

"Gibson wrote Irwin from Paris on April 17 of a way around this difficulty. 'There is a new plan to use Seventy-Fives which can be fired at the same time along a wide front, and in this way reprisals will be prevented. For this method special shells will have to be prepared, so it cannot be put into effect immediately. The shell is designed to carry a package of small pamphlets or tracts, and the explosion spreads them in a radius of several kilometers behind the lines.'"

Science News Letter, November 25, 1939

CHEMISTRY

New Gas-Oil Explosives Would Help U. S. in War

THE United States is better able to produce explosives than any other nation on earth. It has raw materials in abundance, the chemical industrial organization to secure large production and the transportation to put them where they are needed.

It is significant that this appraisal comes from the head of the Austro-Hungarian munitions industry during the World War, Prof. Ernst Berl, now research professor at the Carnegie Institute of Technology, Pittsburgh, and an American citizen. Surveying America's capacity to produce explosives, Prof. Berl in the technical journal, *Chemical and Metallurgical Engineering*, emphasizes that chemical advances make it possible to produce military explosives from raw materials not used for explosives manufacture in the last war.

From natural gas, from crude oil, by fermentation of carbohydrates, from sugars, from bituminous coals, there can be made explosives with unfamiliar names that are quite as devastating as TNT.

For instance, methane in natural gas can be converted into acetylene and into methanol (wood alcohol); formaldehyde can be made direct from methane or from methanol; acetaldehyde can be obtained from acetylene; combine acetaldehyde and formaldehyde, nitrate the product and there results pentaerythritetranitrate, one of the most important newer explosives.

TNT can be made from aromatics extracted from petroleum as well as from the coking of soft coal. And in dozens of other ways the newer chemical methods, primarily developed to promote better living in a peaceful world, can contribute to explosives for use in war.

Science News Letter, November 25, 1939

RADIO

Two-Way Facsimile Unit Developed For Aviation

Observer Can Spot Information on Map and Transmit; Secrecy Can Be Insured By Any Scrambling Method

A PICTURE of streamlined action in military reconnaissance through the use of new two-way facsimile communication has been demonstrated by W. G. H. Finch, communications engineer, before Army and Navy officials.

With the little 25-pound unit in an observation plane over the enemy lines it is possible to transmit back, immediately, to every battery at the front the location of troop concentrations, gun emplacements and other vital military intelligence.

The reconnaissance pilot merely takes along a prepared map of the region and marks on it the information discovered. This portion of the map is placed in the transmitting scanning unit and, in an instant, it appears at every battery which can reach the objective by gunfire.

By present methods the plane must fly back and drop messages over the lines or else take photographs and return to its base. The developed prints are then rushed to headquarters and then all batteries must be notified from G.H.Q.

Complete secrecy for the facsimile transmitting system can be obtained by any of the present "scrambled" radio methods which present a hodge-podge of signals to a receiver that might intercept the messages, but which is automatically decoded properly in the pre-arranged facsimile receivers.

Even "radio barrage"—the jamming of distorting signals on the same wavelength—has little effect on facsimile transmission, Mr. Finch said in an interview. This deliberate distortion has been tried experimentally. While it grays in the background it does not usually prevent the arrival of the intelligence superimposed upon it.

Tests on the *U.S.S. Fanning*, at sea, were made with the device in which a diagram of an engine part was received on shipboard at the same time that the ship's transmitters were trying to "jam" the signals by transmitting on the same wavelength. The diagrams came through and were legible.

While this military application has interest at the moment, it is really only one small aspect of the peacetime uses of facsimile which will be augmented by the new two-way unit.

Police departments are putting facsimile receivers into their squad cars and obtaining permanent written instructions for patrolmen. Where before officers could claim that they did not receive a message because of "dead spots" in a city, the facsimile receiver indicates such areas clearly. If a patrolman leaves his car and fails to hear a message the new facsimile brings him a permanent message on his return. Photographs of wanted criminals, and fingerprints also, can be transmitted swiftly.

For aviation, charts of data, weather maps and any information that can be put on a piece of paper can be winged swiftly by the mobile two-way units. Ear-phones can be used solely for radio beam signals and the co-pilot's duties as radio operator can be greatly diminished.

For ships at sea, navigational data and all other types of intelligence can be



SCIENCE AID TO POLICE

With this new facsimile instrument the policeman cruising in his radio scout car can actually see the picture of the man he is hunting.

transmitted. Just before the present European war broke out, plans were under way for ships' newspapers printed by facsimile from shore transmitters.

Nineteen radio stations throughout the country are now sending home "radio newspapers" during the early morning hours into more than 5,000 homes which now have low-cost facsimile receivers. In one Midwestern city, home correspondence courses for farmers are being made available.

Great newspaper syndicates are daily transmitting pictures across the oceans and the continent and bringing news photos to the front pages simultaneously with the written stories about them.

The fact that facsimile can be sent by telegraph or telephone wire, or by radio, gives it an enormous range of usefulness. Straight printed messages in six-point type can be transmitted at the rate of 300 words per minute. This is four times as fast as teletype, says Mr. Finch.

Science News Letter, November 25, 1939

CHEMISTRY

1938 Nobel Prize Given For Research on Vitamins

THE NOBEL PRIZE in chemistry for 1938, withheld last year, has now been awarded to Prof. Richard Kuhn, of the Kaiser Wilhelm Institute of Berlin, for his researches on vitamins and carotenoids. His investigations were made on the relation between carotene, the yellow coloring matter of butter and of vegetables such as carrots, and vitamin A.

Science News Letter, November 25, 1939

The population of the world is believed to have more than doubled since 1800.

Government scientists have produced a new non-crystallizing rosin, which may prove valuable in manufacture of paint and varnish.

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WORKING EXHIBIT

In this diorama at the Buhl Museum, showing the observatory in Denmark of Tycho Brahe, the little men respond to the visitor's button pushing by going through the motions of making astronomical calculations in the way they were done before the days of telescopes. (See facing page)

CHEMISTRY—AERONAUTICS

Combine Research To Produce Vast Amount of Super Gas

Anti-Knock Fuel Can Be Made Directly From Paraffin And Olefins, Using Sulfuric Acid as a Catalyst

DISCLOSURE of new methods for producing vast quantities of 100-octane, super-aviation gasolines by the use of widely available sulfuric acid as a chemical catalyst, was reported to the meeting of the American Petroleum Institute in Chicago in a joint announcement of five leading oil companies.

Super fuels for aircraft—having anti-knock ratings of 100-octane—have rapidly increased in use. Some 7,000,000 gallons were used in 1937. By 1938 the amount had risen to 20,000,000 gallons and 1939 and 1940 use is anticipated to be much greater.

The assurance of a larger quantity of this vital and precious fuel for airplanes, at a reasonable price, comes with

the new announcement of large scale operations by the Anglo-Iranian Oil Company, Humble Oil and Refining Company, Shell Development Company, Standard Oil Development Company, and the Texas Company.

What has made possible the operation of the six refining plants by these companies, says the report, is the discovery that an 85-octane gasoline (which with the addition of a small amount of tetraethyl lead becomes 100-octane fuel) can be made directly from paraffin and olefins, using sulfuric acid as a catalyst. Sulfuric acid is widely available and its use represents a major advance on a commercial scale, says the report.

The new development combines the