

formed which we call the Keys of Florida; and in the same way the little patches now rising highest on the summit of the Reef, will enlarge gradually into more and more extensive islands, though at present many of them are scarcely visible above the water level.—Mrs. Agassiz in "Our Young Folks" for March.

#### FELL'S RAILWAY OVER MONT CENIS.

The railway over Mont Cenis, which is a temporary method of transit only until the tunnel is completed, is called the American railway, its inventor, Mr. Fell, who built the one up Mount Washington, being styled an American; and we were promised a ride in real American cars. The time of starting was 7 A. M. There was a great crowd of all sorts at the station, a lively fight for tickets at the box office (for the perfect French system has not reached the other side of the Alps), and then we waited till half-past 7 before we were let out to the cars. The train ready to go consisted of an engine and two first-class passenger carriages. The carriages were about half the length of ours at home, with seats on each side, so that passengers face each other as in an omnibus, and with windows at the sides from which it is difficult to see out when one is squeezed in tight on the seat with his back to them. The cars are also very narrow, the track being only three feet six or seven inches gage, so that they are not much more comfortable than an omnibus. The fare, first class, was twenty-five, second class, twenty-two francs, from Susa to St. Michel, the time occupied in the passage being from four to five hours.

The locomotives of these trains are small, compact, and powerful; their trucks, as well as those of the carriages, set well in the middle, so that they can turn very short curves. The track has three rails, one elevated in the centre. Beside its ordinary driving wheels, the locomotive has two horizontal wheels which press this third rail on either side, and it is by this strong traction that the train is pulled up. The carriages have corresponding wheels for the center rail, but their only use is to keep the train on the track. Both cars and locomotive have double sets of brakes, one for the ordinary and one for the central rail, so that they can screw the cars to the track with the grip of a vise, and render it almost impossible for the carriages to run away. There is every precaution against accident; and I should only fear the snow storms of winter, and perhaps an avalanche in some places high up, which are not roofed in.

We began to climb the hill directly we left the station, exactly as a carriage drawn by horses would do. In fact, our track ran parallel to the carriage road all the way, was just as steep, and made the short turns of the latter. Our train seemed to be a huge live reptile with legs and claws, that crawled up by its own power; it literally dug right up hill, and we felt ourselves mounting, and, looking back, we could see the steep incline. On the curves, where the wheels got a good grip of the rail, we moved with ease and more rapidly than on a straight pull, where the locomotive evidently labored more, and we rose more slowly. The steepest grade on the road is one foot in nine feet, but this is only for short distances. The rise of one in twelve is more common; and the least (of which any note is taken) is one in twenty-five. The curves are so short as to be startling. We seemed to turn in a space as small as an ordinary wagon could. The shortest curves are on a radius of only 120 feet; that is, our train would run round a circle only 240 feet in diameter. Our track was all the time in sight, behind and before, running along the steep hillsides, and constantly doubling, like a compressed letter S.

You march up with triumphant ease, rising among the grand snow peaks like a conqueror. The valleys open behind you, with their rivers and brown villages, the great panorama expanding with every revolution of the wheels. You skirt precipices and look down upon nestling villages and green fields; you push your way up among the snow regions, the stone huts of the begging, half naked, dirty peasants, and the refuge houses of the road; are whisked round rocky headlands, through tunnels and covered ways, over deep gullies and tracks of avalanches, rising always higher and higher, as by no expenditure of strength, into a purer air, among peaks of virgin snow, among the silent summits of the enduring Alps.

The day was superb, with blue sky and fine air, and it was so warm, even in the snow regions, that I needed no overcoat. Our view was, for the most part, uninterrupted and magnificent. The summit level is about 6,400 feet above the sea, and before we reached it we passed into a covered way, built of wood at the sides and arched with iron, and were immured in this, in the ascent, descent, and on the level for four or five miles, I should think; dark, unpleasant passages, made worse by the smoke and fumes of the locomotive. These covered ways are absolutely necessary as a protection against avalanches in many places and against the falls of snow for long distances. Through the chinks of the boards I could see the snow piled up high along the way. The summit station is in one of these long sheds, and is gloomy enough.

We made the descent more rapidly than the ascent, swinging round the short bends with considerable velocity. The brakes were jammed hard down until I could smell the odor caused by the friction. On the descent I saw the frowning forts of Brumont d'Essillon, on peaks high above the abyss through which the Arc foams and roars, connected with the road by a thread of a suspension bridge over the gorge, called the Pont du Diable. The forts are being demolished now, under the agreement between France and Italy. Lower down, and about ten miles up the mountain from St. Michel, we caught sight of the rubbish at the opening of the great tunnel, which enters the mountain at Fonceneru. It is to be 83

miles long, and it is expected to be completed in 1871. It is, no doubt, a great and most interesting bore, but if I desired a pleasure trip, I think I should prefer the raid of Mr. Fell over the mountain to this hole through it.

