasion must have started from this side of the Chesapeake. Which it did.

It's like looking at mirrors in mirrors. Trucks and searchlights, emplacement guns, mobile guns, artillery and antiaircraft guns are telescoped down lines and over ridges as if



Even Grandma Finds Work Suitable to Her Strength and Skill

Here she oils the engines that drive a Cleveland, Ohio, blooming mill, that part of a steel mill where red-hot ingots are rolled into shape (page 213). Larger wheels than these, also kept spinning by women, power blast furnaces. About a third of America's manpower today is womanpower.

they had come out of the ground that way and were ready for harvest. Guns which rake the sky in front of you look like matchsticks at the far end of the line.

Do you know what a 16-inch gun sounds like? Or a 12-inch? Or even a 9-inch? Have you ever had it lift you up on your toes, and smash like a physical blow against your eardrums, and bring all your bones together until they scraped? Here at Aberdeen women work with these guns on the firing line!

And they fire machine guns and carbines and pistols, round after round, until the shells pile up like little brass mountains (pp. 207, 208).

They work with mufflers and heavy mittens in winter, and sweat under the heat of sun and hot metal in summer. They are great brawny women bulging out of tight overalls and youngsters from high school wearing the famous red and white bandannas which mark them as WOWS (Women Ordnance Workers).

One carbine tester is a grandmother. I tried the gun she handled so easily, and an officer had to back up against my shoulder so it wouldn't knock me down. A girl from North Carolina who used to drop squirrels from her front porch is testing tank guns.

We took a jeep over the "world's worst road," built that way for proving mobile equipment. There were mud traps and sand traps, 60° grades and 40° curves, tropical roads and alpine roads, and concrete roads with 6-inch washboard waves.

Aberdeen is called the brains of the Army because Ordnance research deals with some of the finest phases of science and mathematics, and because it proves them all.

In the Aberdeen ballistics laboratory we found scientists from universities and observatories all over America carrying on research in the art of gunfire. Dr. Edwin P. Hubble of Mount Wilson Observatory, whose photography made possible the mapping of 10,000 new universes, is here, among others.

J. Baylor Roberts

One Can Almost Feel the Heat and Hear the Bark of This Aircraft Gun Test

The girl pulls the rope trigger and stands away while a 20-mm. machine gun is given a breakdown test at Aberdeen (Maryland) Proving Ground. Composition wall blocks are sound-absorbent and fire-resistant. Girl fires until gun breaks down or the officer whistles (page 205).

"Astronomy is a twin science to ballistics," said Dr. Hubble. "There is peculiar affinity between the motion of heavenly bodies and the less heavenly path of projectiles. Knowledge of one is directly applicable to the other."

A large percentage of the staff is made up of girl astronomers, physicists, and mathematicians, who work in darkrooms, chemical laboratories, and firing rooms. They photograph the actual trajectory of bullets, compute tables of velocity, work over high-speed radiographic equipment, and analyze performances of both Allied and captured ammunition.

This is no routine testing. One gun may have a book of 86 pages, plus charts. An army couldn't function without it.

In one laboratory a girl was working over spinning shells suspended from balanced mechanisms of some sort.

"Measuring moments of inertia among other things," she explained, and showed the difference between a shell which might ride nose-high or drop nose-heavy and one which would go where it's supposed to go.

Music Amid the Noise

They said women's nerves couldn't stand the noise of the big guns, that their frames wouldn't take it. Women ordnance workers can stand anything.

In the shop at the Frankford Arsenal where casings for gun shells are made, the industrial crescendo of all America seemed to me to reach its peak. It was a different kind of noise from the big guns, but equally shattering. It was steady and penetrating and mixed —the thunder of giant stamping machines, the pounding of drop hammers, the whish of boiling water, and the ringing of bumping metal, all run together like the big, noisy climax of "Götterdämmerung."

"We have music, too," said the major. I couldn't hear it, though passing workers seemed to be whistling to something. After

J. Baylor Roberts

These 90-mm. Shell Assemblers Put the "Power" in Womanpower!

These Aberdeen Proving Ground workers have an average weight of 227 pounds. The shells they make are for test purposes. All fighting tools of the Army are thoroughly tested here (page 205).

picking noises apart, like going through apples, I finally made out the faint strain of a march, and then I noticed an amazing thing. Hands threw levers, loaded conveyers, and whipped from shell to shell in rhythm. It was fantastic.

