nobility had left their country residences to spend winter in town.

On Monday it came to our ears that the King's Theatre, which had been closed for a time back, was to be opened that evening, and the king, ministers, and *Riksdagen*, members of Parliament, were expected to be present. Though not much of a theatre-going man, I did not need much urging to accept a ticket for the parquette. Punctually at 7 the king attended by the queen, queen dowager, princes and princesses of the family, appeared in the royal box. The audience rose and faced their majesties. The orchestra of fifty performers struck up the National Anthem, at the close of which the king bowed acknowledgment of the honor, and all were seated.

Thus I found myself in the midst of royalty, nobility, and gentry, the beauty, *elite*, and authority of Sweden, composed of bishops, barons, counts, ministers, officers of the army, princes, and royal personages of the Crown, with their beautiful ladies by their sides. It was an impressive scene, and gave rise to many interesting reflections, which I cannot now write you.

When I thought how much I should like to impart to his majesty the testimonies of the gospel restored, and the work of God as it is now progressing on the earth, and inform him how he could assure the stability of his throne, the perpetuity of his dynasty, with the peaceful prosperity of his realm, the spirit whispered it were well I could not, for if I were to, it would probably prevent the liberty now enjoyed by the Elders in preaching the Gospel throughout the state, and perhaps cause the expulsion of both Elders and Saints from its borders. I breathed a silent earnest prayer that He who is the King of kings, would vouchsafe peace and increase of liberty to the dominion of Carl XV. of Sweden, until those of his subjects who are the seed of Israel, shall obtain a renewal of the promises made to the fathers upon their own heads. The theatre was about the size as the one in Salt Lake City. The performance was an opera, entitled "Le Vivandiere," or "Daughter of the Regiment."

Last evening I met again with the Saints, and assisted to confirm four, who walked two miles to find where they could be baptized by cutting through ice two feet thick. Others have signified their intention to be baptized when it is warmer. There are Saints 200 miles north of here, but the difficult traveling prevents our visiting them. Where we have been the snow is three and four feet deep. It is now beginning to thaw, and we think of returning to Copenhagen soon.

Copenhagen, Feb. 10.—Arrived safely here. Have meetings here to-day, and expect to see you before long, as snow is too deep to travel and labor to advantage in Jutland and Norway.

I am thankful to see the editorial on Congress and polygamy; it is time to speak and write in plain and strong language. The brethren here send love. I am your fellow-laborer in the Gospel.

F. D. RICHARDS.

[Correspondence of the *Sacramento Union*.]

DONNER PASS, NEVADA CO.,
April 17, 1867.

NITRO GLYCERINE AND ITS USE.

The horror created in California through the destruction of life and damage effected by the explosion of nitro glycerine in San Francisco and Aspinwall is doubtless still fresh in the public mind; and I believe the dread of the compound then created was so strong that no one then imagined that an attempt would again be made to bring the article into public notice or use. But in these days experiment is persevering and aggressive, and upon the principle that man can control what man invents, a persevering pioneer class will not let their inquiring minds rest until they can trample upon and cry "Eureka" over difficulties and dangers that seem to the mass of men insurmountable. The perseverence displayed in the Arctic regions and in Africa of late, where only science was to be served and scientific fame the reward, has shown the world that there are men in it who have so little of a sordid tincture in their composition that for such reward they are willing to spend life and effort. But this is a small class; and to the great mass the material reward of expected dollars created or saved is the spur that makes the human mind exert its powers and the human body suffer hardships in the field of discovery, inquiry and invention.

The successful use of nitro glycerine promised a large saving of dollars and as great a saving of human muscle, and though its late introduction into the world of industry created a sensation most alarming and disaster most deplorable, making its very name one at which the world grew pale; yet, ere this excitement had well cooled, there were a few scientific persons who believing that experiment would make it possible for them to take this literal devil and deprive him of his horns, making him useful to the great world of industry and an economical agent in it. Among the very few people on this coast impressed with this belief was James Howden, a Scotchman by birth. He commenced some few months ago to experiment in the manufacture of nitro glycerine, and after many tests and trials and loss of time, he has finally brought the compound into practical and entirely successful use up here. From him I have gathered the following facts relative to the manufacture and use of this article. Its manufacture is accomplished as follows:

