Calico Printing.

[Abstract of a paper recently read before the Roundabout Club, a literary society, of Melrose, Mass., by L. Williams.]

The lecturer remarked, in commencing, that if Cotton is King, Calico must be *Prints*. Like charity it covers a multitude of sins, and many a man has experienced the dangers that lurk in calico, so that only a veteran should approach it No material for garments was ever so universally worn except one, and that years ago, in a far off land, where the whole female population wore fig leaves. Calico is derived from Calicut, a town in India where the cotton cloth was first made, and strictly speaking is plain cotton cloth, after being figured it becomes prints. The most common cloth now used for printing is known as 64 square 7 yards, meaning a square inch of the cloth counts 64 threads each in the warp and filling, and 7 yards weigh a pound. Immense quantities of this cloth are used annually by the calico printers In the city of Fall River alone there are thirty printeries, and their weekly product is 149,000 pieces, and their monthly pay roll amounts to $310,000; and besides these mills there are hundreds of thousands of yards made in Lowell, Manchester, and other large cities. There are cheaper prints, but the demand at present is for higher grades than the average, which shall weigh 6 yards to the pound and count from 72 to 100 square. Printed calico was probably known to the Egyptians several thousand years ago In India, the printing of calico was originally the well known Randanna pattern, and printed on silk as well as cotton. The manner of making the little squares and other figures seen upon these goods was very primitive, and consisted of tying bits of cord around small portions of the cloth before it was put into the dye pot. Then the yellow or red dye would color the cloth except where it was tied by these cords, these latter spaces being left irregular and white. This was followed by a certain paste or wax laid upon the cloth, which would resist the dyestuff, thus saving the spot beneath so that the wax being removed the white figure would remain. The next idea was to prepare plates of lead, through which were cut the required figures. One of these was laid at the bottom of a large number of these layers of dyed calico, and the other on top, the figures being exactly opposite each other. A powerful pressure was then applied, and an acid, strong enough to take out the color without injuring the fabric, was poured in at the top upon these figures, slowly penetrating the mass and being kept in by the pressure, and thus forming the figure. The next advance was to block printing, the pattern being engraved on blocks of wood, smeared with the color, and stamped on the calico. A greater variety of figures and colors were produced by these, but only by using separate blocks for each color, and also one for the ground and another for the dark line always observable between every figure.

By the "Toby Tub," next invented, all the colors were stamped with only one block, and on the edges of these were pins, which pricked the cloth exactly where to place the next block in stamping, which was done by boys seated at long rows of tables, each with block and color. The calico was stretched between the feet of the boy from one end of the room to the other, and as it was pulled slowly along, each boy would stamp his pattern.

The printing of calico was introduced into England in the seventeenth century, but little progress was made until 1764, when Robert Peel, grandfather of the future prime minister, left the plow for the printery. The block he used, however, had a handle on the back, struck by a mallet to produce an impression. A piece of calico of 28 yards required 448 applications of the block. Copper plates, working much like an old-fashioned press, came next, and in 1785 the cylinder press was invented, and one of the old style was shown by the speaker and described, who said the calico printing press of to-day is the same thing, and the 28 yards of cloth can now be printed in two minutes. The expense of engraving the copper rollers of the cylinder was very great, and they soon wore out. About this time Jacob Perkins, of Newburyport, born there 1766, and who also invented *steel* plates for bank notes, brought out a process of transferring the engraving from a small three inch long steel cylinder to the large copper roller, by first cutting on the soft steel, hardening it, and then bringing it out in relief on a second cylinder, from which, after again hardening, it is pressed on the copper roller, which, when worn out, can easily be renewed.

