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Contents:

(Illustrated articles are marked with an asterisk.)

The large list of patents now issuing weekly, indicates that the back cases are being rapidly disposed of. This will be good news to inventors whose applications have been long pending. We feel assured that hereafter there will be no such annoying delays in the examination of cases, such as have been experienced for two years past. Inventors will find the present a very favorable time to present their applications. We are prepared to furnish those who contemplate applying for patents, with complete and explicit instructions how to proceed. Our facilities for the prompt transaction of patent business are unequaled.

Patents granted in 1855 can be extended under the general law, but it is requisite that the petition for extension should be filed with the Commissioner of Patents, at least ninety days before the date of the expiring patent. Many patents are now allowed to expire which could be made profitable under an extended term. Applications for extensions can only be made by the patentee, or, in the event of his death, by his legal representative. Parties interested in patents about to expire, can obtain all necessary instructions, free of charge, by writing to this office.

MODERN ENGINEERING.

While Americans justly point with pride to the completion of the Pacific Railroad as one of the greatest feats of engineering accomplished in modern times, and Europeans are congratulating themselves and the rest of the world on the near completion of the great Suez Canal, there are some other works of importance already projected which claim attention. In fact, the principal difficulties in the accomplishment of the two immense works alluded to consisted chiefly in their magnitude. Magnitude alone is not enough to deter modern engineering from attempting any work in this age of enterprise, and very few natural difficulties exist which it has not shown its ability to surmount. Fell's railway over the Alps, with its unparalleled grades, noticed in another column, and the Mont Cenis Tunnel, have demonstrated that the iron horse can overleap or break through almost any natural barrier.

A rival to the latter work in magnitude and difficulty is the Mont St. Gothard Railway, now in a fair way to early commencement. Prussia and Italy have given, through their ambassadors, to the Swiss confederation, assurance of their readiness to aid in the prosecution of the work, and a conference has been held at Lucerne to initiate operations.

At this meeting it was announced, by Dr. Alfred Escher, that the necessary capital would be obtained from the following sources; viz., Italy, £2,500,000; Germany, £2,000,000; Switzerland, £2,000,000; thus making an aggregate capital of £6,500,000.

It is stated that the Italian projection of this road will be principally adhered to. This project includes a perfectly straight and nearly level tunnel of nine and one-fourth miles, which the contractor of the Mont Cenis tunnel has, it is said, offered to construct in eight or nine years, including steel rails, for £2,400,000.

The opening of the St. Gothard route will furnish an easy communication between Western Germany and Northern Italy.

Another work now under consideration by the municipal council of Bordeaux, spoken of by engineering authorities in Europe as the grandest, most important, and economical work that has been proposed for centuries, is the cutting of a ship canal from the Bay of Biscay to the Mediterranean. The *Engineer* describes the route and its possibilities as follows:

"Let any one cast his eye over the map of France, and he will see that if a straight line be drawn from Bordeaux through Toulouse, it will touch the coast of the Gulf of Lyons not far from Perpignan. From Bordeaux to Toulouse the Garonne is a navigable and busy river, so that over two-thirds of the line it is only a question of widening and correcting a waterway already in existence. From Toulouse to the Gulf of Lyons there exists the Canal du Midi, and by means of these an immense traffic is carried on between the southern and western departments of France. The line of water exists already, all that is required is to deepen and straighten it; and if this could be done in half the time mentioned at double the cost, it would be the most economical piece of work perhaps, that was ever executed."

The projector of this work is M. Staal de Magnoncourt, and the work is estimated to cost 442,000,000 francs, or nearly $88,400,000 in American gold. It is also estimated that it can be completed in six years. The completion of this work would afford a direct line of communication with India through the Suez Canal, from any of the northern parts of Europe.

Thus modern engineering goes on, making the paths straight for advancing civilization, startling the wilds of the desert with the hum of industry, and making arid wastes to bloom.

THE COAL MINERS' COMBINATION.

