

found that will keep the skin of sheep in a healthy condition free them from scab and vermin, and keep the wool clear of vermin.

"I take 100 pounds of tobacco, refuse, stems, etc., and boil it in 50 gallons of water long enough to produce 40 gallons of the extract of tobacco, which will be from one to six hours, according to the degree of heat and strength of the tobacco. While the liquid is hot I add to it gradually common pulverized chalk, till effervescence ceases. Then, when this mixture is cool, I add 1 gallon of tersulphide of calcium, prepared in the usual way, and mix thoroughly.

"When the compound is to be applied, one pint must be diluted with one gallon of water, and then the sheep washed with or immersed in it. This is equally efficacious when applied to cattle and other animals."

EDITORIAL CORRESPONDENCE.

Passports in France—The Antiquities of Nimes—Pont du Gard—Avignon—Papal Palaces—Laura's Grave—Hercules and the Ligurians—Marseilles to Nice—A Trip over the Corniche Road—From Geneva to Spezia—A Magnificent Sight.

SPEZIA, Jan. 9th, 1868.

On quitting Spain we spent our first night in France at Perpignan, a dull, ancient, strongly fortified city, not far from the frontier. For some unexplained reason when we alighted from the diligence, where we had been "cribbed, cabined, and confined" for ten hours, an officer approached and civilly asked for our passports, and in the morning, as we were about to take the train for Nimes, we were again requested to produce them; but the officer took our word that we were traveling Americans, and permitted us to go about our business. It should be understood that France professes to have dispensed with the passport system, therefore it appeared to us singular that we could not come and go to and from old Perpignan without passports. We surmised that this excessive vigilance was occasioned by some convention between Spain and France, to prevent the escape of those Spaniards who were concerned in the revolution that broke out last spring in the province of Catalonia, a province bordering this portion of France. Francis Arago, the celebrated astronomer, was born in a small town near Perpignan, and for many years was a representative in the French Assembly.

Our journey led us through the old city of Narbonne, which boasts of Roman antiquity, but is now chiefly celebrated for its industrious bees, who gather a highly aromatic honey from a disconsolate looking heath in the vicinity. This whole region, however, has a mournful, bloody interest connected with the heretical Albigenses, who were cruelly put to death in answer to the call of the Church of Rome. The historian asserts that 60,000 were massacred, but the inhuman abbot declared in a letter to Innocent III. that he could only slay 20,000. "Kill all," said he; "the Lord will recognize his own." Here the vine is extensively cultivated, and some exquisite qualities of wine are produced, such as the sparkling St. Peray, which is made from the natural juice of a sweet grape, and accounted to be more wholesome than the common sweetened champagne. "The nearer the bone the sweeter the meat." So it is here in these wine producing districts—the rougher the soil the sweeter the wine. Throughout this section there are also numerous unwholesome lagoons of salt water, from which an immense quantity of salt is produced by solar evaporation.

Nimes is one of the oldest and most interesting cities in France, and abounds in remarkable and well preserved Roman remains and antiquities. The old city has narrow, ill-regulated streets or lanes, but in the newer portions the streets are broad avenues. Beside, there are fine parks, gardens and promenades, well shaded and well kept. I think, on the whole, that it is one of the prettiest cities in France—a spot where the weary traveler might comfortably stop to rest for a few days to repair damages, and recruit for a trip towards Italy. There are upwards of a hundred distilleries in Nimes, but the people appear to be sober and industrious. It is not known who founded the Amphitheater, but it is said to be much better preserved externally than the Coliseum at Rome. The building is oval-shaped, seventy feet high, with double row of arcades or galleries, sixty on each story, the lower ones serving as so many entrances to the arena and galleries. It is probable that 20,000 spectators could be accommodated, as there are thirty-two tiers of stone seats rising one above the other. Recent excavations have led to the discovery of a sub-arena, which is supposed to have contained an artificial forest of trees, which were elevated during the time when animals were fought in the presence of the Roman Emperor and on other great occasions.

The guide who conducts visitors through the building assured us that this was the idea which archæologists entertained respecting the sub-arena. It might just as well be that as anything else. A few workmen are kept employed in repairing such portions of the Amphitheater as threaten ruin, and some restorations have been successfully carried out. The arena is now used for very innocent French bull fights, which differ from those in Spain in this, that French bull fights are perfectly bloodless exhibitions, as the law does not permit any wounding of the animal; they simply tease and annoy him.