I talked with a locomotive driver on our train (by the way an Englishman, as they all are on this road), who insisted that Mr. Fell is not an American. He knew him well, lived near him in the north of England, and said he was not an engineer at all, except so far as this invention was concerned, but a dissenting clergyman. He is certainly a dissenter from the ordinary style of railways. The engineer was an excellent specimen of an intelligent, illiterate English mechanic, with a drawl and nasal twang in his speech that a Cape Cod man might envy; and he gave me a great deal of valuable information about the road, which I might here impart, if your readers cared for valuable information, which I suppose they do not. He was takin' a day h'off for pleasure, he said, and goin' down to see the work on the big bore. 'Twas a nasty bit of work this of running twice over the road daily, as he did, and only getting twelve pound a month for the job, especially in the winter, with the snow and beastly wind. There had been only six days in the past winter when they couldn't run on account of snow, and then the passengers had been carried over the break on sledges. He explained to me the construction of the locomotive, the application of its power, the working of the brakes, and the whole thing, so that I think I can build a road out to West Hartford, over Prospect Hill and to the Tower, if anybody desires, when I return. Sealed proposals, inclosing stamp and photograph, can be left on the Probate steps. I said to the engineer that I supposed it impossible for the locomotive, with three rails, to get off the track.

Well, he said, his machine got off once last winter. The fact was, that the thing got the upper hand of him, and ran away with him. He spoke of it as if it were a horse. He was running with the locomotive alone, takin' her down the mountain, not mindin' exactly, when he found he had got on so much steam that he couldn't hold her. He was goin' down the one in nine, round them ere nasty curves, when she started. He shut off, and jammed down all the breaks, reserve and all, but she only appeared to go the faster. Away she went, like the — (so he said), whisking round, and at last bounded off and went slam ag'in a rock. "If she'd a gone over the ravine on t'other side, I wouldn't be here to tell ye of it."

It was nearly one o'clock when we ran into St. Michel, and, passing the humbug of a custom house, took comfortable cars for Lyons.

C. D. W. in Hartford Courant.

#### NOTES ON SCIENCE AND ARTS.

When the scientific soirées begin, it is a sign that the scientific season is half gone; and now the Easter holidays are over, and scientific investigators are working the harder to complete their self-imposed tasks before summer comes with alluring smile to entice them to the seaside or the mountains. General Sabine, the President of the Royal Society, has held two soirées, in which, as usual, science and art were exemplified in a very interesting way, and ingenious mechanical models were exhibited. Among them, was Biddler's coal-winning machine, of which we have recently made mention; and Price Williams' switch, which entirely does away with the numerous "points" seen at railway junctions, and keeps the main line of rails always unbroken, whereby a frequent occasion of danger is avoided; and Milroy's excavator, which digs equally well on land and under water, and is very useful in digging out the foundations of bridges, or in sinking cylinders. It may be described as a heavy metal ring suspended by chain and pulley, and carrying a number of hanging flaps. These flaps, when the ring is lowered into place, and agitated, act as spades; and when a sufficient quantity of earth or sand is loosened, they can be so regulated by another chain, that they bring it up to the surface, where it is dropped into a truck and carried away. From these particulars, it will be understood that deep holes can be dug, even under water, without sending men down to do the work.

Well deserving of notice is a much improved safety-lamp for use in mines, invented by Mr. Story Horn of Newcastle-on-Tyne. It has long been known that the Davy lamp does not insure safety under all circumstances; it is liable to become choked, the light is dim, and in some conditions it may occasion an explosion. These defects are remedied in Horn's lamp; the light is good; accumulation of soot cannot take place to render it dim; and whenever explosive gas finds its way in, the construction of the lamp is such that it becomes its own extinguisher, puts out the flame, and thereby prevents an explosion. There are other points in its favor; but these we may omit, as in the foregoing brief sketch the merits of this new lamp are sufficiently set forth, and because it has been tested in the severest manner, and proved trustworthy.

F. N. Gisborne, who has for years past made himself conspicuous by his signals for use on board ship, in mines, factories, or dwelling-houses, has now brought out a method which, for simplicity and efficiency, excels all his previous inventions. First, he used galvano-electricity, then pneumatic tubes, and compressible air-chambers, both costly and liable to derangement. Now, with a balance-weight and a chain, he accomplishes all he desires with his system of signals. A captain standing on the bridge of a steamer can, by touching the indicator, send an order to the steersman or the engineer, and see at once whether they obey without changing his position. And that which can be done in a ship can be done in a house, workshop, or mine, and by a simple mechanical arrangement, which can hardly fail to be received with favor. It has been already adopted in the five leading navies of Europe; and the great Prussian iron-clad *König Wilhelm*, now

building on the Thames, is fitted with a set of Gisborne's signals, finished in a style which may truly be described as royal.

