THE MODERN GUNNER

He Is a Wizard, With Science For His Confederate.

WONDERFUL BATTERY WORK.

Manazing Results Achieved by Our Coast Defense Experts and the Bewildering Array of Apparatus by behick Accuracy of Fire Is Attained.

The war department makes little rander about the condition of the coast defenses. Such activity as one sees walkest the fortifications reveals little. The sun spreads a flood of gold upon tibe soft, grassy covering of their slopand somehow one does not which of them as impregnable for-Exercises. Such guns as one sees look impecuous enough. They do not seem tos formidable as one imagines they cought to look. In fact, however, these thetresses are mailed fists with a velwat covering. Army officers assert That no hostile war vessel could reach The upper bay of New York barbor if in could be seen. It would be annihi-Inted before it reached the Narrows.

Sunnery has shared in the modern mendency to specialize and to become Machly scientific in its practice. Gunmass are now specialists. A battery is a highly organized mechanism, working almost automatically. In the old days the men who fired the guns used. no see what they fired at. Today, with game capable of throwing a thousand mound shell as far as the eye can see um a clear day, the men who discharge the guns no longer necessarily see the extrect which is to be struck by the ciant hall they release. Until the shot is fired the gun itself cannot be seen

move 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 which tow the floating targets are meparated from them by only 600 feet line. The men upon the tugs have more expectation of being struck than if they were a mile behind the min. They never have been struck, although the different batteries have Erequent practice. The song of the mbell to the men on the tug is not like the song of the Lorelei, for death does mot follow in its wake. To be sure, Take motoring, one has to become acemstomed to face what seems like impunding death. Faith in the gunner, me in the chauffeur, and in the gun, as an the motor car, is an essential.

What is done by the guns in some of war forts is illustrated by what has precently been accomplished at two of fire forts along the Atlantic coast. At Boston a target four and a half miles from the fort and moving along the Micrison at the rate of five miles an Boor was struck by every shot fired ffrom a ten inch battery in less than Most minutes, the number of shots Being six. The following day a batthey of tweive inch guns performed whe same feat, bunching the shots mozee closely than did the ten inch The shots of both batteries were se close together at the target that they might have been inclosed in a pretangle 10 by 20 feet.

Buttery Parrott, at Fort Monroe, secently was called upon to fire at a moving target an unknown distance away. Actually it was about three and and half miles away. Pyramidal in share, it looked as it moved across the water about as a leg o' mutton sail on s skiff would appear at a distance of gen miles. Every shot was a hit, and the fourth and last destroyed the tar-The entire round was fired in 1 mainute & seconds.

One of the firing tests is called "fire command." In this test the gunners expected to change the fire from one target to another of the three in other string as directed and hit it withmed changing the speed of the fire. The surgets are supposed to represent the witals of a warship. This mythical wassel is considered to have a freeboard, or height out of water, of twento-four feet. In estimating the hits, the basis is that of a representative hattleship. A shot which does not acmally hit the target, but which would have pierced a vessel had it been where the target was, is counted a hit. Concers 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 worth each represent a given number was yards. When a shot strikes the officers sight along the handle-and note how many spaces to the right or left at the center the shot hit.

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

The effect of all of these factors in the combination under all possible conattions has been worked out by experiments and computations and the remust 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 bitting 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 is "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 a precention 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 hundreds of 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 a 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 sickoning 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 Mag-

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 defles 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.

-WALKING BANKS.

All Mexicans Carry Large Sums of Money on Their Persons.

A bank to the Mexican is not to be thought of for the handling of small amounts. Almost any Mexican in professional or business life carries on his person anywhere between \$200 and \$800. Even the poor Indian in his blanket can more than likely produce more than many foreigners.

The ordinary foreigner in Mexico. whether tourist or business man located here, carries perhaps \$50 to \$100 with him and no more. If a tourist, the foreigner will deposit any money over that amount he happens to have with him in the safe of the hotel at which he is registered; if a business man, he will carry no more than that amount on his person and will give a check for anything over that amount. The Spaniard resident in Mexico is inclined to carry much larger sums than any other foreigner here, and he will often carry sums of money aggregating nearly \$1,000.

