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OUR CALAMITY.

An appalling and overwhelming calamity has befallen the nation. The Chief Magistrate has been stricken down by the hand of an assassin; and, as one man, the people are aghast at the magnitude of their loss. In the flood tide of victory, in the fullness of the joy which our successes in overthrowing the rebellion warranted, a pall drops upon the flag, ashes are strewn upon the laurel, the jubilant shouts are changed to cries of mourning.

It is too early to foresee the political results of this awful crime. Our hearts are sick unto death at the sudden revulsion which has taken place in public affairs. Though the hand of justice may not close over the offender presently, the execrations of all right-minded men will forever settle upon the infamous cause of it. In His own hour, the All-seeing God will exact punishment therefor.

The deep grief which sits upon the faces of the people, shows how dear to them was the simple, honest, upright man, who so lately guided us. Wise in judgment, inflexible in decision, magnanimous to his enemies, pure in private as in public life, history will record no brighter name upon its pages than that of ABRAHAM LINCOLN.

GETTING POTASH DIRECTLY FROM THE ROCK.

Potash is worth ten cents per pound, and unlimited quantities of it are distributed through all our granite rocks. Among the patents issued from the United States Patent Office during the week ending March 21, we see there was one to Frederick Oldfield Ward, of London, England, of a process for extracting potassa from the alkaline silicates in which it occurs.

Granite is composed of three minerals, mica, quartz and feldspar; it is in the feldspar that potassa occurs. Feldspar, besides being one of the components of granite, is found also in many places in this country and Europe in large masses or beds by itself. It contains generally about 16 per cent of potassa,

and many efforts have been made to devise some economical process for extracting this potassa.

The potash in feldspar is combined with silica, forming a silicate of potassa, an insoluble salt. Silica has a very strong affinity for fluorine, and judging from Mr. Ward's claim we infer that his plan is to separate the silica from the potassa in feldspar by means of this substance. The cheapest source of fluorine is fluor-spar, a beautiful mineral that is found in considerable quantities in New England, New York, Illinois, and other parts of the country. It is a fluoride of calcium, being a combination of the two elements, fluorine and the metal calcium.

If fluor-spar and feldspar were finely pulverized, mixed together, and highly heated, both the fluor spar and the silicate of potash in the feldspar would be decomposed; the fluorine and the silicon of the silica would combine to form fluosilicic acid, which would pass off as a gas; the calcium would be oxidized, forming lime; and a mechanical mixture of lime and potash would remain.

By the addition of water, the potash would be dissolved, and if a portion of the lime were dissolved also, this could readily be removed by passing carbonic acid gas into the solution; thus a solution of pure potash would be obtained. From the phraseology of the claim we infer that this is Mr. Ward's process, and we do not see why it should not be economical and practical. If it is, the invention is one of great value.

In some deposits of feldspar a portion of the potash is displaced by soda, and in this case both alkalis are extracted by the process.

McCULLOCH ON CALIFORNIA CURRENCY.

It is stated in the papers that Secretary McCulloch has written a letter, giving his opinion that if California had adopted a mixed currency of paper and gold in place of her pure metallic currency, it would have materially increased her wealth, through its effect in lowering the rate of interest.

We have no doubt of the superior intellect of Mr. McCulloch, and of his eminent ability as a practical banker. We have entire confidence also that he will make an excellent Secretary of the Treasury, provided he does not fall into any unsound theories in relation to the currency.

But if he has written the letter attributed to him, it seems to us that he fails to draw clearly the distinction between currency and capital.

In California, as in other communities, the currency forms not more than two or three per cent of the aggregate capital. That which is called money at interest is really not money, but steam engines, stamping mills, gold-washers, steamboats, stocks of merchandise, and capital in various other forms. It is the relation of the supply and demand of this aggregate capital that determines the rate of interest.

When Mr. McCulloch was president of the State Bank of Indiana did it ever occur to him to consider what it was that made up the capital of that bank? The assets of the bank, to the amount of the whole capital and a considerable portion of the deposits and circulation, were in the form of bills receivable. These were pieces of paper, some of them worthless, and some of value to the amount of thousands of dollars. What made these valuable? The fact that the signers were in possession of money equal to their face? Not at all. Very few of the business men whose notes were discounted by the bank held money on hand to the amount of their debts, but all of them whose notes were good had capital in merchandise or other forms of personal property to the full amount of their debts. In ordinary times and in a normal condition of trade, the money which banks have on hand is due to depositors, belongs in fact to men who have left it with the bank for safe keeping, and every dollar of the capital of the bank exists in the form of merchandise. At the times when the capital is hired and when it is repaid, it exists in the form of currency, money being employed in these as in other exchanges of value; but during most of the time that it is loaned it exists in the form of merchandise.

