

THE NEW DYNAMITE GUN.

Ever since the introduction of what are known as high explosives, some means have been sought by which they could be thrown from guns with accuracy, and a sufficient distance to render their use practicable for purposes of war. The nature of dynamite and nitroglycerine precludes their being loaded in cannon and fired in the ordinary manner by gunpowder, which has been proved conclusively in many ways, and has almost invariably led to the destruction of the gun in which the attempt was made.

Thus far the application of high explosives has been principally confined to torpedoes. These latter in their various forms have attracted a great deal of attention, different governments spending large sums in maintaining and perfecting them. The various systems, while undoubtedly advantageous in a great many cases, are, nevertheless, restricted in their very nature, and this has stimulated investigators to devise means by which high explosives, such as dynamite, could be projected "overland" with safety.

It is now claimed that this knotty problem has been put in a fair way of being solved, and, strange to say, by a medium long since applied to the propulsion of projectiles, but the use of which has never yet been attended with sufficient success to warrant its permanent introduction. We refer to the use of air and steam under high tension, and in the new dynamite gun compressed air of very high tension is used as the propelling power.

This new gun is the joint invention of a number of men under the leadership of Mr. H. D. Winsor, of New York, and one form of it is now undergoing a series of tests ordered by the Government, which are being made under the special direction of Lieut. E. L. Zalinski. In the mean time a description of the apparatus will be interesting as illustrating a new departure in appliances of war in a direction which has heretofore proved unsuccessful.

Our illustration represents the 4 inch gun which is now building at the Delamater Iron Works, New York, and which embodies the latest improvements. It will be seen to consist of a tube, 40 feet in length and 1/4 inch thick, mounted upon a light steel girder. The latter is trunnioned and is pivoted on a cast iron base, thus enabling it to be swung into any desired position and range. To assist in the latter operation guys are placed on either side of the base, and their length can be altered and fixed by turning the band wheels shown.

Compressed air is introduced to the gun from below and passes up through the center of the base, the pipe connecting with one of the trunnions (which are hollow); it is thence introduced into the pipe shown at the side of the gun leading into the valve. This valve is a continuation of the breech of the gun, to which it is connected by the short passage shown.

