Correspondence

Ancient War Implements.

MESSRS. EDITORS:—I am not familiar with the history of the experiments and improvements in artillery, only having read somewhere, when a boy, that the first cannon was made of leather and the first balls of stone; and having a distinct opinion, during our late war, that grape out of smooth bore batteries at short range, would, upon an average, do more work than single bolts fired from rifled guns at ranges of one to five miles. But I have been under the impression that the advocates of the breech-loading system claimed it as a modern invention. Am I right or wrong in this supposition? There are, in the Museum of Northern Antiquites, at this place, two pieces of breech-loading ordnance, taken from a wreck in neighboring waters, which are at least three hundred and fifty years old The guns are of wrought iron, and the workmanship is evidently that of welding one flat ring on to another, which I had also taken to be quite a modern idea. I have heard it said that there is a pretty good pattern for a Colt's revolver in an old collection in Germany, but for this I cannot vouch.

The hatchets and arrow heads of the stone period found in the north of Europe, are many of them of the same pattern as those found all over the United States; the arrow heads being of inferior, and the flint knives and spear heads being of superior workmanship to any I ever saw in America. Did the inventive powers of savages run by necessity in the same channel in different continents? or were the patterns of these instruments and the unknown art of fashioning the hardest of stones inherited by tradition from the original diverging kindred families in Asia? Does the shape of implements of hunting and of war throw any light upon the question of the first peopling of America? From the bronze period there are in the same Museum specimens of curious spiral war trumpets cast in one piece, a work which it is said could not now be done any where but in Japan. Is this true that savages could cast metal into forms which a Yankee cannot, or is it only the innocent enthusiasm of an honest antiquary?

Y.

Copenhagen, Denmark, May 5, 1866.

[In reply to our correspondent we would say that his comparison between the smooth-bore guns firing grape, and the rifled guns discharging bolts, is based upon a wrong theory. One is intended for one purpose and the other for an entirely different one. Discharges of grape, from smooth bore guns, upon bodies of men at short range, is one of the most destructive agencies of warfare. Balls, bolts, or shells are rarely used at short range, from rifled guns, unless to pierce the sides of ships or breach the walls of fortifications. The object of the rifled bore is to obtain greater range and accuracy.

Breech-loading cannon are probably as old as any style of guns. It is difficult to assign the precise date to their use, but Benton in his "Ordnance and Gunnery" says: "Among the earliest cannon are found those which were loaded at the breech instead of the muzzle. One of the earliest methods was that of having a rectangular, horizontal opening at the breech to receive a sliding chamber containing the charge, the block being held in its place by a key inserted from the top of the piece."

The Colt's revolver, or rather the principle of its operation, is by no means modern. We have heard Col. Colt, himself, acknowledge this. At the time he invented his revolving arm he did not know that he was reviving one of the lost arts. Subsequently, however, he obtained a specimen of rude workmanship, which we believe dated back to the sixteenth century. The barrels or chambers in this machine were revolved by hand.

The similarity of the rude stone weapons and implements found in the north of Europe to those found on this continent, does not, in our opinion, argue a consanguinity of races or mutual intercourse. The same necessities of men in one locality would urge them to the adoption of similar means, to provide for those necessities, as those adopted by other tribes, however far removed; for God made of one blood all the nations that dwell upon the face of the earth. The spear, the bow, flints for arrow heads, and other articles, have been found indiscriminately among the savage tribes of all parts of the world, and in all ages.—EDS.

Crytography.

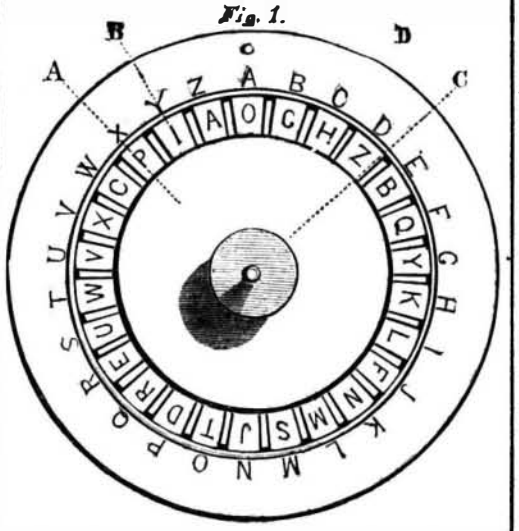
MESSRS. EDITORS:—In the SCIENTIFIC AMERICAN of May 5th appeared a very interesting article on cipher writing, and it struck me that a description of a little instrument I invented during the war, for producing unlimited numbers of cipher alphabets, might not prove uninteresting to the readers of your journal, especially as the Chief of the Signal Corps of the U. S. Army ordered fifty of the instruments, and for all I know, manufactured his ciphers during the war by them. They were never patented, and the Government received them at cost price.

