



EXPENSIVE

A cathode ray tube, used in television receivers. Electrons paint the image on the fluorescent screen, white in the picture, at the end of the tube. Amateurs buying cathode ray tubes pay \$40 for a tube giving a three-inch by five-inch image.

being televised. The varying beam of light reflected by differently shaded parts of the scene passed to a photoelectric cell, where it was converted into an electrical signal impressed on the radio waves. The receiver used a similar setup, but in the reverse direction.

But since that time, the cathode ray tube receiving and sending schemes have replaced the ponderous whirling discs. Now electron beams translate the image into signals and back into an image again.

Television fans are at present limited to New York, Philadelphia and Los Angeles, for these are the only areas in which television broadcasters are operating. But transmitters are in prospect for Boston, Albany, N. Y., Bridgeport, Conn., and Kansas City, Mo.

"Looking in" on television is confined to those areas because the ultra short waves which carry the sight signals travel only as far as the horizon. These waves have many of the properties of light, traveling only in straight lines being one of those properties. Broadcasts from the NBC station atop the Empire State Building, for example, can be picked up only within a radius of 50 miles.

But the amateurs, come what may, are interested again. And, they say, they're in television to stay.

Science News Letter, April 2, 1938

ENGINEERING

Two Airplane Manufacturers Developing Diesel Engines

TWO of the greatest airplane manufacturers in the United States are hard at work on a highly confidential Army and Navy project looking toward the development of Diesel engines for American military and naval airplanes.

The Wright Aeronautical Corporation of Patterson, N. J., and the Pratt and Whitney Aircraft Company of East Hartford, Conn., are both engaged on the project.

The development, it is believed, is aimed at producing engines capable of developing 2,000 horsepower or more. Civil aviation, which has had the use of powerful Army and Navy engines shortly after they were placed in production, is expected to benefit from the project.

Unusual interest is attached to the project in aeronautical circles because of the fact that the present type of gasoline engine used in this country is believed near the limit of its development. The largest gasoline engine in American use is the Wright 1500 horsepower engine with which the six Boeing Clippers, now building at Seattle, will be equipped.

The two companies are believed to be carrying on their research projects separately, although in close cooperation

with government authorities, as they have been competitors for years.

Advantages of the Diesel stem not only from the more powerful engines of this type that can be built, but also from the fact that no fire hazard exists and that since each cylinder is an independent unit, it can keep functioning even though one part may be damaged. Elimination of the fire hazard is of importance when the high mortality of military aircraft from fire is recalled.

Although construction of production model engines is still a matter of the future, it is believed that some of the \$15,000,000 allotted in the Naval Bill just passed by the House for prototype construction will go into the Diesel project now being worked on.

Science News Letter, April 2, 1938

GENERAL SCIENCE

About Cent Out of Dollar Spent For Research Work

RESearch is the lubricant that makes the wheels of civilization turn faster. Without it, industry and agriculture would not accelerate but would slow down and perhaps even stop altogether. The financial support of research is therefore important. It is a matter of more than idle curiosity as to how many dollars are being spent for research, dollars plowed back into our workaday world to produce more scientific dividends in dollars and better living.

In good round figures, somewhat over a cent is spent for research out of each dollar grossed by U. S. manufacturing and agriculture, according to figures collected from a score of sources. Industry spends more than agriculture, 1.7% (some \$250,000,000) out of the \$14,690,000,000 gross manufacturing income of 1936. Agricultural research, almost wholly by state and federal institutions, used 0.37% or some \$35,600,000 of the estimated \$9,530,000,000 cash farm income and value of home consumed farm products combined.

In terms of population, the total for research expenditures in these two great fields is only a couple of dollars per person in the U. S.

RADIO

New Television Parts Placed On Sale

ADDITIONAL parts for the construction of television receivers are ready for sale to interested amateur radio operators, the Radio Corporation of America has announced.

The new parts listed for sale include a deflecting yoke, two power transformers, a vertical output reactor, a vertical oscillation transformer, a horizontal oscillation transformer, a horizontal output transformer, two power supply capacitors and a power supply reactor, it was stated.

Sale of the parts does not mean the placing of commercial television receivers on the market, RCA emphasized, but it is in line with the radio industry's policy of making equipment available to qualified amateurs.

Science News Letter, April 2, 1938

When such compilations are made, the question arises as to what to include in the figures for research. The historian who is looking into some problem can rightly say he is engaged in research. But the figures quoted are largely for inquiries and developments in the physical and natural sciences, the fields in which chemists, physicists, engineers, biologists, etc. work.

Medicine and health fields see considerable expenditures for research, the results of which are mostly measured in better health and less human suffering. Research pays magnificently, often thousands of per cent. in dollars and more in gains to civilization.