When the power of the trades unions has been felt by capitalists they have not only bitterly complained of the evils of these combinations, but have not hesitated to stigmatize their action, as subversive of good order, and partaking of the nature of conspiracy. They have sought for legal enactments, to tie the hands of such organizations, and have appealed to judicial tribunals for redress upon, to say the least, very doubtful grounds of legal complaint.

This journal, while it has never denied the legal right of combination and association, for any lawful purpose, has constantly maintained that such labor combinations were unwise; that although temporary improvement in wages might be obtained by such means, the universal laws of trade and commerce would ultimately prevail, and thus in the long run, time, which makes all things even, would make wages even. The beginning of the reaction has already come, in decreased demand for labor at the present ruling prices, in the enormous stimulus to immigration imparted by the current rates of labor, and the influx of vast numbers of workmen, skilled and unskilled, from foreign countries to overstock the trades. Nothing but unlawful means can prevent the employment of these workmen at less than union rates, and the result will be that the next step in wages will be a step downward. By demanding too much, the end of these unions will certainly be defeated, and from such over-demand, the leaders of these combinations—though in many cases intelligent and far-seeing—cannot restrain the mass of workmen. In this way these associations always fail to permanently improve the condition of their members. Combination and association are social powers of the greatest magnitude, but they are the most difficult to control of all the forces of society.

Capitalists can hardly complain of such combinations with a good grace when they set the example themselves. Certain coal miners in Pennsylvania, have been doing the very thing which they have so often deprecated in their employés. They have combined to limit the amount of coal which they will take out in order to augment prices. The New York *Evening Post*, has taken the ground that the power to take such action depends on the monopoly given them by the tariff laws, and so reasoning from particulars to generals, demands the repeal of those laws.

Now although we have maintained, and do maintain that the protective policy is what is needed for this country, we never advocated immutability in tariff enactments and are ready to concede that when a tariff intended to protect the labor of this country against the cheap labor of Europe creates a monopoly in any branch of trade or manufacture, that branch has been too much protected and the tariff should be immediately reduced. The free trade teachers would substitute annihilation for reduction in all cases; we say annihilation also, in all cases where it can be clearly shown the life of any industry is not endangered thereby. Not to prohibit importation absolutely, but to so far protect any industry that it can compete on favorable terms with the same industry abroad, is what we deem the extreme limit legislation should go in this matter.

But we are far from believing the coal business to have assumed the proportions of a monopoly in this country, and we have reason to believe that the demands of the employés have been pushed so far that to ensure reasonable profits on their business, proprietors have found it necessary to take some decided stand. The position they have taken as an organization is most unwise, and will eventually react upon themselves.

The same rule applies to coal-mining as to any other branch of industry. As advocates of protection we believe that the importation of coal from Nova Scotia, which the *Post* maintains can be done at the rate of $5 35 per tun, by the removal of present duty on coal, would, if it gave us cheaper coal, cost us dear in the destruction of an important branch of home industry. There is more than one effect which the adoption of the free trade policy would produce in this country. Yet that one effect is the one which is so alluring to the laboring man that it is constantly held up to his vision. Give us free trade and we will give cheap clothing, cheap teas and coffees, cheap sugars, etc., etc., cry the opponents of protection. But in their list of low priced commodities, they always omit the important item of labor. Labor so cheapened by small demand that it will go begging for employment at any price and finally be forced to cultivation of the soil as a last and only resource. Not that there is anything about the noble occupation of agriculture, as such, to be dreaded, but it is easy to see that with the labor of the American people entirely turned into this channel, such enormous depreciation in prices must ensue, as will render farming unremunerative, glut the home market, and compel us to carry our products thousands of miles to sell them. This part of the picture is never presented by the free trade preachers. The word cheap is charming to the ear of the masses, so long as it is not applied to labor; but when everything else is cheap, labor is never an exception.

The *Tribune* has shown, however, that the removal of the duty on coal would not allow the Nova Scotia miners to get it out and bring it to this market at the price which the Pennsylvania miners seek to obtain. That price is, we understand, $5 per tun delivered in New York.

