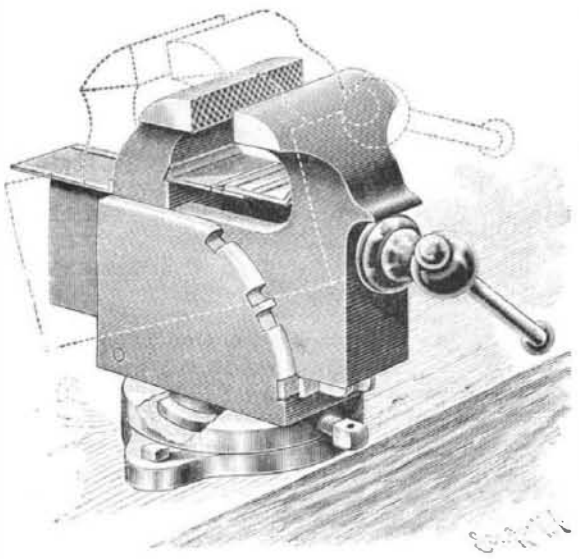
A CONVENIENT BENCH VISE.

The illustration represents a vise which may be readily moved into any desired position to hold the work at different angles to the horizontally moving file in the hands of the mechanic, to facilitate the proper filing of hexagons, octagons, or articles of other shapes. The improvement has been patented by Mr. Abraham Lurie, of No. 330 East Seventieth Street, New York City. In the base plate turns a circular offset projecting from the bottom of a casing carrying the vise proper, which is locked in place by



LURIE'S BENCH VISE.

a set screw. In the rear end of the casing, near its bottom, is a pivot on which is hung the foot of the shank of the fixed jaw, the opposite movable jaw having its shank formed in the shape of a casing fitted between the parallel sides of the outer casing. The bottom of the casing for the shank of the movable jaw has dovetails engaging corresponding grooves in opposite sides of the shank of the fixed jaw, so when the latter is moved into an angular position on its pivot, as indicated by the dotted lines in the illustration, the movable jaw moves with it, without disturbing the relative position of the two jaws, the screw rod at the same time operating to move the movable jaw toward or from the fixed jaw. To lock the fixed jaw in the desired angular position, a locking device, consisting of two L-shaped latches, is attached to its foot, the latches being normally held in an outermost position by a spring, when they engage correspondingly shaped notches in the segmental edge of the sides of the outer casing. The latches may, by pressing inward, be readily disengaged from either set of notches, and the casing carrying the jaws may be turned in its base on loosening the set screw. There are sliding plates between the jaws, and a fixed plate extending rearward from the fixed jaw, to prevent filings from passing into the casing.

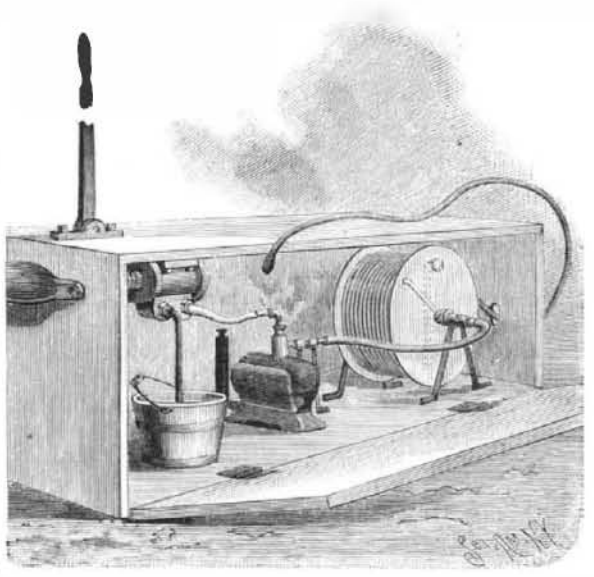
THAWING OUT FROZEN PIPES, ETC.

The difficulties, inconvenience, and sometimes very considerable loss which may attend the sudden freezing up of pipes, drains, etc., have suggested the improvement shown in the accompanying illustration, for the ready thawing out of such conduits, and for which a patent has been granted to Mr. Daniel H. Streeper, of Norristown, Pa. The apparatus is contained in a box, in which a boiler is held over a plumber's furnace, a hand pump at one end of the box forcing water into the boiler through a hose, while a pipe from the boiler leads to a pipe which forms the axle of a drum supplied with water by an independent filling tube. A portion of the pipe forming the axle of the drum is perforated, and it is surrounded by a hollow axle whose ends are closed by stuffing boxes, a pipe leading from one end of the hollow axle outward on one face of the drum to the rim, on which the pipe is formed into a coil, adapted to be unwound from the drum as required in use. The pipe is preferably of lead, but a hose may be employed instead, and on its outer end is a pilot for conveniently guiding the end of the pipe into and through the frozen pipe to be thawed out. For forcing a flexible hose forward in a frozen pipe a rod may be attached to the pilot, or the pilot may be flexibly attached in case the pipe is to pass around curves. In operation the water heated by the furnace is forced by the hand pump from the boiler into the hollow axle, where it heats the water in the drum and the pipe coiled on it, the hot water or steam at the same time passing through the pipe itself, and through the pilot at its end, into the frozen pipe, the coil being unreeled from the drum and pushed into the frozen pipe as the operation progresses.