Here is also to be seen a little Corinthian temple, a beautiful and well preserved specimen of architecture—a miniature of the splendid Church of the Madeleine in Paris. At one time this temple was degraded to the purposes of a horse stable, but it is now used as a museum for antiquities found in the neighborhood, and some pictures, one of which, the master-piece of Delaroche, represents Cromwell lifting the lid of Charles I.'s coffin, and looking at his headless corpse. The well preserved, double-arched Porte of Augustus, which

now serves as the entrance to a stable yard, was erected sixteen years before Christ. Within the enclosure of a fine Public Garden are to be seen the Roman baths of Augustus, also the ruins of the Temple of Diana. During the progress of the excavation of the baths, a large Corinthian column, with a finely cut capital, was unearthed, and within the temple there are some splendid pieces of sculpture in marble, statues, and bas-reliefs. During the past summer a laborer working about the roots of a rose bush, dug up a curious bas-relief, nicely chiseled, which represents "Old Father Time" discovering truth. In his wanderings about this world of care, Father Time, on one occasion, came across a man having three children, and was naturally curious to know whence they originated. Upon lifting a robe, or veil, he discovered a beautiful female figure concealed beneath its folds, and thus maternity was fully revealed. And thus it is that sooner or later time discovers truth. Upon a hill rising high above the garden, there is a singular tower, dismantled and broken. For what purpose was this high pile of stone erected? Some wise ones say it might have been a light house, but it being fifty miles from the sea, this hypothesis is not a supposable one. Some miserly gardener imagined that it might contain a rich treasure, but after considerable digging and searching, nothing was found, and to this day the old tower stands on the hill-top, a curiosity for the curious. Perhaps "Old Father Time" may sometime aid the discovery of the truth in this case.

Ancient Nimes was supplied with water brought through an aqueduct a distance of twenty-five miles. A carriage drive of two hours, on the high road to Avignon, and a little turn up the valley of the river Gardon, brings you to "Pont du Gard," one of those grand, cyclopean structures for which the Romans were so famous. It consists in a range of triple arches, one rising above the other. In the lower range are six grand arches, spanning the river bed. The middle range has eleven arches. The top range has thirty-five, over which passes the U-shaped canal, carefully cemented and covered by flat stone, and large enough to admit the easy passage of an ordinary sized man. It is said that the Romans were ignorant of the hydrostatic law that water confined in a tube rises to the level of its source, therefore they incurred the enormous expense of building open aqueducts. The broken remains of this structure are visible for miles from where it crosses the Gardon, and the cement used for the lining is as hard as the granite rock itself. The aqueduct bridge has an elevation of 160 feet, and a length of 886, and is more grand for its severe simplicity, being constructed of heavy, granite blocks, wholly destitute of ornament. This Roman structure is in a wonderful state of preservation, and is now undergoing some repairs for the purpose of once more returning to its original duty of carrying water to Nimes. It has stood in its present solitude for nearly two thousand years, during which time sixty-six generations of living men have come and gone, kingdoms have risen, flourished and been destroyed,—indeed, how many strange thoughts and associations crowd upon the mind when one gazes for the first time upon structures raised by human hands, and which had a place upon the earth before our Saviour came to seek and to save that which was lost.

There are evidences that the river Gardon was at one time six feet at least higher than at present, and that the beautiful valley, dotted with towns and villas, which opens below the rocky heights of Pont du Gard, was once wholly submerged; for at the base of the rocks, above the carriage road, are extensive caves worn out by the action of the waters. The jolly hermit who has a comfortable dwelling place for himself and little dog in one of the smaller caves, informed us that upon the annual feast of the Pentecost the pious villagers from La Foux come there to dance in the grand cave.

