

**Improvement in Velocipede Wheels.**

Lightness and strength are two essentials in velocipede construction, and many otherwise meritorious inventions have failed to become popular simply because one, or both, of these points were lost sight of in devising them. The improvement which we this week lay before our readers, is one directed especially to securing these vital points, and will become obvious with a very brief description. The rim, a portion of which is shown at the upper right hand corner of the engraving is corrugated as there plainly shown. The spokes are inserted into the rim alternately on opposite sides of the groove in the rim; those inserted into the left lateral portion of the rim connecting with the right end of the hub, and those entering the right lateral portion of the rim joining with the left end of the hub, thereby supporting the rim on both sides, and strengthening the wheel against lateral strains, at the same time admitting the easy attachment of rubber tire if desired. This form of the wheel gives very much greater strength and elasticity with a given weight of metal than could be attained by the old method.

The engraving shows an improved bicycle with the wheels constructed as described. The airiness and grace of the wheels are well delineated, thus illustrating the truth, that beauty of design is always connected with perfect fitness in mechanical construction.

In fact the bicycle from which this engraving was taken, is a marvel of perfect workmanship, and reflects great credit upon the manufacturer and inventor, Mr. Virgil Price, 144 Greene street, New York city, whom address for further information. Patented through the Scientific American Patent Agency, May 4, 1869.

**THE INDICATOR.**

No engineer conversant with the scientific principles of the steam engine denies that the indicator is of immense value. It is to be deplored that the use of this instrument cannot be more general. The comprehension of its principles is within the reach of almost any engineer in charge of stationary or other engines. Why is it that this instrument, so well calculated to add to the perfection of the steam engine, is, among those directly connected with the running of engines, so little known? It is not on account of the difficulty of understanding a card when taken, much less is it the difficulty of attaching the indicator to the engine that hinders its general introduction, but it is the price that is charged for an indicator. Few engineers can afford to pay one hundred dollars for an instrument, and the owners of steam engines are loth to pay the price for a thing, the utility of which they think is at the best but doubtful. The indicator very often is the means of showing the imminent peril at which the engine is working, and this is particularly true where two engines are connected together, for a derangement of one engine affects the other in the highest degree. If the demand for instruments was greater the present styles could be made much cheaper, but, on account of the high prices, the demand is so small that it does not pay to get up machinery for their special construction. The only way we see out of the dilemma is to design a style of instrument which will not be so costly in its construction, and, at the same time, will be as accurate in its action. This no doubt presents many difficulties—some persons may say that they are insurmountable, but I scarcely think so, the thing is possible and will be accomplished by some enterprising person. The indicator in the hands of the great body of engineers will tend towards a better understanding of the action of the steam and will promote inquiries in to the more difficult and complex principles of the steam engine, which will be as beneficial to the owners of the engines as to the engineers themselves. Coal would be saved, and many a break down could be avoided if the engineer in charge had a clear knowledge of those parts of his engine not immediately within his reach. ENGINEER.

**PETROLEUM--IMPORTANT DISCOVERY.**

M. Henri Sainte-Claire Deville has recently presented to the French Academy of Science the third portion of his valuable researches on the physical and heating properties of mineral oils. M. Deville, in this memoir, dwells largely on the dangers incident to the use and storage of petroleum, and on the modes of preventing the disasters which are of such frequent occurrence.

Most persons suppose all such cases to be due to one cause only; namely, to the highly inflammable nature of the volatile ingredients contained in these oils, which, by admixture with air, form explosive compounds. This is a cause of real danger, but the above-named chemist calls attention to a hitherto unnoticed reason for many fires and accidents.

This he attributes to the very great expansion in bulk which mineral oils undergo by increase of temperature. If petroleum has been barreled during the cold season, it will expand largely with the first appearance of hot weather, and will then burst the containing vessels, on the same principle that ice ruptures our water conduits and hydrants. The inflammable material then oozes out, often without being noticed, and is a lurking cause of danger. It is well known that the burning of petroleum refineries and storehouses gen-

erally takes place in hot weather after a cool period has just elapsed.

