Peace Taking Over War's Inventions: Where Theodore Roosevelt Was Born Peace Taking War's Inventions
New York Times (1857-1922); Mar 23, 1919; ProQuest Historical Newspapers: The New York Times
pg. 76

Peace Taking Over War's Inventions

Tests for Gun Barrels Serve for Steel Rails and Big Gun Detectors Measure Bridge Strains—Bureau of Standards' War Work Not Lost

WAR is also creative. For months now, while the tremendous losses have been appraised, the destructiveness of war has oppressed the public mind. Here is a brighter side: how scientific devices and methods designed to multiply death and ruin among the enemy are to be converted into the uses of peace for multiplying production and promoting general well-being. These are processes originated or improved at the Federal Bureau of Standards at Washington, over which, for obvious military reasons, up to this time a veil of mystery has been drawn.

During the war much was heard in vague rumors of instruments which by measuring sounds were able to locate guns of the enemy. Soon after we entered the war work was begun at the Bureau of Standards toward the development of devices used by England and France, and a complete set of sound-ranging apparatus, an improvement on anything in use up to the time, was ready for use just before the signing of the armistice. By means of this device within five minutes of the firing of an enemy gun its location could be communicated to the ordnance officers.

The principle is that sound travels with uniform velocity in all directions, subject to corrections for temperature and direction and velocity of wind. The American device has a central recording station and six substations. These substations are similar to the receiving end of a telephone. The guns, as it were, speak to them. The substations transmit the voice of the gun to the main station. The precise moment of the arrival of each separate sound at the main station is, by means of a special electrical apparatus, recorded on a strip of smoked photographic paper. Any divergence of the stylus or needle indicates sound. The difference in the time of the arrival of the sounds, accurate to the hundredth of a second, can be quickly read, and on the basis of these differences the location of the sound source—that is the enemy gun—calculated. Three-inch guns may be located at five to ten miles distance.

But in peace time there is no need to spot guns. How, then, salvage this idea and the investigation and labor that its application for war entailed? That is the question that arises with all the war work of the bureau. And in order to connect science with the prosecution of the war its facilities were greatly expanded and almost wholly diverted to war service. Two hundred problems having a direct military bearing were taken up, with a staff of experts assigned to the solution of each. Four-fifths of the work of the bureau was for the Army and Navy Departments. An immense amount of research was done. But practically all of it will be saved and will go to enrich industry and commerce in one way or another.

Here is an illustration, to follow up the sound-ranging device: A steel bridge seems a long way from a six-inch gun, as to any application of sound-ranging, but there is analogy. Bridges need listening to. One thing about bridges that has puzzled engineers up to this time is some way to measure the stresses. The method has been to build the bridges with a margin for safety, but how wide that should be was necessarily guess work, and when the load of the bridge increased its ability to bear up under the strain, a question into which both lives and property largely entered, was difficult even to approximate. As the stresses increase, the girders and other steel pieces of the bridge vibrate more. It is like some great stringed instrument, with such a range of vibrations that these are far above and below the ability of the human ear to record them. The plan, yet in embryo, is to adapt the instrument that listens to guns to listening to steel bridges, and by the vibrations received in the microphones to calculate the measure of the strain on the structure, or on any part of it.

Another illustration: In the early days of the war, when we were just beginning to equip our men by the hundreds of thousands, there was a great shortage of rifles, as every one remembers. The manufacturers were pressed to speed up. One difficulty, it now transpires, was a chief cause of delay. That was trouble in obtaining good steel for the barrels. Lack of uniformity in hardness of the steel rods out of which the barrels were made caused the drill boring the hole through the centre of the rod to diverge. A hidden hard spot threw the drill from its course, and there was another ruined barrel. This happened so often that the War Department called upon the Bureau of Standards.

"Is there any way," was asked, "to find out if a piece of steel is of uniform hardness and texture without drilling into it?"

The bureau went to work. The principle followed was that steel was a magnet, and the resistance or ease with which it was magnetized would determine the quality of the steel, its hardness or softness. A device composed of electric coils was made, contrived delicately to measure the degree of magnetization of the steel barrel rod passed through them. If there was an inner flaw it was brought to light. The bad barrels were thereafter thrown out beforehand; the making of rifles for our men took a big onward jump.