Avignon is a place of great historical interest, and I imagine that at the right time in the year it might be an agreeable spot to spend a few days, in rummaging about amid the rubbish of old papal palaces and Roman antiquities, which abound in and around the old, weather-beaten city; but we chanced to visit it when the *mistral* was blowing violently, which chilled all our zeal for the dead past, and compelled us to think more of the present. The *mistral*, at certain seasons, is the scourge of this section. It blows about three months in the year, and is bitterly cold, drying, and painful. Indeed, it requires a great stretch of the imagination to discover either poetry, romance, or beauty in this portion of "sunny France," although in the brains of some people it is esteemed as a sort of Paradise.

The Popes once lived and reigned, temporally and spiritually, at Avignon, after being driven out of Rome by the Prince Colonna, in the days of Gregory VI. The old palace, now used as a barrack for soldiers, still exists, and is altogether one of the ugliest structures in Europe. It has a long history of luxury, profligacy, tyranny, and blood, beginning in the 14th century and ending in 1791, when scores of innocent men and women fell victims to the infuriated French revolutionists, whose horrid crimes and butcheries are unmatched in the world's history, since Christianity came to bless mankind. Three usurpers of the papal authority, Clement VII., Benedict XIII., and Clement VIII., once occupied the old palace, and the good inhabitants of Avignon are even now indulging the hope that Pius IX. may decide to get away from his present annoying situation, and come to the old papal home. There is a marked difference between the church architecture of Spain and France. The former is grand, impressive, and very magnificent. The latter is usually gloomy, mean, and very unimpressive.

We could not quit Avignon without visiting the grave of Petrarch's Laura, within the enclosure of the old Museum, and over which some sentimental Englishman has placed a rustic marble cross.

The Paris and Mediterranean railway passes through Avignon, and Marseilles is reached in about three hours. Between the two cities the road runs through "Campus Lapideus," a plain of thousands of acres, covered with a mass of round pebbles. This is the spot, according to tradition, where Hercules fought the Ligurians. Having exhausted his arrows, Jupiter sent for his use a shower of stones. Some critic, however, has endeavored to spoil the story by saying that if Jupiter really intended to assist the son of Jove, he could have done so more effectually by showering the stones upon the heads of the Ligurians.

Just before reaching Marseilles, the railway passes through a tunnel three miles long, emerging from which the Mediterranean appears in view. Marseilles is a very enterprising, commercial city, but I must confess a dislike to commercial cities in Europe. They have a rough, business element about them, which shows itself in heavy trucks, carts, and other appliances of an active commerce, which jostles the romance of travel, especially after one has been buried for a time amid the antiquities of Spain, Nimes, and Avignon. Still, I feel bound to say that the city of Marseilles exceeded my preconceived notions. Its newer streets are usually broad and elegant, and in all Europe there is not another city which can boast of a drive to be compared with that along the Prado, through the Park and over the little Corniche, which rises above the Mediterranean and extends for three miles along the rocky face of the coast, until it reaches the noble harbor filled with vessels. The combination is very grand, and the view exceedingly fine, but travelers dislike long stays in a business place, and therefore from this point rush off to Nice, about six hours' ride by rail, where humanity in its varied forms of wasting disease and robust health, congregate. England, France, Russia, and ubiquitous America, all have their representatives, who eat, drink, sleep, dance, and sun, and declare that it is Elysium—though not exactly the heaven of the heathen. I confess that I like Nice. It is a sunny spot, happily situated upon the Mediterranean and sheltered on the land side by the Alps Maritime, which carries the rough *mistral* over head and into the sea, where it often lifts the water, and blows it about the surface like snow dancing upon the ice.

A few days spent in Nice only sharpens the desire to press on towards Italy, and the question arises by what way shall the trip be made? A tolerable steamer enables you to reach Genoa in about nine hours if the weather be good, but to go in that way one misses the famous "Corniche Road," to do which will require the best part of four days; but then it offers great advantages over the trip by sea, as it is unquestionably one of the grandest things to be seen in Europe. We decided in favor of the road, and having bargained with an Italian *Vetturini*, who had just come through from Genoa, we left Nice at noon and soon found ourselves slowly wending our way by zig zags up the sides of the mountains, having always in full view upon one side the snowy peaks of the Maritime Alps, and beneath, unrivalled Nice, with its surrounding olive groves and the Mediterranean stretching beyond the setting sun. Having gained the top of the mountain, we obtained a view of the picturesque village of Turbia, with its Roman ruins perched, like an eagle's nest, upon a ledge of rocks, and, thousands of feet below, upon a sharp promontory, jutting out into the sea, the famous little Principality of Monaco, resembling one of those modeled cities which are often seen in museums.

