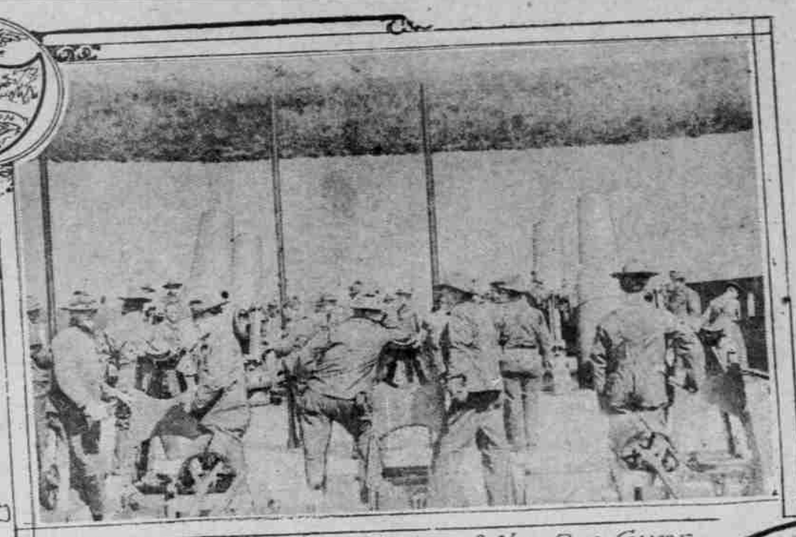
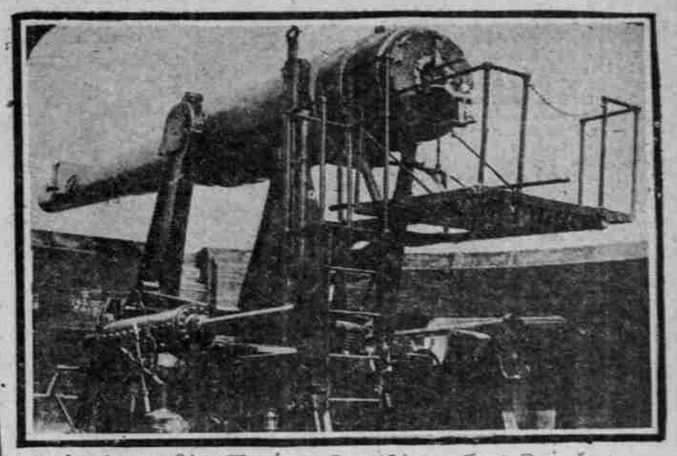
COAST DEFENSE WITH MODERN GUNS IS ESSENTIAL

Fancied Security From So-Called Defensive Works Is Declared More of Menace Than No Protection at All—Oregon Coast Artillery Comprises Eight Companies, Which Are Well Trained.

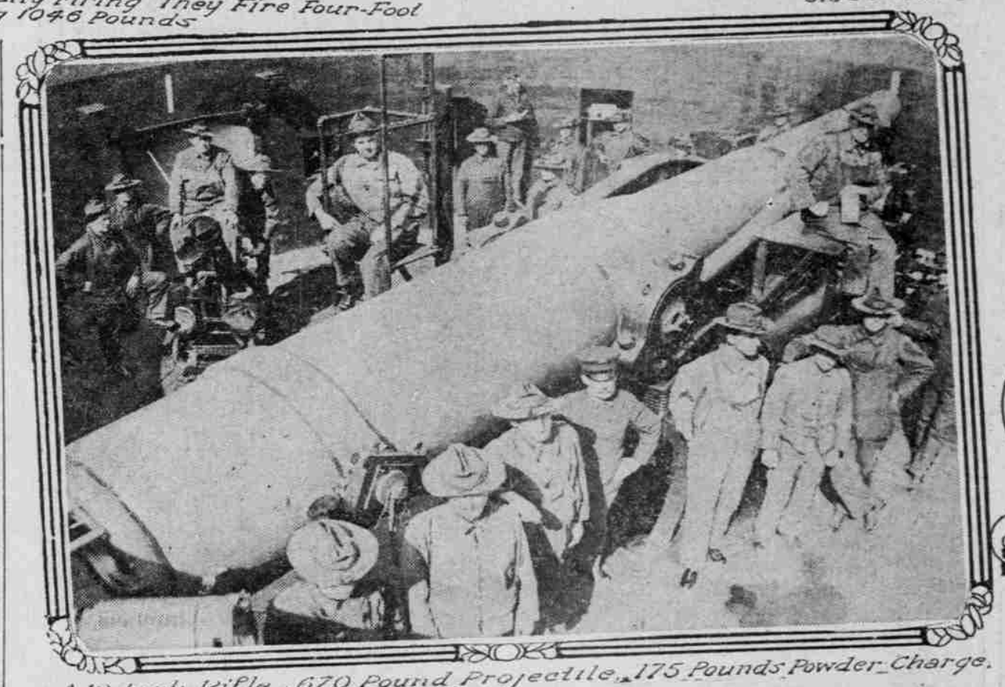
12 Inch Mortars Actually Firing They Fire Four-Foot 12 Inch Shells Weighing 1046 Pounds