This device can be salvaged for peace use in many valuable ways. A flaw in the rail is the explanation of many a railroad accident in which lives are lost and property destroyed. The defect is within; there is no way of telling at the mill. So it is with steel in bridge building and other structures; a bad place inside may one day bring disaster. With this device developed to test out large pieces of steel, a step from uncertainty to certainty in an important matter will be taken in a great industry.

Over on the other side there are many fogs. One of the difficulties airplanes had was finding their home landing in a heavy fog; so another question, one of a great many, was asked of the bureau:

"Can any device be made that will indicate to an airplane when it is approaching its landing place?"

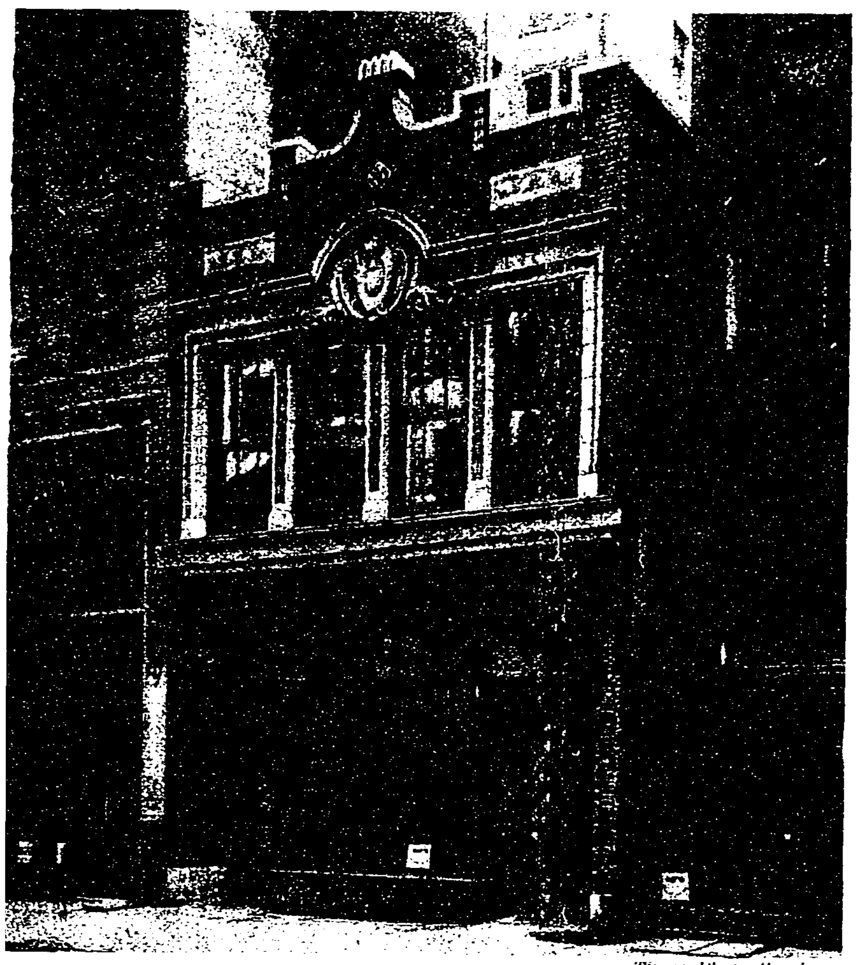
The answer was a magnetic ground coil, a little larger than a wagon bed, which sent radio waves to the airplane and the aviator. These sounds were peculiar and could be distinguished from any others. With the engine stopped, the sounds can be heard 3,000 feet away, 1,500 with it running, but improvements are expected to increase this distance. In commercial aviation of the future this invention will play a useful part.

During the war the methods for firing from airplanes had serious drawbacks. Both the mechanical and the hydraulic devices gave trouble; the timing by which they had to shoot when the blades of the propeller were clear went wrong frequently, and pieces of the propeller were shot away. The difficulties encountered caused the adoption in some instances of firing through the hollow axis of the propeller. The Bureau of Standards was put on this problem, and just before the war ended a method was invented for firing the aircraft gun by electric control. The gun is cocked automatically and is all ready to fire, the electric magnet on the side of the gun holding the trigger if necessary until the gun propeller blade is out of the way. There is a double electric system, one by which through contact with a button on the propeller axis the gun cannot fire when a propeller blade is in the way; the other by which the aviator, by pressing on a button or by biting on a small rubber tube through which two wires pass, starts and continues the gun firing. Tests show a wonderful performance. The gun fires fifteen times a second, and may be regulated in any degree up to this point. In no case has a propeller blade been struck. The advantage of the aviator regulating fire from his mouth when both hands are busy is seen. The gun was not perfected in time to be used by our men in France.