With regard to ciphers, it will be well to remember, that owing to the constitution of our language, a given number of words will contain the same letters repeated a certain number of times, so that there is no cipher, however complicated, which, if used for any length of time, cannot be discovered, the clue being the repetition of the signs.

Besides this, a cipher cannot be produced without the effort of thought, *except mechanically*, and it is safe to conclude that what one mind can conceive another mind is capable of tracing out.

Having these considerations in view, during the first year of the rebellion, I set myself the task of producing a pocket apparatus which would be capable of producing ciphers perpetually without mental effort, and therefore without mental bias or sequence; thus the operator being able to produce 365 ciphers as easily as he before could make one, had no inducement to repeat the same cipher twice over; and as the little pocket disk in its operations followed no bias or rule, depending entirely on *chance* for its changes, the chances were very great against any discovery being made without the key in the possession of each communicating party.

Fig. 1.



The instrument consists of a brass disk, D, about the size of the illustration (Fig. 1), upon which an alphabet was indelibly stamped in a circle. Within this circle of fixed letters there was another circle of movable ones, B, fitting into little recesses opposite each fixed letter. The movable letters are represented separate from the disk in Fig. 2.

Fig 2.

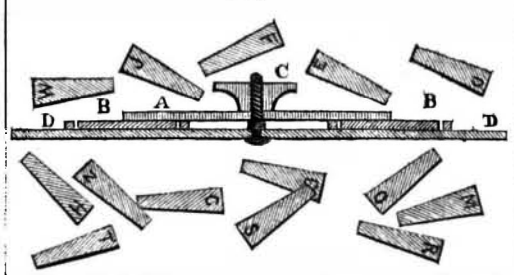


Fig. 2 represents also a section of the disk, in which D D is the disk, B B the movable letters in their recesses, held in place by the circular plate, A, and the nut, C.

To illustrate the mode of using the disk: suppose the movable letters to be put into the disk—the A opposite A, B opposite B, and so on, each fixed letter with a corresponding movable one opposite. We now wish to make a cipher—turn the disk over on the table, the letters will fall out with their faces downward. Now mix them up like a set of dominoes, and replace them at random in the disk; screw the cap down upon them, and the cipher is ready. Probably such an arrangement of letters as represented in Fig. 1 may be the result.

You wish to telegraph to headquarters "Early has entered Pennsylvania," it would not be necessary to use all the letters; you would use, say, EARLY HS ENTD PNSLVA. To transmit this by the disk as arranged in Fig. 1, you would use BOEMIRUBJWZ DJUMXO.

The system recommended was to form, by means of the disk, 37 ciphers, numbered 1 upward. Copies of these were to be furnished to each of the signal officers, with instructions to change every ten days. This afforded ciphers for a year—the date upon which the cipher was transmitted indicating at headquarters the arrangement or key to be consulted in translating, and *vice versa*—the disk being set according to the copy served as the key, and was always at hand. If any of the copies were lost, headquarters were to be at once apprised of the fact, so that a new set of ciphers might be manufactured. Thus, to produce a new cipher, the time only is required necessary to unscrew the nut, upset the movable letters, and replace them at random—the mind has no part in it; therefore, if not used too often, it will be impossible, by any rule, to find out the cipher in time to make use of it.

J. WYATT REID, Consulting Engineer.
New York City, May, 24, 1866.

The European Naval Excursion.

MESSRS. EDITORS:—If there is any thing this country should look upon with apprehension, it is the adoption of the monitor system by England or any other maritime rival. This subject is now being agitated in England by the most influential and scientific bodies. Already lectures of the most exhaustive character, accompanied by diagrams illustrative of our system, have been delivered before the Institution of Naval Architects and the Institution of Civil Engineers, before audiences composed of the highest dignitaries of the kingdom, attracted by the serious national importance of the subject.

