For the Scientific American.

The Mineralogist.—The description and locality of every important Mineral in the United States.

(*Continued.*)

ASBESTOS.

Occurs massive, composed of fibres of various lengths, either straight, curved, or starlike. Color, green, greenish-gray or yellowish gray. Fibres are not elastic nor flexible. On the edges it is transparent. It has a shining lustre, and a weight nearly three times that of water. Found at Washington and N. Haven, Ct., abundantly in New Castle Co., Del.; on the top of the Green Mts.; on the banks of the Hudson, and Island of N. York. *Amianthus*, a variety of this mineral, has been manufactured into cloth and paper, which is incombustible. It is also used for the packing of high-pressure steam-engines.

ASPARAGUS STONE.

Occurs only in crystals. Colors, green, and white. Dissolves in acids without bubbling. Found in Germantown, Pa.; Morris Co. N. J.; Highlands, at Anthony's Nose; near Lake Champlain; on the Island of New York.

AUGITE. (PYROXENE.

Occurs in crystals, in grains, and in masses. Color, brownish, blackish, or yellowish green, and white or gray. Lustre, glossy or faintly shining. Consists of plates or leaves. Three times heavier than water. Fusible. Found in Kingsbridge, Munroe (in iron mines), and Ticonderoga, N. Y.; Litchfield, Brookfield, Washington and Canaan, Ct.; Deerfield, Bolton, and Pittsfield, Mass.; 5 and 8 miles from Baltimore, Md.; Bytown, L. C.

AUTOMOLITE (GAHMITE.)

Occurs in small, dark green, 8-sided crystals; 4 times heavier than water; scratches glass. Found at the Franklin Iron works, N. J.

BARYTES, SULPHATE OF (HEAVY SPAR.)

Occurs in rounded masses, of a yellow, brown or black color. Gives the odor of rotten eggs when rubbed or heated. Yields to the knife, Compared with water it is 4 times heavier.—Localities are, Middlefield, and Greenfield, Mass. Livingston's lead mine, the Highland. near the Hudson, and Little Falls, N. Y.; Berlin, Cheshire, Southington, Farmington, and Hartford, Ct.; Hartfield and Southampton, Mass. on the west side of Paulin's Kill, and near Scotch Plains, also, near Newton N. J.; 3 miles west of North Hope in Buck's Co., Perkiomen lead mine, and at the foot of Blue Ridge in Bedford Co., Pa., near Lexington, Ky.; Liberty, Frederick Co., and Washington Co., Md.

BERYL (AQUA MARINE.)

Occurs in green 6-sided crystals. Scratches glass. Often transparent. Twice as heavy as water. Infusible but turns white. Found at Acworth, N. H. in crystals 2 feet in diameter. Chesterfield, Goshen, and near Northampton and Boston, Mass. Topsham, Bowdoinham, Cumberland Co., and Lincoln Co., Me.; Cumberland, R. I.; Haddam, Litchfield, Middle Haddam, Brooklyn and Chatham, Ct.; Chesnut Hill, East Marlborough, Germantown, Chester Co., Pa.

BISMUTH.

Occurs in shapeless masses, feathery, or net-like; also, crystallized. It consists of thin plates. Soft. Lustre brilliant; tarnishable. 9 times heavier than water. Easily melts, and dissolves in aqua fortis. Found at Munroe, Trumbull, and Huntington, Ct.

BITTER SPAR. (RHOMB SPAR.)

Color, yellowish or grayish white. Consists of plates, which may be separated. Lustre pearly and shining. Transparent. Brittle. When heated it turns to quicklime; dissolves in acids. Occurs at Great Barrington, Middlefield, Adams, Hinsdale, Windsor, Sheffield, and Pittsfield, Mass.; Washington, Litchfield, and Milford hills, Ct.

BITUMINOUS LIMESTONE.

Color, brown. When heated or rubbed, yields an unpleasant odor. When burned, becomes inodorous, and loses its color, and turns to lime. Occurs near Middletown, Ct., presenting impressions of fish.

BITUMINOUS SHALE.

Its structure is slaty, of a brown or black color. Yields to the knife. Twice as heavy as water. Emits the smell of bitumen when heated, and often burns. Frequently contains impression of fish and vegetables. Found in the R. I. Coal beds, and Westfield, Ct.; and nearly every state.

BORATE OF LIME. (DATHOLITE.)

Occurs in small, glassy crystals, usually colorless or a little yellowish, grayish, or greenish white. Yields to the knife. Three times heavier than water. Forms a jelly with acids. Turns white in the flame of a candle. Found at Paterson, N. J.; Hampden and Middlefield, Ct.

BOTRYOLITE.

Occurs resembling grapes, and in rounded concretions formed of layers. Color, white, gray, and red in circles; on the outside yellowish gray. Twice heavier than water—Found near Passaic Falls, N. J.

BRUCITE.

Occurs in grains and crystaline masses, of a yellowish brown or wine color, and pearly lustre. Thrice heavier than water Infusible but turns white. Found at Sparta and Sussex Co., N. J.; Warwick, N. Y.

