ENGINEERING

Tiny Tools for War

So small that they are used only under powerful microscopes, miniature hammers and chisels are helping to build mighty engines of war.

➤ HAMMERS, chisels, saws, tweezers and other tools, so small that they can be used only under powerful microscopes, are playing a mighty part in the war in helping to build and improve gigantic engines for Flying Fortresses and hundreds of other heavy articles of equipment.

The new science of micrurgy, the use of these tiny tools under the microscope, was discussed at the meeting of the American Chemical Society by Dr. George F. Hand of the Fairchild Engine and Airplane Corporation. The tools are moved in use by a mechanical device known as a micromanipulator, operation of which may be learned quickly and easily.

The thimble laboratory, as Dr. Hand calls the collection of tiny tools, has dozens of advantages, among them speed and shortcuts, saving of space and time, use of such minute amounts that rare and costly chemicals can be used, extreme safety in hazardous tests, and savings in personnel and costs. Odors, explosions, poisoning, fires, and acid burns on clothes are practically eliminated.

As an example of a few of the jobs done with these thimble laboratories which are only pocket-size, Dr. Hand said, "Studying rust-proof protection for airplanes flying in tropical dampness, a chisel only 10 by 30 microns in size can dig out an infinitesimal piece of rust. Tiny tweezers handle the rust particles while hammers, saws, and magnets take it apart, and science learns some new information."

Particles of fine desert dust are sorted out with micron pointers, rakes, and o her tools and tested for size, static changes, and chemical nature.

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Pinhead of Blood

Some blood tests, speedy and life-saving, can now be made by chemistry under the microscope with only a pinhead of blood, and science can look forward to the day when a complete analysis of many components can be made with only one drop of blood, declared Dr. Albert E. Sobel of the Jewish Hospital of Brooklyn.

It has long been known that the chemical composition of blood changes in disease. With older methods of analysis relatively large samples of blood were necessary. Microchemistry for medical use has now been developed to this present stage of "ultramicrochemistry" where samples ranging from the size of a pinhead to that of a rain drop are all that are required.

These steps have been made possible, Dr. Sobel said, by such developments as the capillary microburet, which measures extremely small amounts of liquids accurately; the photo-electric colorimeter, which uses light of almost one pure color to detect minute changes in color, and more sensitive dyes to indicate the end of chemical reaction.

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MILITARY SCIENCE

Soldier's Pack Lighter Than When War Began

➤ THE INDIVIDUAL soldier today carries 15 pounds less in clothing and equipment than he did in 1941, the War Department has announced. This means that about 100 tons less material is moved with the average infantry division, releasing valuable cargo and truck space.

In reducing the total load from 110 pounds to 95 pounds, experts of the Quartermaster Corps lessened the number of items carried and cut the weight of some of the individual items. This was done by redesigning them or substituting lighter material, or both.

A soldier embarking for overseas now boards the ship wearing clothing and equipment weighing approximately 18.5 pounds. He carries a 45-pound pack, including rifle, sleeping bag, gas mask, and medical supplies, and a duffle bag weighing from 25 to 35 pounds—depending on his destination and personal effects.

Instead of having to take a complete issue of all authorized clothing and equipment, the soldier may leave certain essential items which are used only occasionally to be shipped in bulk to overseas depots. Items authorized for issue are now divided into two classes, mandatory and discretionary. The first group includes clothing and equipment worn by the soldier, carried in his pack or in his duffle bag. The second category includes items to be issued by the Quartermaster Corps on specific requisition by theater commanders.

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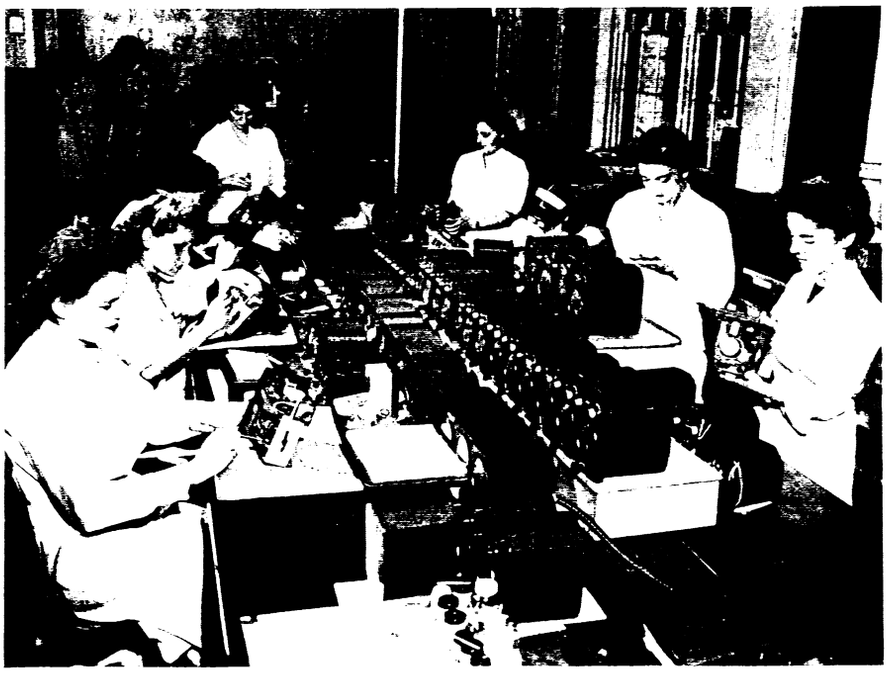

STABILIZERS—The girls in this General Electric laboratory are giving a final inspection to gyroscopes before they are sent to the Army and Navy for use as balancers while planes are in flight.