Women work faster on these jobs than on any I saw anywhere in any industry. It happens to be that kind of work.

Mountains of flat brass disks would dissolve as they were grabbed and rolled under stamps and came out smaller disks; then under another press which stretched them to shell cases, and on through 25 operations in a matter of split seconds.

At the 40-mm. tapering operation, which gives shell cases that indented curve, long belts fed a chain of straight brass cylinders to the big press. Women would snatch them from the belt and slip them under the hammer, then grab them off and set them in moving conveyer cups, all in a single pendulum motion.

Hundreds of women were doing the same thing for different-sized shell cases on different-sized machines. Thousands of hands and fingers seemed to be in constant motion, back and forth, as stamping machines moved ceaselessly up and down, up and down. Soapy steam from scalding tubs filled the air with an eerie mist.

It seemed like pretty rough, hurried work for stuff that should be so infinitely accurate. They told me that a woman worker with a son in the Army had come to them recently with the same question. She had a shell case in her hand that had been dented somehow. They took her carefully through each department, past correcting machines, testing gages, and final inspections until she could return to her job with confidence.

Men said there were jobs that our women wouldn't do—hot, heavy, unglamorous jobs in steel mills and oil refineries and on railroads. They are in all of them today.

We saw women laying out sheet metal in a broiling summer sun, perspiration rolling down the dirty collars of their shirts. We watched them heaving sand on railroad tracks in temperatures below zero.

We sickened to the smells of chemical laboratories filled with women preparing medicines, anesthetics, explosives. I came away wondering how they could stand hour after hour under the screaming, thundering noise of assembly lines.

Hundreds of thousands of war-working women have taken their families to new homes, thrown up feverishly near aircraft plants, shipyards, arsenals, mills, and mines. Nurs-

International News

To This War Mother, Firing a Boiler Is "Easy and Not Tiring"

Members of the "weaker sex" usually take war jobs because they have a man—son, husband, or sweetheart—in the service. This stoker in Hyde Park, Massachusetts, kept her hard work a secret from her husband, also a war worker. Her son is in the Navy.

eries have had to be built for their children.

Employers have added work incentives and securities of ingenious description—counselors, nurses, gymnasiums, clubs, uniforms, rest periods, hot food, music. Some factories have become worlds of their own with "night finals" published by the plant for every shift.

This isn't always the case, of course, even in war. The sister of a famous author, working for a big company in New England, said, "It's still a long run on a cold day to the women's annex, tacked onto an all-male plant."

Flagpole Painters and Junk Sorters

In Kansas City a woman paints flagpoles. New Orleans has a couple of women trash collectors; Lawrence, Massachusetts, three junk sorters. And an appeal has been made to the women of Chicago "weighing more than 200 pounds who enjoy outdoor work and have no objection to the aroma of garbage."

Women in slaughterhouses are brain pickers, belly graders, stomach scrubbers, sweetbread pullers, and vein pumpers. They also have a spice girl.

