Bellite.

An ideal explosive for engineering purposes would naturally require to be flameless, perfectly safe in handling, and, although slow in action, exertive of extreme energy, so as to bring down huge masses of rock or coal without shattering, as unavoidably results from using quick explosives, such as dynamite and others of the nitro-glycerine group. The experiments we had the privilege of watching recently at the Clarence Iron Works, Middlesborough, were mainly intended to demonstrate that in the new Swedish compound, bellite, the invention of M. Carl Lamm, the managing director of the Rotebro Explosive Works, Stockholm, science has secured what practically amounts to an ideal explosive. For the manifestation of this point the programme drawn up by Mr. Napier Hake, F.I.C., who conducted the trials, was excellently conceived, and the numerous civil engineers, owners of collieries, and chemists present appeared to be pleased. Of course, we possess explosives of far higher potency, and others that are fairly safe to use, but hitherto the complaint against the former has been that they act too rapidly, destroying locally all adjacent; while, with one or two exceptions, the safer compounds have not exhibited any phenomenal disruptive force.

The first test to which bellite was submitted was almost crucial, as regarded the problem of security, half a ton weight of iron being dropped 20 ft. on to a packet of cartridges, resting on a thick iron slab, without producing explosion, while, beyond causing breakage, the ignition of 1 lb. of gunpowder inside a paper parcel containing naked cartridges proved similarly harmless. Nor was the fire experiment less successful, a lump of bellite thrown on cinders blown to a white heat merely melting or fusing away with scarcely appreciable ignition. In each case, it should be said, a second experiment was made to prove that the explosive itself had been submitted to the previous test.

Perhaps more interest attached to the next series of trials, in which bellite competed with dynamite, the object being to show that while exerting even greater force than Mr. Nobel's discovery, the new Swedish explosive diffused its energy over a wider surface—in other words, the gases generate a little more slowly. These successive tests were made upon ⅜ in. boiler plates and 70 lb. iron rails in fairly good condition, the charges ranging from 1 oz. to 4 oz., being laid upon the plates, and in the case of the rails—resting on their sides—on the web. In most instances the charges were tamped with a handful of wet mud, but in two tests were exploded without any covering except the usual wrappers. With regard to these latter, dynamite must be considered to have had the best of it, its quicker action bursting a small hole through the plate, and also through the rail web, the competing explosive merely causing extensive bulging with prolonged fracture. In all the other trials, however, bellite produced much the most damage, the surface injured or wrecked being some 30 per cent greater.

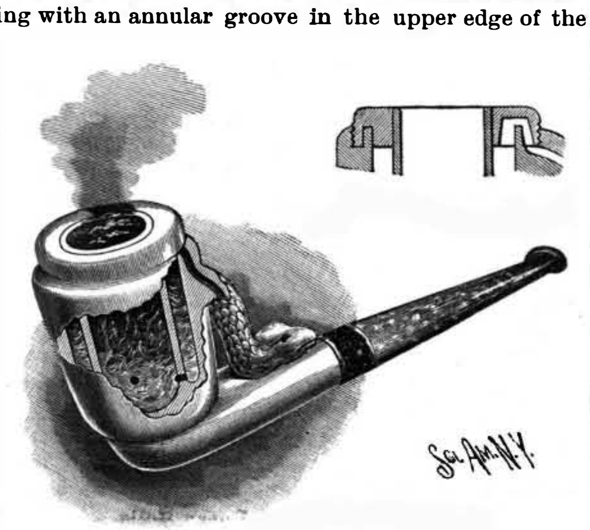
An earlier test, which had failed, namely, exploding a bellite cartridge upon the ⅜ in. to ½ in. lid of a deal box filled with the same, and which resulted in the explosion of the contents, was now repeated on a ¾ in. lid successfully, the box being merely broken to pieces and the cartridges inside fractured and dispersed; the first day's proceedings ending with the explosion of earth and submarine mines, 3 lb. of bellite raising masses of earth to a height certainly not less than 100 ft., and probably half as high again, and leaving a hole found on after measurement to be 11 ft. in diameter, and nearly as deep to the loose earth. The submarine explosion was equally effective.