This miniature spot is a sort of political excrescence upon the rocky headlands of France, and is entitled to the position it holds as the smallest independency in Europe. The Prince of Monaco claims his title by a long hereditary line reaching back to the tenth century, and although the town contains but 1,500 souls, the Prince has his grand palace, and is well well protected by fortifications of no mean pretensions. His Highness' chief source of income is derived from a gambling saloon, where fashionable gentlemen can go down twice a day from Nice to try their fortunes at *roulette* and *rouge et noir*; the boat returning as late as eleven o'clock at night, which enables them to make a long and usually very unprofitable day of it. I have heard it remarked that guests stopping at the hotel at Monaco are sometimes, in a polite way, informed that their room is considered better than their company if they do not patronize the games so graciously instituted for their benefit.

We passed our first night on the "Corniche" at Mentone, another of those very pleasant Mediterranean health ports, where invalids put in for balmy air and cheerful sunshine which are denied them in northern latitudes. The whole coast from Nice to Genoa is a succession of bold, rocky headlands, with intervening valleys and very picturesque old towns, the road being often cut in galleries along the side of the solid rock, sometimes running through tunnels under mountains, again across valleys, in full view of the sea, presenting to the traveler a constant and ever varying panorama of grand scenery; and what increases the interest very much, is the truly wonderful piece of railway engineering which was begun some years ago for the purpose of bringing Nice and Genoa nearer together.

The distance is 122 miles, and some idea may be formed of the magnitude of the work when it is known that there are upwards of 150 tunnels already made through the solid rock, besides many miles of causeway along the borders of the sea, protected by revetment walls to prevent washing. Some of the tunnels have caved in, and although millions have already been expended, the work seems to have stopped.

The Corniche road runs through the outskirts of the village of Bordighera, the spot where Ruffini has laid the scene of his story of Dr. Antonio—a most charming tale—which has added very much to the interest of this Riviera Province. Here the palm is extensively cultivated, and since the days of

Sixtus V, Brodighera has had the special privilege of supplying St. Peters, at Rome, with palm leaves to be used in the Church ceremonies before Easter.

The road passes around the walls of the ancient city of Albenga, the streets being too narrow to admit the safe passage of vehicles. The houses of these old towns along the road are usually very high, and the spaces between them, which serve as streets, more resemble deep rifts through a ledge of rocks. It was also curious to see heavy stone arches thrown overhead across the streets, from house to house, having the appearance of so many little foot bridges. But I understand that they were intended as safeguards against earthquakes, which, in former times, were frequent, unwelcome intruders.

Not far from Genoa we passed through the little seaport town of Coggoletto, which claims the honor of having been the birthplace of Christopher Columbus. The house where in this great event took place, upward of four hundred years ago, is in a block on the main street, three stories high, having a rude fresco of Columbus, and the family shield, with an inscription painted upon its stuccoed front. The lower floor is now used for a very small grocery.

"To what base uses do we come at last!"

We reached Genoa toward evening of the fourth day of our trip, in the midst of a violent snow storm, which reminded us more of rough New England than of "soft, balmy Italy." We were informed that no such storm had occurred for a century. We stopped just long enough in Genoa to confirm what every body is supposed to know that it is a beautifully situated busy commercial city, of narrow streets and fine old palaces, usually magnificently fitted up. From Genoa we hastened on by carriage to the gulf of Spezzia. The trip occupied two days and surpasses the Corniche in beauty and varied scenery. Near to the top of the mountain above Sestri, where the road winds across a high promontory overlooking on either side a wide extent of land and sea, we were favored with one of those magnificent sights which are peculiar to the Mediterranean coast. Upon one hand we had a charming, and extensive view of deep valleys and greer mountains, having their steep sides terraced up to form long narrow table lands for cultivation, overhung with the olive, ilex, the mulberry, and the vine, with here and there fine villas, plain stone cottages, and tall white campaniles of churches rising gracefully above the foliage. Still higher up the mountains the dwarf pine, the myrtle, and other evergreens, now decked with snow. Upon the other hand, a broad sweep of the Mediterranean with a long stretch of beautifully indented coast, cheerful looking villages, and over the sea on one hand a heavy storm as clearly marked as if composed of so many silken cords suspended from the clouds; on the other hand the rays of sunlight, streaming through broken openings in the clouds, making the water look like a vast mirror of burnished gold, whilst beyond and nearer to the horizon we could discern the skeleton forms of ships appearing like the apparitions of so many goddesses of the sea, and above our heads, capping the summit of a mountain peak, a heavy snow cloud, into which we soon passed when we were enveloped in a heavy snow storm, and thus vanished from our sight a picture which the masters have never transferred to canvas. We are now at a hotel in Spezzia where Garibaldi was recently a prisoner under guard, and in sight of the finest harbor in Italy. S. H. W.