A magneto-exploder, constructed by Breguet of Paris, was shown, which will fire a fuse, and consequently a cannon, at any distance from two feet up to two hundred miles.—And Clerk Maxwell exhibited a "Wheel of Life," containing what he calls dynamical diagrams, and these, when the wheel is set agoing, produce many remarkable phenomena of curves and their intersections. Thus, in the hands of a philosopher a toy becomes a means of illustrating the laws of curvilinear motion. Teachers of geometry and natural philosophy would find it useful.—And N. J. Holmes, who is among the foremost of our telegraphists, exhibited his new magneto-alphabetical telegraph, which is one of the cheapest, if not the cheapest, and simplest yet constructed. It comprises two circles of buttons, and the operator has only to touch button after button, and spell out his message as rapidly as he pleases. With this and other instruments before them, government will have a sufficient variety to choose from when they assume control of the telegraphs.

Silver and Co. exhibited specimens of their Norwegian Cooking Apparatus, adapted to different purposes and circumstances, and of different dimensions. One was provided with a thermometer to show the slowness of the rate at which the heat is lost. In one of the small boxes, a pint of water locked up boiling hot at eight o'clock in the morning, was still warm at six in the evening. And in like manner, the apparatus can be used as a refrigerator, and for preserving ice a considerable time unmelted.

Mr. Graham, Master of the Mint, by a singularly ingenious experiment, showed the prodigious amount to which the metal palladium will absorb hydrogen: an amount exceeding by some hundreds of times its own bulk. Two ribbons of palladium, attached to the two poles of a battery, were seen loosely coiled in a water-bath. The current was turned on: the ribbons took in so much hydrogen that they expanded, uncoiled, and stretched themselves across the bath, as if alive. The current was reversed, the hydrogen was thrown off, and the ribbons resumed their coil. They might have been compared to a couple of writhing worms. The sight was amusing; but it exemplified the researches by which Mr. Graham has thrown light on an important question in cosnical science, and led him to the discovery of the new metal, to which he has given the name of hydrogenium.

From all this, it may be seen that a scientific conversazione represents a wide range of the progress of science; while, as we proceed to show, it at the same time, exemplifies the arts. There was a specimen of the first beet-root sugar manufactured commercially in this country; and specimens of the juice as expressed from the roots, and after defecation, and of the waste pulp which finds a ready sale as cattle-food.—There were two or three simple forms of filter which might be carried in the pocket.—There was a model of the viaduct now building across the Holborn Valley.—A piece of inscribed bullock's hide, showing three capital letters and a rude hieroglyph, brought from the south-east coast of Africa, and supposed to be a message from survivors of ship-wrecked crews, now prisoners in the interior of Somali Land.—There were photographs of Mount Sinai and of the surrounding country, taken by the party now engaged in surveying that remarkable land, and very wild and striking prospects do they represent. By and by, a model in relief, made at the Ordnance Survey Office, Southampton, will be brought out, and then scholars will be able to study and follow the route of the Israelites.—Not less remarkable are a series of photographs of Abyssinia, taken during the march to Magdala by the Royal Engineers. The country therein represented must surely be the most rugged and precipitous in the world. Hannibal's march across the Alps must have been a holiday trip in comparison.—Of quite another aspect were the views in the Antarctic regions, which are now becoming important, because from some part of those regions will the two next transits of Venus have to be observed, and astronomers and others are beginning to inquire as to the best place in those desolate latitudes to establish a temporary observatory, and the preparations to be made for the voyage. It is impossible not to wish success to their endeavors, for the settlement of some of the most important questions in astronomical science depends on good observations of the transits.

It is recorded of some of the early Venetian painters that they laid on their colors with palette knives of different widths, and never used the brush. White Warren has revived the process, and exhibits a number of pictures in oil, all painted with the knife, and with marked effect. Land and water pieces, houses, ruins, Gothic towers, and flower-beds present a sufficient variety to test the capabilities of the art and the artist. At present, he appears to be most successful in clouds, landscapes, and gardens.—*Chambers' Journal*.

It is reported that one day, when Lord Brougham had driven to the House in the vehicle of his own invention, which Robinson, the coachmaker had christened after him, he was met in the robing room by the Duke of Wellington, who, after a low bow, accosted him. "I have always hitherto lived under the impression that your lordship will go down to posterity as the great apostle of education, the emancipator of the negro, the restorer of abused charities, the reformer of the law; but no—you will hereafter be known only as the inventor of a carriage." "And I, my lord duke, have always been under the delusion that your grace would be remembered as the hero of a hundred battles, the liberator of Europe, the conqueror of Napoleon; but no—your grace will be known as the inventor of a pair of boots." "Confound the boots," said the Iron Duke, "I had forgotten them. You have the best of it."