

**He is a Wizard, With Science
For His Confederate.**

WONDERFUL BATTERY WORK.

**Amazing Results Achieved by Our
Coast Defense Experts and the Bewildering
Array of Apparatus by Which Accuracy of Fire is Attained.**

The war department makes little noise about the condition of the coast defenses. Such activity as one sees about the fortifications reveals little. The sun spreads a flood of gold upon the soft, grassy covering of their sloping sides, and somehow one does not think of them as impregnable fortresses. Such guns as one sees look innocuous enough. They do not seem as formidable as one imagines they ought to look. In fact, however, these fortresses are mailed fists with a velvet covering. Army officers assert that no hostile war vessel could reach the upper bay of New York harbor if it could be seen. It would be annihilated before it reached the Narrows.

Gunnery has shared in the modern tendency to specialize and to become highly scientific in its practice. Gunners are now specialists. A battery is a highly organized mechanism, working almost automatically. In the old days the men who fired the guns used to see what they fired at. Today, with guns capable of throwing a thousand pound shell as far as the eye can see on a clear day, the men who discharge the guns no longer necessarily see the object which is to be struck by the giant hand they release. Until the shot is fired the gun itself cannot be seen above the parapet.

Hitting the target has become almost an exact science. By mechanical means the striking of a target has become so nearly an infallibility that the tugs which tow the floating targets are separated from them by only 600 feet of line. The men upon the tugs have no more expectation of being struck than if they were a mile behind the gun. They never have been struck, although the different batteries have frequent practice. The song of the shell to the men on the tug is not like the song of the Lorelei, for death does not follow in its wake. To be sure, like motoring, one has to become accustomed to face what seems like impending death. Faith in the gunner, as in the chauffeur, and in the gun, as in the motor car, is an essential.

What is done by the guns in some of our forts is illustrated by what has recently been accomplished at two of the forts along the Atlantic coast. At Boston a target four and a half miles from the fort and moving along the horizon at the rate of five miles an hour was struck by every shot fired from a ten inch battery in less than four minutes, the number of shots being six. The following day a battery of twelve inch guns performed the same feat, bunching the shots more closely than did the ten inch guns. The shots of both batteries were so close together at the target that they might have been inclosed in a rectangle 10 by 20 feet.

Battery Parrott, at Fort Monroe, recently was called upon to fire at a moving target an unknown distance away. Actually it was about three and one-half miles away. Pyramidal in shape, it looked as it moved across the water about as a leg o' mutton sail on a skiff would appear at a distance of four miles. Every shot was a hit, and the fourth and last destroyed the target. The entire round was fired in 1 minute 9 seconds.

One of the firing tests is called "fire command." In this test the gunners are expected to change the fire from one target to another of the three in the string as directed and hit it without changing the speed of the fire. The targets are supposed to represent the vitals of a warship. This mythical vessel is considered to have a free-board, or height out of water, of twenty-four feet. In estimating the hits, the basis is that of a representative battleship. A shot which does not actually hit the target, but which would have pierced a vessel had it been where the target was, is counted a hit. Officers on the tug towing the targets work out the score by means of the "range rake." This is an implement which looks like a garden rake with a short handle. The spaces between the teeth each represent a given number of yards. When a shot strikes the officers sight along the handle and note how many spaces to the right or left of the center the shot hit.

A gunner of the old school would turn gray if he had suddenly to adapt himself to the new methods in the face of the enemy. Hair line telescopes, surveying instruments, barometers, thermometers, anemometers, weather vanes, tide gauges and stop watches are required to secure the requisite results. The accuracy of the fire is obtained only by taking into consideration such details as the curvature of the earth, the speed of the target or the hostile warship, the range or distance of the object from the gun, the pressure or density of the air, the speed and direction of the wind, the temperature and age of the powder when placed in the gun, the height of the tide at the moment of firing the shot and the "drift" of the projectile. There can be no guesswork in securing such artistic results as making hits with successive shots.