The second day's experiments were made in the ironstone mines at Middlesborough, owned by Messrs. Bolckow, Vaughan & Co., and, in the opinion of the experts present, were absolutely successful, the stone being thrown out in large and easily removable blocks, while the absence of offensive gases was particularly remarked. In regard to the other claims advanced for bellite, namely, its flameless character and security against explosion by lightning or electricity, no opportunities were afforded for forming a conclusion, but the fact that it is carried as ordinary merchandise in Sweden leaves little room for doubt as to the sufficiencies of previous tests in these directions. During the first day's trials a distinct flash was visible when dynamite was exploded, but not so when bellite was discharged. The new explosive is a compound of nitrate of ammonium with di- or tri-nitro-benzole, in the proportions of about five of the former to one of the latter.—The above is from the *Engineer*.

Bellite, says *Industries*, closely resembles roburite and gremite, and consists of five parts in weight of nitrate of ammonia, mixed with one part of di- or tri-nitro-benzole, and is manufactured either in the form of a loose powder, yellowish in color, or in compressed cartridges; and in taste and smell is similar to the nitrate of ammonia of commerce. It is claimed for bellite that it is more powerful than gun cotton or dynamite; cannot be exploded by shock, pressure, lightning, electricity, friction, fire, or indeed under any conditions except by aid of a detonating cap, and is, therefore, perfectly safe; gives off no offensive gas, as with dynamite and other nitro-glycerine compounds; is entirely flameless when exploded, and can, therefore, be safely used in coal mines; presents no danger in manufacture even in tropical climates, and in Arctic cold requires no thawing; is absolutely safe in transport, and is, in fact, carried by the Swedish railway companies as ordinary merchandise; and when made expressly for subterranean blasting, does not shatter like dynamite, rather forcing the coal or rock out in large blocks, and causing but a small percentage of dust. It is further claimed that bellite shells might be fired from ordinary cannon, without the slightest fear of the concussion produced by igniting the gun charge exploding the shell and bursting the gun.

AN IMPROVED SMOKING PIPE.

A pipe designed to extract the nicotine from the smoke before the latter enters the stem, and wherein the smoke will be cool upon reaching the mouthpiece, and dirt and sediment will be prevented from settling in the stem, is illustrated herewith, and has been patented by Mr. George H. Wartman, of Montesano, Washington Territory. The bowl has a central receptacle for tobacco, which may be detachable if desired, and there is an annular chamber between the inner walls of the bowl and the outer walls of the tobacco receptacle, adapted to be ordinarily filled with cotton or other equivalent, there being small apertures in the sides of the tobacco holder, allowing the smoke to be drawn therefrom through the cotton. The neck to which the stem is attached has a channel connecting with an annular groove in the upper edge of the



WARTMAN'S PIPE.

bowl, formed by the rim or cap shown in the sectional view. This construction is especially adapted to meerschaum or other bowls to be colored, as the heated tobacco does not come in contact with the bowl.

Chimneys for Boiler Plants.

Referring to the 335 foot chimney of the Clark Thread Company, at Newark, N. J., which of late has been very widely noticed, as being probably the tallest boiler chimney in the world, and which was illustrated in the SCIENTIFIC AMERICAN, Oct. 20, 1888, calls to mind the fact that a large number of chimneys now in existence are of much greater height than the requirements actually call for. There seems to be a prevailing notion that the greater the height the greater, in direct proportion, the draft-producing power of a chimney—a most natural error perhaps on the part of the average power men, but, at the same time, one which has been responsible for much unnecessary outlay in chimney construction. As a matter of fact, the draft-producing capacities of chimneys, having flues of the same size, are in proportion to the square roots of their heights, so that if one was to have double the power of the other, it would have to be four times as high. Attention has been more than once directed to the circumstance that beauty of design, from an architectural point of view, has had much to do with the unnecessarily great heights so frequently encountered, a much favored rule being to make the height of the chimney equal to about 25 times the diameter of the flue. A little consideration will show that by rigidly adhering to this ratio some rather peculiar results will be reached, chimneys for small plants turning out to be much lower, and those for larger boiler plants becoming much higher than is necessary. The area of cross section of the chimney flues in all cases should be made to depend upon the combined areas of the boiler flues, and this with a height of stack of 100 feet, shown by extended experience to be a very satisfactory figure, will furnish ample draft to burn any of the commonly used fuels. Applying the 25 to 1 ratio to two plants of say two and ten boilers respectively, all of the same size, and proportioning the flue areas of the chimneys in the way we have just indicated, will afford a very striking illustration of the shortcomings of the rule. One hundred and fifty feet represent what has on good authority been given as the maximum height of chimney necessary in any case for producing the requisite draft, always provided, however, that the flue area has been properly proportioned. Proprietors of steam plants boasting of chimneys which must exceed this figure in height may indulge in some profitable reflections as to the money needlessly spent in having such structures raised.—*The Iron Age.*

The Dreams of a Hasheesh Smoker.