We do not think this price so extravagant as to justify the statements of the *Post*. It is difficult for outsiders to comprehend how with present prices of labor it could be brought here profitably at much lower rates. The *Post*, and its coworkers may perhaps succeed in convincing the workingmen of this country, that in order to secure cheap fuel, they can afford to submit to a large reduction in current rates of wages but our opinion is they will fail in the attempt. If, however, they succeed, the result will be so disastrous to the country that it will be compelled to return to the protective policy. The past history of the country warrants this prediction.

GENERAL DYER'S VINDICATION.

The charges against General Dyer were strongly urged, and have attracted much attention. Many who felt themselves much aggrieved by the treatment they had received from the Ordnance Department, were extremely bitter in their accusations, and vindictive in feeling toward the Chief of Ordnance.

A brief summary of the principal charges preferred may be necessary to give our readers a full understanding of the merits of the case.

It was charged against General Dyer, that he was himself an inventor, and that he took advantage of his position to advance his personal interests, regardless of the interests of the Government or the merits of inventions submitted to the Department.

It was further charged that by intrigue, in which he was assisted by other officers of the Department, he indirectly obtained the removal of Gen. Ramsey, and obtained his own appointment, in order to further the interests of certain contractors in whose transactions he was interested.

He was also charged with sending in an insufficient report, when the Congressional Committee made requisition for it, and willful suppression of important facts.

He was further charged with instituting what has been known as the "Rifle Projectile Branch," entailing thereby a heavy expense upon the Government; that he exposed official matters to subordinates; that he denied the claims of Mr. Wall, the inventor of the "Springfield Alteration," etc., etc.

But the charge which seemed to imply the greatest dereliction of duty on the part of Gen. Dyer was, that he refused to purchase and introduce certain projectiles which it is alleged he ought to have purchased.

A great deal of rancor has been displayed, and the prosecution have said many hard things during the course of the trial, but it has resulted in the entire acquittal of Gen. Dyer and the confirmation by President Grant of the finding of the court.

Notwithstanding there are many throughout the country who will remain unconvinced of the justice of the decision, we think no other could have been expected from the evidence produced, and we should be most loth to assent to the charge of unfairness on the part of the officers who composed the court, which has been made from some sources.

We have not space to give a synopsis of the evidence taken, which was very voluminous, but the opinion of the court upon the charge of not purchasing projectiles, which, as we have intimated, seemed to be the gravest charge preferred, gives a summary of the testimony upon this point.

The court said that "the question, according to the evidence presented, appears to be narrowed down to the inquiry, whether or not he was derelict in his duty in not purchasing, at an earlier date, a supply of the Eureka projectiles for service in the field; for, it appears by the evidence that full supplies were at all times in store for issue, either manufactured at the arsenals or procured through purchase—by General Dyer or his predecessors in office—of the Hotchkiss and Parrott and other projectiles, which previous to that time had been, or afterward were, considered valuable for service.

"Previous to the order of the 27th of February, 1865, the date of the order to Clifford Arrick, for 5,000 Eureka projectiles for experimental purposes in the field, it does not appear to the court that the Eureka had shown itself superior to some others of the most approved projectiles. Therefore, General Dyer, in not purchasing them to the exclusion of others, or in larger quantities than he did, only exercised such latitude of judgment as must always be permitted to officers in such official position. Nor is there any evidence to sustain

a belief that he was governed at any time by improper or corrupt motives in not making earlier or larger purchases of the Eureka projectiles. The court believes that the relative merits of the Eureka, the so-called Taylor-Dyer, the Absterdam of the latest pattern, and possibly others, have not yet been fully established. The Eureka, from the evidence, appears to have qualities which make it the equal of the best, and it is believed that further trials, such as were recommended by the Ordnance Board of 1868 for the Taylor-Dyer and Eureka, will determine which projectile or projectiles of those now most approved should be adopted hereafter for services in the field."

We shall give on another page some of the conclusions of the Joint Committee on Ordnance on experiments with heavy ordnance, of interest to inventors, as showing the views of the Committee upon the requirements of modern ordnance.

It is a fact of great significance that this Committee believes the Ordnance Department of the Army may be entirely abolished without detriment to the good of the service, and with great economy to the Government.

EXCITEMENT A DISEASE OF SOCIETY.

