INVENTIONS AND PATENTS CONNECTED WITH BUILDING.

This was the subject of a paper read at a meeting of the Inventors' Institute, London, on Jan. 4, by Mr. B. Fletcher.

Mr. Fletcher said: "I shall first take the entire building, and thence work to details. Probably I proceed in this form as it is the usual course pursued in designing buildings, bearing in mind, too, the injunction by the poet:

'Consider what you undertake,
And analyse it well;
And ever work from whole to part,—
Grand principle of master art,—
That makes that work to tell.'

Well, in what does the house of to-day differ from the house built one hundred years ago? I must be understood to mean the usual houses which are being built all over the kingdom, and not as alluding to an exceptional house here or there.

It is wise to imitate the prudent tradesmen who just now are 'stock taking;' and I am afraid, if we take stock, and look upon the houses of to-day and those built some one hundred years ago, like that I live in, we must not say merely that our predecessors built much stronger and better houses than we do, but also that the inventions and patents (grand as they are) have been so little utilized by builders that even in conveniences the old houses will almost equal the modern. It is strange that this should be so, if one considers the almost appalling number of inventions and patents that yearly are granted. Take, for instance, this country, and the average number per annum during the last ten years; a little over 3,000 applications were made, and of these more than 2,000 were granted. The number applied for last year was 3,500, and of these, according to the average, two thirds would be granted. Now see how slow Old England is. In the United States, for the year ending the 30th of September, 1871, 19,429 applications for patents were filed in the Patent Office (including reissues and designs), and as many as 12,950 patents were issued. Yet again, startling as this is, we find that this number was not so great as that of the preceding year. I notice the fees received during the year by the United States Patent Office amounted to 671,583*l*.

I cannot say what proportion of patents relates to buildings; but one sees from time to time in our professional papers a long list of such patents, so that, no doubt, the thought must arise in the mind of the public: Why, then, are not these inventions and patents more used?

I will explain. A man, if he can invent something which will enable him to produce cotton ½d. per pound cheaper, or some machine which shall be a perfect substitute for hand labor in some department where the demand is unlimited, may out of such single invention amass a great fortune. The one condition of such success is that the article manufactured shall be in great demand, and that his invention saves money in its production, or that he produces a better article at the old price, or that by his invention useless materials may be made available (for example, much iron is now used, by the application of the hot blast, that formerly was thrown away: I do not say to the improvement of the iron, but that formerly it could not be used at all). Now, you will notice in all cases the basis of large profit is from extended demand for the article. It is, therefore, evident that an inventor who turns his attention to patents, in connection with manufactures, has the prospect, if he succeeds, of larger profits than he who devotes himself exclusively to patents connected with buildings. This may account in some measure for the relative small proportion of inventions relating to building.

Having, then, shown that the inventive genius is somewhat allured from building patents by the temptation of larger gains, a few words will be well to indicate the difficulties that beset those who, having devoted their time to this class of patents, succeed in producing a valuable and useful one. The architect who is building a house probably goes to see the invention, likes it—thinks he will try it— hesitates—finally, probably, decides against its employment, from fear that it may not be successful. Yet, I think, little blame can attach to him; if the invention succeeds, the merit is the inventor's; if it fails all the blame falls on him for selecting such a "fandangle, stupid thing;" such will be the language his client may use to him. He, therefore, has no inducement to recommend a novelty, as it cannot benefit him in his practice, and by so doing he may lose a client. Is it, then, to be wondered at that we are so conservative in our decisions?

Cui bono, you may ask, all this explanation if there is no remedy? Well, I have a remedy. It is the formation of a commission, with unpaid members, who should inquire into patents or inventions when (and not till then) the results are being manufactured for sale, and should test them, and should also invite the opinion of all who use them; and these commissioners from time to time should report the result of their investigations. I would base their operations very much on the mode of proceeding adopted by the commissioners of the *Lancet;* and I think my hearers will agree with me, that these commissioners have done much good. I feel sure that the commissioners I propose would be of great service, if the gentlemen were carefully selected.