The partograph is another method of engraving, and the operator sits at a table with the print design before her (for a partographist is generally a very skillful young lady), marked out on a zinc plate nine times the size required. Above the table and in front is the copper roll to be engraved, covered with wax. The operator applies the point of the partograph to the zinc, and immediately a set of pointers attached to the one she is using, by machinery, scratches the same figure through the wax on to the copper roller above. This roller is then immersed in a bath of nitric acid, which eats into the copper where the lines are traced, and thus engraved. The design is made nine times its size by being placed in a camera, and afterward rubbed into the zinc, making it more distinct to the designer.

Let us follow a piece of calico from its unbleached state to a finished condition. First, it is bleached to make it white, then it is singed by placing over gas jets or red hot plates to remove the nap or fuzz, and it is then ready for the printing machine, which weighs 10 tons, is 10 feet high, and will print from 1 to 12 colors at once. The figure is engraved on copper rollers, each having a separate roller, which revolves in a trough of coloring matter, covering the roller completely, but a parallel flat rod called the 'doctor," the exact length of the roller, scrapes from it all the color except in the engraved lines, and as the cloth is pressed against the roller, the figure is stamped, each roller imparting one color only, and each exactly fitting the other. Colors and their formation of various chemicals were very fully described by the lecturer, who stated that within eighteen months a great revolution has taken place in the printing of calicoes, and that certain colors, like green, blue, and yellow, once hard to produce, can now be brought out at will, and madder, once so important, is now a thing of the past, and superseded by steam colors and chrome, which last fixes the color Finishing, folding, labeling, and packing into cases complete the task of printing.

Each case contains 2,000 yards, or enough to clothe 200 women. There are 350 printing machines in the country, with a capacity of printing 1,500 pieces each, or a total of 525,000 per week, each piece containing 40 yards, or 21,000,000 yards, and the United States stands second in the business, the printeries of England placing her number one, one printery alone near Manchester running 52 machines; and in France, also, are many manufactories. Mr. Williams said that twenty years ago not a jobbing house in Boston but had a line of English goods, but to-day, and for some time past, it would be difficult to find any; our best designers, however, are from the mother country, and those printers are most successful which employ best designers and printers.

In the Centennial year numerous curious and patriotic designs were made, and a very rare bed quilt made from these was exhibited, the lecturer declining to mention the number of pieces in it, remembering the old proverb, "As you make your bed quilt so will you *lie*." He first suggested a design for patchwork calico, thus saving the time of old ladies, who formerly spent it in making patchwork quilts; and one of these patchwork designs has been produced more than any other engraved in this country. There was a fierce struggle against the introduction of calico by manufacturers of linens and woolens in England and France, and laws were enacted forbidding its manufacture and also its sale, until Madame Pompadour first procured its use in France for furniture covering. It first made its appearance in America in 1788, in the State of Rhode Island, but strenuous opposition was made by the English to have either machinery or printers brought over the water. The lecture closed with some humorous stories concerning calico, and good advice was given to young men about choosing a wife who always displayed neatness and good taste in her morning calico.

A collection of designs of various styles and of the machinery and apparatus used in producing these prints, was used in connection with the lecture, and aided in making it one of the most interesting and instructive ever given in the town, and one much appreciated by the audience.—*Boston Journal.*

Timbuctoo.