BUCHOLZITE.

Occurs in masses. Colors, black and white arranged in spots. Its lustre is glassy, and fragments wedge-shaped. Consists of fibres. Scratches glass. Found at Brandywine Creek, Del. (*To be continued.*)

For the Scientific American.

Expansion of Steam.

(*Concluded.*)

Again let the cylinder of the Steam Engine be supposed divided into 4 equal divisions the initial pressure same as stated before and cut off at a quarter, or after the piston has travelled through the first division, when the piston has arrived at the second division the same effect would follow as before stated, that is we should expand eight lbs. of steam and have eight lbs. remaining in the cylinder; at the third division we should have same as before 5 1-3 lbs., 10 2-3 lbs. expanded; but at the last division or end of the stroke, pressure four lbs. 12 lbs being expanded.

Now it appears from the above reasoning that if we know the initial pressure of steam and the point at which it is cut off we can easily trace out the effect of expansion due to these elements.

To illustrate the subject farther, suppose again we have a cylinder with the dimensions as previously stated and assuming now the diameter to be 40 inches the area of which is 1256.6 and cut this steam off as before at 1-8, now we should not only use but 1 8 of a cylinder of steam, but this 1-8 would be multiplied 3 1-5 times, that is whatever work this 1-8 was capable of doing, its performance must be multiplied 3 1-5 times, to get the whole amount of work that it could do. Now if we imagine the cylinder to be one foot in length working full stroke with 16 lbs. pressure of steam the area as before 1256.6, multiplied by 16 lbs. gives 20105.6 lbs. raised one foot high—this evidently is the effect of the 1-8 of a cylinder of steam. Now by allowing this given quantity to expand into 8 times its original volume, although the pressure is reduced from 16 lbs., its initial entrance, to 6.15 the mean or average throughout the stroke, yet we shall have 1256.6X6.15=7728 09 lbs. raised 8 feet high or 7728.09X8=61824.72 lbs. raised one foot high in the same time; now the one foot of steam could lift 20105 6 lbs. one foot high, so that 20105.6 lbs. from 61824.72 lbs. leaves 41719.12 lbs. of clear gain from expansion.

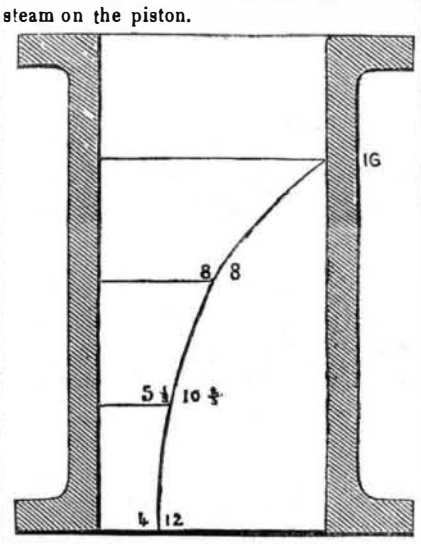
Another example—suppose the cylinder 4 feet stroke and cut off at 1-4, the other elements the same, the work done with the 1-4 of a cylinder of steam would be the same as before and by expanding this 1-4 into four times its original volume, its performance would be multiplied 2 2 5 times so that in this case the mean pressure being 9 54 lbs., throughout the stroke, area 1256.6X9.54 gives 11987.96 lbs. raised 4 feet high or 11987.96X4 gives 47951.-84 lbs. raised one foot high in the same time; here we have also a clear gain of 27846.24 lbs.

Now from what has been said it appears that the shorter the steam is cut off, the more we gain from expansion, and this is true in theory, but will not hold good in practice unless carrying very high steam, too high indeed for general safety; the reason is that when low steam is carried and cut off short the expansion is so great, the steam loses very nearly all its elasticity before the piston has arrived at the end of the stroke, and then there is nothing but the momentum of the machinery to carry it on to the end.

Take two cylinders, let one of them be 8 feet stroke, steam 16 lbs. pressure cut off at ¼ stroke and let the other be 4 feet stroke, same pressure of steam, but working whole stroke. Now the 4 foot stroke would do a certain amount of work, and the 8 foot one would do just as much before the steam was cut off, because the two cylinders would be the same from the beginning of stroke to where steam was cut off, and although there is no more steam used in the one case than the other, yet by allowing the 4 feet of steam to expand into double volume—we gain more than double the effect, for the area of both pistons being the same 12.56.6 inches, the mean pressure, that is the average of pressure on the 4 foot one, would be 16 lbs. throughout the stroke. The area 1256.6X16 lbs. will give the whole pressure on the piston and as previously stated this would be 20-105.6 lbs this raised 4 feet high (the length of the stroke) gives 80422.4 lbs. raised one foot high in the same time, this would be evidently the effect of the 4 foot stroke, the 8 foot stroke having the same area of piston would be pressed with the same force from the commencement of the stroke to where the steam is cut off, but as the steam by expansion loses part of its force the average pressure would be but 13.54 lbs., now the 1256.6 inches area X13.54 lbs. gives 16974.36 lbs. pressure on the piston, but as this piston has to travel twice as far as the 4 foot one, 16974.36 lbs. X8 feet gives 135794.91 lbs. raised one foot high.