I have said that houses now are built very much as they were years ago. Go into any ordinary house in any of the suburbs of London, and what difference will you find? Why, the house is as nearly as possible a counterpart of any old house, except that it is not so strongly built. Shutters are gone, and perhaps instead of the sash bars (which, by the bye, some architects are putting in their new works), a large square of plate glass. In fact, the house when ready for letting usually has not one of the modern appliances.

This being so, let us consider what a house should be.

It should first have a good damp course, to prevent damp arising. Every room should have an air flue to let the foul air escape, and those rooms where gas is burnt should also be provided with an external ventilator. The pipes from closets should be carried up in an inside recess, to prevent frost, and should be accessible by merely opening the wooden covering. The bells should also be so carried up. There should be a hydraulic lift where the house is large. Water, hot and cold, should be on the bedroom floors, and in the lavatories attached to the water closets. Where cupboards are put, they should be fitted with regard to the use they will be put to. For instance, in bedrooms they may be made like wardrobes. To see what is being done out of this country, look at the Americans. Take one of their houses: not a servant (or help, as I should perhaps call them) wanted up stairs, every room always ready, except the dusting; the bed a spring mattress, no making required; a tap to regulate the temperature of the room; washstand, with hot and cold water laid thereto, and waste therefrom; so that, positively, while we are quite helpless without our domestic servants, they can do everything upstairs without servants. Surely the picture I have drawn shows how much we have to do before we can call the Englishman's castle really a home fit for this century. Well may I quote those lines:

'So hard
The growth of what is excellent; so hard
To attain perfection in this nether world.'

As to concrete building, this formed an important portion of the paper, and Mr. Fletcher took great pains in showing its advantages and disadvantages, as compared with the ordinary building materials. He stated the former to be cheapness, strength, and durability, rapidity of construction, and economy of space; the latter, its liability to failure from the use of improper materials, or from the want of knowledge and proper care, and the limits which the material and method impose on architectural design and decoration. He objected to the imitations he had seen of stone fronts by concrete, with core of that material to form moldings, and facing it with Portland cement. Such a method, he considered, would soon bring concrete building into disrepute. There is little doubt that concrete building, so far from being necessarily a "sham," may be made an admirable and useful material, capable of perfectly legitimate treatment with good results. The different kinds of apparatus used in the erection of concrete buildings were treated of. Amongst the peculiar features of concrete buildings was mentioned that with regard to steps; four of Portland stone pounded to one of cement were stated as the proportion. The cost of these steps is about half that of Portland stone. Seven to one is the usual proportion for general building, but four to one is used for coring out for mouldings, and two to one where the projection is very great. An advantage in regard to sanitary arrangement was mentioned, namely, that it will take any number of flues for any purposes anywhere; so solid is the material, that flues may come within three inches of the outer face. All fitting into vertical grooves must be avoided, as the swelling of the cement prevents the lifting of the apparatus.

Many examples of locks and their fastenings, door springs and rollers, water bars, casement fastenings, revolving shutters, electric bells and domestic telegraphs, cottage ovens, stoves, lifts and hoists, dust shoot boxes, pipes, paints and enamels, etc., were exhibited and explained. An ingenious letter box was also introduced, and he concluded his remarks with this observation:

"I think, however, there is a grand future for architecture, but it must be by striving to combine in buildings all the scientific inventions of the day, to do so continuously and with judgment; and herein new forms will be created by the use of new materials, if only the desire be present not to be slavishly bound by precedent, but earnestly to strive to make the requirements of science express themselves in our works. Whilst, therefore, I contend no architect should have or invent any patent, or have any interest in any, for the reason that he may be tempted to use it when some better thing may have been discovered (and this merely from the natural love we all have for the children of our brain), he should be ever willing to experiment with all the inventions of others, and thus give them aid. I have learnt much while pursuing my investigations, and if I but lead others to investigate for themselves, I am confident they will also learn much."

Carr's Disintegrating Machinery.

