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Improved Combination Pleasure Velocipede.

A velocipede adapted to the use of all, old or young, large or small of either sex, skilled or unskilled, in which the pleasure of the exercise is enhanced by association, is the one of which we give an engraving. The action and details of this invention are so well delineated by our artist that scarcely any description is necessary. In looking at the picture one is seized with desire to mount and enjoy the exhilarating sport.

This machine is designed for use in private and public pleasure grounds, or to be let by the hour at large fairs and other public gatherings at which we can conceive of nothing more likely to prove remunerative. It combines all the advantages of the circular railway, so popular at Saratoga Springs and other pleasure resorts, with only a small fraction of the cost of such railways.

The way is made of scantlings or planks so arranged as to form a circular course upon which the combined efforts of a party of riders can get up an extraordinary speed. The handles are merely for the purpose of steadying the riders, as the apparatus needs no guidance. Each wheel when manned, either by ladies or gentlemen, is a driving wheel. Brakes can be attached if desired.

The arrangement of the apparatus in a pleasure ground or courtyard may be made very ornamental, and it will afford inexhaustible and healthful merriment to persons of all ages.

It would seem impossible for the most worn-out man of business to mount one of these seats with a party of spirited young people and not forget for the time that he was other than a rollicking lad in his "teens."

It does one's heart good says our enthusiastic informant, to hear children fairly shriek with glee as the maximum speed is attained. It has moreover this advantage that there is less liability to accident than with many other amusements of which children are fond.

Probably no more durable, useful, and attractive application of the principle of the velocipede than this has been brought out. It is capable of enlargement to accommodate more riders, and contains elements of popularity which will doubtless amply remunerate its ingenious inventor.

Patented through the Scientific American Patent Agency, May 4, 1869. Address for further information G. J. Sturdy & Co., 118 Dorance street, Providence, R. I. State and county rights for sale.

STURDY AND YOUNG'S CIRCULAR VELOCIPEDE.

ANTIMONY.

The story goes that a Benedictine monk, named Basil Valentine, who lived about the time of Luther, at Erfurt, and was fond of scientific researches, gave metallic powders to some hogs, the effect of which was to purge them thoroughly and then to fatten them. He wrote a book called the "Triumphant Chariot of Antimony," in which occurs the following curious passage:

"Let men know that antimony not only purgeth gold, cleaneth and frees it from every peregrine matter, and from all other metals, but also (by a power innate in itself) effects the same in man and beasts. If a farmer purpose in himself to keep up and fatten any of his cattle—as for example, a hog—two or three days before let him give to the swine a convenient dose of crude antimony, about half a drachm, mixed with his food, that by it he may be purged; through which purgative he will not only acquire an appetite to his meat, but the sooner increase and be fattened. And if any swine labor with a disease about his liver, antimony causeth it to be dried up and expelled."

In the kindness of his heart, Valentine thought what a good thing it would be to give some of this fattening powder to his fasting brethren. Unfortunately for the success of the theory, all who partook of it died; hereupon the poisonous mineral was called *anti-moine*, or *antimony*—destructive to monks. There is probably more fancy than fact in this narrative; but as it serves to enliven the tedium of a lecture on this metal, it will no doubt retain its place in our books, and be told to all future generations as a capital joke upon Valentine.

The compounds of antimony were known to the most ancient races, and it was used by the women of the East chiefly for staining the upper and under edges of the eyelids, so as to increase the apparent size of the eye. It is said of Jezebel that she "put her eyes in sulphuret of antimony," as the passage literally means, when Jehu came to Jezreel; and the ancient Greeks called the ore *broad eye*, from this custom.

The alchemists entertained great hopes of the new metal. As they called the acid that could dissolve gold *aqua-regia*, or royal water, so they named antimony *regulus*, or little king, because it so easily attacks and renders brittle, and thus destroys gold. It was also called the wolf among metals, on account of this property of devouring the harmless lambs of the flock. Although the compounds were so long known, the metal itself was not prepared until about the same time as Columbus discovered America. There is something interesting in this coincidence, as the narrative of the great navigator's exploits would have reached but a small portion of the inhabitants of the globe, if it had not been for the invention of movable types, made from antimony and lead, with which to print the story. And to cite another freak of invention, we will state that the shafts of the steamships that cross the ocean, rest in bearings largely made of antimony—and thus commerce and letters owe a great debt to this metal.

We sometimes find antimony in a pure state directly upon the surface of the earth, but this would be too good fortune to be lasting, and in actual mining very little is obtained from such a source. We meet with it in combination with arsenic—in fact, the two metals, arsenic and antimony, appear to have a great affection for each other, and are often found together. Their habits are very much alike, and they are mu-

tually enemies of mankind, as they are violent poisons. The principal ore of antimony is a suphide called stibnite, and from this it is chiefly made. The ore is roasted, and afterward fused with potash and charcoal; and sometimes purified by being dissolved in acid, and precipitated by water, and again fused so as to produce what is, even to the present day, called the regulus of antimony.

The metal is very brilliant, highly crystalline, and can be pulverized the same as a mineral; from which it can be inferred that we cannot draw it out into tubes or wires, or hammer it into sheets, as we can copper and many other metals.

It has a specific gravity of 6·7, and a cubic foot of it weighs about four hundred and twenty pounds. It melts at a low temperature, and when it solidifies from fusion, it expands a little, the same as ice, and takes a perfect copy of a mold. This latter property enables us to employ it in the manufacture of type and music metal. We cannot employ antimony alone for this purpose, as it is too brittle, so we sometimes melt lead, and at other times tin with it. In different countries they use different metals to alloy with antimony to make types. Some English types were found to contain about sixty-nine parts of lead, nineteen and a half of antimony, nine of tin, and the balance of copper. Other specimens have recently been made of seventy-five parts of tin and twenty-five parts of antimony. The manufacturers of types have secrets of their own, which they naturally do not wish to divulge, a great point being to have the faces hard, the impression sharp, and then to be able to cast the very smallest type.

