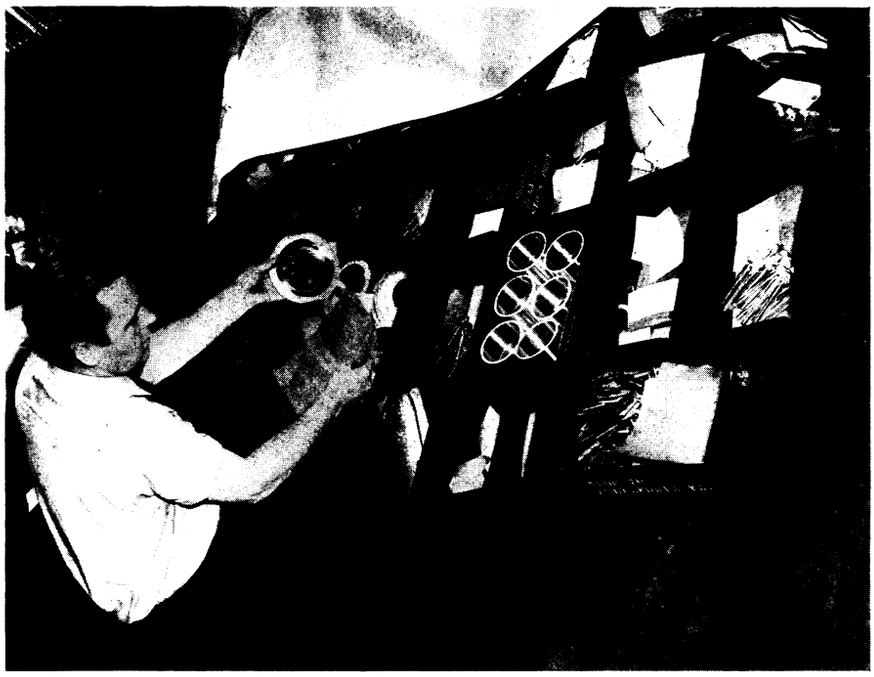

IN THE STOCKROOM

Within a torpedo's fish-shaped shell is a bewildering assortment of small parts—some 1325 different shapes and sizes in all. Accumulating a sufficient number of these is the biggest part of the torpedo factory's work.

neer managing a factory at Fiume, then an Austrian naval base. He first applied the idea of making compressed air the propelling power, and his name still clings to the greatly improved and enlarged descendants of his brain-child.

Whitehead's first torpedo weighed 300 pounds, carried 18 pounds of dynamite, and reached a top speed of six miles an hour. Present-day torpedoes carry a 500-pound charge of TNT and develop speeds around 40 miles an hour, with an extreme range in excess of 8,000 yards.

There has been a steady increase in torpedo caliber. Early models, before the close of the nineteenth century, ranged around 14 inches in diameter. By World War days, 18-inch torpedoes were giving way to the 21-inch caliber now in general use in the world's principal navies. Until recently, the Germans held to a 19.7-inch caliber, but their newest torpedo craft have 21-inch tubes.

There is some hint of further increases. The French navy mounts a good many 21.7-inch tubes, and Britain's two big battleships, the Nelson and the Rodney, are listed as carrying two 24-inch tubes apiece. All other torpedoes used in the British navy, however, are 21-inch, like our own.

It will require very good and urgent reasons, however, for the U. S. Navy to abandon the 21-inch torpedo for another caliber. On the score of manufacture alone, it would mean a terriffic amount of trouble to change. There are about 1325 parts in a torpedo, and practically every one of them would have to be redesigned if a new caliber were adopted. It is better to stick to one good, efficient model as long as we can, the more so since we have such a heavy commitment in existing torpedo armament in that caliber.

A pronounced contrast to the uniform and standardized torpedo armament of the American navy is provided by the French. They have to provide torpedoes to fit tubes of the following calibers (in inches): 15.7, 18, 19.7, 21 and 21.7. Obviously, quantity production, on an assembly-line basis, must be seriously interfered with.

There has been a decided tendency, in the U. S. Navy, to abandon the mounting of torpedo tubes on battleships and cruisers. Our older capital ships and cruisers mount at least a few tubes, but not our later ones. Whether we shall continue thus to omit them from our larger vessels will probably depend, in part, on the lessons of the present war.

Torpedoes played a considerable role in the cruiser action off the mouth of the Plate river last December, even though no hits were scored, and all reports of the tangled fighting in the first days of Germany's invasion of Scandinavian countries indicate that torpedoes were freely used then. It may well be that the tubes will be given back to light cruisers, at least.

Science News Letter, June 8, 1940

MILITARY SCIENCE

Super-Tanks, if Used in U. S., Must Cross Railroad Bridges

SUPER-TANKS of 70 to 90 tons or more, such as have taken part in the fighting during the past several weeks, would probably have to cross railroad bridges if used in this country. Very few of our highway bridges could carry such heavy and concentrated loads, and even all but the most massively built railroad bridges might find them something of a problem.