Science describes the experiences of a gentleman who placed himself under the influence of hasheesh. He smoked it until he felt a profound sense of well-being, and then put the pipe aside. After a few minutes he seemed to become two persons; he was conscious of his real self reclining on a lounge and of why he was there; his double was in a vast building of gold and marble, splendidly brilliant, and beautiful beyond all description. He felt an extreme gratification, and believed himself in heaven. This double personality suddenly vanished, but reappeared in a few minutes. His real self was undergoing rhythmical spasms throughout his body; the double was a marvelous instrument, producing sounds of exquisite sweetness and perfect rhythm. Then sleep ensued, and all ended. Upon another occasion sleep and waking came and went so rapidly that they seemed to be confused. His double seemed to be the sea, bright and tossing as the wind blew, then a continent. Again, he smoked a double dose, and sat at his table pencil in hand, to record the effects. He lost all conception of time. He rose to open a door, and it seemed to take a million years. He went to pacify an angry dog, and endless ages seemed to have passed when he returned. Conceptions of space retained their normal character. He felt an unusual fullness of mental impressions—enough to fill volumes. He understood clairvoyance, hypnotism, and all else. He was not one man or two, but several men living at the same time in different places, with different occupations. He could not write one word without hurrying to the next, his thoughts flowing with enormous rapidity. The few words he did write meant nothing.

Cocoanut Fiber as a Defensive War Material.

In the last report of the Curator of the Nilgiri Gardens attention is drawn to a new use for the refuse fiber of cocoanuts. Dr. Lawson says that his attention was drawn to the subject by Mr. Money, a planter in the Nilgiris, who sent him an article in the *Revue des Deux Mondes* for August 1, 1886, by M. De la Barriere, entitled "Batiment de Combat et de la Guerre," in which the author described how the refuse of cocoanut, after the process of retting, might be used for backing the iron plates of ships of war. The method of proceeding was to take a quantity of the powdered refuse before it was quite dry, and subject it to pressure, when the natural viscidity of the macerated cellular substance of the nut caused the whole to cohere and to form a plate, which in general appearance was like a mill-board, only much more brittle.

Owing to the hygroscopicity of this substance, if a hole is made through it, the parts adjacent to the puncture absorb water, swell up, and immediately close the orifice. Dr. Lawson got a sack of this refuse and made a plate 18 in. square by about ¾ in. in thickness, which he placed between two boards, and then fastened it to one side of a box, which contained a head of one foot of water. A bullet half an inch in diameter was fired through it, but not a drop oozed out. This experiment was repeated three times with the same result. Then a ¾ in. bullet was fired through the plate, when a few drops only made their way through. Lastly, a bullet nearly 1 in. in diameter was fired through the plate, when a large jet of water shot through, but in the course of a few seconds the stream decreased in volume, and in less than a minute had ceased to flow altogether. Whether or not this material could be advantageously used for the purpose which M. De la Barriere suggested, or for any other purpose, is a matter worth considering, for, as he truly says in his article, millions of tons float away annually down our rivers in India.

Deep Sea Soundings.

Her Majesty's surveying ship Egeria, under the command of Captain P. Aldrich, R. N., has, during a recent sounding cruise and search for reported banks to the south of the Friendly Islands, obtained two very deep soundings of 4,295 fathoms and 4,430 fathoms, equal to five English miles, respectively, the latter in latitude 24 deg. 37 min. S., longitude 175 deg. 8 min. W., the other about 12 miles to the southward. These depths are more than 1,000 fathoms greater than any before obtained in the Southern Hemisphere, and are only surpassed, as far as is yet known, in three spots in the world—one of 4,655 fathoms off the northeast coast of Japan, found by the United States steamship Tuscarora; one of 4,475 fathoms south of the Ladrone Islands, by the Challenger; and one of 4,561 fathoms north of Porto Rico, by the United States ship Blake. Captain Aldrich's soundings were obtained with a Lucas sounding machine and galvanized wire. The deeper one occupied three hours, and was obtained in a considerably confused sea, a specimen of the bottom being successfully recovered. Temperature of the bottom, 33·7 deg. Fahr.