There is a peculiar kind of antimony made by means of the galvanic battery, which explodes like gunpowder when it is touched with a red hot iron. It is even not safe to scratch it with a file for fear of serious consequences. Fortunately, this form of the metal is not commonly met with in the arts, or dealers in the article would be exposed to much danger. Compounds of antimony are used in the manufacture of certain kinds of metals without phosphorus, but the explosive metal has no application for this purpose.

Antimony has been employed to impart hardness to iron, but as manganese is preferable, it is not very popular for this purpose. It is also used with copper and zinc to make brass, where a particular quality of that alloy is required. When we wish to make a pure transparent, colorless gloss, we sometimes use a little antimony.

A very curious fact has recently been observed by Parkinson, that when antimony is combined with ten per cent of metallic magnesium, an alloy is formed which will actually deliquesce and melt away to water in the air. No uses have been suggested for this alloy, but it is worthy of note in the behavior of two metals.

An iron-black powder, used for bronzing plaster casts, papier-mache figures, and imparting a steel color to those and other similar objects, is finely divided antimony, produced by precipitation with zinc.

The beauty and permanence of antimony in the air suggests its use as a suitable coating for the protection of other metals, such as iron and copper.

The butter of antimony is dissolved in alcohol, and clarified with a little muriatic acid, and the bright copper surface is plunged into it for half an hour. It becomes coated with a beautiful bright film of antimony, which adheres strongly, and does not alter in the air. Copper-wire coated in this way can be bent without destroying the thin film.

We can make a powerful galvanic battery by employing antimony at one of the poles, instead of gas carbon. Amalgamated zinc in dilute sulphuric acid is used at one end, a massive block of antimony, immersed in a saturated solution of equal parts of common salt and epsom salts, at the other. This forms a simple, cheap, and powerful battery, suitable for electro-plating.

In England, the best Britannia-ware contains antimony, and the English government harden their bullets and shot with it.

As an anti-friction metal, for the bearings of machinery, for the packing of railroad axles, it is now largely employed.

A beautiful carmine red color, and a fine yellow, are prepared from its compounds. In medicine, tartar emetic, which is partly composed of antimony, is well-known, and for a hundred years no substance has been the occasion of greater controversies, or more extravagant expectations as a remedy in all cases of sickness, than antimony. It was even necessary, at one time, for the government of France to prohibit its use, so great was the excess in its prescription.

Notwithstanding the numerous uses to which this metal is applied, there are not more than one thousand tuns of it produced every year.

We have thus sketched a majority of the popular applications of antimony, and may have beguiled our readers into acquiring information which they did not possess before. It is worthy of note, that the cosmetic which was a favorite of the "broad-eyed" woman of ancient Greece, has not ceased to retain its supremacy in modern times, and the medicine that fattened hogs at the time of Valentine, is now prescribed by the veterinary surgeon as a panacea for the ills of horse-flesh. In fact, antimony plays an important *role* in the ordinary affairs of life, for we drink our tea, shoot our enemies, cure our horses, cross the ocean, travel on the railroad, paint our pictures (not to say our faces), sing our songs, strike a light, harden our steel, coat our copper, purify our glass, print our books, telegraph our messages, and use as a medecine this wonderful metal.—*Professor C. A. Joy in the New World.*

Carbolic Acid as a Preservative Agent.

The *American Naturalist* answers several correspondents who have asked questions regarding the use of carbolic acid as a substitute for alcohol, etc., that carbolic acid in water alone will not preserve animals, but pure glycerin, with a very small amount of carbolic acid (say about three or four drops of acid to 2 oz. of glycerin) answers admirably for some delicate animals. But the best thing for preserving most animals is alcohol. The contraction of animals put into alcohol (complained of by some correspondents) is caused by the alcohol being too strong. All animals should be put into weak alcohol at first (not over 25 or 30 per cent), and after remaining a few hours should be transferred to about 75 or 80 per cent alcohol. A very fine article for preserving the tissues of animals, and for soft animals like mollusks, actinias, worms, insects, larvæ, etc., can be made, after a few experiments, of glycerin, a little of the strongest alcohol, and a very small portion of carbolic acid. This preparation will preserve the colors as well as the tissues. A little fine soap (white castile is the best) put into alcohol will prevent most colors from fading, unless exposed to direct sunlight.

Experiments on Heavy Ordnance.

The following conclusions, deduced from experiments on heavy ordnance, are given in the Report of the Ordnance Committee, presented to the Senate February 15, 1869:

1. That no more heavy guns should be purchased for mounting in the fortifications or use on shipboard until such improvements are made in methods of fabrication as will insure more reliable endurance than has heretofore been exhibited.

2. That the Rodman system of gun making, while partially successful in smooth bores and small calibers, has so far failed in rifles of large caliber as to show it to be unworthy of further confidence. Recent improvements in defensive works and armor plating render heavy rifled guns the most efficient means of attack, and no system of fabrication which does not furnish such guns should be adopted or continued. The principle of initial tension, which is the basis of the Rodman system, appears to be of doubtful utility, as applied by General Rodman, especially for rifled guns. This tension, it is admitted, gradually disappears from the gun with age, and in time is entirely lost.

3. That guns cast solid, in the manner practiced in the navy under the direction of Rear-Admiral Dahlgren, while exhibiting satisfactory endurance as smooth bores with small charges and hollow projectiles, have not the requisite strength for rifles of large caliber. This mode of casting seems to be defective in principle, as the tensions inaugurated in cooling have a tendency to aid the powder to rupture the gun.

4. That experiments should be at once conducted for the purpose of ascertaining the real cause of the bursting of heavy guns, and of determining upon some method of fabrication that will secure uniform endurance.

5. That every encouragement should be given to inventors, and a full and fair trial accorded to all devices offered to the Government that promise a solution of the ordnance problem.