This country is greatly benefited by German immigration. The peculiarly philosophical tendency of German mind, the calm patience with which it investigates all questions of importance, the independence with which it rejects what it considers false, and asserts what it believes to be true, are elements of character and good citizenship anywhere, but are particularly valuable in a mixed population like the American.

In a recent conversation with a German friend upon the state of modern society, he made the following very forcible remark: "Excitement is disease. Man does not need it. He ought not to have it. What a healthy mind most craves is placidity; to do its work in perfect calm, without any stimulus except that afforded by perfect bodily health. Mind and body healthy, each will give all the stimulus the other needs without resort to artificial means."

There is so much meaning in this that it will bear considerable amplification. Mental dissipation and physical debauchery are alike disastrous in their effects; alike breed a fierce appetite for more, an appetite that will not be appeased except by deeper and deeper drafts, which finally ruin body, mind, and soul.

The taste for mental excitement now prevalent through all classes of society, is strongly evinced in the theatrical performances, the prominent literature of the times, the morbid taste for sensational displays, involving danger to human life, the detailed accounts of crimes and executions demanded of the press by the public, and the general personal uneasiness to be observed when people have nothing in particular to do. Few Americans, comparatively, can sit down and content themselves in quiet thought. The sensational novel is one of the mildest stimulants resorted to by a large mass of our people to "kill time," as it is called. A philosophical work would reduce them to the last stages of mental exhaustion. A discussion upon any solid topic is ineffably wearying. Their mental motions are, so to speak, shaky and uncertain till they have had their intellectual grog. They look with wonder upon a man or woman who can do hard mental work, and stand it without recourse to any stimulus, without at all comprehending that it is not work, but worry and excitement which kill.

This state of things is so wide spread that we are justified in calling it a disease of modern society. Its symptoms are erotic suicides, speculative manias, gambling, embezzlement, and crimes of a more henious type.

What is the remedy? This is a question easily asked but terribly hard to answer. Religion, legislative enactments, social philosophy, all seem powerless to effect a cure. We are sometimes disposed to think that the only way is to let the disease run its course like smallpox, producing its unsightly and foetid erruption, until the poison eliminates itself from the body politic. Society, as at present organized, may die of the disease, or peradventure it may survive to enjoy better health afterward.

The social science conventions do not seem to get at the root of the matter at all. They persist in isolating single symptoms and looking upon them as the disease itself. One member will tell you that the inordinate love of wealth is the matter, taking for a text the familiar but utterly false maxim, "The love of money is the root of all evil," and propose to enact laws that shall prohibit the accumulation of giant fortunes. Another will hold up to view what has been with an unjustifiable shrinking from plain speech, styled "the social evil," and attribute all the evils of society to the morbid influence of illicit desire. Another assigns the evils of society to drunkenness, and so on. These things are results—not causes.

We do not profess ability to prescribe a cure for the universal malady of the age. It will require the sober study of philosophers for years to come, but of one thing we feel very certain; namely, that all systems of ethics which place faith in the emotional nature of mankind, only substitute one form of excitement for another without even approximating a cure.

The world has everything to hope from the men who believe religion and philosophy should go hand in hand, and much to fear from the misguided philanthropists who appeal only to feeling.

THE EFFECT OF SEWING MACHINES UPON FEMALE HEALTH.

There are fortunately some American women left whose constitutions have resisted the effects of wrong living and bad dressing, to such an extent that they can sit bolt upright for a considerable time without an excruciating pain in the small of the back, or walk a mile or two without being sick a day or two to pay for it. Women of this kind can operate a sewing machine at intervals without discomfort, or may follow it as a business without evil consequences. But precisely those who from enfeebled health most need the aid of this invaluable invention, are the ones who are debarred from its use. The effects produced on the latter class of females by the use of the sewing machine have been thoroughly studied, particularly in France, and have been found to comprise a variety of ills peculiar to the sex most employed in such labor, which it is unnecessary to enumerate here. It is estimated that over a million sewing machines are now at work in the United States alone, and it has become a fact recognized both in this country and abroad that the prevalence of pallor, lassitude, pain in the back, and leucorrhœa are more prevalent among those who work with sewing machines than among almost any other class of women.