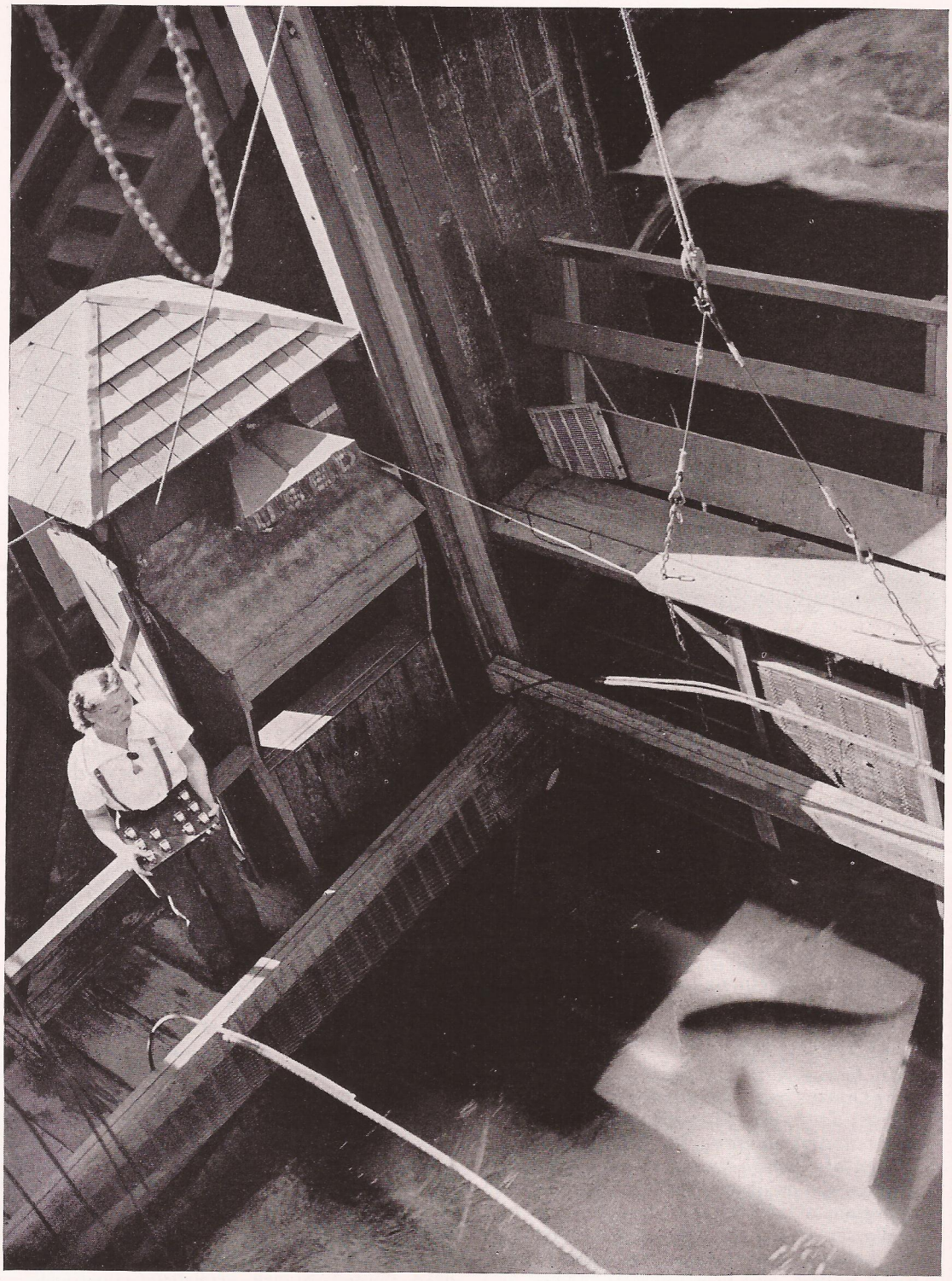
You've seen women cabbies, bus drivers, trolley motormen, and messengers. You've landed at airports and watched them load baggage, call flights, control traffic. In Denver a girl in the glass tower sometimes directs a plane a minute on the runways while monitoring four radio circuits, a battery of telephones, and the public-address system.

They are also milkmen, postmen, firemen, street cleaners, and traffic cops. Ten policewomen patrol the Boston Common and sections of that city's entertainment areas.

Thousands of newly trained women are keeping telephone lines open, working through the night, making quick decisions which may affect the heart of a home or a big war contract. It takes 12,000 calls to build one bomber, 87,000 to build a submarine.

These aren't the glamour jobs—but they're collateral to victory. As I write there is still a bus parked on a downtown street in San Diego with the grim sign: "Just one of many—idle for lack of drivers." And people crowd and struggle to reach the busy Navy docks and aircraft factories.

Into war plants and research laboratories have poured women geologists; physicists; meteorologists; aeronautical, radio, and electrical engineers. Women scientists are studying and experimenting with the headline materials of the age—cures for strange diseases,



U. S. Army Corps of Engineers, Official

Girl Census Taker Tallies Two Salmon as They Swim through the Bonneville Fishway

The white deck silhouettes the fish as they reach the top rung of the fish ladder around the dam. Successive pools, each higher than the last, form a water stairway for Columbia River salmon on their spawning runs upstream. As many as 100,000 fish a day are counted. The girl can identify 25 species.

Watervliet Arsenal, Official

Repairing a Scout Car—One of the Many Necessary but Unglamorous War Jobs

At the Watervliet Arsenal, near Troy, New York, one woman mechanic has spread a tarpaulin over the fender to protect it from grease. Most arsenals come under the jurisdiction of the Ordnance Department.

synthetic rubber, experimental lubricants, radar. Many are actively famous; others have brought their talents and learning out of retirement to apply them to war research.