6. That more efficient means for harbor defense should be adopted. The late war demonstrated that sand was the best material for defensive works, and that forts of masonry, such as we have now mainly to rely upon for the protection of our seaboard cities, are inefficient to prevent the passage of armored, or even wooden vessels. The destruction of such defenses is only a question of time to ordinary guns of heavy caliber. It was also demonstrated that forts alone, of whatever character, cannot resist the entrance to harbors of powerfully armed ships if the preponderance of guns on the assailing fleet is sufficient. In the opinion of the committee, obstructions must be largely relied upon for harbor defense, in connection with properly constructed fortifications.

7. That no officer of the army or navy should be allowed to receive a patent for any article required, or likely to be required, for use in those branches of the public service, or to be in any way interested in the manufacture or procurement of such articles. It should be the duty of Congress to recognize in suitable rewards the services of such officers as might make inventions of especial value to the Government.

8. That the Ordnance Department of the army can be entirely abolished with great advantage as to economy, and without detriment to the good of the service. The duties now performed by officers of that corps could be performed by officers detailed from the artillery service, under the direction of a chief stationed at Washington. In this manner the whole expense of the ordnance establishment would be saved, and artillery officers, who have not only scientific training, but practical experience, would have a voice in the selection of the guns and ammunition they are required to use.

The committee are of the opinion that, for the reasons shown, the interests of the public service demand a change in the system of procuring ordnance and ordnance stores, and the manner of conducting experiments with a view to determining the value of the same. The present system has failed to answer the purpose for which it was designed, and the United States is in the position to-day of a nation having a vast coast line to defend, and a large navy, without a single rifled gun of large caliber, and a corps of ordnance officers who have thus far failed to discover a remedy for the failure of the guns, or to master the rudiments of the science in which they have been trained at the public expense. The importance of an immediate change is shown by the fact that the Chief of Ordnance of the army asks for appropriations to purchase over 1,900 guns to arm the forts, not of a new and better system to be decided upon after more thorough and careful experiment, but of a kind that experience has shown to be inferior in range and penetration to the guns of foreign powers, and unreliable as to endurance.

It is proposed that 85 of these guns shall be smooth bores of 20-in. caliber, 490 of 15-in. caliber, and 600 of 13-in. caliber. The experience of all nations goes to prove that the most effective way of developing ordnance power is by rifled guns. To return to smooth bores, throwing huge spherical masses of iron with low velocities, is to disregard all modern progress in the science of gunnery, and to go back to the arms in use two centuries ago. Furthermore, the advisability of using guns of such great size is very doubtful, for the slowness with which they be handled and fired makes them less effective than smaller guns delivering a more rapid fire. Two hundred of the guns required it is proposed shall be Rodman 12-in. rifles, notwithstanding all of that class of guns heretofore procured for the army or navy, and subjected to test, have either burst disastrously before the lowest reasonable test has been completed, or have given such indications of failing, after a few rounds, as to be considered unsafe. It is proposed also to purchase 610 10-in. Rodman rifles, although the committee cannot learn that any gun of this class has ever been subjected to test in this country, except the Parrott rifles of that caliber, which are acknowledged failures, having been condemned by both branches of the service.

No progress toward obtaining better guns is likely to be made while the ordnance bureaus are organized as at present; and the committee deem the best way to secure such impartially conducted experiments as will determine with certainty what are the best arms, and to insure greater economy and regard for the public interests in their purchase and adoption, is in the formation of a mixed ordnance commission composed of officers of high character detailed from both the army and navy, who shall have no interest in patents or devices for arms.

How the Florida Keys were Formed.

Just outside the lower extremity of Florida are a number of islands—the easternmost almost touching the main-land, while the western lie a little farther off.

In consequence of this peculiarity in their disposition, the space left between these islands and the Florida coast, marked on the map as mud flats, is broad and open at the western outlet, but almost close toward the east. It is important to remember the form of this broad intervening space, stretching between the keys and the main-land, because the narrower and more shallow end may easily be filled up with sand, mud, etc. If you will look at the map, you will see, by the flats at the eastern end of this once open channel, that such a process is actually going on. In fact, a current sets toward the channel, drifting into it sand, mud, and *débris* of all sorts.

I hope to show you how these flats, gradually consolidated into dry land, will at last make a bridge between the islands and the lower extremity of Florida, uniting them solidly together, so that the former will cease to be islands and will become a part of the main-land.

Indeed, we shall find that Florida, herself, so far as her structure is known, is only a succession of such rows of islands as now lie outside her southern shore, united together by flats exactly like those accumulating at this moment between the present islands and the coast. These islands are called the Keys of Florida, and are distinguished from one another by a variety of appellations, such as Sand Key, Key West, Indian Key, Long Key, and the like. They are of various sizes; some—like Key West, for instance—are large, inhabited islands, planted with fruit and flower gardens, where cocoanuts and other palms, orange trees, and bananas grow in great luxuriance, while others are mere barren rocks, scarcely rising above the surface of the ocean, washed over by the waves, and wholly destitute of verdure.

Suppose now that in fancy we sail out from the keys on their seaward side, choosing a bright, calm day when the surface of the ocean is still. The waters of that region are always remarkably clear; and under such influences of sky and atmosphere they are so transparent that the bottom may be seen at a considerable depth, distinct as a picture under glass.

Sailing southward to a distance of some four or five miles from the keys, we find ourselves in the neighborhood of a rocky wall rising from the ocean bottom. As we approach it, if we look over the side of the boat, we shall see that we are passing over a floating shrubbery, a branching growth, spreading in every direction, its lighter portions swaying gently with the movement of the sea. It is not green, like land shrubbery, but has a variety of soft, bright hues, purple, rosy, amethyst, yellow, brown, and orange. If circumstances are favorable, and the water crystal-clear, as it sometimes is, we shall have glimpses of bright-colored fishes swimming in and out amid this tangled thicket; or here and there we may discern a variety of sea-anemones, their soft feathery fringes fully expanded.

