ENGINEERING

Salvage Brass-Clad Steel

Common solvent, cupric ammonium carbonate, is used to remove the copper and zinc, leaving the steel to be reprocessed. Copper and zinc then freed by smelting.

➤ UNSCRAMBLING the proverbial omelet is a simple problem compared with the task of separating copper, zinc and steel that are all mixed together in the scrap resulting from bullet-making operations in American munitions plants. The difficulty is a new one, caused by the decision of the Army's Ordnance Department to change over from bullet jackets made entirely of soft brass to brass-clad steel jackets.

A modern bullet is a relatively complex affair. Instead of the simple, solid leaden slug used in our older wars, high-velocity rifles like the Garand and the Springfield demand a bullet with a hard jacket, filled with a lead-antimony alloy to give it weight and balance. A copper-zinc alloy that amounts to a soft brass (technically, "gilding metal") has been used. Scrap from jacket-making operations with this metal can simply be melted down and re-used.

But for economy's sake, it was decided to use a steel jacket coated with only about 20% of its weight in the gilding-metal alloy. In the scrap, the steel is still firmly stuck to the alloy, and it becomes a chemical job to separate them. It is decidedly worth doing, for the scrap production is now estimated at nearly 20,000 tons a month.

The problem was met by the use of a common solvent, cupric ammonium carbonate, already used by some copper producers on ore and commercial scrap. It removes the copper as oxide, the zinc also (though not quite so successfully), leaving the steel to be melted down and reprocessed. The copper and zinc can, of course, be freed as metals from their respective oxides by modifications of standard smelting processes.

The cupric ammonium carbonate solution process was recommended by the Metallurgy Committee of the National Academy of Sciences after investigation of this and several other methods. The project was undertaken at the request of the War Production Board.

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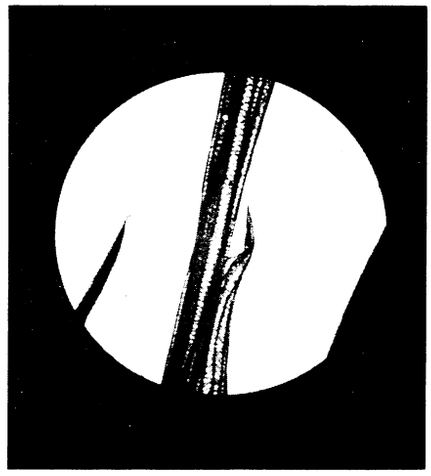

***ELECTRON MICROGRAPH** of a few of the feathers on the edge of a mosquito's wing. The picture from which this illustration was reproduced was made with the General Electric portable electron microscope, and showed the details in the structure of these tiny parts magnified 5,000 times. The magnification is not quite so great in this reproduction, but the details shown here are not visible in the most powerful of light microscopes. See light microscope photograph on facing page.*

ENGINEERING

Gas Mains Repaired

➤ SPEEDIER repair of shattered low-pressure gas mains after bombing or other disasters has been developed by wartime engineering. Plastic fillings, rubber bubbles and butterfly valves are some of the unusual devices described by G. S. Goldsmith, engineer of distribution for the Brooklyn Union Gas Company, Brooklyn, (*Chemical and Metallurgical Engineering*, December).

Filling the broken main with plastic material, such as wax, stops gas flow from a six-inch pipe within five minutes after the emergency crew arrives.

The idea originated at the Philadelphia Gas Works Company during an emergency. Why not disconnect a customer's meter and pump something like heavy grease out through the lead-in pipe to plug up the broken main? It worked so well that other experimenters picked it up; improved on it for war use.

The butterfly control valve is a glorified stovepipe damper developed by the San Diego Gas and Electric Company. The disk, faced with discarded garden hose or similar sealing material, is inserted through a slot cut in the top of the gas main. Operation is controlled by a rod sticking up to the street surface.

When ends of the shattered main are not covered by debris, Mr. Goldsmith believes that conical plugs are the most practical device. A flexible joint connects the plug to a long sectional pole for insertion. Thus the operator can avoid the issuing gas or shooting flames.

Rubber bubbles are preferred for blocking off mains of large diameter. This method is used in peacetime by digging up the gas main, drilling a hole in the pipe, inserting the rubber bag, then inflating it with air.

With a large section blown away and the gas ignited, as occurs under war conditions, there is no time for such procedure. Standpipes installed every three or four blocks would permit insertion of the rubber bubbles at a moment's notice. But they are expensive. Now methods have been developed by Mr. Goldsmith and his associates to reduce cost. Their machine will drill and tap a hole in a gas main three feet underground in one operation.

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● RADIO

Saturday, January 23, 1:30 p.m., EWT

"Adventures in Science," with Watson Davis, director of Science Service, over Columbia Broadcasting System.

Dr. Ivor Griffith, Dean of the Philadelphia College of Pharmacy and Science, will discuss "Synthetic Substitutes for Drugs."

Monday, January 18, 9:15 a.m., EWT; 2:30 p.m., CWT; 9:30 a.m., MWT; and 1:30 p.m., PWT

Science at Work, School of the Air of the Americas over the Columbia Broadcasting System, presented in cooperation with the National Education Association, Science Service and Science Clubs of America.

"Longer Lives" will be the subject of the program.