THE IMPERIAL INSTITUTE, LONDON.

Among all the stately and happy ceremonials of the Queen's Jubilee, none possessed greater intrinsic significance than the recent opening of the Imperial Institute by Her Majesty. That event, as it marked the completion of the idea of showing by a permanent memorial the expansion of the empire during the fifty years of Queen Victoria's reign, was of national importance. To-day a magnificent palace, ample in its proportions as befitting the world-wide empire which it symbolizes, and well adapted for the several purposes for which it is intended, occupies the site at South Kensington made familiar by the series of exhibitions of which the Colonial and Indian Exhibition of 1886 was the last.

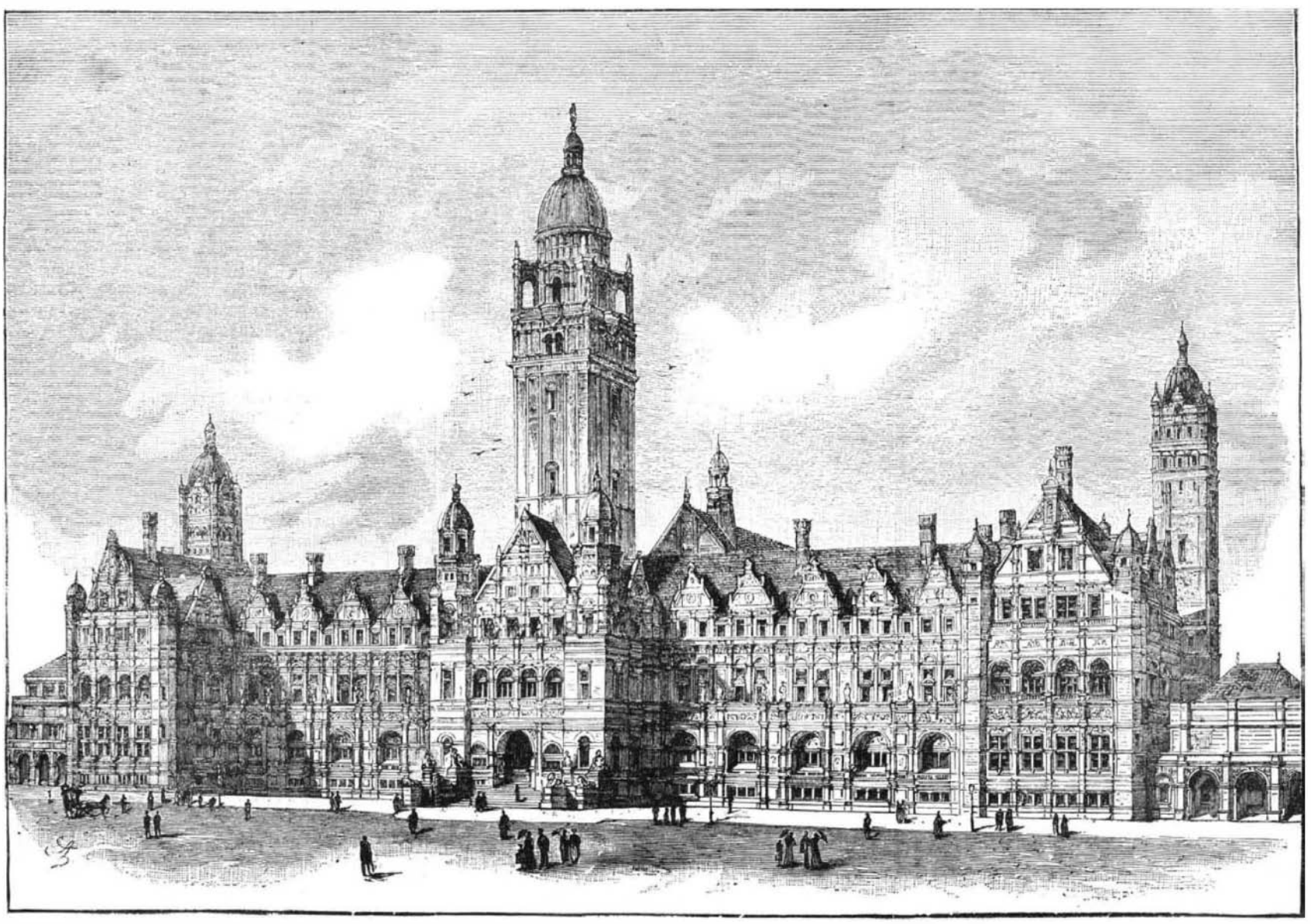
By accepting the advantageous offer of the Royal Commissioners of the first International Exhibition, the owners of the site, the executive of the Imperial Institute have been enabled to devote to the building the greater part of the public funds raised, and a total area of nine acres is now covered with the structure and its courts. Looking down from the great square central tower, one notes immediately on the north side the full proportions of the Albert Hall dome, with the