Now is the time of the year to look out for petroleum fires, and to see to their prevention. The conclusion to be derived from M. Deville's memoir is, that it is essential to leave sufficient space for expansion by heat in all vessels containing petroleum, and never to fill them to repletion.

When the paper of M. Deville shall have been published, we shall be able to tell our readers the exact extent of space needed for the mean expansion of all mineral oils.

This statement, taken in connection with the very recent

ed and described must be a boon, which to the science of hair-dressing is what the telescope is to astronomy.

This adjustable mirror is attached to the frame of any toilet glass, no matter what size or shape, by means of a flat plate screwed to the back side of the top of the frame, and having a shoulder which also rests on the top of the frame. This plate has a double adjustable joint from which extends forward a hollow rod, movable in any direction and held when adjusted by milled set-screws at the double joint. Within the hollow rod slides a bent rod to which a circular mirror is attached, which may be drawn out, or thrust in as occasion

may require, and fixed by a set-screw passing through the side of the hollow rod. The reflector may thus be lowered or elevated, turned to the right or left, and fixed in any position required. The reflector is also fixed to the rod by a movable joint and set screw, so that it can be placed at an any required inclination.

It is finished in superb style, being silver-plated throughout, and makes an elegant and ornamental addition to the toilet glass.

We are informed this article has met with a very favorable reception in Europe, and as its convenience and utility are obvious, its introduction in the United States will probably be an easy matter. The agent for the patentee, is Chas. J. Hartmann, room 46, No. 40, Broadway, New York city, whom address for further information.

**How Bronze Statues are Cast.**

Among the various branches of fine-art metal work, the casting of bronze statuary, a *chef-d'œuvre* of Elkington's establishment, possesses perhaps as many points of interest as any. A leading process of bronze casting is known, says the *Engineer*, as the *cire perdue*, or wax process. A structure of iron bars, forming the skeleton of the statue, sustains the core. This rough angular outline stands on a kind of platform, having a fire-hole beneath for the purpose of melting the wax when the statue is completed. A mixture of clay, pounded brick, and other material, capable of being easily worked when moist, and very solid when dry, is then used for building up the skeleton, so as to present the general contour of the figure, but less than the proposed statue by just the thickness of the metal to be employed. Over all this is placed an

equal layer of wax, on which all the details are expressed by the sculptor. "When," says Mr. Aitkin, our informant, "the work is satisfactory from every point of view, ascending rods of wax representing channels, by which air is to find exit on the metal entering the molds, are placed wherever required. Viewed in this state, the model and its accompaniments strongly suggest the venous and arterial system of the human body, as shown in anatomical works, with the difference that the wax rods are external to the model of the body, which is visible through the intervening mesh-work. The whole model and rods are then painted over with fine loam in a liquid state, the process being repeated until the crust is strong enough to sustain a thick loam plaster. It is then bound with iron hoops, and a fire is lighted beneath the platform. The outer coating of wax, exactly representing the metal to be cast, is melted out, and the mold is intensely heated until dry enough to receive the molten metal from a reverberatory furnace adjacent to the mold. Jets are made for the introduction of the metal, and the apertures left by the melting of the wax rods afford a ready mode of exit for the air. The plug of the furnace is withdrawn, the flowing metal fills the mold, and the statue is completed. This process is somewhat hazardous, seeing that any defect in the casting would completely destroy the long labor of the artist." —*Mechanics Magazine*.

**Telegraph Verdict.**

The case of Henry L. Davis against the Western Union Telegraph Company, which has recently been on trial at Cincinnati, Ohio, resulted in a verdict for three thousand dollars damages, with costs, amounting to over two thousand dollars more, against the company.

This was a very important suit, involving the question of the right of telegraph companies to discriminate in the transmission of dispatches. The plaintiff's telegraphic reports were delayed in order to give the company's reports precedence.

The legal principle on which this decision is founded is, that a telegraph company is a public servant, bound to transact all business confided to it fairly and impartially, and that it has no right to afford exceptional facilities, even for the transmission of its own business, when such business comes into competition with that of the public. The fairness and justice of this principle must be admitted by every unprejudiced person, and we hope that it will be vigorously maintained by courts and legislatures, until the time shall come when a person desiring to make use of telegraphic facilities shall have assurance of fair treatment under any and all circumstances.—*Telegrapher*.