At a recent meeting of the Institution of Mechanical Engineers, held at Birmingham on the 25th of January, the first paper read was a "Description of the Disintegrating Flour Mill, and Machine for Pulverizing Minerals, etc., without grinding, crushing, or stamping," by Mr. Thomas Carr, of Bristol. In this process of disintegration, the particles of the material operated upon are shattered in mid air by a succession of blows delivered with extreme rapidity in opposite directions, and are thus pulverized by the force of the blows alone, without being subjected to the compression or friction which accompanies the ordinary processes of grinding, crushing, or stamping the material between two surfaces. The disintegrator consists of a pair of disks rotating in contrary directions upon two shafts situated in the same line; the opposing faces of the disks are studded with a series of short projecting bars or beaters, arranged in successive concentric rings or cages; and the rings of beaters fixed in one disk, intervene alternately between those fixed in the other disk, and revolve in the opposite direction. The material to be pulverised is supplied through an opening in the center of one of the disks, and receives from the innermost rings of beaters a centrifugal motion propelling it towards the circumference of the disks; in its course through the machine, it encounters successively the several rings of beaters revolving alternately in opposite directions at a high speed, and the particles are thus dashed violently by each beater against the beaters in the next outer ring running in the contrary direction, whereby the material is effectually broken up and reduced to powder. In this mode of action, by the free blows of the beaters upon the material, the friction and compression between the machine and the material, which are involved in all grinding, crushing, or stamping processes, are avoided, as the material is not acted upon between a pair of surfaces; and the whole force of the blows given by the revolving beaters is usefully expended in pulverizing the material. Disintegrating flour mills upon this construction have now been a year in regular work with complete success, a single machine of 7 feet diameter being found to do the work of twenty-seven pairs of millstones, and produce the same percentage of flour from the wheat, with a remarkable saving in cost of production; the quality of flour, moreover, is decidedly superior, owing to the absence of the compression that accompanies grinding by millstones; and in consequence of the bran being scaled off in larger flakes than in grinding, it is more perfectly separated from the flour in the subsequent dressing process. Smaller sizes of the disintegrating machine have been several years in use for pulverizing various mineral substances, such as artificial manures, calamine and blende ores, auriferous quartz, and rock asphalte; also for breaking up cattle food, such as oil cake, etc., and for mixing in sugar factories different shades of moist sugar, and for mixing the materials for making mortar; and the machines have proved very successful for these purposes. Models were exhibited of the machine, with specimens of a variety of materials pulverized by it, and the samples of the flour produced by the disintegrating flour mill.

American Solar Eclipse Observations.

It appears from a recent official report of Professor Pierce of the Coast Survey, that the first total eclipse of the sun, visible in this country since the formation of the Government, was that of June, 1806. This was accurately observed at several points, and a valuable painting was made of it. We were not favored with another until that of November 30, 1834, which was observed by R. T. Paine, Esq., of Boston, at Beaufort, S. C. A third eclipse did not visit our country until 1860; hence, at that time this wonderful phenomenon was, for most American astronomers, a matter of hearsay. The path of the eclipse of July 18, 1860, was from Washington Territory to the northern shore of Labrador, and thence across the ocean to Spain. This eclipse was observed by expeditions organized under the Superintendent of the Coast Survey, and the results are published in the report for that year. It was also observed by the astronomers of several Governments abroad, and was the first total eclipse which was photographed. In 1868, British, French, and German expeditions were fitted out for the observation of a total eclipse in India. On this occasion brilliant discoveries were made in regard to the spectrum of certain rose colored prominences seen about the sun at such times, and these discoveries have been increasing in interest ever since. In 1869, another total eclipse was visible in the United States. It was observed by parties organized by the Coast Survey and other Government bureaus. The results were of high importance. Photographs of the entire corona were taken for the first time. The first observations were made upon the spectrum of the corona. The radial polarization of the corona was first observed with care, and the former knowledge of the subject was advanced in every direction. The results of these two eclipses were of such importance in regard to one of the chief scientific problems of our time, the constitution of the sun, as to excite the profoundest interest throughout the world.

THE ECLIPSE OF DECEMBER, 1870.