Since our publication of an article, entitled "The Sewing Machine, its Origin, and Suggestions for its improvement," to be found on page 246, current volume, we notice the subject has been taken up and discussed at length by the press of this city, and a large number of improvements have been suggested to obviate the use of the feet in driving sewing machines; but it should be remembered that it is not the amount but the kind of work performed, that results in injury. A small cheap motor would be very useful, but an application of the power of the body in a manner free from the objections of the treadle motion would be better. The slight swaying of the body from side to side, or a rocking motion might be utilized for this purpose, or the weight of the body raised at intervals might be called in, as a sufficient force for the purpose.

There is a demand for some improvement in the mode of applying power. If motor machines are relied upon for the purpose, they must be of the simplest character, durable and capable of being operated by any one; and both constant and uniform in their action. The latter consideration will for the present exclude electro-motors from competition without taking into account the cost of running such machines by any form of battery now known.

Small portable steam engines, are the next most promising resource, but they cost money to make, and money to run them, take time to get up steam, and are otherwise ill adapted to the purpose. Spring motors are liable to get out of order, and the winding them up is one of many objections against either them or weights. It has been proposed that in large cities small hydraulic engines might be successfully introduced for this purpose, but the impracticability of this will be apparent from the following computation:

The power of the average human frame, is 4,166·6 foot-pounds per minute. Estimating the power required to drive a sewing machine as one-tenth of this, we shall have in round numbers, 466 foot-pounds, amounting per day of ten hours to 279,600 foot-pounds. Allowing the average head in upper and lower stories of buildings to be 30 feet, it will require for a single sewing machine the fall through that head of 9,320 pounds, or in round numbers 148 cubic feet of water per day. If all sewing machines in New York city were to make this extra demand upon the resources of the Croton Board, it would find itself seriously embarrassed to meet it with the present supply.

A small gas engine seems to offer more points of feasibility than anything we can think of, provided the necessity of using an electric discharge to ignite the gas, could be obviated by a cheap and efficient substitute.

The fact remains that a small and reliable motor is very much wanted for this purpose and inventors would do well to grapple at once and vigorously with the problem. "First come first served," is the rule in invention, and he who can bring out the first sewing machine motor, fully adapted to the requirements of the case, is a made man.

Any such machine would also find a wide application for a host of domestic purposes, as well as in the requirements of light manufacturing.

THE RESOURCES OF THE GREAT WEST.---WALLA WALLA VALLEY.

We have had the pleasure of a call from Mr. H. Parker, of Washington Territory, who has given us some interesting information in regard to the resources of the great West, and more especially in regard to Walla Walla Valley, a region of remarkable fertility and mildness of climate, combining advantages for manufacturing with its other attractive features.

This region is one of many of somewhat similar character to be found on the Pacific slope, but has as few drawbacks, perhaps, as can be met with in any region of like extent in the United States.

In the first place its climate is extremely temperate—a fact that may seem to those who have experienced the cold of the northern parts of Washington territory, as being paradoxical, but which is no more so than many other climatic peculiarities to be met with in localities no more widely separated than those in question. But little frost is experienced, and the rich bunch-grass, which abounds throughout the valley, enables farmers to winter their stock with very slender provision for the rare emergencies of cold weather, from which this valley is nearly exempt.

Second, the soil is unexcelled in fertility. Wheat, oats, and barley, are grown in large quantities and of excellent quality, and corn, also, does well. Vegetables and fruits thrive abundantly, and the small labor required to cultivate the soil is amply repaid. Communication with the seaboard is easy through the Columbia River, a distance of some three hundred miles. A branch road, running through the valley, will soon connect it with the Union Pacific road.

There are now a number of thriving flouring mills and saw mills located in the valley, and the water-power is ample to perform all the manufacturing needed for that section. As a future location for Woolen Mills it probably cannot be excelled by any other on this continent. The material is there, the water-power and building materials are there, and cheap Chinese labor, which has been found excellently adapted to such work, is to be had in abundance. The contour of the streams which water the Walla Walla Valley is somewhat peculiar. The tributaries of the Columbia River, which flows nearly parallel through the country like the fingers of a giant skeleton hand, unite, near their influx into the main stream, to form a stream of considerable size. They have not worn deep channels, as is the case with many streams, and gulleys and gorges do not interfere with the full utilization of the fall, which is great, though nowhere abrupt.