At the University of Rochester, Dr. Frieda Robscheit-Robbins, who assisted in the research which led to the Nobel prize-winning discovery of treatment for pernicious anemia, has dropped her peacetime studies to work on a substitute for blood plasma.

In Plastics and Electronics

Women chemists, swathed in gauze masks, run tests in plastics and resins in the laboratories of the vast Monsanto Chemical empire. They have entered a no woman's land here in one of the biggest chemical companies in the world. The Hercules Powder Company has women Ph.D.'s experimenting with explosives.

At the Mellon Institute of Industrial Research, in Pittsburgh, the staff of women chemists has jumped 500 percent since 1941. The first woman to receive an engineering degree from Carnegie Tech is a metallographist for Westinghouse Electric & Manufacturing Company. Another Westinghouse engineer is a girl of 26 who is working in electronics research. She read her first paper last year before the American Institute of Electrical Engineers—"Skin Effect in Bimetallic Conductors."

Westinghouse is a conspicuous case of the need for skilled technicians, particularly in the field of radio and electricity, which has lost thousands of men to the Army Signal Corps. It is training dozens of women electrical engineers at Carnegie Tech.

RCA has sponsored 70 women engineering aides through Purdue to supplement its staff of graduate women radio engineers already working in vital international communications. Aircraft plants, shipyards, tooling industries—they've all set up schools for training women to replace skilled men.

In less than four years the Government alone has trained more than 2,000,000 women for war jobs. Working within industry, in schools, and on farms, it has taught them to build, design, analyze, plow. At the 200 colleges operating under the War Training program, 235,000 women have been trained for technical or professional jobs in war industries.

In the two years ending December, 1943, the

Mrs. H. J. Webb, an Electrical Engineer, Exemplifies America's Growing Group of Women Technicians

Only 26 years old, she helped write a paper on electric power transmission and is now doing vital research on war-needed electronic tubes. Here she works out a problem at Westinghouse's Pittsburgh, Pennsylvania, laboratories. Electricity has been her hobby since she became a "ham" radio operator at 13. Her husband is also an electrical engineer.

Army trained almost 500,000 civilian women for jobs with the industrial, maintenance, service and supply units of the fighting forces.

At war's end, the country will emerge with a vast pool of skilled, semiskilled, and professional women.

Now, More Women Needed

But this is the year of invasion!

Five million more women have gone to work since 1940. Almost 11,000,000 men are now in uniform and the number is increasing every month.

In certain areas, industry and civil life still need thousands more men and women, which means women, *apart* from those agriculture wants during the berry-picking, corn-husking, harvesting seasons!

War production is scheduled to reach its peak this year. Cutbacks in ammunition, small arms, and antiaircraft guns will be offset by such top-urgency articles as landing craft, trucks, radar, communications equipment.*

* See "Landing Craft for Invasion," by Melville Bell Grosvenor, NATIONAL GEOGRAPHIC MAGAZINE, July, 1944.

Aircraft production has hit a mighty stride. The big B-29's have gone into mass production. Plane output reached more than 9,100 in one recent month. But it took 1,000 people working 48 hours a week for a year to replace the bombers lost at Schweinfurt! And one Army division used up all its guns in one month in Italy!

In some areas they've launched a home-to-home canvass to tap the remaining available housewives of the community.

An Industry of "Spaces and Structures"

In the roaring infernos of the country's steel mills, I found hundreds of housewives, even mothers and grandmothers.

Steel is big. It's powerful. It's exacting. If you made cake the way they make steel, you'd count the grains. And you'd make it in a huge hall. You'd make it with ovens open and flames roaring and you'd have to stay right by it to test it every three seconds.

The steel industry is a thing of great spaces and structures—heat, and brilliant flashes of light, and noise. You get the impression of much plant, much equipment, few people. There is no look of an assembly line. Jobs are studied and have a place way off in this corner or that. Then they meet and mix and you have steel.

There was a man in the giant crane overhead. Another walking toward the furnace to help direct the crane ladle. A few others here or there watching.

"Do women handle those cranes?"

"They handle some like them, but not those. Watch it."

The big ladle of molten iron was swinging toward the mouth of an open-hearth, for pouring. "Women don't pour molten metal. Most of those men have been steelworkers all their lives. They are older, and highly skilled. It takes years of training and experience."