Mr. John Bourne, the eminent English engineer, in a lecture before these scientific bodies, was so emphatic in his condemnation of the system adopted for their ironclad fleet as to cause great consternation among those who are responsible for it, while, on the other hand, so complete were his demonstrations of the correctness of the monitor system, that the supporters of the government plans were utterly discomfitted. Indeed, so prompt, decisive, and unanswerable were Mr. Bourne's replies to the interrogatories, which the members of these bodies are permitted to ask the lecturer, that even the Chief Constructor of the Navy, Mr. E. J. Reed, one of the most accomplished naval architects in Europe, was driven to the wall. Mr. Bourne concludes his demonstration with the following curt interrogatory, "Why then have we not got monitors? And what would our predicament be if such vessels were suddenly to confront us?"

Still further, we find that Mr. John Scott Russell, the builder of the *Great Eastern*, in his great work on naval architecture recently published in London, devotes much space to the discussion of the monitor system, and concludes with an endorsement fully as emphatic as Mr. Bourne's. Many others appear to have taken up and endorsed these views, for we find that for the last month, the columns of the London mechanical journals have been, to a great extent, occupied with correspondence backing up by even new arguments, the demonstrations of Messrs. Bourne and Russell.

To make a long story short, it may be briefly stated that opinion in England on this (to them vital) subject has reached such a pass that it seems only necessary for one of our monitors to anchor safely in the Mersey, to cause John Bull to commence at once a fleet of heavy monitors.

It seems that Mr. Assistant Secretary Fox, in the fullness of his wisdom has undertaken to complete this demonstration If Mr. Fox can assign any reason, or even a pretext for not only sending a monitor to England but crossing in her himself, we should really

ike to hear it. We cannot afford to have a system, purely American, which has been proved through many a hard-fought battle, and in which consists our great naval strength, actually forced upon our great maritime rival, and that, too, simply because Mr. Fox has taken into his head that nothing short of a heavily-armed monitor will answer his purpose. If Mr. Fox really thinks it necessary for him to inspect the vents and breechings of foreign ordnance, and to place his fingers in the perforations in French and English ironclad targets, and that a national vessel should be detailed for this duty, we cordially approve of the plan; but, at the same time, we must be permitted to suggest that a "double rudder" would be the most appropriate vessel, both from their extraordinary speed and great maneuvering qualities. Either the *Winooski* or the *Eutaw*, if they can be spared from the dock trials and Potomac excursions, are well adapted for this duty.

PRO BONO PUBLICO.

Sawing Lumber.

MESSRS. EDITORS:—Having had much experience both in building and in running saw mills, having also acquired useful information upon this subject from others, I think I can justly claim to be "a practical sawyer," and I would like, for the benefit of those seeking information in relation to circular saw mills, to give some of my ideas, and in so doing take exceptions to some of those advanced by Mr. Churchill in your paper of May 12th.

We are beginning to think out here in "the virgin forests of the West," that we have better and more effective mills, and know better what is required in that line, than is known in the soft pineries and second-growth timber lands of the Eastern States; at any rate, we know that the directions to give the saw one-half inch range toward the carriage in 20 feet, and to give the mandrel one-eighth inch end play, although possibly beneficial under a certain condition of the saw, or perhaps in sawing a certain kind of a log, are not at all to be relied upon under innumerable other circumstances: it is frequently as necessary to give the saw lead or range from the carriage as toward it; in fact it is very desirable to be able to vary and change the lead of the saw at pleasure. I like to have a mill constructed so that I can change and control the lead by varying the line or angle of the mandrel in relation to the carriage, so as to correct any tendency of the saw to vary from the true line either way. The provision made for this in the Martin & Ashcroft patent mills is the best and only convenient one I have seen as yet.