The following information with regard to the little-known city of Timbuctoo was lately obtained by the Geographical Society of Oran, Algeria, from an Israelite Rabbi of Morocco, who was on his way from Timbuctoo to Paris. The Rabbi described Timbuctoo as an Arab town in every sense of the term, built absolutely like all those of the interior. The inhabitants are Foulah negroes, and there are no whites. There are, however, sometimes Jews from North Africa, who come to trade, but they never settle there. The town is at about an hour's distance to the north of the Niger. Its population is about 50,000; it is larger than Oran (about six miles round), but not so large as Marseilles. The town is, in fact, a mass of villages, extending over a very considerable area. The Niger, which passes to the south of the town, flows from the west to the southeast, and is very broad; there is abundance of fish. Navigation is carried on by means of oared barges and rafts, constructed of pieces of wood bound together by cords. The blacks call the Niger the Nile, or "El Bar" (Arab, "the sea"). The river is subject to regular floodings, which fertilize the lands on its banks, the only ones which are cultivable; the inundation reaches the walls of the town. The country is very fertile; the crops are sorgho, millet, rice, tomato, onions, turnips; indigo grows wild. There are also many cocoanut trees, gum trees, and a tree which produces oil which the natives use for lighting. There are also forests of valuable timber trees. The country is governed by a Marabout, who takes the title of Sultan; the present ruler is named Mohamet-el-Bekai. He does not reside at Timbuctoo; his capital is Ahmet-Ellah, a town of more than 100,000 souls, situated about twelve leagues from Timbuctoo. The road connecting the two towns is covered with villages and gardens. The town of Timbuctoo is under the command of a Caid, who has very great authority, and who has under his orders a tax collector, also very powerful. The Sultan has no army, but when fighting is necessary everybody is a soldier They are armed with bows and arrows; only the chiefs have guns, pistols, and sabres. Trade is carried on principally by barter or by means of cowries. Caravans bring cotton or linen goods, glass trinkets, mirrors, arms, swords, guns, pistols (generally of English manufacture), knives, needles, etc. Salt is a valuable import, a slave often being given for a kilogramme or two. The caravans take back loads of the grain of the country—rice, sorgho, millet, ostrich feathers, gum, ivory, gold dust, lead, copper, etc. Trade in slaves is carried on on a very large scale. To the north of Timbuctoo many camels are reared; to the south the people wander about with herds of sheep and cattle.

ENGINEERING INVENTIONS.

An improved engine governor and speed regulator has been patented by Mr. Joseph Reid. of Monroe, La. This invention relates to a governor based upon the principles of gyroscopic action. A reliable automatic stop device is provided, which, being a portion of the governor that is regularly in use, is not liable to become gummed or stopped, but is always in working order.

An improvement in rock boring machines, patented by Mr. William W. Graham, of West Rutland, Vt., relates to adjustable brackets, gauges, and guides for what are known as "diamond rock boring machines," the object being to provide means for boring the alternate holes of a series the proper distance apart, at whatever angle they may enter the rock surface; also to provide means for preventing the boring hub and spindle from running to the right or left of the line, thereby insuring an open communication between the holes bored by the first and second operations.

An improvement in bridges has been patented by Mr. Robert B. Vardell, of Dardanelle, Ark. The object of this invention is to provide a bridge of great strength and durability, that can be thrown across a stream at a single span, and require for its support only an abutment at each end.

Mr. Michael F. Craig, of Nevada City, Cal., has patented a device which consists in the combination, with a locomotive, of apparatus for sprinkling or wetting the rails either in front or behind the driving wheels, as circumstances may require, the apparatus being under control of the driver.

An improved rotary engine has been patented by Mr. George Murray, Jr., of Cambridgeport, Mass. The object of this invention is to provide a novel and simple device that can be used as a steam or hydraulic engine to transmit power, or as a force pump or blower when power is applied to it. It consists, essentially, of a universal joint with solid sections fitted snugly, but so as to revolve within a globular shell.

Mr. John C. Dean, of Indianapolis, Ind., has patented an improvement in valve gears, which consists of an arrangement in the steam chest of a direct-acting steam pump, of an auxiliary piston and valve, that are so operated as to regulate the admission and exhaust of steam to and from the main steam cylinder, and prevent loss of steam when the pump is in operation.

An improvement in spark arresters for locomotives, patented by Mr. David Hawksworth, of Plattsmouth, Neb., consists in a cup-shaped spark arrester that deflects the sparks against the sides of the stack. This is combined with a stack having an annular chamber that receives the sparks, from which chamber they are drawn by suction obtained by the use of an interior conical pipe or nozzle, the sparks and cinders being thus circulated and broken up until they pass off in dust.