Below him a small cluster of people were working hard over a furnace. Women? We couldn't tell. We couldn't tell at six feet. They dress like men, and hair is pushed under caps; and, as with shipyard welders, clothes give no shape. "They're women," said the foreman. "They do most of that work now."

The women were dragging out the old burned-up bricks from the insides of the furnaces. Each of these interiors has to be torn down and rebuilt periodically. These women handled fire, bricks, mixing mortar, and masons' tools; and it was dirty work.

Near the thundering blast furnaces women were preparing the sand-lined runners which deliver the molten iron to ladles. In the adjacent building they were oiling the giant compressors, and the Gargantuan wheels spun between ceiling and floor and made them look like dolls.

In laboratories they were making chemical analyses and metallurgical tests, and out in the mill they were reading temperatures and testing samples of hot metal. Everywhere they were working with steel—mixing, testing, manipulating controls. They seemed ridiculously dwarfed by the size of the equipment and the work.

We found a handsome, middle-aged woman in one of the control pulpits perched up over the big soaking pits. Pulpits are the small booths filled with levers which control the movements of giant mill machinery. She had a cigarette in one hand and was using the other to shove a lever.

Split-second Control

"Watch," said someone, pointing down below to the hot pits. As she moved a lever, a big pit cover would slide back and giant tongs would swing in to drop a big steel ingot into the pit for heating or would remove it red-hot for rolling. By signals, she worked in split-second coordination with the craneman handling the ingots.

These are giant things. They weigh tons. When they go swinging through the air, blazing-hot like this, they are terrifying. They move with a rush of heat and a pained, quivering noise.

In the blooming mills they are raced over rollers in enormous hot chunks and pummeled and mashed and pushed and shoved on to be pummeled and mashed again. Walls come together with terrific force, and animals run up and down your spine as you imagine what it would be like to drop some small thing like a human in those works.

As a red-hot billet came off a line, it was raced toward new rollers and slides controlled by the hands of another woman.

This one had to catch the hot block as it landed on a steel brace almost at her feet. Throwing a lever at the exact moment of contact would send it along a new roller on a 90° path to her right.

One after another the blazing blocks of steel would hurtle toward us.

"How did you happen to take a job like this?" I asked, keeping one eye on those hot rectangles of horror.

"It was my husband's job. I knew the terms."

"Had you ever done it before?"

"No." She laughed. "I had never worked at anything. Except at being a housewife."

"How do you like it?"

New York Sun, Vincent Lopez

This Train "Man" Wears a Hat Created by Bonwit Teller, Inc.

After 10 days' schooling, she became one of the first women to take over the duties of trainman, a grade below conductor. She collects tickets, opens and closes outside doors, and knows how to operate airbrakes. There are few vacancies for women in this job as the men usually are over draft age.

"I'd rather be a housewife. And the sooner the better!"

In strip mills steel is rolled into sheets like pie crust and into special shapes. In the strip mill at the Republic Steel Corporation's plant in Cleveland, women were handling cranes to stack the big steel plates rolling off the line for ships. Women were crating one big shipment for Russia.

Women Work on Every Bendix Item

One woman in dirty old coveralls sweeping the floor was a grandmother. Mrs. Varkony, from Hungary. For two years she cleaned a bank building. This was better.

Do you remember the Bendix Aviation Corporation advertisement that appeared not so long ago showing a huge bomber covered with tiny white stars, indicating the equipment manufactured by the company?

We checked and found that women's hands had helped build every item marked—and thousands more.

At the Bendix Eclipse-Pioneer plants in New Jersey women were in the foundry, machine shop, assembly rooms, and research labs, working on everything from the casting of engine housings to the assembly of the tiniest gimmicks in precision flight instruments.

This was one of those fabulous places where

women seemed to make up a cross section of the whole feminine war effort.

Any of these plants is a story in itself. It's a city in itself. It becomes almost the whole life for the people who work in it. It builds most of their friendships, influences their home life, makes their existence revolve around those hours spent at work.

A few, particularly among the "duration crowd," put in their time and then chuck the whole plant atmosphere when they leave, considering they've done their job—which they have. But this isn't the usual case.

Nearly every girl we talked to in these city-like factories reflected the influence of the shop surroundings. It's one of the reasons many of the plants have developed new streamlined methods of securing and *hanging on* to labor.

Adventures in Morale

Some plants play music between shifts, music during work; they have organized riding or ball clubs, even glee clubs.