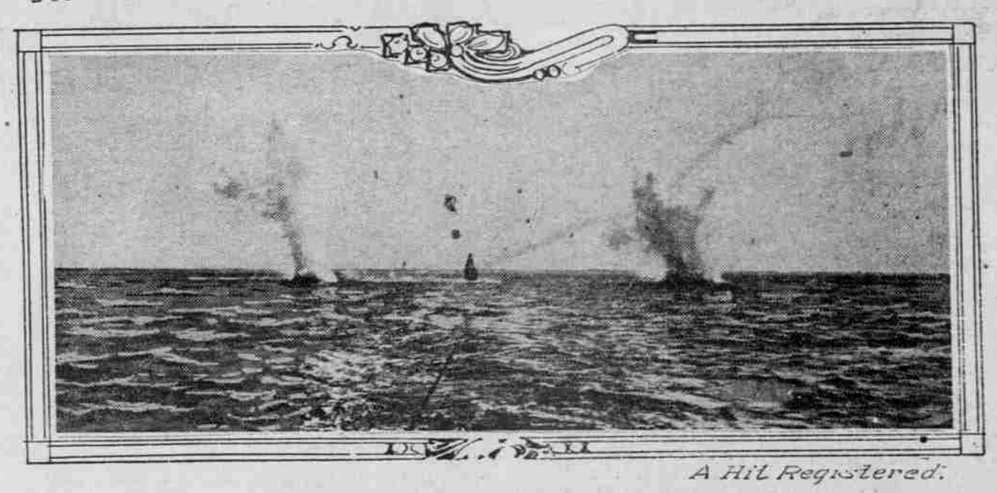
Close View of the Big Guns



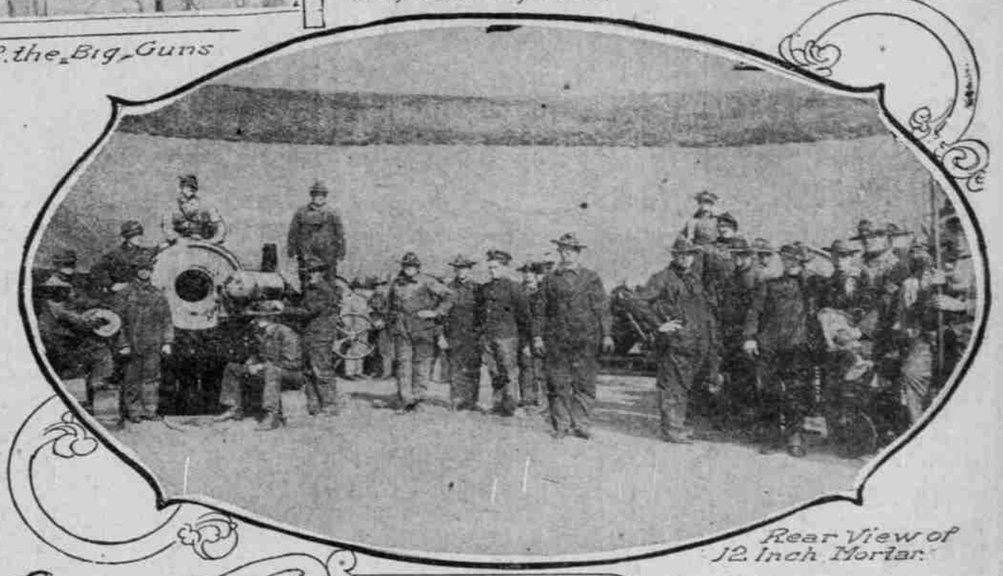
10 Inch Rifle Firing Position Gun Pointer Only Man Exposed.