This wonderful growth, over which we have imagined ourselves to be sailing, is the top of a coral wall. Reaching the surface of the water at intevals, it forms little rocky islands here and there, divided from each other by open channels, through some of which vessels of considerable size may pass. This wall is in fact a repetition of the same process as that which has formed the inner row of keys, though in a more incomplete stage; it is built up by coral animals from the sea bottom. Wherever circumstances are most favorable to their development, there they grow most rapidly. In such spots they bring the wall to the sea level sooner than in others.

This done, however, the work of the coral animals ceases, because they cannot live out of water. But in consequence of a certain process of decay and decomposition, such a wall—or coral reef, as it is called—is surrounded by coral sand and fragments worn away from it by the action of the sea.

Materials of this sort, mixed with sea-weed, broken shells, etc., soon gather upon the top of the reef wherever the coral growth has brought it to the sea level. By degrees a soil is collected upon such spots, raising them more and more above the surface of the water. In this way the islands have been

formed which we call the Keys of Florida; and in the same way the little patches now rising highest on the summit of the Reef, will enlarge gradually into more and more extensive islands, though at present many of them are scarcely visible above the water level.—*Mrs. Agassiz in "Our Young Folks" for March.*

FELL'S RAILWAY OVER MONT CENIS.

The railway over Mont Cenis, which is a temporary method of transit only until the tunnel is completed, is called the American railway, its inventor, Mr. Fell, who built the one up Mount Washington, being styled an American; and we were promised a ride in real American cars. The time of starting was 7 A. M. There was a great crowd of all sorts at the station, a lively fight for tickets at the box office (for the perfect French system has not reached the other side of the Alps), and then we waited till half-past 7 before we were let out to the cars. The train ready to go consisted of an engine and two first-class passenger carriages. The carriages were about half the length of ours at home, with seats on each side, so that passengers face each other as in an omnibus, and with windows at the sides from which it is difficult to see out when one is squeezed in tight on the seat with his back to them. The cars are also very narrow, the track being only three feet six or seven inches gage, so that they are not much more comfortable than an omnibus. The fare, first class, was twenty-five, second class, twenty-two francs, from Susa to St. Michel, the time occupied in the passage being from four to five hours.

The locomotives of these trains are small, compact, and powerful; their trucks, as well as those of the carriages, set well in the middle, so that they can turn very short curves. The track has three rails, one elevated in the centre. Beside its ordinary driving wheels, the locomotive has two horizontal wheels which press this third rail on either side, and it is by this strong traction that the train is pulled up. The carriages have corresponding wheels for the center rail, but their only use is to keep the train on the track. Both cars and locomotive have double sets of brakes, one for the ordinary and one for the central rail, so that they can screw the cars to the track with the grip of a vise, and render it almost impossible for the carriages to run away. There is every precaution against accident; and I should only fear the snow storms of winter, and perhaps an avalanche in some places high up, which are not roofed in.

We began to climb the hill directly we left the station, exactly as a carriage drawn by horses would do. In fact, our track ran parallel to the carriage road all the way, was just as steep, and made the short turns of the latter. Our train seemed to be a huge live reptile with legs and claws, that crawled up by its own power; it literally dug right up hill, and we felt ourselves mounting, and, looking back, we could see the steep incline. On the curves, where the wheels got a good grip of the rail, we moved with ease and more rapidly than on a straight pull, where the locomotive evidently labored more, and we rose more slowly. The steepest grade on the road is one foot in nine feet, but this is only for short distances. The rise of one in twelve is more common; and the least (of which any note is taken) is one in twenty-five. The curves are so short as to be startling. We seemed to turn in a space as small as an ordinary wagon could. The shortest curves are on a radius of only 120 feet; that is, our train would run round a circle only 240 feet in diameter. Our track was all the time in sight, behind and before, running along the steep hillsides, and constantly doubling, like a compressed letter S.

You march up with triumphant ease, rising among the grand snow peaks like a conqueror. The valleys open behind you, with their rivers and brown villages, the great panorama expanding with every revolution of the wheels. You skirt precipices and look down upon nestling villages and green fields; you push your way up among the snow regions, the stone huts of the begging, half naked, dirty peasants, and the refuge houses of the road; are whisked round rocky headlands, through tunnels and covered ways, over deep gullies and tracks of avalanches, rising always higher and higher, as by no expenditure of strength, into a purer air, among peaks of virgin snow, among the silent summits of the enduring Alps.

The day was superb, with blue sky and fine air, and it was so warm, even in the snow regions, that I needed no overcoat. Our view was, for the most part, uninterruped and magnificent. The summit level is about 6,400 feet above the sea, and before we reached it we passed into a covered way, built of wood at the sides and arched with iron, and were immured in this, in the ascent, descent, and on the level for four or five miles, I should think; dark, unpleasant passages, made worse by the smoke and fumes of the locomotive. These covered ways are absolutely necessary as a protection against avalanches in many places and against the falls of snow for long distances. Through the chinks of the boards I could see the snow piled up high along the way. The summit station is in one of these long sheds, and is gloomy enough.

We made the descent more rapidly than the ascent, swinging round the short bends with considerable velocity. The brakes were jammed hard down until I could smell the odor caused by the friction. On the descent I saw the frowning forts of Brumont d' Essillon, on peaks high above the abyss through which the Arc foams and roars, connected with the road by a thread of a suspension bridge over the gorge, called the Pont du Diable. The forts are being demolished now, under the agreement between France and Italy. Lower down, and about ten miles up the mountain from St. Michel, we caught sight of the rubbish at the opening of the great tunnel, which enters the mountain at Fourneau. It is to be 8½ miles long, and it is expected to be completed in 1871. It is, no doubt, a great and most interesting bore, but if I desired a pleasure trip, I think I should prefer the raid of Mr. Fell over the mountain to this hole through it.