By departments and by shifts, workers are brought together until usually there gets to be an old-school-tie urge to outperform and outproduce the other team. And the types which get pooled into these groups are amazing. College graduates, salesgirls, society women, waitresses, beauticians, all finding a common bond in their daily tasks.

The Bendix foundries are the last word in modernized technique, with automatic air and temperature controls, together with a maze of conveyer systems to expedite handling of materials. On one side women were making cores much like mud pies—tapping, patting, shaping the soft white sand into precise forms which are then baked for magnesium and aluminum castings (page 196).

On the other side, and in comparatively heavy clothes, women of all sizes were burring, cleaning, and snagging—which means finishing up the castings—working with saws, grinding wheels and files.

Add all of this to the scream of band saws biting off chunks of excess metal and the clang of automatic vibrators jiggling the castings to rid them of sand; the rattle of tumblers bouncing around the small metal chills to knock off bits of scrap and the roar of a dozen or so oil-burning crucibles melting ingots of metal.

Up on the balcony three women, one per shift, work around the clock, continually checking the automatic recording and control instruments which operate the giant ovens. The heat control of every casting is timed to a minute—much like a recipe—apply more heat, gradually reduce temperature, let set, and presto, it is finished.

Ethel, of the Machine Shop

We moved from one noise to another.

Ethel, in the machine shop, was about five feet tall and a former model. Operating a turret lathe, each time she would start a new operation she would rock up and down on her tiptoes to peek into the whirling part she was machining. Then she would release a lever, make another turret swing, peel off another thousandth of an inch, and rock again.

All the while she kept up a patter about her job and seemed to handle the mechanical animal in front of her much the way Frank Buck handles tigers.

I asked her how she happened to get into this work. She said, "Oh, I don't know. I guess I just like working with my hands—crocheting, operating a turret lathe—that sort of thing."

Girls in pink sweaters with bows in their hair were bent over grinding, gear-cutting, and burring machines. Milky fluids poured over the cutting parts to keep them cool, and big pans caught the grease and oil as it sprayed out from fast-moving parts. But the women stayed clean.

Women don't wear pink sweaters on all machine jobs. Mostly they are dressed to safety standards.

They have come to know the difference between jigs and fixtures, taps and drills, sprues and risers. They tell you they work on a "J & L" or a "W & S," and that means a kind of machine, and *anybody* knows which kind.

In the experimental laboratories at Bendix, women physicists and mechanical and electrical engineers were absorbed in research on innumerable types of aircraft instruments and other automatic controls.

Suction and pressure gauges, sextants, compasses, de-icer controls, air and hydraulic pumps—women belong in this type of work. They are whizzes at winding coils, putting tiny gears in place, twisting delicate wires, following intricate patterns.

I found a dancer assembling gyros for drift-meters, a waitress inspecting tiny parts for precision instruments, a typist assembling wee pieces in an altimeter, and hundreds of others—housewives, beauticians, milliners, debutantes. Their small agile hands play rings around men in assembling tiny intricate mechanisms which make up most of the Bendix products built at this plant.

It takes six miles of wire for the electrical system of one Flying Fortress (page 194). Men used to install the wiring after the plane

Office of Defense Transportation, Official

As They Clean They Sing, "Children, I've Got Heaven on My Mind"

This job is not new for women, but they now represent nearly half of all railroad-coach cleaners. Cars are cleaned at the end of every run. By January 1, 1944, railroads had lost 227,531 employees to the armed forces, yet total personnel increased by twice that number (page 220).

had been assembled. Now a subassembly system breaks the installation into 26 units, and women do 75 percent of the work.

Western Electric has 43,000 women turning out tank and artillery radios, gun directors, aircraft instruments, microphones, teletypes.

At the Government-built Sperry Gyroscope Co. plant out on Long Island, nearly 50 percent of the production workers on compasses, bomb sights, gun sights, automatic pilots, and Klystrons are women. They could use 75 percent.

We wandered through one of the big assembly shops here, stopping every so often to watch women's fingers nimbly forming multicolored, spaghettilike rolls of wire into compact designs on cabling boards, or fitting small condensers, relays, and terminal strips into neat little patterns. They didn't always know why things went one way instead of another, but they seldom made a mistake.

In the engineering division women calibrationists were working the bugs out of many of the famous Sperry navigation instruments. In some ways, they are better than men at this. They have more patience and are more critical of imperfection.