A FIRM in Oshkosh, Wisconsin, has contracted to make 1,000,000 feet of wooden tubes, to lay down in that city for gas pipes. They are made of timber six inches square, bored in the same way as pump barrels.



PRICE'S IMPROVED BICYCLE.

and destructive oil-fires at Hunter's Point, L. I., and at Weehawken, N. J., occurring under the precise conditions of temperature described by Mr. Deville, will attract much attention.

**THE ADJUSTABLE LOOKING-GLASS REFLECTOR.**

How the amount of labor involved in the complicated structures which ladies now wear at the backs of their heads can be accomplished by a pair of hands without eyes, has always been to us an inscrutable mystery. Our own back hair



with its simple parting is a matter of some anxiety, only relieved by consultation with some one of our household, previous to our emergence into the street of a morning; and when the answer is satisfactory there always remains a gloomy doubt on our mind, as to whether the inspection was carefully made and the answer based upon the real state of things. We have been assured the amount of experiment which enables a lady to adjust her hair unaided is something very remarkable; and that it has hitherto been guided only by the sense of feeling, the result of each experiment being determined by aid of a handmirror. If this be really so, the article herewith illustrat-

Scientific American.

MUNN & COMPANY, Editors and Proprietors.

PUBLISHED WEEKLY AT  
NO. 37 PARK ROW (PARK BUILDING), NEW YORK.

O. D. MUNN, S. H. WALES, A. E. BEACH.

“The American News Company,” Agents, 121 Nassau street, New York.  
“The New York News Company,” 8 Spruce street.  
Messrs. Sampson, Low, Son & Marston, Booksellers, Crown Building, 188 Fleet street, London, are the Agents to receive European subscriptions. Orders sent to them will be promptly attended to.  
A. Asher & Co., 20 Unter den Linden, Berlin, are Agents for the German States.  
Tubner & Co., 60 Paternoster Row, London, are also Agents to receive subscriptions.

VOL. XX, No. 24... [NEW SERIES]... Twenty-fourth Year.

NEW YORK, SATURDAY JUNE 12, 1869.

Contents:

(Illustrated articles are marked with an asterisk.)

*Improved Combination Pleasure Velocipede.....369	The Rubbish in the Patent Office.....375
Anthony.....369	The American Association for the Advancement of Science.....375
Carbolic Acid as a Preservative Agent.....370	New Process for Manufacturing Beet Root Sugar.....375
Experiments on Heavy Ordnance.....370	*Improvement in Velocipede Wheels.....376
How the Florida Keys were Formed.....370	The Indicator.....376
Pell's Railway over Mont Cenis.....371	Petroleum—Important Discovery.....376
Notes on Science and Arts.....371	*The Adjustable Looking-Glass Telescope.....376
*Slide Valves.....372	How Bronze Statues are Cast.....376
Black Walnut Polish.....372	Telegraph Verdict.....376
*Improvement in Springs for Vehicles.....373	Modern Engineering.....377
Utilization of Bones.....373	The Coal Miners' Combination.....377
Hydropathic Treatment of Rail-road Stocks.....373	Gen. Dyer's Vindication.....377
The Game of Croquet.....373	*Excitement a Disease of Society.....378
Explosion of a Gasometer.....373	The Effect of Sewing Machines upon Female Health.....378
Large and Small Cart-wheels.....373	The Resources of the Great West—Walla Walla Valley.....378
Is Machinery Hostile to Mental Culture.....374	Meteorological Science.....378
Excellent Copying Ink.....374	Editorial Summary.....379
Why Large Wheels are of Lighter Draft than Small Ones.....374	New Publications.....379
Extinguishing Kerosene Lamps.....374	Manufacturing, Mining, and Railroad Items.....379
Vibration of Metallic Vessels containing Water.....374	Applications for the Extension of Patents.....379
Coal Tar and its Products as Preservatives for Wood.....374	Answers to Correspondents.....380
Women as Farmers and Cattle Breeders.....375	Recent American and Foreign Patents.....380
	List of Patents.....381

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 unequalled.

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, starting 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 employes. 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 employes 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 ton, 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 ton 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 co-workers 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