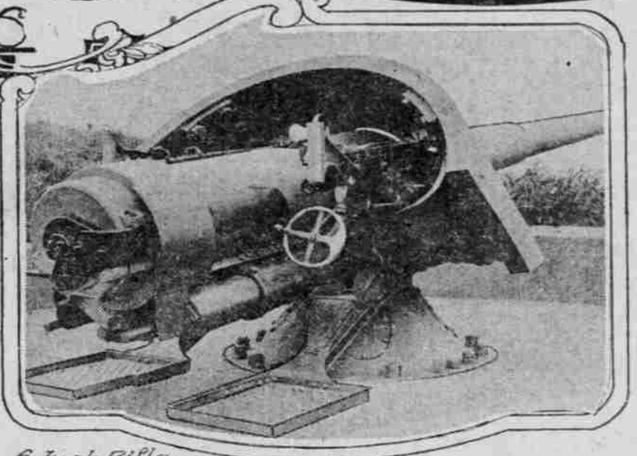
A 10 Inch Rifle, 670 Pound Projectile, 175 Pounds Powder Charge.



A Hit Registered.



Rear View of 12 Inch Mortar.



6 Inch Rifle, Steel Shield, Pedestal Mount

BY JOHN V. ROWAN.

FORT STEVENS is on the Oregon side of the mouth of the greatest river on the Pacific slope of both Americas. The Columbia River, with its tributaries, drains over 250,000 square miles of Northwest territory. Oregon's sturdy citizen soldiery, encamped at Fort Stevens, under the command of Lieutenant-Colonel C. C. Hammond, is studying the problems incidental to the defense of a region equal to all Germany and nearly the size of the 13 original colonies.

If the entrance to the Columbia is ever forced by a foreign power, the fall of Puget Sound and California is assured. The occupation of the Columbia Basin means the control of the network of railroads leading both to the Sound and California. With the mouth of the river passed and the coast-defense guns silenced, Portland is as helpless as a new-born babe, and the coast-defense guns of the Puget Sound and California so much worthless junk. Permit a foreign power to occupy this basin and the only natural marching route for all large bodies of troops of all branches of the service is cut off from the interior of the United States. Small forces of the enemy can hold the impassable ranges of California and the ridges that dominate the Sound.

Eight Companies in Service.

In proportion to the state's population, Oregon's troops have responded to the call to the colors in defense of their coast line as no other state of the Union has. This is particularly true of the Pacific Coast. California, with far more than a score of regular artillery companies, has only a trifle more than one-half as many state troops for their coast line. Washington, with approximately 15 companies of regulars for their coast defense, has about one-third as many state artillery supports. But Oregon, and Oregonians should be proud of the fact, has three times as many state troops for its coast line as it has regulars and soon that astounding proportion will be four to one. Only three companies of regulars now man the fortifications on the Oregon and Washington side of the Columbia's entrance, and one of these three is now at Vancouver. It is stated that the original plan of the War Department was to ask each coast state to provide one relief for their coast guns, the regulars in equal number to form the other. Oregon has more than met the issue, the other Pacific Coast states have not.

The citizen troops at the mouth of the river represent every large city in the state, excepting Astoria and Marshfield. Both of these communities are now forming companies, however.

Colonel Hammond's staff consists of Majors White and Cappernol, Captain Williams, adjutant; and Lieutenant Harris, quartermaster. The First Company of Ashland is commanded by Captain Malone; company officer, First Lieutenant Spencer. The Second Company, of Eugene, is commanded by Captain Bond; company officer, First Lieutenant Svarovarnd. The Third Company, of Eugene, company officers, Lieutenants Keeney and Jensen. The Fourth Company, of Roseburg, Captain Buchanan, commanding; company officers, Dunham and Kenan. The Fifth Company, of Albany, is commanded by Captain Knox. The Sixth, of Cottage Grove, Captain Woods, commanding, with Lieutenants Cousin and King, company officers. Medford is represented by the Seventh Company, Captain Vance, commanding; Lieutenants Foss and Dud, company officers. Portland's company, the Eighth, is commanded by Captain Wright, company officers, Lieutenants Lundgren and Walton.