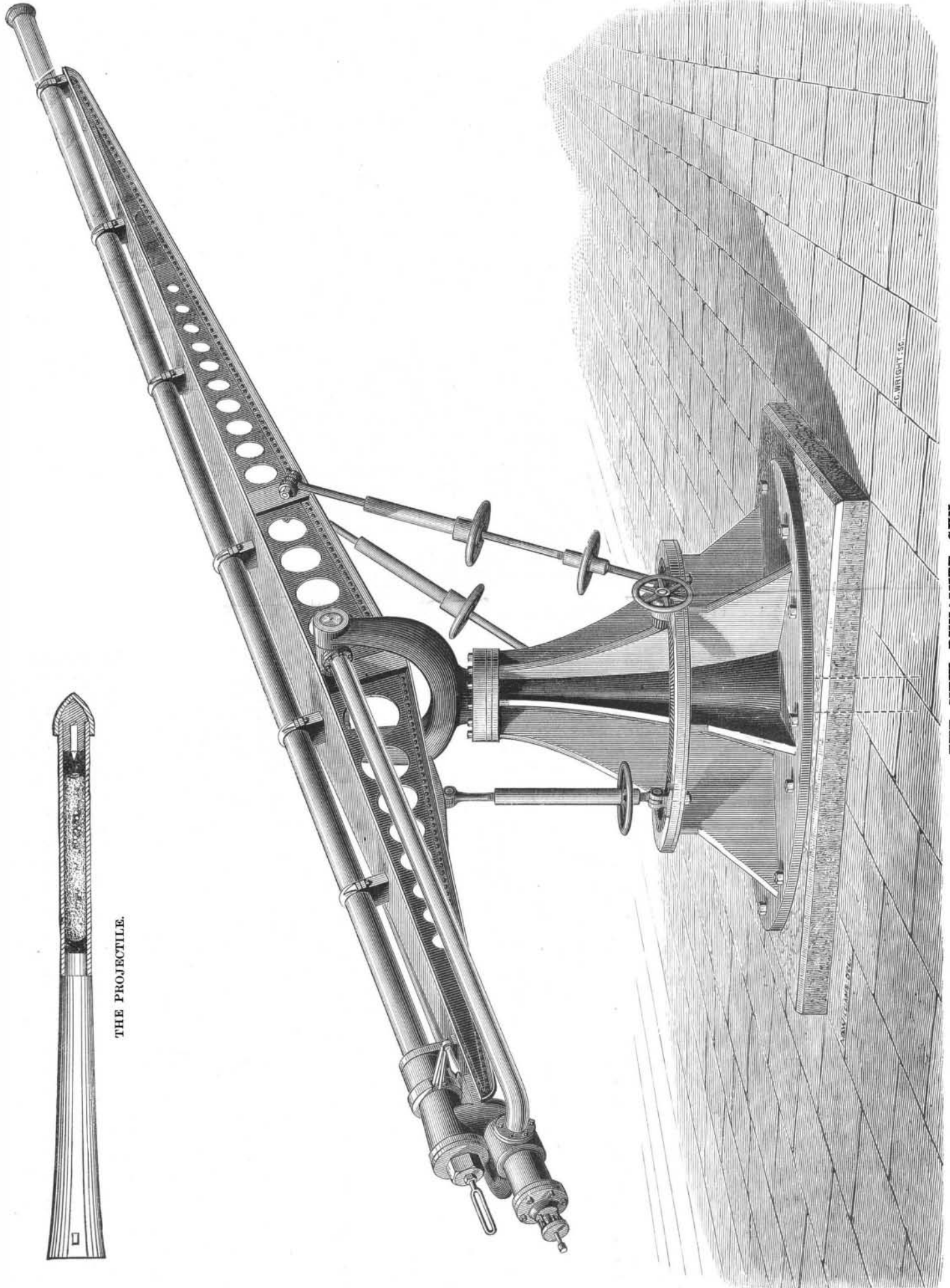
An important feature of the system is the projectile, or dart, and upon which the success of the undertaking greatly depends. By referring to the illustration it will be seen to consist essentially of two parts, and while several different modifications have been tried, the principal features are alike in all of them.

The forward part of the dart consists of a thin brass tube, into which the charge of dynamite is inserted. At the rear, the tube is closed by a wooden plug, which flares out toward the rear until its diameter equals that of the bore of the gun. The forward end of the brass tube shows a mass of some soft material, into which is inserted a pin firmly held in place, the end being closed by a conical metal cap. Provision has also been made to allow a certain amount of air to act as a cushion for the dynamite cartridge, thus lessening the shock due to a sudden discharge. It is therefore claimed

that, under ordinary circumstances, there is little danger of the charge exploding, since the pin cannot reach it and ignite the fulminate at its end; but when thrown from the gun the impact against a body will displace the soft material and drive the pin home, causing an explosion.

Another feature of the projectile is the power which it possesses to correct, to a certain extent, the deflection due to a side wind. It will be noted that with the present construction the center of gravity of the dart is some distance forward of its center of figure. A side wind would, therefore, acting upon the lighter rear part, have the tendency to deflect it so as to turn the head of the dart into the wind, which action would, in a measure, tend to keep it in the line of its trajectory. The firing of the gun, if the expression may

great step in advance will have been made, and one which will work great changes in warfare, both naval and military. As an auxiliary to coast and harbor defences such a gun would be of great value; and placed on board small launches the latter might approach and hurl their deadly missiles with great accuracy, the absence of a loud report and of a flash of fire giving additional security from detection. Another advantage of these guns is their cheapness; their cost is but a trifle compared with that of other guns of equal power of destruction; and whereas the latter require heavy special machinery and many months of labor to complete them, the former can be built in any well equipped shop in a period of time not exceeding a month, if need be. Nor does it seem unlikely that the



THE NEW DYNAMITE GUN.

be used, is accomplished in the following manner: The dart is inserted in the breech, and a gas check placed in position; a lever then being moved, the valve is opened, and the air pressure admitted.