It was felt by everybody even casually interested in science that the eclipse of the year 1870 afforded an opportunity for removing the last obscurity from the subject of the corona, such as ought not to be let slip; the more so as no other eclipse was expected to be observed by a Government expedition from this country during this century.

In accordance with these views, Congress authorized the fitting out of an American expedition, similar to those to be sent out by Germany, France, Great Britain, Italy, and Spain, to study the phenomena of this eclipse.

It was decided to dispatch two parties—one to be stationed in the vicinity of Jeres, in Spain; the other, in the Island of Sicily, in the neighborhood of Catania. A large number of spectroscopic observations were made by both of these parties during the eclipse, with results establishing the correctness of the previous observations, especially the fact of the radial polarization of the corona.

BRICK DUST CEMENT.—In the Spanish dominions ordinary brick dust, made from hard burned, finely pulverized bricks, and mixed with common lime and sand, is universally and successfully employed as a substitute for hydraulic cement. It is a regular article of commerce, sold in barrels by all dealers in such articles, at the same price as cement. The proportions used in general practice are one of brick dust and one of lime to two of sand, mixed together dry and tempered with water in the usual way.

EVERY railroad station in England has a stairway or plate form, or some other means of crossing the track, and such persons as disregard the prescribed way and step upon the track are immediately seized and fined twenty-five dollars. In this way, the companies are saved many suits for direct and constructive damages.

The Great Canal Reward.

Last year, it will be remembered that, the State of New York offered a reward of one hundred thousand dollars for the invention of any form for the application of motive power to the canal boats by which they could be economically propelled, as cheaply as by horses. The law was published in full in the SCIENTIFIC AMERICAN in May, 1871.

The Canal Commissioners have recently published a report, in which they say that they have received over 700 communications from all parts of the world in reference to power on canals; many models have been sent, some being the productions of women; some are valuable, but many are the results of inexperience, or are visionary. The Commission does not advise any change in the law, of the kind desired by such persons as think its objects cannot be secured as it now stands and is construed by the Attorney General. On the contrary, the Commission is of the opinion that compliance with all the present requisitions of the law should be insisted upon before the money should be awarded. All the time allowed by the law will be given to the competitors; but the Commission will adhere to the determination expressed at its first meeting, that boats in actual service, and not drawings or models, will be considered as competing for the money offered by the State.

The reward still holds good, and any person who desires further information upon the subject may address Henry A. Petrie, Secretary of the Canal Commission, Albany, N. Y.

THE COMBA SCURA BRIDGE---MONT CENIS RAILWAY.

We are indebted to *Engineering* for a view of one of the numerous bridges which convey the Mont Cenis Railway across the ravines and streams that interrupt its course. The Comba Scura bridge spans a singularly picturesque ravine in a spur of the Piedmontese Alps, and it crosses at a hight of 395 feet above the bottom of the valley.

The following are the principal dimensions of the structure:

Clear span between abutments	185	feet	2 inches.
Width	14	"	9 "
Depth of girders	18	"	0½ "

It was constructed to carry and sustain a test load of 4·5 tuns per lineal yard, with a deflection of $\frac{2}{3}\frac{1}{2}$ inch at a calculated strain on the iron of about 4 tuns per square inch. The weight of iron in the bridge is 201 tuns.

The Comba Scura bridge, as well as that of the Serre-de-la-Voûte, situated about 6½ miles further up the valley, was contracted for by Messrs. Kreeft, Howard & Co., of London and Turin, and both were constructed, from designs prepared by the Italian Government engineers, by Messrs. Fleet & Newey, Crown Boiler Works, West Bromwich, London, England.

MINING IN COLORADO.

A correspondent of the New York *Evening Post*, writing from Central City, Colorado, gives the following interesting ticulars:

ORE RAISED FROM THE VEINS.