Correspondence.

The Editors are not responsible for the opinions expressed by their correspondents.

Nitro-Glycerin---Its Dangers and its Advantages.

MESSRS. EDITORS:—Permit me to offer a few suggestions in respect to nitro-glycerin since it is an agent so powerful in blasting rock that it is destined in a few years to play an important role in civil engineering; wherever the rock is exceedingly tough and the quantities to be removed are sufficient to permit its manufacture on the ground and pay for intelligent supervision, it will inevitably be largely used. Contractors and miners who study economy or who are under engagements to complete works within a limited period will resort to its use on account of its immense power and consequent economy, in spite of liability to accident. A brief review of some accidents that have been published, and the teachings to be gathered from them may not be out of place.

Discovered by an Italian chemist, A. Sobrero, in 1846, nearly eighteen years elapsed before it attained its present terrible notoriety in the United States; the accident in front of the Wyoming Hotel being the precursor of the slaughter of forty-five persons at Aspinwall, and six persons in the offices of Wells, Fargo & Co., at San Francisco. It is to be regretted that Alfred Nobel, the Swedish engineer, whose name is associated with its introduction to the United States, was not a chemist, since, had this been so, there is very little doubt but the fact of its tendency to decomposition at a temperature of from 110° to 130° Fah. in the presence of organic matter would have been discovered and guarded against, or at least not ignored, with so fearful a loss of human life.

The explosion at Aspinwall was a necessary sequence of shipping nitro-glycerin from a port (Hamburg) where the temperature was at the time of shipment 55° to 60° Fah., to a tropical climate where the temperature was 110° to 120°, aggravated by the cases being confined in the hold of a steamship, the containing vessels being closed with cork. If the nitro-glycerin had not been thoroughly washed, the chemist will at once recognize in the above description elements certain to culminate in disaster.

The gases disengaged by the surging of the nitro-glycerin against the cork and decomposing it, would permit the nitro-glycerin to escape into the surrounding packing (sawdust). This would generate a new and easily ignited compound, and

being mixed up with the undecomposed nitro-glycerin subjected to the rough handling of the stevedore's employes (a thermometer in the hold of the vessel probably would stand at not less than 180° in that climate), the sun pouring down the hatchways added to the radiation from the steam boilers and furnaces, an explosion would certainly occur. The use of it has undoubtedly been retarded by the above accidents, and the public have not been reassured by a vein of bravado which affects to pooh-pooh the possibility of an accident in its use. Your columns contain a statement of thousands of blasts having been performed without accident, of driving over roads with it at a rapid pace, but unfortunately these assertions were so speedily succeeded by an accident destroying eight persons accompanied by a mild censure of the coroner's jury on the person who made them, that less confidence than ever seems to be felt with regard to its use. Meanwhile, at Newcastle-on-Tyne, England, the sheriff and town surveyor with four other persons were hurried into eternity while engaged in burying some cases of this compound in a creep or crevice of an old pit the object being to remove it from the city and thus prevent accident.

The lesson to be derived from these accidents as I conceive for parties proposing to use nitro-glycerin is not to entirely rely upon the statements and assertions of others relative to the properties of the identical specimen they are about to handle, but with sober caution in every case verify for themselves, by experimenting with a few drops at a time the actual quality of the nitro-glycerin they are about operating with, for it differs in purity and liability to explosion.