The advantages we have named, combined with the great salubrity of the climate, must, at no distant day, make this section one of the most thriving and populous of the fertile regions of the West. It has, at present, a thriving and intelligent white population of seven or eight thousand, with schools, churches, and all the other advantages of older settlements. No trouble is to be apprehended from Indians, they having been all removed to reservations, and peaceful relations firmly established.

Our information in regard to the Walla Walla Valley does not rest wholly upon the statements of Mr. Parker, although that gentleman gave us many new points in regard to it. It was stated to us, years ago, by a gentleman who had thoroughly explored that region, and who has since, for business reasons, settled lower down the river, that, for natural advantages of soil and climate, it would be hard to find, anywhere, a tract of country, of the same size, that could excel it.

The opening of the Union Pacific Railroad, with the projection of the Northern Pacific Road, must give an enormous stimulus to growth throughout the entire northwest, and the capital invested there now will surely be "seed sown in good ground.

METEOROLOGICAL SCIENCE.

The science of meteorology seems to make slower progress, and to have, at present, fewer practical applications than any of the other sciences. A few prominent facts have been discovered, such as the direction of storms, the average velocity with which they progress, the formation of clouds, the effect upon climate of felling large forests, etc.; but such facts scarcely constitute a science. The simple knowledge that certain phenomena of electrical or atmospherical character occur, without the knowledge of the manner of their occurrence, or their physical causes, is practically of small benefit. The causes assigned for most of these phenomena are yet chiefly based on hypothesis. It is true we are aware that winds are caused by heat, and rain is produced by the cooling of moist air; that lightning is a form of electricity, and so forth; but as yet, all researches have failed to detect invariable laws of succession, or relations of cause and effect.

The utmost that can be said by the most skillful meterologist, is, that when certain atmospheric conditions are indicated by his instruments, dry or wet weather is more likely to supervene than when the converse is indicated. He is still obliged to confess that "all signs fail in dry weather," with him as well as with the unlearned.

Our readers are aware that a series of observations are made from different stations in the United States under the direction of the Smithsonian Institute. These observations are confined, we believe, to barometric and thermometric observations, with some meager remarks as to the state of the atmosphere; whether cloudy or otherwise, wet or dry; and if high winds are prevailing, the fact is also recorded, with the direction from which they blow. These observations are, we believe, generally performed in a very imperfect manner, and really amount to almost nothing. In fact, we believe the money invested in instruments and the time expended are nearly or quite thrown away.

The reports are, to our knowledge, in some cases, made complete by interpolation to cover neglect in the observer, and as there is no check upon their accuracy their tendency would be to mislead rather than otherwise.

The Institute is not to blame for these deficiencies, which attend any system of general meteorological observation requiring personal attention of a large number of assistants, who have no reputation to lose by neglect and nothing to gain by accuracy. It requires considerable inducement to make a man confine himself to hours in a gratuitous service.

Science needs improved self-registering meteorological instruments acting automatically, and recording results; requiring attention at wide intervals only. The possibility of constructing such instruments has already been fully demonstrated. It remains only to simplify and cheapen their construction.

The telegraph is an important adjunct to meteorological researches, and its aid should be called in as often as possible. In case the proposed postal telegraph is put into successful operation, central reports at Washington of meteorological conditions at quite frequent intervals, both at day and night, might easily be made from prominent points of the country. These reports, transferred by symbols to a general map, would be the most complete record of the kind ever attempted, and would be likely to throw light upon the subject, if, indeed, anything is to be expected from such observations. It is quite doubtful if any periodical law or laws exist which control atmospheric conditions. We are inclined to look upon them as results of a multiplicity of causes, in their nature variable, and, therefore, indeterminate. However, neither their determinateness, or the contrary, can ever be demonstrated