Mr. Charles Bried, of Newark, N. J., has invented a boiler shell constructed of convexo-concave plates, united together with their convex surfaces inward to form a fluted cylinder, and with their joints stayed against springing by braces applied at the outside of the boiler, whereby the shell is rendered capable of sustaining high pressure at the inner side without spreading or rupturing.

Gloomy Thoughts and Gloomy Weather.

Dull, depressing, dingy days produce dispiriting reflections and gloomy thoughts, and small wonder when we remember that the mind is not only a motive, but a receptive organ, and that all the impressions it receives from without reach it through the media of senses which are directly dependent on the conditions of light and atmosphere for their action, and therefore immediately influenced by the surrounding conditions. It is a common-sense inference that if the impressions from without reach the mind through imperfectly-acting organs of sense, and those impressions are in themselves set in a minor æsthetic key of color, sound, and general qualities, the mind must be what is called "moody." It is not the habit of even sensible people to make sufficient allowance for this *rationale* of dullness and subjective weakness. Some persons are more dependent on external circumstances and conditions for their energy—or the stimulus that converts potential kinetic force—than others; but all feel the influence of the world without, and to this influence the sick and the weak are especially responsive. Hence the varying temperaments of minds changing with the weather, the outlook, and the wind.—*Lancet.*

The Scientific American in Turkey.

The United States Consul General at Constantinople writes to this office, under date of October 31, that he had sent a copy of the SCIENTIFIC AMERICAN to the Palace, and it is, adds the writer, a gratifying evidence of the interest it creates, that the Sultan has ordered portions of it to be translated into Turkish for his reading.

The Origin of Coal.

Various theories have been propounded to account for the origin of the different kinds of mineral fuel which form the basis of modern industry. The most eminent geologists have hitherto ascribed the formation of coal to large quantities of driftwood accumulating in estuaries, where they were subsequently covered by sedimentary deposits; the ligneous structure becoming modified in the course of ages. Mons. E. Frémy has recently published some valuable researches on the origin of coal, in the course of which he arrived at results differing considerably from those obtained by other observers. In examining the various substances which might be supposed to give rise to beds of coal, some interesting observations were made. It was found, for instance, that all wood contains a substance which has been called vasculose, and to which its physical properties are chiefly due. It is present in oakwood to the extent of 30 per cent. In searching for a method to distinguish lignites from genuine coal or authracite, it was found that the former are completely decomposed by nitric acid, which is not the case with the latter. In the first series of experiments, vegetable tissues, or the skeletons of plants, were heated in closed iron tubes for many hours, at a temperature of from 200° to 300° Centigrade. Steam, acids, gas, and tar were given off, while the vegetable substances, although becoming black and brittle, retained their original shape, and offered no resemblance to coal.

Other substances produced by the vegetable world were then treated under similar conditions. Among those bodies experimented upon were sugar, starch, gums, chlorophyl, and resinous and fatty substances of vegetable origin. By prolonged heat combined with pressure these bodies were converted into substances offering a certain resemblance to coal. They were of a brilliant black, frequently fused, in soluble in neutral acid or alkaline solvents, and, when exposed to a red heat, gave off water, gas, and tar, leaving as residuum a hard and brilliant coke. The chemical analysis f these substances confirmed their resemblance to coal, as may be seen from the following examples:

	Carbon.	Hydrogen.	Oxygen.	Ash.
Coal made from sugar	66·84	4·78	28·48	—
Coal made from starch	68·48	4·68	26·84	—
Coal made from gum arabic	78·78	5·00	16·22	—
Pit coal from Blanzy	76·48	5·23	16·01	2·28

These three substances were chosen for experiment because, being most abundant in the vegetable kingdom, they probably played an important part in the formation of coal. But, although these bodies were so easily converted into coal, it remained to be explained how the tissues of plants could be changed into the same substance. A clew was given by the analysis of pieces of fossil wood, which were found to contain considerable quantities of ulmic acid. This acid exists also in peat, and may be produced from the vasculose contained in wood. In order to ascertain the influence of ulmic acid on the formation of coal, it was exposed to a high temperature in closed vessels. The following analyses show that the percentage of carbon increased with the duration of the experiment:

	Carbon.	Hydrogen.	Oxygen.
Coal made from ulmic acid heated for 24 hours	67·48	5·84	26·68
Coal made from ulmic acid heated for 72 hours	71·72	5·03	23·25
Coal made from ulmic acid heated for 120 hours	76·06	4·99	18·95

Like natural coal, the substance produced was insoluble.

Ulmic acid produced from vasculose was remarkable for its fusibility; this may account for the similar property of bituminous caking coals. On treating leaves with alcohol, various substances, such as chlorophyl, fatty bodies, and resins are extracted. When these were heated together for 150 hours a mass was obtained closely resembling natural bitumen.

The above experiments render it highly probable that the plants which gave rise to coal first underwent a species of peaty fermentation, during which they lost their organic structure. The peat thus formed became gradually converted into coal by the combined action of heat and pressure.

Tobacco, Cotton, Corn, and Wheat.

The estimate of the tobacco and cotton crops of this year, printed in this paper some weeks ago, proves to have been over-hopeful. Instead of exceeding last year's yield they will both probably be short. The report of the Department of Agriculture, issued November 15, gives the following estimates:

Tobacco.—The indicated produce for the entire country is 98 per cent of that of 1878. The gain has been greatest in Tennessee, Connecticut, and New York; the loss greatest in Ohio, Missouri, and West Virginia, with a material decrease, also, in Maryland, Illinois, and Indiana. In general, the quality is better than that of the previous crop, though damage to some extent from "house-burn" is reported from Kentucky and Virginia, and from frost in Ohio.

Cotton.—The returns indicate a yield per acre of 176 pounds lint, against 191 last year. This yield, estimating the area planted at 2 per cent more than last year, would make a deficit in this year's crop of 290,000 bales of 450 pounds each. All the South Atlantic States show some decline. Texas falls off 35 per cent. All the States bordering on the Mississippi River show decided gains.

On the other hand corn and wheat show gains, as follows:

Corn.—According to the returns of November 1 the corn crop promises an increase of 200,000,000 bushels, or nearly 15 per cent over last year. The Atlantic and Gulf coast States note some decrease, but the other portions of the Union have greatly increased their yields. The Southern inland States increased nearly 30 per cent, and the other parts of the Mississippi valley nearly 20. The Pacific States report about the same yield as last year.

Wheat.—The returns of November 1 show an increase in this wheat crop of 26,000,000 bushels over that of last year This great increase is the result of the very large yield in all the States bordering on the Ohio River and Missouri. The North western States show little variation from last year. Kansas and California both decline in yield. Texas, of all the Southern States, is the only one that falls off in yield this year.

How Wheat is Raised in Dakota.

Recent investigations as to the methods of cultivating wheat in the northwest, the cost of the crop, and so on, have been made by a special commission appointed by the British Government. In the course of their observations and inquiries the following information was obtained at the Dalrymple farm:

So soon as the frost has left the first six inches of soil, which is generally by April 1, the seeding of the wheat commences. Scotch Fife, a good, hard, thin skinned red variety, is used. The seed is selected for the newly broken up land. If any cockle or other weeds are observable, they are carefully winnowed out. No dressing or pickling is adopted. During autumn or winter, in 1 5-8 bushel lots, the seed for each acre is bagged up. Whenever the weather permits seeding commences. The seed is distributed by broadcast machines, one hundred being at work daily for three weeks. Two hundred sets of harrows complete the operation, two or three turns being required, and Mr. Dalrymple jocosely states that he orders it "to be well done, and then give one turn more." Four harrows, united by chains, work in a set, cover twenty feet, and are drawn by four mules. In each harrow are seventy-two round teeth. The set costs $14 to $15. Immediately after the wheat seeding, the oats and barley grown for horse provender are put in.