It will be noticed that the principal accidents that have been published have occurred not to miners in their actual use of it for mining purposes but either in moving, transporting, or liquefying the compound when it had congealed, etc. In one case, however, a miner struck the rock that had been disturbed but not broken up by the blast to ascertain if it was rotten or solid (the nitro-glycerin had been poured into the drill hole without a cartridge); an explosion occurred from the blow on the distributed nitro-glycerin. Another case of a miner who for weeks previous to and at the time of the accident had been habitually drinking, using the magazine to store his bottle of whisky as well as the cans of nitro-glycerin and who, marvellous to relate, concealed his drunken habits from his employer. This case needs no comment; it is obvious a drunkard would be entirely unfit to have charge of a magazine whether containing nitro-glycerin or gunpowder. Instant dismissal of such a man, even if it stops the works, is an imperative duty in justice to his fellow miners.

There is one element of danger in manufacturing nitro-glycerin which will be overlooked by the tyro, viz., impurity of the acids used. It involves considerable care and skill to prepare concentrated nitric acid free from nitrous fumes, and if free when prepared, still exposure for a few minutes to the sun's rays, or any organic matter dropped in, causes decomposition; now if such acid be used, the washing (after the nitro-glycerin is produced) is so tedious, it must be continued so persistently, that few employes will give the labor requisite to ensure its thorough removal. Impure nitro-glycerin is the consequence, and, like a slow fuse, it is only a question of time how long it will take to reach the point of explosion. Manufactured where it is to be used, and used as soon after it is made as may be conveniently possible, avoids, however, this element of danger—less washing is then possible. Pure nitro-glycerin is colorless; a yellow tint indicates impurity, either of dextoxide azote, or iron contamination, caused by using iron vessels in the course of manufacture.

It may be purified by dissolving (very gradually) and at a low temperature not exceeding 50° Fah., in sulphuric acid and separating by the gradual addition of nitric acid always maintaining the temperature below 50° Fah., then pouring the mixed acids and nitro-glycerin in a fine stream, into at least five times their volume of cold water and thoroughly washing with distilled water the precipitated nitro-glycerin. The water used for washing should have its atmospheric air removed by boiling and then be allowed to cool. Condensed steam will answer. Printed assurances have been circulated that nitro-glycerin may be safely exposed to a temperature of 212°, that it may be stored for an indefinite time, without loss in weight or deterioration in quality; that it is insoluble in water, and that it is a fixed oil not subject to evaporation. In a limited sense, these assertions are true of a chemically pure nitro-glycerin; thus, under certain conditions, say at a temperature of from 50° to 60° Fah., pure nitro-glycerin entirely free from dextoxide azote and from organic matter may be stored for an indefinite time without deterioration. It is not vaporizable at ordinary temperatures but dropped on to a hot surface of soapstone it does evaporate and it is (sparingly) soluble in water.

But if commercial nitro-glycerin, as imported, be heated repeatedly in bulk from 110° to 130°, and then stored at 120° or thereabouts, an explosion will follow; the authority for this assertion is Prof. Abel, Supt. Laboratory, Woolwich Arsenal. An impression exists that in the congealed state it is more easily exploded than in the liquid form. I think otherwise. Fragments, the size of a bean, laid on a cold face and struck repeatedly with a cold steel hammer (temperature 28°) could not be exploded. Cartridges, 14 inches by 1½ in diameter filled with nitro-glycerin and exposed to cold so as to solidify their contents were armed with a charge of powder a percussion cap containing 3 grains fulminating mercury (sporting caps only contain half-grain charges) and a fuse, were placed on ice and the fuse fired; the cap and powder exploded, the cap being driven four or five inches down into the solidified nitro-glycerin, the tin cartridge was split open, and the cylinder of frozen nitro-glycerin driven through the tin bottom of the cartridge. When a cartridge of liquid nitro-glycerin armed in a manner similar to the preceding

was fired, explosion took place, firing at the same time the congealed nitro-glycerin that had missed exploding.