In using these mills I have many times in a day had occasion to make this variation, and have often done it while the saw was cutting in the log, and always with the most perfect success in correcting any difficulty in the lead of the saw (it is done by simply turning a nut upon a screw connected with the back box of the mandrel). I have also in the use of these mills found great advantage in keeping the points of the teeth in good order, and preventing the lumber from being scratched by the edge of the tooth, by using the arrangement for throwing the saw away from the log in running back; it saves the edge of the tooth next the log from being worn off unequally, and the face of the saw from being heated by the log rubbing against it.*

With regard to the one-eighth end play, it is an old idea, and is about run out, out here. If a saw commences to deviate from the true line it will be very apt to continue to do so, (this was learned long ago in using the handsaw). The effect of allowing this deviation is to saw irregularly, and often seriously injures the saw. The right way is to have your saw cut perfectly free and on a true line, and if it commences to vary, correct it at once; have the log held firmly against the head blocks so that it cannot spring, if it has any tendency to.†

The idea that the teeth of the circular saw should have the same form as the sash saw, is, I think, a great mistake, because it is desirable in all cutting instruments to have them as keen and sharp as they will stand in use without bending or breaking, and it is found that teeth of the circular saw will stand to be much more hooking and pointed than the sash saw.

I find that the best adjustment of the saw for general purposes (have it true, of course, both edgeways and sideways) is to hold it by means of the saw guide exactly at right angles with the line of the mandrel. I swedge back and spread out the points of the teeth of the common plate saw sufficiently to make a firm, cutting edge, and also to cut perfectly free and clear the face of the saw (I do not bend the teeth sideways at all but depend upon upsetting and spreading). I keep the tooth gummed out and filed under as hooking as it will stand; this depends upon the kind of timber to be sawed; the proper line for this will be one drawn from the point of the tooth to a circle from one-half to five-eighths the diameter of the saw. I have found the freest and best cutting saws (requiring the least power) to be those made with inserted teeth; the reason is obvious; the edge of a forged tooth can be drawn out much thinner and sharper and will stand a finer edge than the rolled-steel plate can be made to.* An objection to these saws is a danger that the teeth may get loose and fly out, yet a great many of this kind are in use with, perhaps, as few accidents as from the use of ordinary machinery. I hope the importance of the saw mill interests will excuse the length of this article, and hold myself ready to verify the correctness of it by practical tests if necessary.

WM. RICHIE.

Thorntown, Ind., 1866.

*The use of Martin's & Ashcroft's patent is owned by Messrs. Owens, Lane, Dyer & Co., of Hamilton, Ohio, who are extensively engaged in manufacturing them.

†A good device for this in many cases is an improved saw mill dog, patented by A. S. Petigrew, August 2, 1864.

*Saws of this kind are manufactured by Messrs. Spalding & Brothers of Chicago, by the American Saw Company of New York, by Woodrough, McPartlin & Co., Cincinnati, Ohio, and probably by other saw manufacturers.

NEW PUBLICATIONS.

A MANUAL OF BLOW-PIPE ANALYSIS AND DETERMINATIVE MINERALOGY, FIFTH EDITION. Wm. Elderherst, T. Ellwood Zell, Philadelphia, 1866.

This book is used as a text book in several of the colleges, and is the best book on the subject extant, at least in the English language. It will prove of great utility to chemists, miners, and mineralogists.

The blow pipe is an instrument easy to use for ordinary purposes and enables one to determine in the readiest manner the character of minerals. The highest skill in its use, however, requires great study and labor, and perhaps genius. Platner, who might be named the Paganini among blow pipers, could do about as much with a shilling blow-pipe as ordinary chemists with all their costly apparatus and chemicals.

The price of this book is $2,50 and in this city may be obtained of D. Van Nostrand, 192 Broadway.

DIFFERENTIAL CALCULUS.—With Unusual and Particular Analyses of its Elementary Principles, and Copious Illustration of its Practical Application. By D. John Spare.

We have received the above work from Messrs. Bradley, Dayton & Co., Boston. We do not doubt that it is a valuable mathematical work, but we would thank the publishers who send us books to be noticed, to forward them at their own expense, and not charge us for the privilege of noticing them.