Gunnery Is Taught.

The general course of instruction at Fort Stevens is directed by First Lieutenant Shippam, inspector-instructor, U. A. C., O. N. G., of the regular Army, under the supervision of the commanding officer, Colonel H. H. Ludlow.

The training takes up all phases of artillery drill, sub-caliber and service target practice, together with practice in infantry drill and guard duties. All officers at Fort Stevens and selected non-commissioned officers from the 93d, 34th and 160th Companies are assisting in the training process.

Subjects for the grade of first-class gunner include the general use of all forms of cordage, explanations of the use and operation of gins, blocks, tackles, sheers, in fact, all weight maneuvering devices. All parts of the guns and their various functions are studied. A thorough knowledge of fuses, primers, explosives, powders and projectiles is imparted. Drill duties of the different positions of the men and the duties connected therewith are part of the curriculum. How to distinguish different types of fighting craft, method of aiming and laying the pieces, duties in the plotting room, the range control, operation of telephones, etc., are part of the course.

A further amplification of this plan involves special training in the more technical positions, including observers, gun pointers, plotters and gun commanders. Extra pay is provided for those who qualify for the above ratings.

Target Practice Thorough.

An interesting preliminary phase leading up to the use of the big guns under actual battle conditions is known as sub-caliber practice. The sub-caliber tube, in reality a miniature gun or mortar, is inserted in the bore of the large pieces. The shells used for the guns weigh one pound, for the mortars an 18-pound shell is employed. These small guns are fired at the same intervals and with similar methods to those in use for full service conditions. Their use makes the state troops very efficient in making necessary corrections for trial shots, accustoms them to the employment of the various instruments used, develops speed and co-ordinates the work of all.

The purpose of a rifle is to penetrate the sides and turrets of attacking war vessels. For this purpose a shell weighing in excess of 600 pounds is employed. It is propelled from the gun at a speed approximating one-half mile per second, thus insuring extreme penetration before the shell explodes. The penetration of a shell corresponds closely to its caliber, that is, at effective ranges.

Our disappearing rifle is the invention of General Crozier, of the ordnance department. It is so designed that the rifle, except in firing position, is protected by thick concrete walls and extensive earth embankments. As it is about to be fired, the gun leaps upward and forward, like the head of a striking serpent, and launches its deadly missile of forged steel toward the enemy's battleships at a speed second only to the planetary bodies.

Firing of Mortars Indirect.

All firing by the mortars is indirect. Not one member of the detachments at the guns can see the target. When the mortars are about to be fired they are elevated (pointed upwards) at an angle exceding 45 degrees. Consequently, the projectiles, weighing over one-half ton each (1045 pounds) describe great semi-circular curves with a sharp descending branch, thus causing them to strike on the decks of attacking battlecraft.

At the last target practice held at Fort Stevens, the Ninety-third Company, commanded by Captain Waldron, C. A. C., smashed a 10x10-foot pyramidal moving target at a range of 13,400 yards from the battery. The data for the guns were obtained from stations nearly five miles apart, one station being in the state of Oregon, the other on the opposite side of the river, in the state of Washington. Some idea of the delicate accuracy of work involved may be formed when it is recalled that the shell fired at the rapidly moving target was in the air exactly 73 seconds.

Better Coast Defense Needed.

Despite the brilliant showing of our Coast Artillery Corps, both regulars and state troops, it is becoming apparent to military observers that our coast defense system, in view of recent improvements in naval armament, has become nearly obsolete in many of our fortifications. The fancied security engendered by so-called defensive works is more of a menace than no protection whatsoever.