The conclusions I arrive at from the above observations are: 1. That nitro-glycerin will be largely used, owing to its great economy in mining, especially in very tough rock. 2. That the temptations to secure a profit regardless of a due sense of responsibility will tempt manufacturers to offer an impure article and unless this be carefully watched in magazine or speedily used great accidents will be apt to occur. 3. The miner should see that his nitro-glycerin is colorless and inodorous, if he stores it away; if it has a yellow tinge, emits bubbles, or gives off gases, or if on opening a can there is any indication of pressure and if on inhaling the air in the can there is a disagreeable or suffocating sensation in the trachea such nitro-glycerin is dangerous to store and should be used immediately or purified as previously directed. 4. That general statements relative to nitro-glycerin cannot be entirely trusted, for the reason that the writer may be describing either a pure, a comparatively pure, or an impure article, and remarks applicable to the pure article do not hold good as applied to a partially decomposed or decomposing nitro-glycerin.

GEO. M. MOWBRAY, West Shaft, Hoosac Tunnel.

North Adams, Mass.

Rotary Yokes and Bells.

MESSRS. EDITORS:—The practice of rotating bells for alleged security against breakage, by the use of any of the so-called rotary yokes, in order to have the clapper strike on spots that may be changed and multiplied, until the entire inner circle of the sound bow-ring or a succession of spots in it is hammer-hardened and expanded, has no warrant in science or practical mechanics. All the particles adjacent to the hammer-hardened inner circle or succession of spots thus produced are subjected to a forced strain that impedes free vibration and weakens cohesion. Every considerable change of temperature, and all vibration producing sound from the bell increases this strain; sometimes both causes co-operate, and then as the disturbance of the particles is always greatest at the greatest diameter of the bell where the hammer-hardened spots or surfaces are made, and the forced strain exists, the danger of breakage is enhanced. It is well known that genuine bell metal composition in the form of a bell preserves the property of elasticity to that extent that the arrangement of the particles undergo no permanent change by any amount of vibration in ringing, only at the clapper spots. It is also known that bells have been in continuous use without breakage for a period as long as seven centuries with the clapper striking only on the two opposite spots. In all such cases, the clapper first wears a slight depression that is a counterpart of its form, at the spot where it strikes; the clapper and the spot conform to each other so completely after a time as to avoid all appearance of further wear. The spot is thus better suited to receive the impact of the clapper stroke and initiate the vibration which from thence pervades the whole mass of the bell without encountering condensed portions which would impede vibration by the partial immobility of the packed spots as will always be the case where there is a ring or a succession of spots hammer-hardened. A discussion of this question by a late commission to the Parliamentary Buildings in England tending adversely to the supposed benefits in the practice of swivelling bells in rotary yokes; and the collection of a number of facts and a number of broken bells that had actually been rotated, prompt these remarks.

J. C. M.

Cincinnati, Ohio.

Length of the Day---How to Make Plaster of Paris Harder.

MESSRS. EDITORS:—It has occurred to me that neither in the articles in your paper on "The Day Line" nor elsewhere have I seen the fact mentioned that the entire length of each day is 48 instead of 24 hours as always taught. Of course I mean its duration on the earth; not at any one place. I mention it because to all to whom I have spoken of it, it was a new idea, and it may be so to a great many others. I presume it is not necessary for me to explain how this is; as it will be evident on examination to those who have not before thought of it.

I also thought it might be worth while to say in relation to the question asked by "C. H. G., of Tenn.," No. 5, current volume, that I have experimented with plaster of Paris in the way of which he speaks, and, with one exception, have found all admixtures to impair the hardness of the plaster. The exception is iron filings. When these are mixed with plaster they rapidly oxidize, and the coherent mass of oxide of iron formed, adds its own strength to that of the plaster, making a very firm mass, which has also the advantage of strongly uniting itself to surfaces of iron. I have not observed what proportion of the filings is best, but suppose they should form about one fifth the whole weight.

F. BOWLY.
Winchester, Va.

Remedy for Smoky Chimneys.

MESSRS. EDITORS:—May I communicate the result of my observation and reflection on some kinds of smoking chimneys, or such as have an imperfect draft? If a chimney is built near a wall or any other obstruction to the passage of the wind when it is blowing from the side on which the chimney is erected, the compression of the air in the vicinity of the wall is such that it will seek every crevice, stove-pipe and chimney through which to escape, thus producing a draft the wrong way. Remedy: Raise the vent of the chimney above the region of compressed air; or move it back or to one side, out of it.

G. R. H.
Centralia, Mo.