In many other branches problems upon which the prosecution of the war in some sense turned were worked out. The foundations of two new American industries were laid, one the making of optical glass, for which a new and superior pot was invented; the other, the making of master gauges, for the immediate need of controlling the essential dimensions of guns and shells, but of value through the industries. The latter was the largest single problem undertaken by the bureau.

(Continued on Page 14)

Where Theodore Roosevelt Was Born



Times Photo Service.

House Which Will Be Reconstructed as it Was When Occupied by the Roosevelts.

A FUND of $1,000,000 will be sought by the Woman's Memorial Roosevelt Association to restore the house in which Theodore Roosevelt was born and to establish it as an American citizenship centre. The building, greatly altered since the time it was owned by the Roosevelt family, was recently purchased by a number of New York women. It is at 28 East Twentieth Street, between Broadway and Fourth Avenue, and is practically surrounded by tall loft structures. The intention of the buyers is to restore the house to its exact condition prior to the civil war and to furnish it as far as possible in accordance with the household fittings of that period, following the Colonel's own description in his autobiography.

"On Oct. 27, 1858," he wrote, "I was born at 28 East Twentieth Street, New York City, in the house in which we lived during the time that my two sisters and my brother and I were small children. It was furnished in the canonical taste of the New York which George William Curtis described in the Potiphar Papers. The black haircloth furniture in the dining room scratched the bare legs of the children when they sat on it. The middle room was a library, with tables, chairs, and bookcases of gloomy respectability. It was without windows, and so was available only at night. The front room, the parlor, seemed to us children to be a room of much splendor, but was open for general use only on Sunday evening or on rare occasions when there were parties. The Sunday evening family gathering was the redeeming feature in a day which otherwise we children did not enjoy—chiefly because we were all of us made to wear clean clothes and keep neat.

"The ornaments of that parlor I remember now, including the gas chandelier decorated with a great quantity of cut-glass prisms. These prisms struck me as possessing peculiar magnificence. One of them fell off one day and I hastily grabbed it and stowed it away, passing several days of furtive delight in the treasure, a delight always alloyed with fear that I would be found out and convicted of larceny. There was a Swiss wood-carving representing a very big hunter on one side of an exceedingly small mountain and a herd of chamois, disproportionately small for the hunter and large for the mountain, just across the ridge. This always fascinated us; but there was a small chamois kid for which we felt agonies lest the hunter might come on it and kill it. There was also a Russian mujik drawing a gilt sledge on a piece of malachite. Some one mentioned in my hearing that malachite was a valuable marble. This fixed in my mind that it was valuable exactly as diamonds are valuable. I accepted that mujik as a priceless work of art, and it was not until I was well in middle age that it occurred to me that I was mistaken."

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.

Peace Taking War's Inventions

(Continued from Page 11)

Hitherto, Sweden has had a virtual monopoly on gauges. The latest series of these gauges shows a precision and workmanship never before attained. They are accurate to less than one-millionth of an inch.

In an earlier stage the Bureau of Standards had a slow fight for recognition. For ten years it had been trying to get a new building for industrial research. Congress was preoccupied with river and harbor bills. Then came the war and a thousand questions for science to answer. Facilities had to be increased. Out of his own fund the President gave the money for two large buildings. The bureau had no funds to conduct the costly and extensive experiments called for by the Army and Navy Departments. Out of the ample funds voted by Congress for them the Army and Navy Departments transferred the needed money to the bureau, about $2,000,000 all told.

But the war is over now and the question is up to the future of the bureau—whether it is to be developed in accordance with the vast expansion expected in American industry as a great laboratory for national advancement in manufacture and commerce or is to be held down by lack of funds as in the past. The Department of Agriculture receives an appropriation of $25,000,000 a year, the Bureau of Standards something more than $1,000,000. The friends of the bureau do not expect a rapid increase to what is allotted the Department of Agriculture by Congress, but they do expect, in view of the more and more important part played by physical and chemical research and scientific and technical standardization, large and steady increases in the appropriations for the maintenance and expansion of the bureau.

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.