Rosebud Yellow Robe

One of the girls was Rosebud Yellow Robe, the great-grandniece of Sitting Bull. She is a graduate musician.

Sperry has one of the greatest arrays of technical talent in America, and it uses women in every capacity. It has even opened its own engineering schools for them. They are skilled spectrometrists, microphotographers, metallographists, physicists. A 29-year-old woman doctor is the medical supervisor of their high-altitude laboratory.

In the engraving rooms of the Bausch & Lomb Optical Co., I watched women trace delicate lines over waxed lenses for gun sights to tolerances of plus or minus two microns.

International News

In a Chicago Freight Repair Yard, Women Pivot a Bad Boxcar Truck

A hard job even for men, they lift one end with a wheel stick and roll the other around it to the desired direction. The truck probably has "shelled" or worn treads and will be replaced. New or repaired trucks are on flatcar in background. Today some 100,000 women are employed by railroads.

Precision sighting on another instrument calls for a tolerance of within one micron—39 millionths of an inch!

There is an aiming circle in production at Eastman Kodak Company which is used with gun batteries to pick up enemy positions; when the information is received, guns are aimed through what is known as a panoramic telescope.

These are highly refined operations and instruments must be flawless. Each gun in a field artillery battery has its own panoramic sight, with one aiming circle for each battery.

Quick Changes in Inventory

At long tables stacked with drab-painted instruments, women were removing minute dust particles by vacuum hose. This is the last touch before final inspection—after other women have built the housings, made the gears and tiny parts, cemented the lenses, aligned the sights, assembled the complete units.

And now the Government has women inspectors here to give each item a final check before it goes to the Army.

Eastman makes 31 types and models of optical instruments for fire control, along with military and naval cameras and such curiosities as steel pontoons used in the construction of bridges, wharves, and dry docks for the Navy. It is an interesting example of the strange changes in inventory which war has brought to thousands of manufacturers and of the quick adaptation of old talents to new jobs.

We took a trip through some of the dim, spectral spooling rooms, just to get an idea of what women always have done in the way of repetitious jobs under strange working conditions. This is where those millions of rolls of film are turned out that you see stacked up in big yellow blocks in drugstores and camera shops all over the world.

It was a weird sort of working life, made to

U. S. Army Signal Corps, Official

Down Such Debarkation Nets Soldiers Swarmed on D Day

At Fort Mason, California, a former power machine operator and a saleswoman put the finishing touches on the mass ladders which are hung over the sides of transports during landing operations. They resemble the cargo nets the Navy has used for years and the "save-all" nets which were spread between sailing ships and piers to catch falling cargo.

feel subterranean by its windowless rooms and long, dark corridors. We felt our way through Stygian passages, pushing back heavy curtains and hearing voices all down the line calling, "Watch out—*watch out*—watch out!" A peculiar hum grew into a chattering roar as we seemed to near the machines.

"See those women over there? The green light means they are rolling panchromatic film. Red, in the next room, means Verichrome."

"Over *where? What* green light?"

Then I began to make out rows and rows of women, like ships coming out of mist, in white smocks and dustcaps, swinging their hands back and forth over machines, setting in spools, throwing a gear, taking them out.

I moved up close and watched them in fascination. Spool in, whir, spool out. What do they think about? What do they do after work?

The point is that they can do it—and millions of women can do it. If they couldn't, there wouldn't be enough rolls of film or bomb sights or aiming circles—or any of the other hundreds of thousands of things which take monotonous application to a single routine operation.

Women Take to Tall Trees

In the big lumber camps of the Northwest, women in high boots and checkered shirts have entered the big trees, a new world for women. The trade of the lumberjack was a hallowed one. Men of timber, like men of steel, are proud of their breed. Their jobs take strength. They live close to Nature and they are a manly lot. Their women have rarely reached within earshot of the crash of trees.

A few were flunkies in camp cookhouses, and some worked in the mills tying bundles, checking, marking, cleaning up.

Acme Newspictures

Lady Lumberjacks Direct Logs through the Mill Pond with Peaveys and a Pike Pole

Five big trees must come down to provide building lumber and crating for every man in the service. These New Hampshire women, whose boy friends are in the armed forces, are helping supply the timber. This mill, near Concord, is operated entirely by women—a model of the gradual female encroachment in this hitherto 100-percent-male industry.