I talked with a locomotive driver on our train (by the way an Englishman, as they all are on this road), who insisted that Mr. Fell is not an American. He knew him well, lived near him in the north of England, and said he was not an engineer at all, except so far as this invention was concerned, but a dissenting clergyman. He is certainly a dissenter from the ordinary style of railways. The engineer was an excellent specimen of an intelligent, illiterate English mechanic, with a drawl and nasal twang in his speech that a Cape Cod man might envy; and he gave me a great deal of valuable information about the road, which I might here impart, if your readers cared for valuable information, which I suppose they do not. He was takin' a day h'off for pleasure, he said, and goin' down to see the work on the big bore. 'Twas a nasty bit of work this of running twice over the road daily, as he did, and only getting twelve pound a month for the job, especially in the winter, with the snow and beastly wind. There had been only six days in the past winter when they couldn't run on account of snow, and then the passengers had been carried over the break on sledges. He explained to me the construction of the locomotive, the application of its power, the working of the brakes, and the whole thing, so that I think I can build a road out to West Hartford, over Prospect Hill and to the Tower, if anybody desires, when I return. Sealed proposals, inclosing stamp and photograph, can be left on the Probate steps. I said to the engineer that I supposed it impossible for the locomotive, with three rails, to get off the track.

Well, he said, his machine got off once last winter. The fact was, that the t'ing got the upper hand of him, and ran away with him. He spoke of it as if it were a horse. He was running with the locomotive alone, takin' her down the mountain, not mindin' exactly, when he found he had got on so much steam that he couldn't hold her. He was goin' down the one in nine, round them ere nasty curves, when she started. He shut off, and jammed down all the breaks, reserve and all, but she only appeared to go the faster. Away she went, like the —— (so he said), whisking round, and at last bounded off and went slam ag'in a rock. "If she'd a gone over the ravine on t'other side, I wouldn't be here to tell ye of it."

It was nearly one o'clock when we ran into St. Michel, and, passing the humbug of a custom house, took comfortable cars for Lyons. *C. D. W. in Hartford Courant.*

NOTES ON SCIENCE AND ARTS.

When the scientific soirées begin, it is a sign that the scientific season is half gone; and now the Easter holidays are over, and scientific investigators are working the harder to complete their self-imposed tasks before summer comes with alluring smile to entice them to the seaside or the mountains. General Sabine, the President of the Royal Society, has held two soirées, in which, as usual, science and art were exemplified in a very interesting way, and ingenious mechanical models were exhibited. Among them, was Bidder's coal-winning machine, of which we have recently made mention; and Price Williams' switch, which entirely does away with the numerous "points" seen at railway junctions, and keeps the main line of rails always unbroken, whereby a frequent occasion of danger is avoided; and Milroy's excavator, which digs equally well on land and under water, and is very useful in digging out the foundations of bridges, or in sinking cylinders. It may be described as a heavy metal ring suspended by chain and pulley, and carrying a number of hanging flaps. These flaps, when the ring is lowered into place, and agitated, act as spades; and when a sufficient quantity of earth or sand is loosened, they can be so regulated by another chain, that they bring it up to the surface, where it is dropped into a truck and carried away. From these particulars, it will be understood that deep holes can be dug, even under water, without sending men down to do the work.

Well deserving of notice is a much improved safety-lamp for use in mines, invented by Mr. Story Horn of Newcastle-on-Tyne. It has long been known that the Davy lamp does not insure safety under all circumstances; it is liable to become choked, the light is dim, and in some conditions it may occasion an explosion. These defects are remedied in Horn's lamp; the light is good; accumulation of soot cannot take place to render it dim; and whenever explosive gas finds its way in, the construction of the lamp is such that it becomes its own extinguisher, puts out the flame, and thereby prevents an explosion. There are other points in its favor; but these we may omit, as in the foregoing brief sketch the merits of this new lamp are sufficiently set forth, and because it has been tested in the severest manner, and proved trustworthy.

F. N. Gisborne, who has for years past made himself conspicuous by his signals for use on board ship, in mines, factories, or dwelling-houses, has now brought out a method which, for simplicity and efficiency, excels all his previous inventions. First, he used galvano-electricity, then pneumatic tubes, and compressible air-chambers, both costly and liable to derangement. Now, with a balance-weight and a chain, he accomplishes all he desires with his system of signals. A captain standing on the bridge of a steamer can, by touching the indicator, send an order to the steersman or the engineer, and see at once whether they obey without changing his position. And that which can be done in a ship can be done in a house, workshop, or mine, and by a simple mechanical arrangement, which can hardly fail to be received with favor. It has been already adopted in the five leading navies of Europe; and the great Prussian iron-clad *König Wilhelm*, now building on the Thames, is fitted with a set of Gisborne's signals, finished in a style which may truly be described as royal.

A magneto-exploder, constructed by Breguet of Paris, was shown, which will fire a fuse, and consequently a cannon, at any distance from two feet up to two hundred miles.—And Clerk Maxwell exhibited a "Wheel of Life," containing what he calls dynamical diagrams, and these, when the wheel is set agoing, produce many remarkable phenomena of curves and their intersections. Thus, in the hands of a philosopher a toy becomes a means of illustrating the laws of curvilinear motion. Teachers of geometry and natural philosophy would find it useful.—And N. J. Holmes, who is among the foremost of our telegraphists, exhibited his new magneto-alphabetical telegraph, which is one of the cheapest, if not the cheapest and simplest yet constructed. It comprises two circles of buttons, and the operator has only to touch button after button, and spell out his message as rapidly as he pleases. With this and other instruments before them, government will have a sufficient variety to choose from when they assume control of the telegraphs.

Silver and Co. exhibited specimens of their Norwegian Cooking Apparatus, adapted to different purposes and circumstances, and of different dimensions. One was provided with a thermometer to show the slowness of the rate at which the heat is lost. In one of the small boxes, a pint of water locked up boiling hot at eight o'clock in the morning, was still warm at six in the evening. And in like manner, the apparatus can be used as a refrigerator, and for preserving ice a considerable time unmelted.