No horse or hand hoeing, no weeding, or any further expenses are incurred until harvest, which begins early in August. About 300 extra men are engaged. One hundred and fifteen automatic self-binding harvesters are busily at work; 100 of these are Walter Woods', the remainder McCormick's. Both are reported to do their work admirably; no objection is found to the wire binding. The grain is shocked, and cutting is overtaken in twelve days. No time or outlay is expended in stacking. The twenty-one steam thrashing machines, made the Buffalo Company, and costing $600, with thrasher, winnower, and straw elevator in one, are placed at convenient points throughout the fields. Ten wagons, each with a pair of horses or mules, bring up the shocks and carry off the thrashed corn in three bushel bags an average distance of two miles to the railway cars. A gang of twenty-five men keep wagons and thrashing machines steadily going, and deliver at the station 1,000 bushels of wheat daily. Each day the thrasher and engine, which is partially self-propelling and costs $800, is moved so as to shorten haulage of sheaves. Every busy day, fifty railway cars, each containing 400 bushels, are loaded, and stand ready for dispatch, usually to Duluth, 254 miles distant, on the western corner of Lake Superior.

The crop of the present year Mr. Dalrymple states to be much the same as that of former seasons. It averages 20 bushels an acre of 60 lb. to the bushel. The natural weight is 59 lb. to the bushel. As usual the produce of the newly broken up land is best. The quality is fully as good as that of 1878. When run once through the winnower at Duluth, it will be graded No. 1 hard. Mr. Dalrymple usually sells as fast as he can deliver, but this year, holding for the rise, he has still the chief portion of his crop warehoused at Duluth. The oats are reported to yield 50 bushels to the acre, and 38 lb. to the bushel, last year 60 bushels were produced. The barley has not done particularly well this year, but generally runs 40 bushels. On each farm a few potatoes, cabbages, swedes, and other vegetables are grown for home use and for the cows which are kept to supply dairy produce; but wheat growing is the great business of this great farm.

Now comes the important question of the cost of production. Mr. Dalrymple furnishes the following figures: Land valued at $12 per acre, interest thereupon at 6 per cent, 72 cents; taxes and rates, 10 cents; buildings, machinery, and teams valued at $10, interest at 10 per cent, 10 cents; plowing $3; seed, $1.50; harvesting and thrashing, $3, total, $8.42.

Mr. Dalrymple thus produces an acre of wheat for less than $8.50 (34s.) per acre; indeed he asserts that hitherto the actual cost has not reached $8, excepting in the case of the first year's crop, which the extra expense of breaking up and two plowings advanced to $11. For four years his acreable yield has averaged 20 bushels, each of which, on the basis of the above calculation, would cost 42 cents, or 1s. 9d. On his own and other suitable wheat-growing farms, in favorable seasons, Mr. Dalrymple declares that the crop does not cost more than 35 cents per bushel. Sold, as it readily can be at the railway station at Casselton, at 75 cents to 80 cents, a very handsome profit is obtainable.

M. L. Collot has discovered the true *Phylloxera vastatrix* upon *Vitis caribbæa*, a wild species of vine found in the forests of Panama, far removed from any vineyards or localities where the true vine (*V. vinifera*) is cultivated. This strongly confirms the opinion that the *phylloxera* is indigenous in America.

The Indians as Farmers.