Had California adopted a currency of mixed paper and gold the paper would have displaced gold to an amount nearly equal to its own volume. The shipment of this gold would have brought in cloth, steam engines, canned fruit, and other merchandise in exchange. A portion of this would have been con-

sumed in more luxurious living, and a portion would have been added to the capital of the community. But had the whole been saved and added to the capital, it would not have increased the aggregate capital to the extent of one per cent, and its effect upon the rate of interest would not have amounted to the one hundredth part of one per cent.

THE GOOD TIME COMING.

The "good time," which tramping minstrels have been promising so long seems really coming at last. Gold falls rapidly daily, and as the political prospects of this sorely tried country brighten our foreign relations improve commensurately. By the surrender of Lee the Confederacy is left without an army to defend it, and from this time forward we may expect a new order of things.

The *Richmond Whig* says what we have before asserted that "Improvement, renovation and reconstruction must assuredly follow in the wake of the Union armies, in things political, as well as things material. A strong force of laborers is to be at once put at work on the broken points of the Richmond, Fredericksburg, Aquia Creek and Potomac Railroad, and its completion, which will occur within the next few weeks, will put Richmond in rail communication with the capital of the United States. Again the iron bands, broken by the ruthless hand of war, welded again, will once more re-unite a divided people in bonds too strong to be put asunder. The river obstructions are, we believe, being removed as expeditiously as possible, and forty-eight hours will not elapse, we opine, before we hear of steamers at Rockets, direct from New York, Philadelphia and Baltimore. The river at City Point is filled with a sutler's fleet awaiting permits to enable them to bring their supplies up to Richmond."

In that portion of our beloved country uprooted by the chastening hand of the Government in reclaiming its own, there lies a fertile field for commerce which will speedily be worked. Lands that slovenly, enforced labor have impoverished, shall grow crops fabulous in that olden time when the thong was the master and no hope of remuneration visited the minds of those who tilled the soil. Factories shall rise, and hands to fill them, work them, and brains to manage them will be required and not found wanting, and the future seems bright with promise for mechanical pursuits, as the armies of the rebels fray out into ragged, purposeless crowds of unemployed men.

These it is the province of labor to call into useful activity again, and the hands that held the saber shall wield a different steel to far better purpose. Labor shall settle the differences, and hostilities be quenched in the desire to obtain homes and comforts for wives and children now destitute. Thus will the rank and file of the two armies once opposed to each other become assimilated in the bonds of good feeling and dissensions between sections which the political press affect to deplore will be unknown. Thus, then, is "the good time coming" at last.

MODEL HOUSES.

There is nothing which New York is more deficient in than dwellings, or homes, for people of moderate means at a reasonable rent. Our avenues are lined with costly brown stone residences, the rent of which would be a handsome income for most persons, and in the lower quarters of the city there are blocks of buildings which are let and sub-let to all comers indiscriminately.

It is the mean between these two that is wanting. To any one who has not lost all sense of the ordinary proprieties of life, who still retains sufficient self respect to hate dirt and uncleanness, of whatever name and nature, these tenement houses are simply untenable. Rowdy boys cluster around the door and steps, clatter up and down stairs at all hours of the day and night; these, together with other nuisances affect the well being of those who desire to lead quiet lives.

Some of the houses alluded to were not built for the occupancy of more than one family, and the arrangement of them is faulty and unhealthy to the last degree. We need not hope for any abatement of taxes for years to come. On the contrary they will, doubtless, increase; real estate, therefore, will be

high, and whole dwellings are not to be hoped for by persons of small means. There is no reason, however, why houses, varying from two to four stories in height should not be constructed with a view to the accommodation of gentlemen's families, or those, who, respecting themselves, regard their neighbor's comfort and convenience also.

Houses built in "flats," so termed, are common in Europe where taxes are great and many persons of the highest social culture and standing occupy said flats to their very great convenience. All the necessary fixtures and appurtenances belonging to house-keeping may be found on one floor, and within the limits of 100 by 25 feet, or less, according to rent, and the tenant is as much at home, as private and safe from inquisitive neighbors as any one can be under such circumstances. Dumb waiters for raising coal from the cellar, places for storing the odds and ends of housekeeping, laundries for getting up the linen, airy, well ventilated rooms for living, and above all sleeping in, kitchen with hot and cold water, bath room, in short the usual appliances of civilized life should be the distinguishing features of such houses and the demand for them is yearly increasing.

There are a few houses now in this city on such plans and they are secured immediately as soon as vacated; palpable proof of the estimation they are held in. An improvement on the plan of each tenant purchasing his own coal would be a heater in the cellar where, for a stipulated price the landlord could in cold weather heat the premises night and day with great economy; fuel for cooking alone would then be necessary.