Here we see by using steam expansively although there is not a pound more expended in one case than the other yet we have a clear gain of 118820.55 lbs.

In estimating the horse power of the condensing engine the pressure of the vacuum obtained must be added to the mean pressure of steam on the piston.



The accompanying diagram is intended to represent a cylinder of 8 feet stroke with the steam cut off at 1-4 the curve (called the hyperbolic curve) shows the diminution of the steam from the time it is cut off to the end of the stroke the figures 8—5 1-3 and 4 is the pressure of the steam at those points, and the others 8—10 2-3 and 12—the amount of expansion at the same points the area of the interior of the curve may be counted as the expenditure of steam and the exterior area as the expansion or clear gain. The pencil of the indicator when the steam is cut off at a 1-4 stroke, should trace out this curve although there are very few engines that will come up to this, still the nearer they can come to it the more perfect will be their expansive principles.

How to Construct Plank Roads.

Lay out the intended line with care to avoid steep inclinations, never ascending more than one foot in thirty or forty, and winding many feet around rather than go up one. Grade the road bed wide enough for two wagon tracks but plank only one. Lay down flat wise two stringers, twelve by three, four feet apart centre to centre. Imbed them well in the earth; across them, at right angles, lay three inch hemlock plank, eight feet long,—Pack the earth well up to them; slope the earth track toward the ditches (which should be wide and deep), and your Plank road is made.

The inner stringers should be higher than the outer ones, so as to carry the water off freely. They should be in two pieces, each 6 by 3, so as to break joints. The ends of the planks should not be laid to a line, but project a few inches on each side alternately, so as to make it easy for wheels to get on the track, and to avoid forming a rut alongside. They need not be fastened down, but spiked down, say, every fifth or tenth plank, the rest being well driven against these.—When hemlock plank get worn down 2 inches the knots project so as to make the road too rough, and to require renewal. Allow one inch more to hold them in and we have three inches thickness. Hemlock is generally used as cheapest, but pine or oak would be better.

The cost of the road will vary with the price of lumber. On the plan recommended it will require 127,000 feet of plank, 32,000 feet of stringers per mile: in all about 160,000 feet board measure. Other items of cost are the levelling the road bed and laying the plank, which costs from 50 cents to $1 per rod. The excavations and embankments necessary to give the road proper grades, and the bridges and sluices cannot be esitmated without the data of a survey, but the price per mile may be set down at $2,000 with lumber at $9, and omitting extra excavations and embankments, and gate houses. The difference of a dollar per 1,000 in the price of lumber, makes a difference of $170 per mile.

As to durability, seven years for hemlock would be a safe estimate, though our experience is as yet very limited. One set of stringers will outlast two or three coverings of plank. But, to be profitable, the plank must have so much travel as to wear them out before they rot out. The wear and tear of the first year equals that of the following six, as a tough elastic coating of woody fibres, &c. is soon formed, and protects the plank from wear. On one road, the passage of 160,000 teams wore the plank down but one inch.

Charcoal Roads.

As the public are settling upon the determination to improve in some way the Western roads, attention is claimed in Wisconsin for those formed of Charcoal, which are asserted to be more durable and costing two-thirds less than the plank roads. One of these is now being built from Port Uloa, in Washington Co. to some point in Dodge Co. The contracts are let ot $1 61½ per rod or $499,20, and $520 per mile.

Population of the British Empire.

The inhabitants of the United Kingdom, according to the returns made in 1845, numbered about 20,000,000. The colonists, (subject and tributaries,) in the colonies and settlements belonging to the British Empire, amount to about 136,079,000, making together about 156,000,000. There are only three European states with a population more numerous: Russia with 63 millions; Austria, with 37 millions; and France, with 35 millions. But taking the whole British Empire, it is certain that no other state in the world is peopled so extensively, excepting the Chinese; but that is doubtful, because Chinese statistics are not to be depended upon The British Empire is more than four times as populous as France—twice and a half as large as Russia; and amounts alone to as much as the population of Russia, Austria, France, Prussia, Spain, and Holland.—The whole human race is estimatsd at 800,-000,000; the British Empire at 156,000,000; so that its population comprises upwards of one-fifth of the human race. The population tributary or subject on the British people numbers five times its own amount.

Large Icthyosaurus.

The largest specimen of this remarkable fossil reptile, as yet in this country, has just been received by Prof. Webster, from Somersetshire, England. It is seven feet long, and with the rock in which it is embedded weighs half a ton. The Professor has also added it to the mineralogical and geological cabinet of Harvard College, where, we have no doubt, it will be quite at home with its old acquaintance the Mastadon, obtained by the same gentleman, from New Jersey, a year or two since.

Gold in Maryland.

A rich vein of gold has recently been discovered on the farm of Mr. J Ellicott 25 miles West of Baltimore. The purity of the gold is stated to be *remarkable.*