The ordinary Mexican professional man will be found to carry sums of money on his person that would surprise the ordinary traveler and even cause him worry were he forced to carry it with him, yet the Mexican never even thinks of it.

It was but a few days ago that an instance of this kind was brought to attention. One Mexican of the middle class asked another in a casual way if he could change a thousand dollar bill. The other pulled out a wallet from his inside pocket and counted out nearly \$2,000. Time after time this has happened, and it seems no uncommon thing for a Mexican of the middle class to carry between one and two thousand pesos on his person.

One Mexican, who was being reproved for this apparent carelessness and imprudence, replied:

"We do not have any of your American holdups and highwaymen in Mexico. I have known my friends to have their pockets picked for large amounts through their own carelessness as to where they carried their money, but I have never heard of any one being hit over the head with a blackjack and his pockets rifled of their contents. That thing is unknown in Mexico, and so we have no fear in carrying these 'amounts."

The check idea seems to have taken but small hold as yet upon the citizens of Mexico, especially when small amounts of less than \$1,000 are concerned. They consider it much easier to pay spot cash than to give a check for amounts of \$50 and \$100, and they claim, with some amount of reason, that a business deal can be put through with better advantage to themselves

when the cash is in sight. Even the Indians in the street carry amounts of cash that would never be supposed to be in their possession. They carry their money in leather belts fastened around their bodies inside their trousers. These belts are hollow and are open at one end. Into the open end the Indian slips his nesos or bills until he has the whole full. The belt then is either taken off and bidden away or the bills are changed for larger denominations and still carried around the body. But the Indian is a stickler for "pesos duros" and prefers them to any other class of money except gold.-Mexican Herald.

Too Much at Stake.

The question for discussion before the debating society that had met in the little schoolhouse belonging to district No. 13 was this: "Resolved, That the works published under the name of William Shakespeare were really

written by Lord Bacon." The debate was fierce and prolonged, but, as frequently happens in such cases, the disputants on one side ad informed themselves thoroughly, while the others, relying upon their having the popular side of the controversy, depended solely on their oratory; hence the Baconians, having learned all that could be said in favor of their contention, made really a very plausible case and had decidedly much the better of the argument. At the close of the discussion the three judges who had been selected held a brief consultation and decided in favor of the neg-

"Why did you decide against us?" subsequently asked one of the disputants. "You know we presented good arguments, while the other fellows didn't show any."

"That's all right," answered the judge to whom this question was addressed, "but two of us had just bought expensive copies of 'The Works of William Shakespeare' that cost us \$15. Do you suppose we were going to acknowledge that Shakespeare didn't write 'em?'-Youth's Companion.

An Ode to His Washerwoman.

Even in the face of financial embarrassment the Yale student refuses to be downcast, for when the florist threatens suit if his bill is not paid or when in walking through the city streets the student sees his newest shirt adorning the grinning face of his washerwoman's young unhopeful it is not his nature to spill a bottle of ink on a dissertation on the subconscious relationship of poverty to vice. More likely he will go whistling back to the campus and put to the tune some such verses as appeared in the Yale Record of years ago under the title "Owed to My Washerwoman:" I promise thee that some day I will come In answer to thy oft repeated dun. And in thy eager hands I then will lay

The dollars ten I've owed for many a day. I will not censure thee for rips and tears, For e'en the socks that now thy husband

Yes, some day in the dim futurity I'll pay it all, I promise thee.

And so he will set the whole campus laughing, if not to paying their bills.-E. R. Embree in Bohemian.

MAKING A TIME TABLE

A Peep Into the Chart Room of a Great Railway.

WORKING OUT" A SCHEDULE.

Threads and Pins That Enable the Officials to So Place Trains as to-Avoid the Danger of Collision and All Unnecessary Loss of Time.

Travelers who consult the ever handy time tables to the arrival or departure of the particular train that is to carry them probably never give a thought to the manner in which a modern time table is made up. To the uninitiated it is a Chinese puzzle, and even those well versed in its mysteries often become confused. How are time tables made? What is the procedure in determining the speed of a train and the exact time and place it shall meet another train? The answer to these questions is to be found in the chart room.