Our coast defense plans, matured over 10 years ago, embodied the use of 10 and 12-inch rifles in the majority of the coast fortifications. In view of the fact that eight, 10 and 11-inch guns were the accepted standards of naval attack at that time, it is obvious that the defensive system of that date was adequate for the purposes involved. However, within the past five years all naval armament has been increased so that 12, 13 and 15-inch rifles are the rule and not the exception of the modern standard. Moreover, naval guns are so constructed that they permit the use of greater powder charges and consequently insure increased ranges and greater velocities than are obtained in the harbor defense.

It is a positive fact that the modern "Super Dreadnought" could well afford to ignore all the fire a 10-inch rifle could bring to bear on her. These craft carry as high as 18 inches of armor plate and the penetration of the coast rifles, with few exceptions, under the most favorable circumstances, does not exceed the caliber of the piece, or, in other words, about 10 inches. Imagine the effects of a shell weighing 1400 pounds traveling at a tremendous rate of speed opposed to a shell weighing less than 700 pounds, conceive the results of a fire that is effectual at 26,000 yards as opposed to a system ineffectual at 14,000 yards and you have some faint conception of the inadequacy of the present coast defense as opposed to the attack of a first-class naval power. The comparison is as that of a boy weighing 100 pounds engaging in combat with a husky athlete that tips the scales at 220 pounds.

Canal Is Vulnerable.

Under ordinary circumstances, our fleet is very properly referred to as "the first line of defense" and the Coast Artillery Corps as "the second line of defense." However, the Government policy of keeping the fleet on the Eastern coast makes it obvious that for Western coast defense the Coast Artillery Corps becomes in the very nature of things "the first line of defense."

It might be argued that, with the building of the Panama Canal, both coasts are accessible. This is not true. The fleet of an enemy might very effectually blockade the Western exit of the Canal by strewing countless floating mines, using a number of submarines, a large fleet of their own or possibly by adopting the heroic expedient of sinking one of their fighting craft in the very jaws of the exit. A canal is like the neck of a bottle. Our fleet would have to emerge in detail, one by one. Though supported by coast guns, they would be subjected to a concentrated fire of the full complement of the enemy, arranged in battle formation. Moreover, is it conceivable that the citizens of the Eastern coast would view with equanimity the departure of their main "line of defense?" This is particularly true if we were engaged in a war with two powers.

A number of high power 18-inch rifles, together with large numbers of mortars, a comparatively cheap weapon, would make any foreign power hesitate before essaying a naval attack on our coast defense. These rifles would be capable of hurling one-ton projectiles to a range of 20,000 yards and to a far greater range, though with lessened penetrative possibilities. At greater ranges their lack of penetrative possibilities could largely be made up by increasing their explosive contents. And we are better able to meet this last requirement than any of the other world powers, thanks to the inventive ingenuity of our much-criticised regular Army officers.

Mortars Most Effective.

Since the best deck protection offered does not exceed four inches, it follows that mortars are most effective types of artillery weapons. By slightly decreasing the weight of the projectile they can be used up to ranges of 21,000 yards.

With such weapons it would be impossible for battleships to approach close enough to silence the fort batteries to such an extent as to enable them to use mine sweepers with comparative immunity; therefore, if they risked all on a dash for the harbor entrance they would not only be obliged to face a terrific fire, but the more terrible danger of explosive mines filled with gun cotton or the newly invented mine explosive, trotol.

Another consideration of paramount importance to the citizens of the West is the location of at least one of our armanent factories for heavy artillery in proximity to this Coast. The life of an average big gun does not exceed 100 shots. To be relined they must be shipped to Eastern states, a needlessly slow and highly expensive expedient. Even considerable repairs necessitate a transcontinental trip.

The installation of a coast defense battery requires nearly two years. In other words, once war is declared we must stake our all on what we have.

Hydroplanes Are Essential.

Naval powers have commenced to recognize the value of the hydroplane. That move should be met by a decided improvement in our aeroplane service. Prior to the European war France was reported to have 1400 aeroplanes, Germany 1200 planes, and we had less than a score of military machines. Our long coast lines would be particularly susceptible to raids from the enemies' hydroplanes, and, unless we can meet them in equal numbers, our coast defense system would be thrown entirely out of gear.

Coast highways, constructed for movable guns of heavy caliber, would be a highly desirable addition to our defensive system.