This method of discharge will, it is thought, obviate the danger of shock, which had heretofore proved a stumbling block to success, and in addition the valve controlling mechanism is automatically arranged to admit the air gently at first, to overcome the inertia of the projectile, following with full pressure, and finally closing at the proper time, as the dart leaves the gun.

It will readily be seen that, if this gun prove successful, a

system may be applicable to the use of armies in the field when engaged in siege operations.

Experiments made thus far have shown that the apparatus can be depended upon for a fair degree of accuracy and rapidity in firing. As regards the range attainable, the two inch gun now being tested has attained 1 1/4 miles with a pressure of 420 pounds to the square inch. In the four and six inch guns which are in course of construction, it is intended to use pressures of 2,000 pounds and over, by the use of which a range of three miles is hoped to be attained.

While this new application of compressed air to the pro-

pulsion of dynamite is no doubt valuable, it is hardly to be expected that it will, with its limited range, ever take the place of heavy ordnance—a point which its inventors wisely do not claim; but if it shall transpire that the gun is, in itself, a practical success for much shorter distances, it will be of the greatest importance and a valuable accession to our present appliances of war.

Especially will this be so in this country, where our coast line is so extended, where good harbors are so numerous, and appropriations for harbor defense so meager and so often *nil*, and where in fancied security we expose our defenseless shores to hostile invasion; under these circumstances does it become necessary for us to substitute cunning for might, and rely upon some such means as torpedoes and dynamite guns to protect us from unexpected and uninvited approach.

Basket Willow.

E. H. McJ. asks what is basket willow, and where can it be obtained? A. It is a species of the genus *Salix* that is popularly known as swamp willow, or osier. For basket purposes the stump or stool is kept down by the cutting of the shoots annually, which are the portions used in basket making. It may be obtained in a wild state, being identical with the native pollard willow, or cuttings may be got from any reliable nurseryman.

About twenty-five years ago Col. Samuel Colt of revolving pistol fame reclaimed from the overflows of the Connecticut River, at Hartford, Conn., a vast area of land by means of extensive dikes which now form a portion of the street geography of the city. Within the area thus reclaimed he built his enormous factory and villages for his workmen. To protect the banks of the dikes from the action of the river currents and the destroying influences of rains and melting snows, he planted them thickly with osiers—the basket willow—and cut, or rather mowed, the shoots every summer with the intention of sending the vigor of the plants into the roots, so as to bind the inclined surface of the dikes in one mass. The result was just what was expected as to covering the particles of the banks, but it forced the consideration of the utilization of the shoots annually cut away.

To do this, Col. Colt imported Swiss basket makers, built a collection of Swiss-fashioned cottages for them, and for several years (until his death) carried on the business of willow basket making. This industry has since ceased, but the osiers still grow in great luxuriance. The sides of the Colt dike in Hartford contain enough of osiers to plant hundreds of acres, as all that is necessary to insure growth is to insert a cutting in ground that is not absolutely dry.

The Maple Sugar Season.

It is so easy to adulterate maple sugar with cane sugar, or maple sirup with glucose, that those who really care for the genuine article find it rather difficult to get. This was notably the case last year, when the weather was not propitious for a good yield of maple sap. The best conditions for a good sugar season are found when the ground has been deeply frozen by a severe winter, followed by a spring which commences to open early, but gives several weeks of alternate freezing and thawing, before the frost is all out of the ground. Weather when it freezes quite sharply at night and thaws freely during the day, always gives a good "sap run." The following tables show the yields of maple sugar in the principal sugar producing States for the years 1870 and 1880, as given in the census reports of those years:

	1870.	1880.
	lb.	lb.
Vermont.....	8,864,302	11,261,077
New York.....	6,692,040	10,693,619
Ohio.....	3,469,128	2,895,782
New Hampshire.....	1,800,704	2,731,745
Michigan.....	1,781,855	3,423,149
Pennsylvania.....	1,545,917	2,866,010
Indiana.....	1,332,332	235,117
Total.....	25,486,278	34,106,499

But the above table only includes those States producing over 1,000,000 pounds. The addition of the product of those other States which produce less than this amount annually would considerably swell the above total for 1880, and probably bring it up nearly, if not quite, to that of 1860, which was about 40,000,000 pounds, and the largest ever recorded. This, at an average of 10 cents per pound, would give a value of \$4,000,000.

JADE AND JADE OBJECTS FROM CENTRAL AMERICA.

In the American Museum of Natural History, on the gallery floor, there is displayed a group of curiously carved objects. Their colors are various shades of green, changing from a white faintly greenish in hue through a bright apple green to dark jasperoid olive. Their appearance is enigmatic, and their singular and bizarre forms and sculpture lend an agreeable contrast to the beautiful stone of which they are made. These objects, from their mysterious association with an extinct civilization, possess a value quite inestimable.

They are cut from jade, a stone which is of itself precious, delicate in tint, dense and tenacious in texture, and of extremely rare occurrence in nature. It takes a most lustrous polish, can be worked into fragile and exquisite forms, although it is so hard that a file makes but little impression upon it. This stone was formerly seldom found in the collector's cabinet, or at best represented by poor and unpretentious specimens, but the spread of Chinese exchange has brought elegant examples of their workmanship in this mineral to the hands of western connoisseurs.

Jade is pre-eminently a mineral of Asia, and its dissemination in prehistoric relics in Europe and America has formed the ground for elaborate disquisitions on early traffic and exchange between these remote regions, or used as evidence to establish a primitive migration from Asia as a center.

It must be remembered, however, that mineralogists now distinguish two kinds or species of stone, to both of which, in common language, the term jade is applied. One of these, *nephrite*, is essentially a silicate of magnesia with a specific gravity of about 3 and a hardness of 6 to 6.5, while the second is *jadeite*, a silicate of alumina with a gravity of about 3.33 and a hardness of 6.5 to 7.



JADE OBJECTS FROM CENTRAL AMERICA.

Prof. H. Fischer, of Germany, has devoted a great deal of attention to a close study of the probable origin of the jade objects of America and Europe, and reached the conclusion that one class, the nephritic, had been derived from the mines of Turkestan, and that the second class, the jadeites, had been brought from Burmah.

This rather strained conclusion has been combated by Dr. Meyer, of Dresden, who states that bowlders and fragments of nephrite have been found in North Germany and Steiermark, and raw jadeite in large masses, generally as bowlders, in Alaska.

In this opinion, recently published, he has been sustained by Prof. Arzruni, of Breslau, and so far as regards jade implements and objects in this country, it is interesting to learn that the Smithsonian Institution has received reports of the finding of jade in place, along with jade specimens, in Louisiana, while in 1881 Dr. Brantford, their agent, was commissioned to make careful examinations for possible jade mines in Central America.

Many other minerals seem to have been confused with jade, as ancient authors speak of specimens of a citron yellow, deep blue, turquoise blue, and red. Jasper, prase, emerald, and chalcedony have thus been confounded with true jade. In China the jade is called *yu*, a name of great antiquity, and is brought from the city of Khotan, in the canton of Yarkande, of Turkestan, being transported from Tartary through Bokhara. Here there are said to be mountains composed of this valuable stone, but the finest specimens are only found in the seams of the highest pinnacles, which are detached by the workmen, who clamber to these points and roll the separated masses down the mountain side.

Jade figures extensively in Chinese literature. It has been regarded with admiration from the earliest times. It is the synonym of purity and virtue. It forms the richest and most expensive decorations of the wealthy, and a thousand allusions in poetry and drama indicate its absorbing fascination for the Mongolian mind.