STREEPER'S APPARATUS FOR THAWING OUT FROZEN PIPES, ETC.

cross of the Prince Consort Memorial rising behind it. The Royal College of Music, also in process of building, occupies the ground between the north gallery of the Institute and the Albert Hall, with the City and Guilds of London Technical Institute adjacent. In front, to the south, the immediate object seen is the Natural History Museum, the ground intervening on the other side of the new wide avenue lying ready for new buildings of the South Kensington Museum, or other public institution, which should harmonize with the surroundings. The trees of Hyde Park and Kensington Gardens, the open spaces, and the glint of the Serpentine form an agreeable contrast to the regular lines of streets and blocks of tall houses—dwarfed from this height, however—which characterize this part of London.

Though the building is to a certain extent shut in by its surroundings, and it is difficult to get an adequate



THE NEW IMPERIAL INSTITUTE, LONDON.

idea of its actual dimensions, yet no eye can fail to be captivated by the magnificent facade along the north side of the Imperial Institute road. The actual length of the main building is a little over 200 yards, but with the arcades the whole frontage presents one long line of 300 yards.

Mr. T. E. Colcutt, the architect, has adopted the Renaissance characteristics, and the general impression conveyed by the *ensemble* of the building is one of strength and permanence, relieved by ample mouldings in the gables and carvings of the balustrades.

Portland stone is the material chiefly employed in the structure, and as this comes from the Whitbed Quarry, it is hoped to long withstand deterioration in the London atmosphere. The great portal, flanked by lions and other statuary from Mr. Pegram's chisel, is ornamented with a frieze covered with symbolic sculptures, and with a seated figure of the Queen. At the side is the great foundation stone, brought from the Cape, of three tons weight.

Passing through the main entrance, a vestibule is reached, into which a polished stone corridor opens, running on either side to the end of the building. The vestibule gives access behind to the great reception hall, the finest part of the interior. Opening out of the corridor on the principal floor are spacious conference rooms for the American, Australasian, African, and Indian sections, the administrative offices, and temporary library and reading room. Ascending from the main entrance by a highly decorated marble staircase, we reach the first floor, which is devoted to conference rooms of the crown colonies, meeting rooms for societies connected with the institute, and the departments of commercial intelligence. The corresponding rooms on the floor above are chiefly intended for the sample examination stores and laboratories, a map department, and for the social use of the fellows of the institute. Parallel with the main building, in its rear, and separated by quadrangles, run two long galleries, the intermediate and the north, in which are stored, in individual sections, the exhibits of the various colonies. In many cases a nucleus has been acquired in stores handed over by the Colonial Commissioners from the Colonial Exhibition of 1886, the Indian section especially starting, through this means, with a considerable display.

In his letter to the Lord Mayor of London in 1886, the Prince of Wales sketched in outline the objects of this Jubilee memorial, the form of which is due to his own suggestion, and which has taken definite shape under his constant active supervision. It was to be "at once a museum, an exhibition, and the proper locality for the discussion of Colonial and Indian subjects."

The grants already guaranteed by several of the great colonies insure their active interest in the maintenance of their own sections.