In his annual report to the Secretary of the Interior, Commissioner Hoyt states that during the past year there has been among many tribes a marked advance toward civilization. The substantial results of Indian farm labor during the year 1879 are given as follows:

By Indians, exclusive of the five civilized tribes of the Indian Territory:

Number acres broken	27,131
Number acres cultivated	157,056
Number bushels wheat raised	328,637
Number bushels corn raised	643,286
Number bushels oats and barley raised	189,054
Number bushels vegetables raised	390,698
Tons hay cut	48,333

By the five civilized tribes:

Number acres cultivated	273,000
Bushels wheat raised	565,400
Bushels corn raised	2,015,000
Bushels oats and barley raised	200,000
Bushels vegetables raised	336,700
Tons hay cut	176,500

The Commissioner says that the only sure way to make Indians advance in civilization, under the best conditions to promote their welfare, is to give each head of a family 160 acres of land, and to each unmarried adult 80 acres, and to issue patents for the same, making the allotments inalienable and free from taxation for twenty-five years; also that from all except the five civilized tribes there has been a call for such allotment of land, and a largely increased desire for houses, agricultural implements, wagons, civilized dress, etc., etc.

The End of a Famous Mill.

English papers announce the total destruction by fire of the famous Heathcoat Mill at Loughborough. The founder, Mr. Heathcoat, in 1809 invented an improved twist lace machine that virtually revolutionized the industry. The introduction of these labor-saving machines led to the Luddite outrages, and in 1816 a gang from Nottingham, armed with pistols, hatchets, and axes, attacked Heathcoat's mill, overpowered the armed watchmen, shot and injured one of them named Asher, destroyed fifty-five costly frames, cut and burnt the lace, and did damage to the amount of more than £10,000. Some accomplices in the outrage gave evidence against their companions, and at Leicester Assizes six men were sentenced to death on a charge of shooting with intent to murder. They were executed at the New Bridewell in Leicester, and it is a noteworthy fact that at those Assizes twenty-three men were condemned to the punishment of death. The six Luddites were hung up with a man whose crime was that of setting fire to a stack of oats. The action of the Luddites drove the manufacture from Loughborough to Tiverton, where Mr. Heathcoat amassed a princely fortune.

The Revival of Trade.

Speaking of the more hopeful condition of British trade the London *Times* traces the improvements to "a genuine growth of the industrial organism of the United States." "The revival of our trade, so far as it is healthy and has promise of permanence, has been due to the recovery of industry in the United States. The self-love of some appears to be wounded by this admission. It makes our economic condition appear to be more dependent on the economic condition of other countries than they like. They may be consoled by the reflection that the interdependence thus revealed is mutual. If the recovery of the United States helps to give life to some of our industries, we by those same industries sustain the recovery in the United States."

Good Tunneling.

The new Almaden quicksilver mines, in Santa Clara County, California, are said to have over 35 miles of workings underground, it being a two days' journey to make a circuit of all the shafts, tunnels, drifts, etc. In the Santa Isabel shaft, after descending 1,700 feet, ventilation became so bad that the work had to be stopped, although the vein at that point was very rich. Another shaft was sunk over a quarter of a mile from the first, bnt when the same depth was reached, the atmosphere again became insupportable. To meet the difficulty, the engineer, Hennen Jennings, commenced the construction of a drift, to connect the two shafts on the 1,700-foot level, and thus secure ventilation. The excavation was begun simultaneously from each shaft, and the error at the point of connection was, it is said, only 25 thousandths of a foot, while the walls of the drift came together so closely that the point of intersection could not be detected without the nse of a transit. When the tunnel was complete, a dranght of air rnshed throngh, putting out the lights of the miners, and reducing the temperature to an agreeable coolness. It is doubtful whether closer surveying under equally difficult circumstances has ever been performed.

The Assay of Silks.

The recent spontaneous combustion of grossly adulterated silk brought somewhat prominently into notice the extent to which such adulteration prevails in Europe. The weighting of silks has awakened complaint in another direction, namely, from the silk-growing departments of France, whose industry is ruined by it. Cheap foreign silks serve equally well for loaded tissues, and the market is spoiled for the high class products of France. Accordingly it is proposed to establish at Lyons a central office for the cheap and rapid assay of silks, so that in all sales of silks the value of the goods may be rated by the proportion of silk which they contain.