This stone was regarded by the inhabitants of Mexico and Central America with equal delight, and the evidences of

their art are shown by our illustration. It was called by the Aztec the *chalchihuitl*, and the familiar story bears repeating of how Montezuma, in sending presents to the King of Spain, "desired to add a few *chalchihuitls* of such enormous value that he could not consent to give them to any one except such a powerful emperor. Each of these," he added, "is worth two loads of gold."

These interesting relics were discovered in 1852, in a vault in Ocosingo, in the department of Quesaltenango, Guatemala, and were purchased by the Museum from E. G. Squier, the famous explorer and archæologist. The most striking piece in the collection is shown in the center of the group. It is the Central American Buddha or Cuculcan, who was adored in Mexico under the name of Quetzalcoatl—the green feathered serpent. Of this quite delicately cut figure in pale jade, blotched with emerald stains, Mr. Squier says:

"The figure is represented seated cross-legged on a kind of ornamented couch or cushion, with the left hand resting on the left thigh, while the right hand is raised breast high, as if in the act of benediction. He wears a girdle around his loins, and on his breast is represented an oblong rectangular plate or tablet, suggestive of that said to have been worn by the Jewish high priests. The face is in profile, showing the salient nose and retreating forehead that characterize most Central American sculptures. An ornament is inserted in the lobe of the exposed ear, and the head is surmounted with the characteristic elaborate plumed head-dress that we observe on the monuments and in their paintings."

Two cup-like objects, with expanded rims, will be noticed in the illustration. These are rings which are supposed to have been attached to the heads of dignitaries or priests,

and to have confined sheaves of feathers, such as so commonly constituted their luxurious head-dresses. Another characteristic head is shown upon the irregularly semi-circular fragment near the middle of the group. Here is repeated the elaborate coiffure, in the midst of which appears a shield-like accessory; the enormous earrings are shown, and a collar or necklace projects beneath the chin. A close inspection of the carving reveals the tip of the tongue pushed up between the lips, which Mr. Squier considers a symbol of *life*, "for to speak, among the aborigines of America, was the synonym of to be." A similar though more pro-

fusely decorated head, with pendent earrings and massive necklace, is shown, and an instructive profile upon a triangular piece of jade near by presents the same features more clearly, while the high cheek bones, rather oblique eyes, and arched nose are typical.

Another striking relief has been cut upon a cylindrical portion of darker jade, and symbolizes death, with its closed eye and the depending tongue. This was taken from the ruins of Tuloom on the mainland of Yucatan. The other objects are less interesting, but all are carefully perforated, and some at a number of points, justifying the belief that they were suspended and used in personal decoration, or as ceremonial badges.

The skillful execution of these objects, the admirable portraiture, and the evidence they afford of the existence of a specialized class of artisans, as well as of a stock of ideas to illustrate, contribute to elevate our conceptions of a civilization which before the arrival of Columbus possessed its cities, temples, and an organized system of government.

Cure of Elephantiasis by Electricity.

An interesting communication on the treatment and cure of elephantiasis among Arabs by Doctors Moncorvo and Silva Arango has been presented to the French Academy of Sciences by M. Gosselin. The cure consists in decomposing the tumid swelling of the limbs, known as elephantiasis, by means of electrolysis, but at the same time the general health of the patient is also treated hydropathically, that is to say, by the cold water cure, sea baths, tincture of iodine, iodide of iron, arsenic, and other tonics. These medicines are intended to renovate the constitution, but are not of themselves sufficient to reduce the tumors. Electropathy, however, applied as soon as possible after the first manifestation, checks and ultimately cures it. The cure is generally perfect, and takes place at the end of a few days in some cases; but if the elephantiasis is of long standing the cure is also a long process, and must be accompanied by proper medicines. The electrolysis is effected both by continuous and interrupted currents sent through the tumid swelling.