The effect of all of these factors in the combination under all possible conditions has been worked out by experiments and computations and the result utilized in devising apparatus which automatically registers the in-

formation which is essential at such speed that half a dozen half ton shots can be thrown into a ship from a single battery in the space of less than four minutes. The "drift" of the shot is the distance to the right which a revolving projectile from a rifled gun will go in the course of a given distance. The range and the point where a vessel will be at the moment a shot could reach it are reckoned in actual practice at least once in every twenty seconds. The establishment of twenty seconds as the interval when a fresh survey shall be taken is based upon the fact that no boat could change its speed or its course sufficiently in that space of time to affect the probability of a shot hitting it.

The gunner may have all the knowledge of what to do when a hostile ship appears and know exactly what his gun will do under any given condition, but there are two things which cannot be learned until the exact moment when the gun is to be fired. One is the direction in which the gun is to be pointed, and the other is the amount of elevation or depression which must be given the muzzle in order to have the shot reach the exact spot where the vessel will be when the shot may be expected to reach there. Attached to the carriage of the gun and high enough so that the gunner can look through it over the parapet is a telescope with hair lines crossing the opening at right angles to each other. The telescope is set so that it can be moved from the left to the right by means of a thumbscrew.

This permits right and left corrections to be made in sighting the gun after the range has been determined. The amount of elevation which is necessary in order to make the shot "carry" to the exact spot where the enemy will be "set off" at the gun by means of another mechanism. At other points in the fort are heavily built towers containing the instruments for securing the range and the apparatus for automatically working out the calculations instantaneously. There are two of these instruments at a known distance apart.

A hostile warship is seen in the offing. The two surveying instruments are turned upon it from their respective angles, while the gunner takes his place at the telescope attached to the gun. Others are busily engaged in loading the gun. The man at the telescope shortly receives from the towers directions how to set his sight, while the other men charged with "laying" the gun in direction and elevation receive the data by which they make "settings" at the gun. They swing the gun around until the object which is to be struck appears in the center of the hair line eyepiece of the telescope and set the mechanism which will insure the proper elevation when the gun rises from its cradle. Suddenly the gun springs up. The muzzle shows over the parapet. A cloud of smoke bursts forth, and the men who have not taken the precaution to rise on their toes and open their mouths receive a shock that disturbs their equilibrium and threatens their eardrums. The gun settles back in its place once more. Soon there is ocular evidence that the shot and the hostile ship five miles away have met, to the damage of the warship. The decks amidships are seen to open and men run back and forth. Steam veils the hull, for steam pipes have been pierced. Scientific gunnery has conquered, and at the expense of a few hundred pounds of powder and steel a vessel which cost \$2,000,000 or \$3,000,000 has been incapacitated.—New York Tribune.

A Change of Manners.

We hardly appreciate the rapid transformation of human nature on its highest levels within a single generation. In this consideration "the highest levels" are those attained by the great middle class, who constitute the main audience for the best literature. At least this is the case in America. Thackeray in his lectures on English humorists was addressing such class in England, and in his lecture on Steele, contrasting the Victorian with the Queen Anne era, he said, "You could no more suffer in a British drawing room under the reign of Queen Victoria, a fine gentleman or fine lady of Queen Anne's time, or hear what they heard and said, than you would receive an ancient Briton." The lecturer had just before referred to Tyburn and remarked that a great city had grown over the old meadows. "Were a man brought to die there now the windows would be closed and the inhabitants keep their houses in sickness horror. A hundred years ago people crowded to see this last act of a highwayman's life and make jokes on it."—H. M. Alden in Harper's Magazine.

The Unlettered Learned.

Crudity of diction is not always indicative of crudity of thought. The latter has been longer in the world than language, for the primeval savage was not without the elements of mind when gestures and grunts were his sole means of expression. To rebel is as human as to err, and he who defines grammar is not necessarily a fool.

"How often we hear it said, 'Oh, he's an uneducated man,' and so pay no serious attention to what the 'unfortunate' may have to say. It may happen that we suffer more than he does by such assumed superiority. The round of the seasons can effect as much as a college curriculum to an open eyed man, not in the same direction, not with equal artistic finish, but a fool is he who sets down the untutored student of the outdoor world as little better than a fool. By syntax and prosody we cannot solve the problem of an oak tree or that of the minnow in the brook that flows past its gnarly roots. Greek philosophy does not explain the color of a flower nor Roman sophistry why birds build nests.—Lippincott's.

AN ALLIGATOR'S TAIL.

The Muscles of This Wonderful Organ Are Like Springs of Steel.