In their own stately chambers in the front of the building, decorated with woodwork sent from the colonies themselves, the special conferences of the British American representatives, and of the British Australasian in the west wing, and those of the British African and the British Indian in the east wing, may be expected to decide issues of great commercial importance. The colonial importer and the manufacturer of the great industrial centers will find a common meeting place for the discussion of kindred interests, while opportunities will be afforded for the inspection in the galleries of samples of the products of every part of the empire. As an intelligence department serves to keep the War Office acquainted with the military resources and requirements of every land under the protection of the British flag, so a commercial intelligence department will have its headquarters in the institute, where systematic information upon the commercial development and the products of the various colonies may be obtained for the furtherance of British trade. The details of this system are being worked out with great elaboration. The arrangement of the Indian section is most advanced, and in the index museum it is already possible to compare various specimens of cotton fibers, rice, gum, and other raw products. Thus valuable help in no long time will be forthcoming from the institute in the improvement of commercial education by scientific organization. Another side of the institute's usefulness will be brought into prominence when its fellows enter upon their privileges. That these are sufficiently attractive may be gauged from the fact that more than a thousand candidates were elected at the last meeting of the executive council. The annual subscription entitles to free use of the reading and conference rooms and to admittance to the meetings held by the institute, while in the building itself rooms are set apart for their special comfort, much as in a club house.

A building so vast necessarily requires an immense amount of machinery for purposes of lighting, heating, and lifting. The machine room contains engines capable of supplying electricity for the 1,200 small lamps and 100 arc lights, and of driving hot or cold air through miles of piping. There are eleven lifts worked by hydraulic pressure obtained by pumping engines and power storage plant. The tanks for the water required in the building are placed in the three towers, of which the central will reach an altitude of 300 feet, while the flanking towers, only one of which has yet been completed, and which will have an exceedingly graceful appearance, will be 176 feet in height. The estimated cost of the building when fully completed is not far from $3,000,000.

The Ox Bot Fly.

In North America, so far as we yet know, *Hypoderma bovis* does not occur. Considering the frequency with which cattle have been imported into this country from abroad this fact seems almost incredible, yet until the species is observed and recorded we must consider its presence in America as merely conjectural. The American ox warble, in every case so far observed, is the larva of *Hypoderma lineata*. This species has come to be known, especially through the South and Southwest, as the heel fly, on account of the habit which the female has of frequenting the legs of animals for purposes of oviposition. While the eggs are laid on other parts of the body that may be reached by the tongue, the species shows quite a strong tendency to select the flanks and legs around the heels, and the habit, almost everywhere observed, that cattle have of seeking to protect their legs by running into water during the bot fly season finds its explanation in these facts. The eggs are attached firmly, by a strong cleft, in rows of from five to ten or more, to the hairs.

When the cattle lick themselves, the young larvæ are taken into the mouth, as, under pressure and moisture, the egg readily splits at its anterior end and releases the young larva, which is already well developed when the egg is laid. Doubtless quite frequently the eggs with the contained larvæ are taken with the hair in this licking, but in either event the larva in leaving the egg is armed with many minute spines, which permit it to adhere to and to penetrate the walls of the œsophagus. Here it soon moults and takes on the second or smooth stage, which for eight or nine months wanders slowly in the tissues of its host. The slow movement and the little nourishment taken reduce the inflammation and irritation to a minimum; in fact, the most remarkable thing in the life-history of this larva is the long period of latency and the slight development that takes place during the summer and autumn months. During the late winter the larva reaches a point beneath the skin in the region of the back and penetrates the skin, anal end first, as Dr. Curtice believes, and as seems most probable. Here it moults a second time and reassumes its spinous character, producing more or less inflammation and developing rapidly, with its enlarged spiracles fitted for more perfect breathing. The third moult soon follows, and we get the more strongly spined grub, with its still larger spiracles, which lives in the swellings or sacs so well known to stockmen. It finally works its way out, drops to the ground, which it enters, and where it contracts, hardens, and darkens in color. In a few weeks afterward the perfect fly issues.

That such is the normal and invariable life-history of *Hypoderma lineata* I think there can no longer be a doubt, and the burden of proof of any departure from it will rest hereafter with those who contend otherwise. That the remarkable life-history of such a well known insect, and one which does so much injury to our cattle interests, should have remained so many years unknown, is only another illustration of the fact that we have yet much to learn of our commonest species.

That this life-history of *Hypoderma lineata* will be fruitful in bringing to light the actual facts in reference to the European *Hypoderma bovis* there can be little doubt. The unity of habit in the same genus, the structure of the egg, as already known, of *Hypoderma bovis*, and the fact that nothing definite is yet known of the earlier larval stages or the mode of oviposition, all convince me that this species will be found in Europe to have a precisely similar life-history.—*C. V. Riley, in Insect Life.*

The Busk-Ivanhoe Tunnel.