The chaft room is usually in some quiet corner of the general offices of a railway company and for weeks at a time is locked. But every now and then the word goes forth that the schedule is to be shortened or lengthened, new trains to be put on or some change made that necessitates the revision of the time card. Then from distant points of the system the division superintendents gather for a conference with the heads of the passenger and freight departments in order to learn the most desirable time for trains to arrive and depart from terminals. With this information, they retire to the chartroom, where there is a separate chart for each district.

The charts are white boards about six feet wide and from two to five feet high. The names of the stations, accurately scaled, are printed on the boards at the side, and from the top of the board many colored strings dangle, more suggestive of a parior game than a tool for laying out the path of traffic and commerce.

The superintendents confer regarding the time at junction points on connecting trains and then work out the schedule on intermediate points on a chart of his division.

Horizontally the chart shows 12 midnight on the left side, and there a line extending across the chart for each five minutes from that time until the full twenty-four hours have been shown. For convenience each third line, representing a period of fifteen minutes, is in a different color.

Superintendents are supplied with various colored slik thread, pins and a tack hammer. Red is used to designate a passenger train, green for a second class or freight train, and black is for a third class or local freight train. Whenever a train is scheduled out of a terminal at a certain hour a pin is driven at the intersection of the station line and hour line-this being the beginning -and such other times at various stations as may be desired are determined by drawing the thread over the board to meet the intersection of the various stations and hour lines at the proper times. Where necessary tacks are driven to keep the thread on the proper

schedule. Westbound trains run down and diagonally to the right. Eastbound trains start at the bottom, run upward and diagonally to the right. Wherever these threads cross, a meeting point is indicated, and if this crossing of the threads is between station lines it is then necessary to adjust the time on each train, so that the meeting point will be at the most convenient station. This is done by holding the lines crossed at station with a pin. Of course on double tracks these meeting points are not necessary.

After the chart has been strung a former issue of the time card with pen and ink is brought into use, and the superintendent begins at original terminal, looks at the station line, and whenever any string representing a train crosses this station line he notes the time as shown on the proof of the time card. One train at a time is read from start to finish, and after they have all been checked they are rechecked to see that all meeting points are properly made and noted on proof, after which the time table is ready for the printer.

To make a successful time card a superintendent must be perfectly familiar with the grade and track conditions and when stringing the thread must allow more time for unfavorable grade, railroad crossing and other unusual stops, so that the running time of the train will be uniform. Whenever it is desirable to make a meal stop a pin is put in at the proper station and the string run horizontally to the line until the required number of minute lines have been passed, when it is again taken down the board at the proper degree of speed. By making the string more vertical the speed is increased, as there are fewer minute lines crossed. By swinging thread to the right the speed is decreased, and by the use of pins this can be arranged between each station to suit conditions.-St. Louis Globe-Democrat.

Disposing of Her Rivals. "The president of our club is an awfully clever woman." "What did she do?"

"Disposed of her rivals for office by putting them on the nominating committee."-New York Press.

Double Surprise.

The Friend-Your marriage to Sapphead was quite a surprise to me. The Ex-Widow-Well. I guess it was more of a surprise to him.-Boston

PAPER WATERMARKS.

Method by Which the Devices Are

Imprinted on the Sheets. The discovery of the watermark was the result of an accident-probably a thousand years ago. Parchment was then made of vegetable pulp, which was poured in a liquid state into a sieve; the water dripped out from below, and the thin layer of pulp that remained was pressed and dried. When dry it was found to bear upon it the marks of the fiber that composed the bottom of the sleve.

These fibers seem to have been twisted reeds, and the mark they left on the parchment took the form of wide lines running across and across diagonally. In those days the watermark was regarded as a blemish since the fiber was thick and coarse and the deep impression made on the paper proved a drawback in writing. The quill of the scribe found many a yawning gap to cross on the surface of the manuscript-"switchback scripture" it has been termed. But when wire was substituted for fiber in the sieve the lines of the waterwark grew thinner and less conspicuous.