Thirty-five pounds of a mixture of two parts of sulphuric and one part of nitric acid are placed in a stoneware jar; this jar is immersed in snow, or ice-cold water, until the temperature of the acids in it is reduced to 32° Farenheit. When this low point has been reached seven pounds of pure glycerine (one part in five of the quantity of acids used) are taken and poured into the jar, while its contents are slowly stirred. The effect of this introduction, by the time that about half of the glycerine is stirred in, is to raise the temperature of the jar's contents up to 60°. If the stirring in of the glycerine was not now stopped the heat engendered would soon raise the temperature of the acids to a boiling point, and the contents would begin to bubble and spirt out, to the danger of the maker. But a ten minutes cessation of the mixing process again causes cooling, and allows the balance of the glycerine to be safely stirred in. After this has been done another ten minutes rest is given, and then a tub containing a seven times larger volume of water than that formed by the compound is used. This water is with a broad stick whirled rapidly around the tub, the compound is poured slowly around the edge of the moving water, the object being to thoroughly wash or bring the compound into contact with it. The result is, that the now nitro glycerine, being insoluble, soon makes to the bottom of the tub, while the acids, being soluble, mingle with the water and with it are poured out, being of no farther use. This mingling of the glycerine with the two acids deprives it of one quality while it imparts to it another—three equivalents of hydrogen are removed and replaced by a like number of equivalents of nitrous acid. By this simple process, which a child might quickly learn, an explosive giant, which the world has had terrible reason to fear, is called into existence full grown. Another change effected is, that while glycerine is a harmless compound, which may be safely partaken of freely, nitro glycerine is an active poison. One drop will produce a lasting and violent headache; a few drops will produce sudden death, the primary symptoms, the headache, being quickly succeeded by the secondary, which much resemble those produced by a dose of strychnine, and are tetanic spasms first, lockjaw second, and speedy death third.

Now the article is made, and it is used as follows in blasting: A hole two and a half feet deep, and of one and a quarter inches in diameter, is drilled in the rock that is to be blasted, and three and a half ounces of the nitro glycerine are placed in an appropriately shaped tin box or cartridge. On the top of the compound is placed a small copper cap containing a few grains of powder. A hole is left in the cartridge to admit the fuse, connecting with the surface. The apparatus is then lowered to the bottom of the hole, and upon it a plugging of paper is first pressed down, and over that damp sand or earth is tightly rammed down until the cavity is entirely filled. The operators light the fuse and retire, and in about a minute a terrific explosion occurs. The displaced rock is lifted out in clean, large blocks by the nitro glycerine, very few small pieces being detached. Very little smoke is produced, the absence of which, in long tunnels especially, is most desirable, both for sanitary reasons, the effect upon the lights used and time consumed formerly in letting the powder smoke scatter. So much as to the operation. Now as to the question of time and expense. It is found that when nitro glycerine is used, a hole one and a quarter inches in diameter is equal to a hole of two and a quarter inches in diameter where powder was used, and it has been amply demonstrated that three laborers employed in drilling can drill three holes for nitro glycerine in less time and with much greater ease to themselves than they could formerly drill two of the larger sized for powder. A saving of one-third in the size and cost of drills is of course also effected, which in itself is a large item, as drills are all steel and sold by the pound.

Between the cost of the nitro glycerine and powder, taking as the test the amount of rock which a given quantity of each will displace, a difference of fully one-third is found in favor of the glycerine. In fact, to sum up, a certain amount of blasting work can be much more desirably performed with nitro glycerine than with powder, while an aggregate saving of fully one-half the cost necessary to be expended in using the latter is effected. Probably there is no State in the Union where more blasting, quarrying and mining are at present carried on, and future railroad building will be, than on this coast; and the saving of time which the general use of nitro glycerine promises can hardly be overestimated.

THE PACIFIC RAILROAD AND ITS PROGRESS.

To the Central Pacific Railroad Company is very largely due indeed the successful introduction of this powerful industrial weapon, and that the gratitude of all having the State's progress at heart is largely due them no one will deny. About two thousand blasts, in which nitro glycerine was the moving agency, have been made within less than two months in the summit tunnel on the line of the Central Pacific road, and not the slightest accident has occurred. From viewing it with the greatest dread, the white and Chinese employes have come to view the nitro glycerine as a powerful and valuable assistant, which exhibits a strong friendship for human muscle. The secret of its safe use lies in manufacturing it from day to day, just as it is required. If allowed to lie unused for any length of time it has a strong tendancy to decompose In this state, even if uncovered, it is somewhat dangerous; but it is when packed in air tight boxes and exposed to a warm climate or artificial heat that its destructive qualities are most rapidly developed. In every respect this danger was ignorantly courted in the glycerine which was imported to our State. It was packed in air tight boxes and sent upon a long tropical passage; this produced decomposition and the formation of dangerous gases, which had no vent (want of this being the most fatal error) and everything being ripe the last strain was put upon the neck of the camel of destruction by the concussion of even the slightest blow. Make the article on the ground as it is required, and while it is fresh it may be sealed up in a box and thrown against granite and no explosion will occur; but in its decomposition and confinement from air lies prolific death and destruction.

Experiments are being made by mixing starch with glycerine, which promise success. With this last will come a still further reduction of expense in favor of the new explosive agent, starch being much cheaper than glycerine.

Up here at the Summit I find, even with deep snow, astonishing progress is being made in driving ahead the great work of building the road which is to connect us with the East and our old homes.

The trip over the road at this season reveals some as grand and beautiful sights, I think, as can be seen in the United States, and I unhesitatingly assert that every person who once passes over it, at this season especially, will become a friend of the road and route. A terrible earnestness and restlessness are being displayed along the whole line, and not the slightest doubt now remains upon my mind, after coming and seeing for myself, that the Central Pacific road, after the experience of this, its initial Winter, high up in the mountains, can be successfully operated the year round.

M.