Today women are working by the side of the men of timber and in place of those who have gone. They ride logs down rivers, walk flumes, work over rafts in the booming and sorting grounds. They are "swampers," who log off the branches of felled trees with heavy axes—and this is tough work; and "whistle punks," who keep signals straight between men down in gullies or over ridges—and this is important.

They drive the big trucks which haul giant logs from the forests. They stand at the head of the bull chain which feeds logs from pond to mill, and they handle big timber—Douglas fir, Sitka spruce, ponderosa pine.

It takes fast action along the chain. Men bet they couldn't do it. They were nervous, and the women were nervous. Collisions between logs and head saws can be serious; setters, scalers, and "head doggers" who work along the line have to be strong to handle the peaveys and nimble to keep their feet free from the moving chains. Trimmermen have to think fast to work the right saws as the lumber goes by.

Women Handle Night Shifts Alone

Women handle the night shifts alone on these jobs now.

Timber is war-critical. For every man in service five big trees must come down to barrack him, furnish and crate his equipment, and get it to him.

Women are getting it to him. In southern mills they feed lumber to screeching ripsaws and band saws, butting saws and resaws; they stack, rack, stencil, load, and truck. Up in Concord, New Hampshire, one mill is staffed by women only.

On the windy peaks of the White Mountains, women "man" the Federal lookout stations for the first time. In western timberlands women

forest rangers in lonely outposts drive pack trains, cut trails, tote guns, and keep an alert for sabotage. Like almost all of the major industries which are using women for the first time, it's the women of the men the industry loses who go into it first. Usually they know what to expect.

All This, and Railroading, Too!

The very bigness and heaviness and dirtiness of railroading have kept it a man's business in this country. Like timber and steel, it was an industry of studied jobs which took skill, stomach, and usually strength. Men dominated them monastically.

It was one of the last to go over to the use of women in all-male capacities. The industry itself has always had a longer list of jobs which women could *not* do than any other.

One by one, they have entered every sacred precinct of yard and line. Old-timers have watched them with astonishment, sometimes with hostility. They are beginning to lay bets now on how long it will be before "some woman" takes 856 on its big run.

In this case, it will be some time. Locomotive engineers usually work up from firemen, and that's one job women aren't doing.

Grooming and servicing, this is mean work —but women are doing it. A big engine steams into its stall streaked with soot, grease, and smoke. They wipe it down like a lathery, muddy race horse. They put out the fire, remove the ashes, blast off the grease with live steam and chemicals, fill the sand dome, lubricate it, shine it.

Somewhere it has dropped off its grimy cars. Other women get these to clean and polish (page 216).

They pack journal boxes, operate turntables, and check cars, which means keeping track of all those numbers you see on freights (a mistake could raise havoc with a shipment of war goods); they paint, cut scrap, and handle signals and switches from coast to coast.

Those women you've seen along the track with shovels are section hands edging the ballast, burning grass and weeds, checking rails and ties. They grease switches, de-ice them in winter, and some I heard along a Pennsylvania track one January morning had even learned to speak the language.

There are women baggagemen in stations, and brakemen, flashing lanterns as you've seen thousands of men in pin-striped overalls doing all your life. Women trainmen are helping conductors (page 214); women cooks are in galleys where swaying trains and hot stoves have never permitted them before.

It takes all kinds of women to run a war. The women of the railroads are a good index of what literally keeps the wheels rolling. You'll find a tiny slip of a girl selling tickets or calling trains and out in the yards great husky Slavic women operating steam hammers.

You'll run across college-girl draftsmen, women lawyers and doctors, women telegraph operators and young kids at switchboards. You'll be surprised at the small women in tough jobs and big women in desk jobs.

You'll even find housewife drawbridge tenders and crossing flagmen.

They are all Americans, with as many races, creeds, and nationalities as there are jobs. And in this and every industry there are as many reasons for their taking those jobs as there are women.

Many have found fields opened to their talents for the first time. Many are there for the money or to follow the crowds.

Many Replace Their Own Men Who Are in the Service

Mainly, however, they are there because there *is* some man in service. They are working to supplement that slim G.I. envelope. And they are fighting to keep the country running, to keep the world supplied, to get their man the stuff he needs so he can get through and get back.

Like the steel which goes from women's hands in this country to the hands of women in the Soviet. It's one movement with one idea. The same steel for men moving from the West and men coming from the East. And women to help get it there.

It all works together. And as the war goes on, the great feel of it and the great interdependence of it gather strength. It's a man's and woman's world.