The possibilities of the usefulness of the watermark became apparent by degrees. It was first found to be of service in preventing the forgery of books and manuscripts. Many a bogus copy of a rare work has been detected because the counterfeiter failed to take into account the watermarks of the original. The watermark of many a precious manuscript in the world's museums is alike its glory and its safeguard. And in the sphere of bank notes and paper money everywhere the watermark is most useful in protecting the notes from imitation.

The term "watermark" is in reality a misnomer since the mark is actually produced by wire. Wire is fashioned into the desired pattern, figure or lettering. This is inserted beneath the sheet in the last stages of its manufacture and while the paper is still capable of receiving the impression and the wire device stamps itself into the sheet. Ordinary note paper held up to the light reveals hundreds of parallel lines running up and down, betraying the fact that the paper was made on a wire foundation. To this the paper owes its smoothness and its even texture.

In the manufacture of postage stamps the watermark is of immense advantage as a safeguard. The aviges that produce the marks are kept strictly under lock and key. They are brought but only when wanted, and an inspector keeps an eye on them till their task is done, when they are at once locked up again. - London An-. swers.

Symbolism of College Gawns. It has been said that few people, in-

cluding many university men themselves, have any definite idea of the meaning of the gowns worn by collegiate students.

In America university gowns exhibit much variety, there being a great difference in the various institutions, but all over the country-in fact, all over the English speaking world-certain distinctions hold.

The ordinary bachelor's gown, the first the student owns, is of unadorned black with pointed sleeves and is ordinarily made of serge or other simple black fabric. The master's gown is like the student's, inasmuch as it is plain black, but the sleeves are cut differently, being long pendants shaped not unlike fish tails and hanging from the elbows nearly to the bottom of the gown. The master's gown may be made of silk, as may also the bachelor's gown if it is worn by a man of long academic standing who has happened to receive no higher degree, but the ordinary university man has no desire to clad himself in silk.

Most doctors' gowns, especially in England and Scotland, have hoods that give them certain distinctions and differentiate by differences of color the doctorates.--Harper's Weekly.

A Disciple of Emerson. He stood in the driving, sloshing rain on a corner contemplating, the curb.

"Don't you know enough to go in when it rains?" asked an acquaintance hurrying by to shelter. "I am a disciple of Emerson," he re-

plied. His acquaintance stopped in astonishment while his umbrella turned inside out. What the"- he began.

"You see that curbstone," the first man continued, "where it has been worn smooth by the throngs? You never saw it when it was washed shiny clean before. Isn't it the most beautiful gray-green and polished like a slab? Emerson said you could find peauty in the rainwater channels in a pile of ashes if you looked for it I'm finding it in the sidewalk."

The other man's comment was smothered in a fresh gust of wind and the wreck of his umbreita.--New York Sun.

Insurance and Assurance. They were talking, the little group of agents, about the words insurance and assurance, some claiming that the first and some that the second was the better word to use.

But with a scornful laugh a Boston

agent in gold rimmed spectacles said: "You are all very ignorant. Insurance is no better and no worse than assurance. Each has a special significance, and each is equally good in its place. The place for assurance is where precaution is taken against a certainty-against, that is, death. Life assurance, we should say if we spoke with perfect correctness. The place for insurance is where precaution is taken against an uncertainty, such as fire. shipwreck, burglary. Fire insurance, marine insurance, we should say."-

Exchange.

Batton - color deces is : Ball . L. Copy . Acopy . Aco

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 slong 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 by 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 iguans by the tail, and I had my strength tested to the utmost to hold on for a 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 ignana. After a brief struggle the eagle flies away with the scaly, hony tail tip, which must afford but slight gustatory satisfaction, while the ignana 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 beto be sacrificed in turn. Sometimes two tails grow out from the old tail stump-surely a superfluity of biess ings. A weak spot in each tail bone is the cause of the breaking. Thus we see that the tail of the Iguana is iudeed 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. Biank, 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 a half dozen crestfallen

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 no appreciable risk. The individual Chinaman is simply a part of a family, the family is part of a neighborhood, the neighborhood is 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, phuishment 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 geopraphical 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, no when one speaks of a boat having a speed of 20 knots it is not necessary or proper 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 24.13 geographical miles per hour.

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