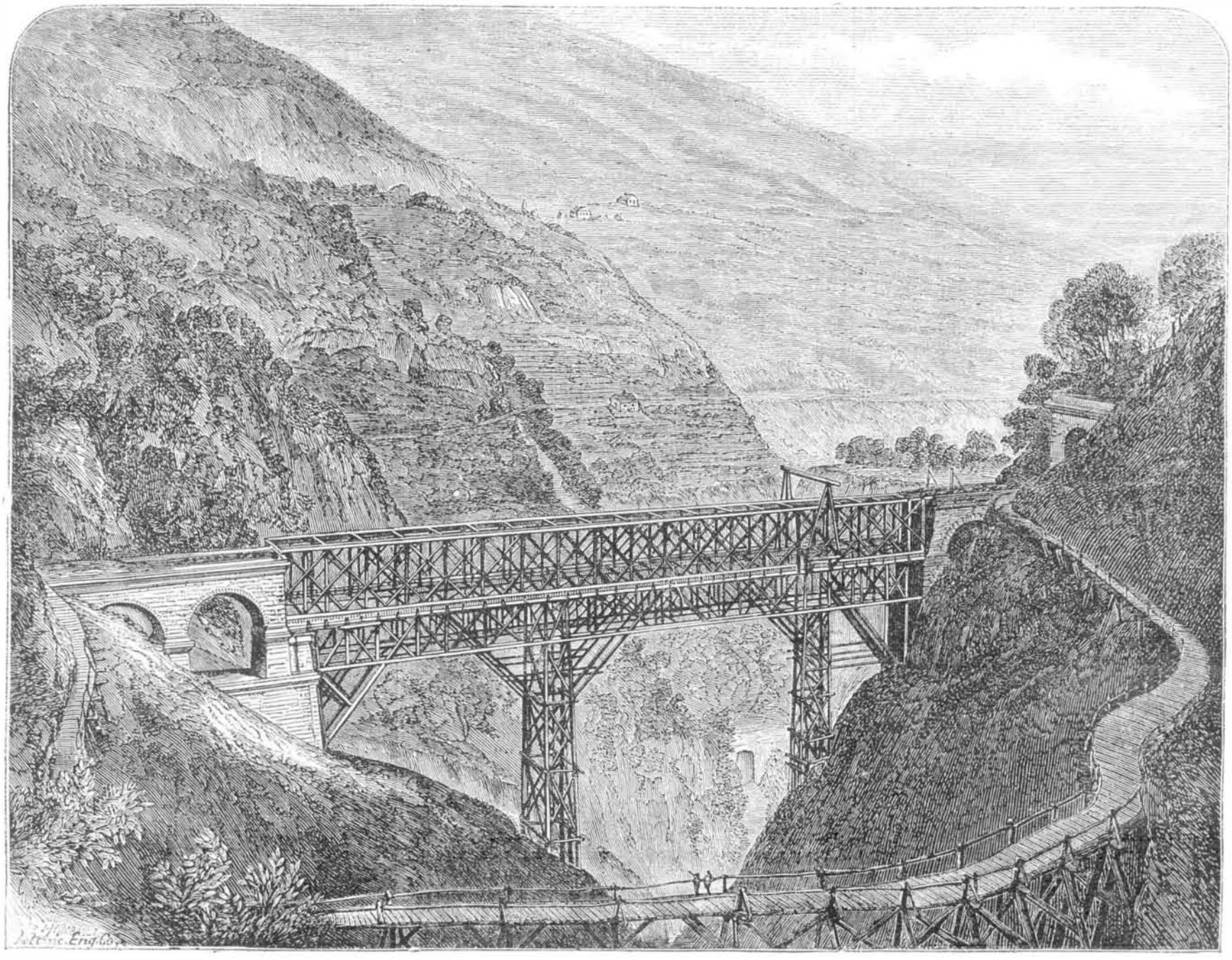
From the veins of Gilpin county alone nearly 600 tuns of ore are raised daily, or a total of 180,000 tuns annually. Nearly 500 lodes have been assayed or mapped in a circle of three miles in diameter; fully a thousand lodes have been recorded, and more or less work performed upon each. From fifteen to twenty miles of reputable lodes are known to exist, upon which there is not less than eight miles of shafting, the deepest shaft going eight hundred feet into the bowels of the earth. There is not less than twenty miles of drifting on these veins, following the ore deposit in the crevices. The assays of the territorial assayer amount to thousands, from samples of those leads. Averaging three hundred of these assays, samples of mill ore alone, taken as they were set down in the official register one year ago, would show this species of ore to be worth nearly $40 per tun. Averaging over two hundred assays of select ore, as they were made during the same time, the result shows a value of $130 per tun for such stuff. Then turning to the tailings, the refuse of ore put through the stamps, we find the average to be over $20 per tun, notwithstanding from ten to twenty per cent of the precious metals have passed away down the stream. Taking samples of this lost material in the streams coursing down to the plains, over $30 to the tun is found to be the average. Notwithstanding this extraordinary waste, the average shipment of bullion from this county trenches on $2,600,000 yearly, a production of $500 per year for each man, woman and child in this county.