On June 30 last there remained 1,084 ft. of tunnel to be bored to complete the Busk-Ivanhoe Tunnel, on the line of the Colorado Midland Railroad. M. H. Keefe, the contractor for building the tunnel, estimates that the headings will meet in four months' time. The total length of the tunnel is 9,400 ft. The boring from the Ivanhoe end of the tunnel has been temporarily suspended because of the trouble in keeping the tunnel at that end free of water, the pumping plant erected for that purpose having proved inadequate. The grade of the tunnel descends uniformly from the Ivanhoe to the Busk end, the latter being 134 ft. lower than the Ivanhoe end; as a consequence water follows the workings of the tunnel into the hill at the Ivanhoe end, and to keep the tunnel free of water the contractor erected two Cameron pumps, one with a 3 in. discharge, capable of handling 100 gallons of water a minute, and one with a 4 in. discharge, capable of handling 300 gallons of water a minute; and also a Deane duplex pump, capable of handling 400 gallons a minute.

Correspondence.

Forging Coppers.

To the Editor of the Scientific American:

In your issue of July 15, 1893, H. K. gives his experience casting solder coppers and then trying to forge them and failing. I made a solder copper in the following manner:

I had no copper but some scraps of sheet copper used in making steam pipes. I suppose it was pure. I closed and welded one end of a 1½ inch pipe (short piece), melted my copper in a crucible in the forge, warmed the piece of pipe, and set it closed end down in one of the holes in my swage block. Had my copper good and hot, in order that it should be limpid and pour free. I stood well back while pouring it, for fear it should "blow," but it didn't. When it was cold, I split the pipe and took the copper in my tongs, heated, and forged it nicely. I used no alloy or flux. The top end, as cast, was somewhat porous or "bubbly;" but this only affected it for a half inch or so.

W. H. WOODRUFF.

Willapa, Wash., July 19, 1893.

Velocity of Projectiles.

To the Editor of the Scientific American:

In the SCIENTIFIC AMERICAN for July 1, 1893, on page 7, appears a "Simple Method of Determining the Velocity of Projectiles." As I understand it, it is entirely wrong and is worthless for the purpose intended. Gravity pulls the projectile down, whether the sights are above or below the bore of the rifle. If the line of sight is exactly parallel with the axis of the bore, then the shot will strike at a certain distance below the bull's eye, whether the sights are above or below the bore. In this case, "half the difference in the elevation of the two bullet marks" will be zero, and hence the effect of gravity in drawing the bullet down is nothing. Absurd! The difference between the bullet marks can only be caused by an angle between the line of sight and the axis of the bore. Gravity has nothing to do with the difference.

F. R. BRAINARD,
Lieut. U. S. Navy.

U. S. S. Kearsarge, Portsmouth, N. H., July 28, 1893.

Sperrylite.

To the Editor of the Scientific American:

In the letter of your Chicago correspondent published on page 26 of your issue of July 8, 1893, the statement is made, relative to sperrylite, that "it is a yellow, dust-like powder, found in pockets, and assays fifteen ounces to a ton of platinum."

While this statement is rather equivocal in its meaning, it is also an erroneous one, in so far as its description of the mineral in question goes. In the last edition of his "Mineralogy," Prof. Dana describes the species as occurring in minute crystals, usually in cubes or cubo-octahedrons, etc. Fracture conchoidal. Luster metallic, brilliant. Color, *tin-white*. The specimens usually seen in collections agree closely with this description. Neither is it a fine powder. It occurs in small grains.

As this is one of the most interesting minerals recently described, I thought the mistake of sufficient importance to call your attention to.

GEORGE VAUX, JR.

Bryn Mawr, Pa., July 28, 1893.

Preserving Butter with CO_2.

It is some time since the solidification of carbon dioxide has been effected, and in such a manner as to render the article of considerable commercial value, and readily adapted to a multitude of useful purposes. Two fresh instances, says *Le Génie Civil*, have recently presented themselves of the extensive sphere opened to the application of the frozen gas. By its aid, butter can be preserved, without in the least interfering with its taste or general properties. The process of preservation consists in placing the butter in an iron vessel, or it can provided with a pipe and tap, by means of which the carbonic acid is injected under a pressure of six atmospheres, and drives out the air. In this condition the butter will remain fresh for four or five weeks. The second instance is one in which the carbonic acid is forced into whey to the point of saturation, and converts that liquid into a refreshing and agreeable beverage which "fizzes" like champagne. The carbonated whey can be inclosed in siphons like ordinary mineral waters, and will remain fit for use for the next six weeks.

Tests with Emmensite.

The ordnance officers are making some interesting tests of high explosives at Sandy Hook. Shells filled with gun cotton and with emmensite were fired recently from the 12-inch mortars. The object of the test was to see if emmensite could be fired without danger of explosion of the gun or mortar. The emmensite shell carried 87 pounds of the explosive. The tests were successful, and when a proper fuse has been secured the army and navy will have an explosive even more efficient than the melinite of the French artillery.