THE IRON MANUFACTURER'S GUIDE.—This is the title of a volume of over 800 pages, royal octavo, compiled by J. P. Lesley, Secretary of the American Iron Association, under whose authority the work is issued. Two hundred and sixty-two pages are devoted to a full history of all the anthracite and charcoal furnaces, bloomeries, forges, and rolling mills in the United States, making it highly valuable as a book of reference to the manufacturer, dealer, and capitalist. The remainder of the volume treats of iron as a chemical element, an ore, and a manufactured article. It will be seen that the geologist, the mineralogist, the miner, and the manufacturer, have each somewhat of interest in the work. It is evidently a book of practical utility as well as of theoretical interest. Published by John Wiley, New York.

COAL, IRON, AND OIL.—This is the unpretending title of a work just published by Benjamin Bannan, editor and proprietor of the *Miner's Journal*, Pottsville, Pa. The book is compiled and edited by himself and S. H. Daddow, mining engineer, and is the most practical and exhaustive treatise on the subject that has come under our observation. The theories explaining the formation of coal and the generation of petroleum are somewhat novel, but appear to be based upon careful observation and analogy. We cannot but agree with the evident belief of the authors of this treatise, that the formation of petroleum, if not of coal, is not altogether and wholly an event of the past, but that the process is still going on, although perhaps not so rapidly as formerly.

The description of the great coal and oil basins of this country will be found valuable and interesting to the business man and general reader, while the statistics and information relative to these two great natural products, will arrest the attention of the practical man and the scholar. The manufacture of iron from the ore is treated in an eminently practical manner, making the work one of great value to mechanics and manufacturers. We shall take occasion to refer again to this treatise when time and space permit.

The volume is one of eight hundred pages and contains over two hundred engravings with numerous tables. It is a most valuable work, and one that deserves to be read by all intelligent men.

Report on the Cattle Plague.

The possible introduction of this dreadful scourge into our country cannot be contemplated without causing much uneasiness, when the fact is borne in mind that in England the plague has swept off sixty-five thousand cattle, valued at $4,500,000. A commission was appointed by the British Government to consider this subject, and the result has been anything but conclusive. There has been a great deal of confusion about remedies, and medical treatment has been of no avail. It is, however, made clear by evidence that the proportion of recoveries is very largely increased "by judicious feeding with soft mashes of digestible food." Under this treatment, out of 503 cases, 191, or nearly 38 per cent, recovered. It is remarkable, moreover, that dividing these beasts into two groups, according as they belonged to large or small stocks, in the former 22 per cent, while in the latter 62 per cent, recovered. The explanation offered is that in smaller stocks fewer beasts are ill at once, there is less concentration of the poison, less crowding, and, not least, better nursing. An analysis of another group of 813 cases indicates still more conclusively the influence of feeding. Among cottagers' cattle, generally fed on mashed food, the recoveries were 73 per cent; in large stocks, where dry food was often given during convalesence, the recoveries were 57 per cent; with mixed food of mashes and hay they were 22 per cent; while among cattle fed entirely with dry food, and treated medically with drugs, the recoveries were but 13 per cent. The number of cases is too small for us to depend on these averages; but they are sufficient to establish the general fact. We may take it as ascertained that "powerful drugs of all kinds greatly highten the mortality of the Cattle Plague. . . . Perfect cleanliness, ample ventilation, constant disinfection of the air and discharges by tar acids, and the most careful feeding with soft mashes of the most digestible food—such, and such only, are the measures which our present experience sanctions for the treatment of the disease." Such a conclusion is quite in accordance with the congested state of the stomach which has been observed after death, and the commissioners believe that a similar restriction as to diet formed the most important part of the cure.

Storage of Gun-cotton.

Gun-cotton is now made into ropes for storage, and kept under water. When an order is received at the manufactory, a few hours suffice to send the cotton on its way. It has been found that by making the ropes with many air channels through the mass, the cotton explodes almost instantaneously, and is as violent in action as the strongest fulminates. Charges for guns are now made into two parts; an exterior composed of cotton of loose texture, the ignition of which starts the ball), and an interior of denser material, which supplies the gas necessary to keep up the constantly accelerating speed of the ball. The result is great gain in initial velocity. Compared with powder in an Enfield rifle the cotton gave a trajectory having an incurvation of $3\frac{1}{2}$ inches, the powder $3\frac{3}{8}$ inches in the first 100 yards.

SLATES.—The test of a superior slate is its ability to remain unbroken, after being made red hot in a furnace, and suddenly immersed in cold water, while at that heat.