Anti-aircraft guns must be rapidly installed.

Fire Control System Complicated.

The average civilian imagines that most guns are fired as you would use an ordinary rifle, namely by sighting. He probably will be surprised to learn that the modern system of handling the coast defense pieces involves the most accurate mathematical computations, that it is not necessary for the members of the gun crews to get a glimpse of the object they are firing at, and that the real eyes and brains of the huge mechanical instruments of destruction they are working with are many miles away from the firing batteries. Most complicated problems enter into the general term known as fire control.

Miles of underground conduits containing electrical cables connect the various stations from which observation of the movements of an enemy, represented by a target, are conducted. These stations contain instruments known as range finders. They are fitted with high-power telescope lenses and are so adjusted that they determine not only the angle to the target, but also its distance from the observation point. Though these stations can be used independently to direct the fire of a battery, as a general rule two are used in conjunction with each other. The distance between the stations, known as the base line, is definitely known even to the fraction of a yard.

Targets are tracked (followed) by means of the range finders on both ends of the base line. Readings of the instruments are made at definite intervals by the use of electrical clocks that work simultaneously at both base and stations. The angles read are transmitted by phone to a room known as the "plotting room." Here the data obtained are reproduced by means of a plotting board, which is in reality a miniature reproduction of the conditions and spacage existing in the field of fire covered by the battery. This information, corrected to conform with the location of the battery, is transmitted to the guns.

Accuracy Is Developed.

In a gun battery, before a rifle can be fired, countless intricate corrections are made to insure accuracy. The target, a mere speck on the distant horizon, is being towed rapidly past the batteries. Actual adjustments are made for the height of the tide, curvature of the earth, which is a considerable factor at extreme ranges, height above sea level, density of the atmosphere, direction and velocity of the wind, the speed of the target and rapidly changing distance to same.

This means the highest type of co-ordinated effort. Over a score of men are involved in the process. Mistakes are not tolerated. An error of a fraction of a degree may mean the destruction of the towing vessel. This means intense mental concentration and the highest type of personal efficiency. A first-class artilleryman cannot be trained in a day, a month, or even a year; nevertheless, we are confronted with the astounding statement from one of our most eminent statesmen—politician, rather—that if our country is threatened, a million men would spring to arms overnight.

Methods of concentrating fire on attacking fleets are unique and highly effective. The channel is carefully marked, all narrow spots being specially noted and numbered. The fleet is observed to approach the harbor. Observing instruments immediately commence to track its course, and it is seen to converge toward a narrow part of the channel.

Soon the fleet arrives in a designated portion. Instantaneously all batteries are notified by the command: "Commence firing! Salvo point, No. 1!" The sharp command is heard in all batteries: "Load!" The guns are set; an instant elapses, the command "Fire!" is given. A combined roar of sound, a flash of luriq flame, and hundreds of tons of steel are presumed to be falling in a veritable maelstrom where the attacking fleet is passing.

Smokeless Powder Discussed.

With the advent of the armor-plated battleship, it seemed for a time as if the designers of artillery were up against a serious dilemma in their efforts to design a projectile that would penetrate the plates. Then came the long-pointed shell somewhat similar to the one now in use.

This move on the part of the gun-manufacturing interests was soon met by a counter move from the boat-builders when they succeeded in hardening their plates to the extent that they resisted in large part the shock of the pointed shells.

The next development in the war game involved a deeper problem—namely, the securing of such a high velocity with the shell fired that it would force its way through the new armor plate. For a time it seemed as if the honors were with the plate manufacturers. Students of the war game realized that the principal fault existed in the almost instantaneous combustion of the powder, thus causing it to spend its force before the shells were actually ejected from the bore of the pieces. All kinds of schemes were used to overcome this seemingly insurmountable obstacle. They experimented with round grains, with many-sided pieces of powder, with exceedingly small grains, but still the first force of the explosion was the greatest, with a decreasing energy as the shell was forced toward the muzzle of the piece. How to obtain a powder with an increasing energy was the enigma.

Smokeless Looks Like Macaroni.