In whales the tail is set transversely instead of vertically. The reason for this is concealed in long ages of evolution. Fishes have always been as they are now, aquatic, but the ancestors of whales and dolphins lived on dry land, where they crawled about on four good feet. When for some reason these creatures of old took to the water they probably did not plunge at once into the open ocean, where their descendants now live, but waded and paddled along in the shallows and marshes of the shore. Here a vertical tail would certainly be in the way, while a horizontal one might be used advantageously. We must not forget also that whales breathe air as we do and that it is more necessary for them to shoot quickly up from the dark ocean depths to the surface than to turn, fishlike, from side to side.

The sting ray and certain other fishes have a sharp, poisonous spine in the tail with which they can inflict a severe wound, but in the case of the alligator it is sheer brute force that the tail is useful for defense. The muscles of this organ are like springs of steel. The great saurian lies asleep in the sun, seeming more dead than alive, but if a half dozen men should seize its tail with all their strength, with one terrible flick the alligator could scatter them, breaking legs and arms as if they were straws and hurling the men far to each side.

In Mexico I once grasped a three foot iguana by the tail, and I had my strength tested to the utmost to hold on for single minute. Then, without warning, the great lizard went one way and I the other. His tail had parted company in the middle, and I had nine inches of it left in my hand. Instead of being fatal to these iguanas, such an occurrence is not infrequent and is of the utmost value to them in saving their lives.

When alarmed their first act is to dive for their holes, but when an eagle is making the attack the swiftness of its flight sometimes intercepts the lizard and the bird of prey seizes the long tail which is the last visible part of the iguana. After a brief struggle the eagle flies away with the scaly, bony tail tip, which must afford but slight gustatory satisfaction, while the iguana seeks the deepest part of its burrow. The short muscles soon close the wound, and in a surprisingly short time a new tail shoots forth and grows to a goodly length, ready if need be to be sacrificed in turn. Sometimes two tails grow out from the old tail stump—surely a superfluity of blessings. A weak spot in each tail bone is the cause of the breaking. Thus we see that the tail of the iguana is indeed an interesting one.—C. William Beebe in Outing Magazine.

This Time the Lawyer Scored.

A lawyer appeared before one of the New York city boards asking that damages be awarded to certain clients because of a change of grade in their street. When he had completed his argument the president said: "Mr. Blank, you ought to know better than to take up the time of this board in this manner. You are too good a lawyer not to allow that on your own presentation of facts these people have not the shadow of a legal claim against the city." Your remarks are fully justified, Mr. President," said Mr. Blank. "I not only expected them, but you have done me a favor by making them. There are times when a lawyer is so pushed by his clients who seem to know more about the law than he does that the only thing he can do is to let them come up against it themselves. They probably know as much about it now as I did before. I thank you for your attention." With that he took up his books and left the room, followed by half dozen crestfallen clients.

The Honest Chinaman.

You soon learn in China that you can trust a Chinaman to carry through anything he agrees to do for you. When I reached T'ai Yuanfu I handed my interpreter a Chinese draft for \$200 (Mexican), payable to bearer, and told him to go to the bank and bring back the money. I had known John a little over a week, yet any one who knows China will understand that I was running an appreciable risk. The individual Chinaman is simply a part of a family, the family is a part of a neighborhood, the neighborhood is a part of a village or district, and so on. If John had disappeared with my money after cashing the draft and had afterward been caught, punishment would have been swift and severe. Very likely he would have lost his head. If the authorities had been unable to find John, they would have punished his family. Punishment would surely have fallen on somebody.—Samuel Merwin in Success Magazine.

What a Knot Is.

Probably there is no nautical term more frequently used than the word "knot." The word is synonymous with the nautical mile, or 6,080.27 feet, while, as every one knows, the geographical mile is 5,280 feet. This would make the knot equal to 1.15 of geographical miles, and therefore, in order to compare the speed of a boat expressed in knots with a railroad train, it is necessary to multiply the speed in knots by 1.15. Another point to be remembered is that speed means a distance traveled in unit time, so when one speaks of a boat having a speed of 20 knots it is not necessary to add per hour, as the word itself when employed as a unit of speed signifies nautical miles per hour. A cruiser that makes 21 knots travels 24.15 geographical miles per hour.

WINTER BUTTERFLIES.