A fully loaded modern freight car weighs about 74 tons—50 tons for the load and 24 tons for the car itself. That puts on railroad bridges a load of the same order of magnitude as a super-tank, although even at that the tank's considerably lesser length would concentrate the weight to a dangerously high point. Yet in spite of all difficulties, American railroad bridges, built for much heavier rolling stock than is used in Europe, would be most nearly able to bear super-tank loads.

Highway engineers figure 22 tons as the maximum permissible truck-length load for even the strongest of our ordinary highway bridges. Heaviest tanks now in use in the U. S. Army, 18 to 20

tons, are safely within that figure. But try to put a load three or four times that great across anything but a monumental-type bridge, and your engineer would without further ado order up repair and replacement parts, and ask you how soon you thought you could pry your wrecked super-tank out of his wrecked bridge.

It is probable that the Germans reinforced with supporting cribwork even the stoutly built French stone bridges which severely censured Gen. Corap failed to blow up in time. It is significant that the Germans did need the bridges for their tanks—super-tanks evidently can't plunge down one bank of a stream, ford it, and climb the other bank as the more agile light and medium tanks can.

American military tacticians stress this country's needs for large numbers of these lighter and medium tanks, as well as the very fast armored scout cars, rather than the very powerful but ponderous and slow super-tanks. The latter, it is pointed out, are built for one special job, the breaching of an enemy fortified line. The lighter, faster vehicles are essentially weapons for warfare of movement, such as followed the initial German success in crushing through the "soft end" of the Maginot line northwest of Sedan.

Science News Letter, June 8, 1940

RADIO

Frequency Modulation May Cause Fast Changes in Radio

When FCC Cleared Radio Spectrum from 42,000 to 50,000 Kilocycles for FM, It Was Go-Ahead Signal

WITH frequency modulation radio, known as FM, given the green light by the Federal Communications Commission, the stage is set for rapid changes in radio—provided war does not freeze the present art and prevent progress.

Within the next five years, radio engineers are freely predicting, almost every large broadcasting station now operating will be paralleled by an FM station, probably carrying the same program. There will be many local stations serving limited areas that will operate on FM alone.

Within a few months or a year all the larger radio sets will be built to receive both the more ordinary amplitude modulation signals and FM. FM broadcasts can not be received on conventional radio sets. Thousands and perhaps millions of sets in the next few years will be manufactured and purchased, as FM broadcasting grows.

Elimination of static, extraordinary fidelity of tone, and lack of interference from distant stations are features of FM.

When the FCC cleared the radio spectrum from 42,000 to 50,000 kilocycles for FM it was a triumph for a kind of radio that many said could not be produced, the invention of Maj. Edwin H. Armstrong of Columbia University, father of important radio circuits used in almost all ordinary radio sets in use today.

Dominant radio broadcasting interests did not take kindly to a new kind of radio, although there was much more interest on the part of manufacturers of radio sets who saw a chance to fill a demand for more sets.

Radio typewriters, in homes and business offices, pounding out news in the same way that it comes over teletypes in newspaper offices, may be a by-product of FM. Or a facsimile service can be broadcast. Either of these services can be multiplexed or carried on the same wave band as the sound FM without any interference. Whether they will be available will depend upon whether the public wants these services sufficiently to pay the price of the rather costly and complicated receivers.

FM quality will be only as good as the receiver that catches the radio signal and converts it into sound. While much conventional radio broadcasting does not run the whole gamut of the spread of sound frequencies, most receivers are much more woefully deficient in their frequency ranges. For instance, the broadcast frequencies of transmitters often range from 60 to 10,000 cycles per second, while many receivers range only from 150 to 5000.

Science News Letter, June 8, 1940

An *armadillo's* armor, at birth, is soft and as flexible as leather.

● RADIO

Dr. Nathan B. Van Etten, president-elect of the American Medical Association will discuss developments in the field of medicine, as guest scientist on "Adventures in Science" with Watson Davis, director of Science Service, over the coast to coast network of the Columbia Broadcasting System, Thursday, June 13, 4:15 p.m., EDST, 3:15 EST, 2:15 CST, 1:15 MST, 12:15 PST.

Listen in on your local station. Listen in each Thursday.

PUBLIC HEALTH

Malaria Mosquito Invasion From South America Feared

INVASION of the United States by a dangerous malaria-carrying mosquito, Anopheles darlingi, is feared as a result of the discovery of this South American disease vector as close to our border as British Honduras.

This mosquito is the most dangerous carrier of malaria in Brazil, except the gambiae mosquito recently imported from Africa. W. H. W. Komp, U. S. Public Health Service senior sanitary engineer stationed at Ancon in the Canal Zone, points out in his report (*Science,* May 31) of the northward trek of this mosquito.

Science News Letter, June 8, 1940