Mr. Graham, Master of the Mint, by a singularly ingenious experiment, showed the prodigious amount to which the metal palladium will absorb hydrogen: an amount exceeding by some hundreds of times its own bulk. Two ribbons of palladium, attached to the two poles of a battery, were seen loosely coiled in a water-bath. The current was turned on: the ribbons took in so much hydrogen that they expanded, uncoiled, and stretched themselves across the bath, as if alive. The current was reversed, the hydrogen was thrown off, and the ribbons resumed their coil. They might have been compared to a couple of writhing worms. The sight was amusing; but it exemplified the researches by which Mr. Graham has thrown light on an important question in cosmical science, and led him to the discovery of the new metal, to which he has given the name of hydrogenium.

From all this, it may be seen that a scientific conversazione represents a wide range of the progress of science; while, as we proceed to show, it at the same time exemplifies the arts. There was a specimen of the first beet-root sugar manufactured commercially in this country; and specimens of the juice as expressed from the roots, and after defecation, and of the waste pulp which finds a ready sale as cattle-food.—There were two or three simple forms of filter which might be carried in the pocket.—There was a model of the viaduct now building across the Holborn Valley.—A piece of inscribed bullock's hide, showing three capital letters and a rude hieroglyph, brought from the south-east coast of Africa, and supposed to be a message from survivors of ship-wrecked crews, now prisoners in the interior of Somali Land.—There were photographs of Mount Sinai and of the surrounding country, taken by the party now engaged in surveying that remarkable land, and very wild and striking prospects do they represent. By and by, a model in relief, made at the Ordnance Survey Office, Southampton, will be brought out, and then scholars will be able to study and follow the route of the Israelites.—Not less remarkable are a series of photographs of Abyssinia, taken during the march to Magdala by the Royal Engineers. The country therein represented must surely be the most rugged and precipitous in the world. Hannibal's march across the Alps must have been a holiday trip in comparison.—Of quite another aspect were the views in the Antarctic regions, which are now becoming important, because from some part of those regions will the two next transits of Venus have to be observed, and astronomers and others are beginning to inquire as to the best place in those desolate latitudes to establish a temporary observatory, and the preparations to be made for the voyage. It is impossible not to wish success to their endeavors, for the settlement of some of the most important questions in astronomical science depends on good observations of the transits.

It is recorded of some of the early Venetian painters that they laid on their colors with palette knives of different widths, and never used the brush. White Warren has revived the process, and exhibits a number of pictures in oil, all painted with the knife, and with marked effect. Land and water pieces, houses, ruins, Gothic towers, and flower-beds present a sufficient variety to test the capabilities of the art and the artist. At present, he appears to be most successful in clouds, landscapes, and gardens.—*Chambers' Journal.*

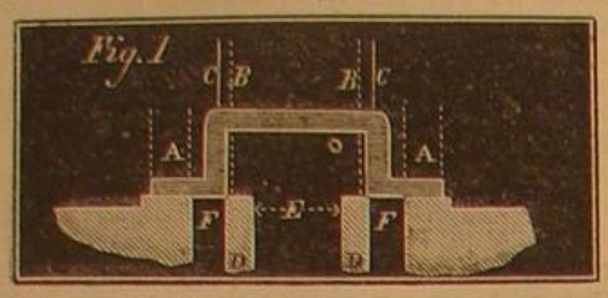
IT is reported that one day, when Lord Brougham had driven to the House in the vehicle of his own invention, which Robinson, the coachmaker had christened after him, he was met in the robing room by the Duke of Wellington, who, after a low bow, accosted him. "I have always hitherto lived under the impression that your lordship will go down to posterity as the great apostle of education, the emancipator of the negro, the restorer of abused charities, the reformer of the law; but no—you will hereafter be known only as the inventor of a carriage." "And I, my lord duke, have always been under the delusion that your grace would be remembered as the hero of a hundred battles, the liberator of Europe, the conqueror of Napoleon; but no—your grace will be known as the inventor of a pair of boots." "Confound the boots," said the Iron Duke, "I had forgotten them. You have the best of it."

SLIDE VALVES.

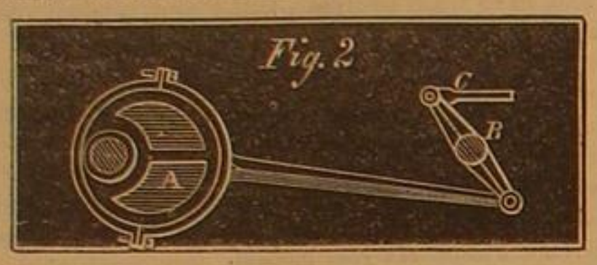
LAP AND LEAD.

A correspondent states that he has derived such great benefit from the use of the following diagrams published in the *English Mechanic*, in 1866, that he asks their reproduction in the pages of the SCIENTIFIC AMERICAN.

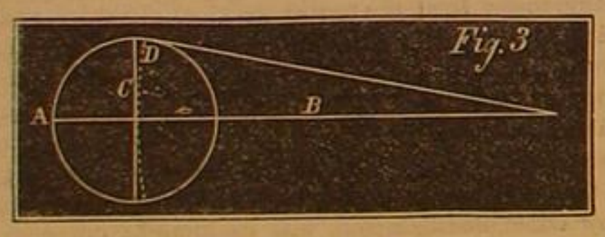
As most of the remarks seem to us to be sound, we reproduce them in our columns, and, as the matter is an important one, we have appended to the notice an addition which will prove serviceable, in a *practical* point of view, to a large number of mechanics. These remarks of ours on the slide valve, will make the subject comprehensible to those who seem to regard its study as too abstruse for ordinary comprehensions, while in reality nothing can be more simple than the working of this most indispensable portion of the modern steam engine:



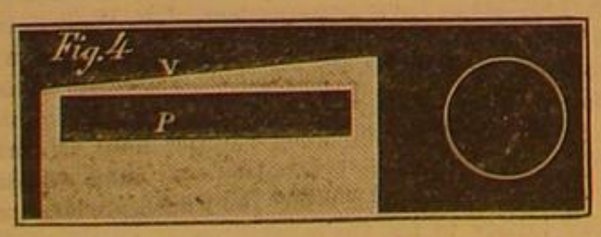
"First, as to the terms 'lap' and 'lead.' On looking at Fig. 1, it will be seen that the valve overlaps the ports at each end. Now, from the outside edge of the ports to the end of the valve, is the outside lap. By the lead of a valve is meant that the port is opened a little in advance of the piston, or the port is open for one stroke before the piston has quite finished the preceding one. This valve, Fig. 1, has neither inside lap nor clearance, and if the inside space was shortened up to the dotted lines, B B, it would have inside lap because it would lap on the bars, D D, and on the other hand if the dark parts were cut away, it would have inside clearance.