Hundreds, yes thousands of our citizens are annually flying to the suburbs from the simple impossibility of living longer in the city under ordinary circumstances, and sooner or later such buildings as we have described will be indispensable in this and other large cities.

GUNPOWDER EXTRAORDINARY.

Under this head the *Mechanics' Magazine* describes the process of manufacturing a new kind of gunpowder which has been patented in the principal countries of Europe, by Captain Schultze, of the Prussian artillery. Our cotemporary says that the new article, "while being nearly four times as powerful as gunpowder, costs, weight for weight, considerably less than gunpowder, and can be used in precisely the same way as gunpowder, its substitution for gunpowder requiring no new method or precaution beyond that of using of the new powder only one-fourth as much as of the old.

"To this it must be added that Capt. Schultze's powder does not foul the guns in which it is used; that the products of its combustion are perfectly transparent gases, offensive neither to the eyes nor to the lungs, and lighter than atmospheric air, so that they soon pass away; and that its manufacture is much safer than that either of gunpowder or guncotton.

"The first process in the manufacture of the new powder is to cut some wood—we are told that any kind will do, but that the harder it is the stronger it will be—into sheets or veneers, of a thickness equal to the diameter which it is desired that the grains of the powder to be produced shall have. For powder to be used for ordinary small arms, Capt. Schultze recommends that the sheets be about one-sixteenth of an inch thick. These sheets, whatever their thickness, are cut up by a punching apparatus into little cylinders, of diameter slightly less than the thickness of the sheets from which they are cut. The cylinders thus obtained constitute, eventually, the grains of the new powder, which is thus granulated at the beginning, instead of, like the ordinary gunpowder, at the end, of its process of manufacture. In order to remove from these cylinders, or grains, all their constituents other than cellulose, they are boiled for about eight hours, in a copper kettle, in a strong solution of carbonate of soda, the solution being changed as often as it becomes discolored; they are then kept in a stream of running water for twenty-four hours; and are next steeped for about two or three hours, being constantly stirred all the time, in a solution either of chloride of lime or of chlorine gas. They are then well washed, first in cold water and afterwards in hot; and are finally kept a second time for

twenty-four hours in pure cold running water. They are then submitted for six hours to the action of a mixture of forty parts by weight of concentrated nitric acid with a hundred parts by weight of concentrated sulphuric acid, one part by weight of the grains being placed with seventeen parts by weight of the mixed acids in an iron vessel, which should either be placed in a powerful refrigerating mixture, or have cold water constantly circulating around it. At the end of six hours the grains are taken out, and carefully drained from all adhering acid. They are then kept in cool fresh running water for two or three days, then boiled in a weak solution of carbonate of soda, then exposed to running water again for twenty-four hours, and then dried as completely as possible. Captain Schultze states—somewhat to our surprise—that up to this point the grains are not explosive, and that this drying operation therefore involves no danger. When fully dried, the grains are ready for the last operation but one, which consists in steeping them for ten minutes in a solution of some salt or salts containing oxygen and nitrogen. Captain Schultze prefers nitrate of potash (saltpetre), or nitrate of barytes, or, what he finds is better still, a mixture of both. He recommends for every hundred parts by weight of the grains, two hundred and twenty parts of water having dissolved in it twenty-seven and a half parts of nitrate of potash and seven and a half parts of nitrate of barytes. The temperature of the solution should be 112 deg. Fah. After having been stirred about in this solution for ten minutes, the grains have only to be taken out and drained, and then dried. The drying must be done, this time, in a chamber kept at a temperature of from 90 to 112 deg. Fah., and will occupy about eighteen hours."

Cotton fiber is almost pure cellulose, and wood fiber is mostly cellulose, but containing gums and other substances. Cellulose is composed of carbon, hydrogen and oxygen in the proportion of 6 atoms of carbon, 10 of hydrogen, and 5 of oxygen, C_6, H_{10}, O_5 . As it takes one atom of oxygen to burn one of hydrogen to water, HO , and two of oxygen to burn one of carbon to carbonic acid, CO_2 , it is plain that 22 atoms of oxygen would be required to effect the complete combustion of the carbon and hydrogen in one atom of the cellulose, 17 more than is contained in the cellulose. To burn cotton or wood, therefore, a supply of oxygen must be furnished from the atmosphere or some other source. In gunpowder this is not required, as the saltpetre contains sufficient oxygen to effect the combustion of the sulphur and carbon. Gunpowder, therefore, will burn in a close vessel excluded from the air, while cotton or wood would be extinguished.