The solution of the problem sounds like fiction, but, regardless of the authenticity of the details, the fact remains to this day we use the same type of powder. It is said that a number of artillerymen were dining together one evening, when the waiter approached with a dish of macaroni. Suddenly one of them jumped to his feet and shouted: "I have it, gentlemen! Note the perforations in this macaroni. If we had a powder built like that we would get an increasing power of combustion, inasmuch as it would burn from the interior of the holes, thus increasing their diameter and gaining the consequent increase of gaseous pressure." All modern smokeless powder resembles in general appearance this same delectable Italian dish. Nitro-cellulose (smokeless) powder is made by treating cotton with acid, hence the importance of cotton in the present international struggle. Before firing this powder is blended to secure uniform results.

With the new powder came an increasing velocity for the guns and a new difficulty for the plate manufacturers to overcome. They met the issue with the Harveyized or face-hardened armor plate, an armor that had an exceedingly hard outer surface. This caused the shells either to deflect from the surface or fail of full penetration. Also they greatly increased the thickness of the armor plate, a fact rendered possible by the great increase in the size and motive force of modern boats.

Not to be outdone in ingenuity, the gun expert again set to work on the problem. High explosive shells were experimented with. It was found, though, that to insure proper explosion it was necessary to make the walls of the projectile so thin that it shattered on coming in contact with the armor plate. Obviously the walls of the shell had to be very thick to gain penetration, and the explosive filling most powerful to shatter in turn the projectile after it had obtained maximum penetration. The discovery of Dunnite solved this problem.

At present increased armor plate has again been met by higher powered guns made possible through the discovery of the hoop principle in gun construction that found its eventual, though not very satisfactory, culmination in the wire-wound gun.

As to where the freezing point of human courage exists in the fight for the development of war instruments of destruction remains a profound mystery. It is related of Sir Henry Maxim, the great inventor of some of the most modern means of warfare, that his real idea was to develop instruments of life elimination so awful that war would cease as a consequence. He now admits his failure.

High Explosive Explained.

Explosive D (Dunnite) is a yellow compound used to fill all shells in use for the coast defense guns of the United States during times of actual war. It was originally perfected by Colonel Dunn, hence its name. Military authorities pronounce it the most destructive high power explosive in use. The Japanese possess an inferior imitation called Shimtose. It is surmised that their explosive was obtained by making an imperfect chemical analysis of the American product.

Artillerymen explain that this explosive, unless combined with another secret composition contained in the fuse, cannot be exploded. This fact renders the explosive peculiarly valuable, inasmuch as the powder can be safely handled and subjected to the shock of firing it out of the huge 12 or 14-inch guns without prematurely exploding it. The arrangement is such within the shells that the portion rendering it explosive is kept away from the Dunnite until the shell strikes the object aimed at, then it unites with its component, causing a terrific explosion, thereby tearing the shell, after it has penetrated the armor, into thousands of fragments.

The advantage obtained through the short time it takes the two compounds to unite (estimated at 2000ths of a second), causes the explosive shells to penetrate and then explode in the very vitals of the enemy's vessels, amidst the engine rooms, boilers and powder magazines. It is stated that in a test of this explosive it tore a hole in a 12-inch hardened steel plate large enough to drive a team of horses through. Before this composition was perfected the thickness of shells was limited to the force of the powder used to explode them, and hence they could not be built heavy enough to secure armor penetration. Dunnite practically nullifies the protection afforded by the best armor plate designed by foreign powers, provided that we adopt coast defense guns of a 14 and 16-inch caliber.

Oregon Troops Developing.

It is but a few years since the state artillery troops might well have been termed an undisciplined mob. Year after year, these men have been coming to Fort Stevens, many times at great personal sacrifice; in fact, many cases are known wherein lucrative positions were sacrificed on the altar of patriotism. These men have been met by the regulars in the same spirit that they came to Fort Stevens, namely, with the desire to accomplish results. They have developed into first-class artillerymen.

Much of their success undoubtedly has been due to the able efforts of their former inspector-instructor, Captain Collins, assisted by Sergeant Gandee. It is believed that Lieutenant Shippam and Sergeant Jirak will continue the work so ably started.

Each year that elapses marks an improvement in the form displayed by the state troops. Their "figures of merit" have been constantly advancing, hence the regulars express themselves as more than pleased with their able pupils.