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Data from "Expenditures for Agricultural and Industrial Research Compared" by Howard P. Barss, Office of Experiment Stations, U. S. Department of Agriculture. 6 p. Order Document 1062 from the American Documentation Institute, 2101 Constitution Ave., Washington, D. C. remitting 26c for microfilm and 80c for photoprint copy.

Science News Letter, April 2, 1938

SEISMOLOGY

Earthquake Reported Near British Columbia Coast

AN EARTHQUAKE occurred near the coast of British Columbia on Tuesday, March 22, at 10:22.3 a. m., EST, seismologists of the U. S. Coast and Geodetic Survey stated after examination of data transmitted through Science Service by ten observatories. Location of the epicenter was in 53 degrees north latitude, 131.8 degrees west longitude. This point is in Skidgate Inlet, on the west side of Hecate Strait, in the Queen Charlotte Islands. A very severe earthquake was recorded from the same region several years ago.

Stations reporting data were: University of California, Berkeley, Calif.; Seismological Observatory, Pasadena, Calif.; Dominion Meteorological Observatory, Victoria, B. C.; Franklin Institute, Philadelphia; Canisius College, Buffalo, N. Y.; Williams College, Williamstown, Mass.; St. Louis University, St. Louis, Mo.; Georgetown University, Washington, D. C.; Manila Observatory, Manila, P. I., and the observatory of the U. S. Coast and Geodetic Survey at Sitka, Alaska.

Science News Letter, April 2, 1938

TACTICS

Value of Tanks Questioned By Italian Military Writer

Experience in Spanish War Declared Disappointing; Light Tanks Vulnerable, Heavies Can't Shoot Straight

TANKS, hailed as the one major military invention of the World War, are already on the way out, in the opinion of Lieut. Col. Emilio Canevari, Italian writer on military subjects (*Army Ordnance*, March).

Tanks scored their great success against the Germans, the Italian writer holds, because German manpower had been badly depleted and what was left was of inferior quality and shaken in morale. Similarly, in early actions in the present Spanish war, tanks frightened and broke the Government militia while the men were still raw and inexperienced. But after they had learned the business of fighting, the tanks got decidedly the worse of the argument.

Light tanks, that can make speed and get into places, are mere traveling tin-pots, easily subject to fatal puncture by heavy machine-guns firing armor-piercing ammunition. Heavy tanks have to keep moving, for as soon as a tank stops, field guns promptly find it and end its career. And even while they are still under way the lumbering "heavies" can be put out of action by 37-millimeter guns and even by the new anti-tank guns of only about half that caliber.

Infantry Destroy Tanks

Furthermore, a moving heavy tank is of relatively little effectiveness, except as a flame thrower. It shakes and lurches so much that its machine-guns and light cannon lose most of their ammunition into either air or earth. Infantry have learned that at close range a heavy tank need not be feared, and in Spain the Government troops have been ruining them by exploding grenades in their tractor treads, or pouring gasoline on them and setting fire to it.

Col. Canevari likens tanks to the heavy cavalry of old-fashioned warfare. These cuirassiers and dragoons could be loosed in thundering charges to complete the demoralization and destruction of troops already defeated in action by artillery and infantry. But if launched against unshaken infantry the heavy horsemen only went to their doom, as

Napoleon's desperately launched regiments did at Waterloo.

Development of the present heavy Russian tank into a self-contained armored artillery unit containing its own ammunition is seen by Col. Canevari as a possible continuance of the experiments with tanks, which he noted have not been satisfactory. But as a piece of movable artillery, such a tank would be used behind infantry rather than ahead of it, he points out.

Mechanization a Dream

But the completely mechanized army, subject of absorbing military fantasies during the past few years, has never been an actuality, will never come into existence and has been doomed by the experiences of the Spanish Civil War, Col. Canevari declares. He finds that earlier pictures of large mechanized bodies of troops, every man operating a tank or another piece of mobile lethal machinery, are not borne out by Spanish military events.

Nor is motorized transport possible in the fighting zone, for motorized units are tied to the highways on which they roll. Destruction of the highways by skillfully retreating enemies can cause havoc to motorized attackers. Bugged down by bad roads, they are an easy victim of attack planes.

Concluding his study of the 20 months of fighting that have seen everything from guerilla fighting to mass frontal assaults, the Italian observer finds that the advantage still lies with the defense, largely because of the ease of building obstacles to an advance and because of the development of rapid-fire arms. Whether Col. Canevari, now in the army reserve, bases his observations on actual service with Italian troops in Spain is not stated.

Science News Letter, April 2, 1938

Traces of black, brown, and red color on the Egyptian pyramids have been studied by a British scientist, who concludes these are not traces of ancient paint on the pyramids, but are natural coloring derived from the stone itself.