"This valve has a lap equal to the port. Therefore if it is set without lead at the beginning of the stroke, the exhaust port will be full open as it ought to be, or very nearly so, more especially when the ports are small. It does not seem to be generally known among drivers, that in a common valve, worked by an ordinary eccentric motion, it is impossible to cut off equal at both ends of the cylinder. This is caused by the angularity of the connecting rod, more or less, as the rod is longer or shorter in proportion to the crank. When the piston is at its half stroke, the crank is short of the vertical line, as shown by the dotted line D in Fig. 3.



"The piston is always before its middle position for the front stroke and behind it for the back stroke; consequently there is always the most steam for the front stroke, which will make the engine 'exhaust fullest at its out center,' as remarked lately by a correspondent. (The front stroke is that made towards the crank.) Some engineers attempt to find a remedy for this by giving the valve more lead for the front stroke, which will allow the valve to reach the end of its travel sooner, thereby shortening the front admission of steam. But this is a very poor remedy; in fact, it is the worst evil of the two, although it may not be told by the beating of the engine. The better way is to have unequal laps or an intermediate lever reversed in action, as shown in Fig. 2. By employing this and fixing it in its proper place, we can get equal admissions for both strokes.



"Fig 4 is a good shape for a valve. The end is beveled about a ¼-inch in a length of 6 inches. This would give the crank a chance to pass the center before the full pressure is applied. I think an eccentric of varying travel would be a good thing for an engine where the loads are more some days than others, so that the steam may be cut off earlier by giving the valve a shorter travel. It might be made like Fig. 5. The conclusions that I come to on the subject are these:

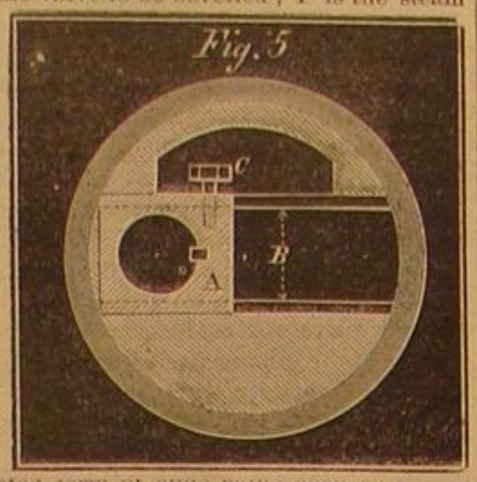
"1. The valve should have a lap equal to the width of port at least.

"2. No lead is required at speeds of less than 400 feet of piston per minute. The back pressure caused by compression is an ample 'cushion' for the piston, and the piston ought to get the pressure gradually after the crank has passed the center by beveling the edge of the valve or other means.

"3. The connecting rod should be as long as possible, never less than five times the length of crank, but seven or eight times the length would be better.

"4. The valve should be a lead for exhaust, in some cases a fully open port.

"In Fig. 1, A A are the outside laps; F F, the ports; E, the exhaust port; D D, the bars. Fig. 2, A, the eccentric; B, a lever with arms of equal length; C is the valve rod. Fig. 3, A, is the center line of cylinder; C is a line at right angles to it; D is the point where the crank pin reaches to when the piston is in the middle of the cylinder. Fig. 4, the dark shaded part V, shows the end of the valve to be bevelled; P is the steam port. Fig. 5, A, is a boss keyed to the crank shaft; the eccentric has a slot cut across it, as seen at B, which allows it to slide on the boss, and is fixed for its proper throw by the screw, C."



We shall limit ourselves, in the following supplementary dissertation, to the description of the most generally accepted form of slide valve, such as is now in daily use in the great majority of our best constructed engines, reserving for some other occasion an account of the many modifications and varieties of such valves, or *cut-offs*, as have at different times been recommended by various engineers.

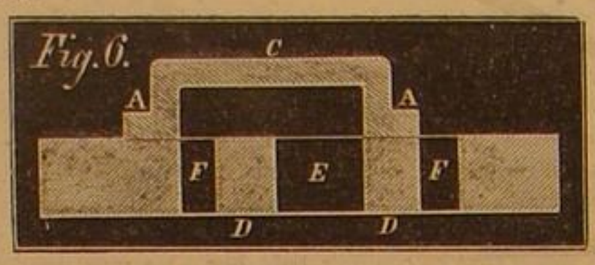


Fig. 6 is a section through such a slide valve, in which C is the slide, A A, the outside laps; F F, the steam ports; E the exhaust port, and D D, the bars.

The slide is best made with an inside lap of $\frac{1}{12}$ of an inch on either side.

The exhaust port must be from 2 to 2½ times as high as the steam ports.

The section of the steam ports must be from $\frac{1}{15}$ to $\frac{1}{20}$ of the area of the piston head for high speed engines, such as locomotives, rolling-mill engines, etc., and from $\frac{1}{20}$ to $\frac{1}{30}$ of the area of the piston for slow speed engines.

The ratio between the width of the steam ports and their hight, ought to be approximately as follows:

4 to 1 for small engines.
5 to 1 for medium sized engines.
6 to 1 for large engines.
7 to 1 for still larger engines.

From what we have just said, it will be seen that the proportions, in inches, of all the parts of a slide valve can be computed when its hight has been determined relatively to the area of the piston, as we have shown above. For this purpose proceed as follows:

1. To find the *hight* of the *exhaust* port, multiply the hight of the steam port by 2½.

2. To find the *thickness* of metal in the *bars*, add $\frac{2}{12}$ of an inch to the hight of the steam ports.

3. To find the clearance of the inner edge of the steam ports, multiply the hight of the steam ports by 4½ and add $\frac{4}{12}$ of an inch.