Guncotton is made by treating the fiber of cellulose with nitric acid, NO_3 ; the acid loses, 1 atom of oxygen, becoming NO_2 , and this enters into the compound, displacing a portion of the hydrogen. The proportion of hydrogen displaced depends upon the mode of treatment. In photographic guncotton the quantity of oxygen carried into the compounds is not sufficient to effect the complete combustion of the hydrogen and carbon, consequently, if photographic guncotton be set on fire in a close vessel, only a portion of it will be burned. By Baron Von Lenk's treatment the quantity of oxygen introduced is sufficient to complete the combustion, hence the explosive quality of his cotton.

As Captain Schultze's cellulose after its treatment by acids is not explosive, it is manifest that the process does not convert it into the tri-nitro-cellulose of Baron Von Lenk, hence the necessity for the addition of nitric acid in combination with either potash or barytes.

A TRUE HERO.

"He that ruleth his own spirit is better than he that taketh a city." Gen. Grant, according to this statement, is a hero in the highest sense. Having fought nearly a whole year for the possession of Richmond, and having captured the city with its defending army, it would not have been unnatural had the General, following innumerable precedents, desired to enter in triumph as a conquering hero. Few men could have withstood the temptation. But Grant, whose modesty equals his military genius, stopping not for such momentary gratification, con-

sidering this no time to indulge in military displays, hastens to Washington to attend to the legitimate duties of his position. Declining all public ovations, he goes at once to the War Department, and, as the result of his advice, the following orders will be immediately issued:—

To stop all drafting and recruiting in the loyal States.

To curtail purchases of arms, ammunition, Quartermaster and Commissary supplies, and reduce the expenses of the military establishment in its several branches.

To reduce the number of general and staff officers to the actual necessities of the service.

To remove all military restriction upon trade and commerce, so far as may be consistent with public safety.

It is estimated that these orders will save to the Government one million dollars per day. Gen. Grant thus shows himself to be not only a military hero, but also a true friend to the people.

HORSE POWER.

When Watt began to introduce his steam engines he wished to be able to state their power as compared with that of horses, which were then generally employed for driving mills. He accordingly made a series of experiments, which led him to the conclusion that the average power of a horse was sufficient to raise about 33,000 lbs. one foot in vertical height per minute, and this has been adopted in England and this country as the general measure of power.

A waterfall has one horse power for every 33,000 lbs. of water flowing in the stream per minute, for each foot of fall. To compute the power of a stream, therefore, multiply the area of its cross section in feet by the velocity in feet per minute, and we have the number of cubic feet flowing along the stream per minute. Multiply this by $62\frac{1}{2}$, the number of pounds in a cubic foot of water, and this by the vertical fall in feet, and we have the foot-pounds per minute of the fall; dividing by 33,000 gives us the horse power.

For example:—A stream flows through a flume 10 feet wide, and the depth of the water is 4 feet; the area of the cross section will be 40 feet. The velocity is 150 feet per minute— $40 \times 150 = 6000$ —the cubic feet of water flowing per minute. $6000 \times 62\frac{1}{2} = 375,000$ —the pounds of water flowing per minute. The fall is 10 feet; $10 \times 375,000$ —the foot-pounds of the water fall. Divide 3,750,000 by 33,000, and we have $113\frac{3}{4}$ as the horse power of the fall.

The power of a steam engine is calculated by multiplying together the area of the piston in inches, the mean pressure in pounds per square inch, the length of the stroke in feet, and the number of strokes per minute; and dividing by 33,000.

Water wheels yield from 50 to 91 per cent of the water. The actual power of a steam engine is less than the indicated power owing to a loss from friction; the amount of this loss varies with the arrangement of the engine and the perfection of the workmanship.

The Atlantic Telegraph.

Captain James Anderson, of the Cunard mail steamer *China*, has been appointed to command the *Great Eastern* during the laying of the Atlantic Telegraph cable. The *Great Eastern* will sail from Valencia, Ireland, about the 1st of July, and may be expected at Heart's Content, Trinity Bay, by the middle of that month. There were sixteen hundred and sixty-two nautical miles of cable completed on the 21st of March, and the whole twenty-three hundred miles will be made and on board of the *Great Eastern* in May.

The English Admiralty have agreed to order two powerful steamers of the Royal Navy to accompany the *Great Eastern* from Ireland to Newfoundland, and also to direct Vice Admiral Sir James Hope to afford such assistance on the approach of the expedition to Newfoundland as may be in his power.

It is confidently expected that Europe and America will be in telegraphic communication before the 20th of July.

GREAT GUNS.—The iron-clad *Stonewall* turned tail and ran away from two wooden ships with nothing but great guns and stout hearts to protect them.