A Hardy Brood For Which Frost and Snow Possess No Terrors.

Coming in one day from a walk in a heavy snowstorm, I dropped upon the evening table some triangular brownish bits that looked at first sight like flakes of dried bark.

"What are those—chips?"

"No, Butterflies."

Such a reply with a foot of snow on the ground and great probability of a foot more before morning was accepted as a pleasure and not to be taken seriously. The idea of catching butterflies in a snowstorm seemed "fishy" for serious consideration.

On the approach of winter most of the butterflies, those delicate little creatures of fair weather, naturally die. But among their number there is a whole hardy brood for which the rigors of winter possess no terrors. These are the angle wings, or vanessids. They are frequently called "thaw butterflies" from the fact that during the warm spells of winter they awake from their torpor and may frequently be seen sunning themselves near their place of hibernation or if the weather is mild and pleasant flitting lightly about in the open places.

These insects pass the winter both as chrysalis and as mature butterflies. Normally they remain in the chrysalis form only about two weeks, but it is probable that the severe cold overtakes some before they are fully developed, which may account for some of them hibernating as chrysalis.—St. Nicholas.

COURTING DEATH.

The Work of the Mounted Police of Canada in the Northwest.

The Northwest policeman's first duty is to die if that should be necessary. He is not allowed to shoot a desperado, go up, sit on his carcass, roll a cigarette and then read the warrant. He must not shoot. At all events he must not shoot first, which is often fatal, for if there is a time when delay is dangerous it is when you are covering an outlaw, writes Cy Warman in the Sunday Magazine.

Numbers of the force have been known to ride or walk into the very mouth of a cocked .45 Colt and never flinch. In about ninety-eight cases out of every hundred the man behind the gun weakened. In the other two cases he extended his lease of life, but made his going doubly sure. When a mounted policeman falls, the open space he leaves is immediately closed, for back of him stands the Dominion government and back of that the British empire. So the desperado who thinks he can kill and get away has a hard time. If the police chase him out of the Dominion back to the islands, he is likely to fetch up at Scotland Yard. If his native village lies south of the forty-ninth, the Pinkertons take up his trail, and when all these forces are after a man his days are gliding swiftly by.

"Next!"

"I was counsel for railway company in the west," says a prominent New York lawyer, "in whose employ a section hand had been killed by an express train. His widow, of course, sued for damages. The principal witness swore positively that the locomotive whistle had not sounded until after the entire train had passed over his departed friend.

"You admit that the whistle blew?" I sternly demanded of the witness.

"Oh, yes; it blew."

"Now," I added impressively, "if that whistle sounded in time to give Morgan warning the fact would be in favor of the company, wouldn't it?"

"I suppose so," said the witness.

"Very well. Now, for what earthly purpose would the engineer blow his whistle after the man had been struck?"

"I presume," replied the witness, with great deliberation, "that the whistle was for the next man on the track."—Harper's Weekly.

Summary Conviction.

Hawaiians all became Christians through the simple process of an edict—kapoo—of one of the sturdy old Kamehamehas. The worthy king, observing that it was easier to kill an enemy with a rifle than with a club and that the rifle was the invention of the Christians, took a short cut through the theological mazes of the missionaries who were trying to convert his subjects and announced that all Hawaiians were from that moment Christians. As he added that he would knock on the head any who objected the thing was done as fast as his couriers could deliver his message to his loving subjects.—New York World.

What He Had Done.

Tactful and delicate even for a Frenchman was the reply made by a Parisian who had not found "life on the ocean wave" all which one could wish. He was sinking, pale and haggard, into his steamer chair when his neighbor cheerfully asked:

"Have you breakfasted, monsieur?"

"No, monsieur," answered the Frenchman, with a wan smile; "I have not breakfasted. On the contrary!"—Everybody's Magazine.

The Name Oscar.

It is interesting to remember that the name Oscar was bestowed on Napoleon on Bernadotte's son—the first King Oscar—to whom he stood godfather, not for any Swedish associations, but because it was the name of a heroic character in Macpherson's "Ossian," a work which Napoleon continually studied.—London Spectator.

The Practical Girl.

"Jack told me he could live on my kisses forever."

"Are you going to let him?"

"Not till I find out what I'm going to live on."—Chicago Journal.

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