MILLING GOLD ORES.

There are 83 stamp mills in this county, 185 engines in place, 4,367 horse power, and 1,597 stamps, of which there are over 800 in use, requiring 1,703 horse power. There are 39 engines used at the shafts of mines for raising ore from the veins and keeping them free of water; 12,000,000 pounds of freight, general merchandise, consumed in the county, and nearly 3,000,000 pounds of flour, all brought there to sustain the mining industry of the region, the product of which is mainly derived from milling the ores regardless of the waste alluded to. These mills are various in size, containing as high as fifty stamps and down to five, mostly driven by steam. The ore, broken into small fragments, is fed into a battery in which the stamps are raised and allowed to fall, crushing the ore fine enough to flow through a screen placed in front. Mercury is fed in this battery, and the pulverized ore, mixed with sufficient water, is then made to flow over wide plates of copper fastened upon wooden platforms, and the copper amalgamated with quicksilver. The gold, or part of it, adheres, forming an amalgam with the mercury, which is afterwards scraped off, squeezed hard, and the lump retorted in a closed retort of iron for the purpose of vaporizing the mercury and getting the gold almost pure. The banks of Central buy these retorts and ship them to the East for minting. Each stamp is calculated to do from one half to three quarters of a tun in twenty-four hours, requiring about one horse power to each stamp head. Most of the ore is reduced in leased mills abandoned by companies, but there are several names famous for good results in custom work. These mill men charge their customers between three and four dollars per tun for doing this work and returning the retort of gold. The tailings are partially caught in the best mills on blankets, and reworked at a profit; the bulk, however, passes outside, a portion stopping to be shovelled into a pile, the balance going on to the stream. The waste is nearly or quite equal to the gross yield in bullion.

SMELTING FOR GOLD.

The most profitable branch of vein mining and reduction was undertaken by Professor Hill in 1867, in connection with some Boston and Providence capitalists, This is a close corporation, managed with rare ability in the executive as well as the metallurgical department. Large profits are made, but kept very jealously from the public eye. As you reach Black Hawk, the sulphurous vapors of these works arrest your attention. From the roadside, you see from twenty to thirty piles of ore, each vieing with the other in sending stifling vapors of sulphur into the atmosphere. These piles are first started on a layer of wood and are run up in a pyramid form some five or six feet, with a diameter at base from sixteen to twenty feet, and then fired, the sulphur affording the only fuel, after the exhaustion of the wood, to keep the fire going from four to six weeks. This ore has passed through the sampling works and been paid for, the amount lying thus in piles at one time amounting to, perhaps, $80,000. After roasting sufficiently to drive off sulphur and oxidize a portion of the iron, these piles are cooled and the ore carried to the smelting furnaces, where, under a heavy heat, more sulphur is driven off, and the silica or *gangue* matter is made to unite with the oxide of iron to form a slag. At the end of the smelting, some eight or ten tuns are thus reduced to one called "matte," containing from $1,500 to $2,000 in the precious metals, and from forty to sixty per cent of copper. This product is then shipped in bags to Swansea, England, for separation into the several metals contained. The establishment contains three smelting furnaces and three



THE COMBA SCURA BRIDGE—MONT CENIS RAILWAY.