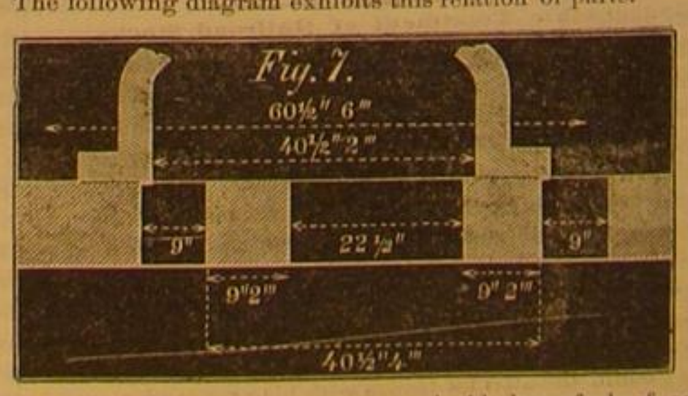
4. To find the clearance of the inner laps, multiply the hight of the steam ports by 4½ and add $\frac{2}{12}$ of an inch.

5. To find the extreme clearance of the outside laps, multiply the hight of the steam ports by 6½ and add $\frac{6}{12}$ of an inch.

6. To find the length of valve stroke, for a full open port, multiply the hight of the steam port by 2 and add $\frac{4}{12}$ of an inch.

Supposing, as an example, a valve with steam ports 9 inches high, as shown in the diagram, Fig. 7, what would be the relative dimensions of the other elements of this valve? They would be:

Steam ports 9″ high.
Thickness of bars 9″ 2‴.
Clearance of inner edge of steam ports 40½″ 4‴
Clearance of inner laps 40½″ 2‴.
Clearance of outer laps 60½″ 6‴.
Stroke for full open valve 18″ 4‴.
The following diagram exhibits this relation of parts.



English builders give an average inside lap of $\frac{1}{10}$ of an inch on either side. For low-pressure engines, working with from 2½ to 3 lbs. over pressure, $\frac{1}{8}$ of an inch is given, while for marine engines, working with from 4½ to 5 lbs. over-pressure, the lap is from 1 to 1¼ inches.

The rule given for lead (relative advance of the slide) is as follows:

Multiply the square of the area of the piston in inches by 0·002, and divide the product by the length of the valve orifice in inches. The quotient gives the width of the open steam ports when the piston has reached either end of its stroke, *i.e.*, is full up or full down. In a 30-inch cylinder, for instance, with 12 inch length of valve orifice, it would be 0·15 inch. The eccentric for communicating motion to the slide must always work at an acute angle to the direction of the slide, and this lead angle must be greatest the greater the degree of expansion used.

Figs. 8 and 9, will make this matter clearer by showing the relative working of slides and piston in an engine where the lap is made to bring on expansion, and which cuts off at ¾ stroke.

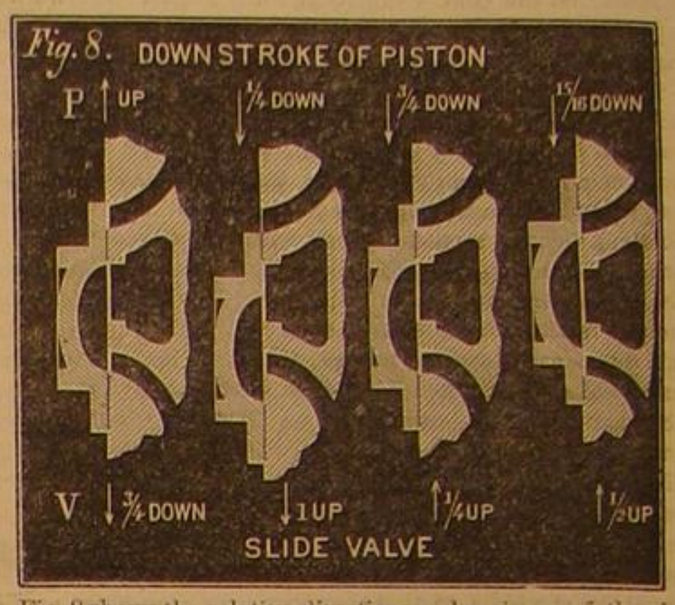
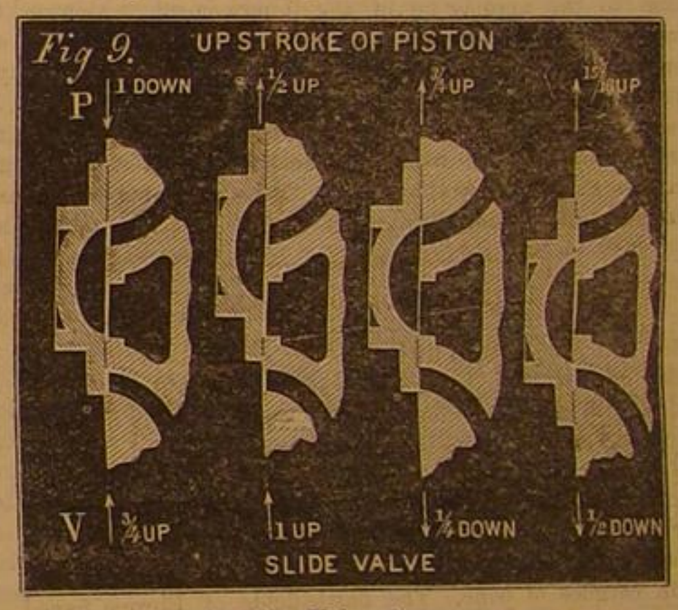


Fig. 8 shows the relative directions and positions of the piston and slide during the whole down stroke of the piston. Starting from the moment the piston has reached its full extent of upward course, we have successively:

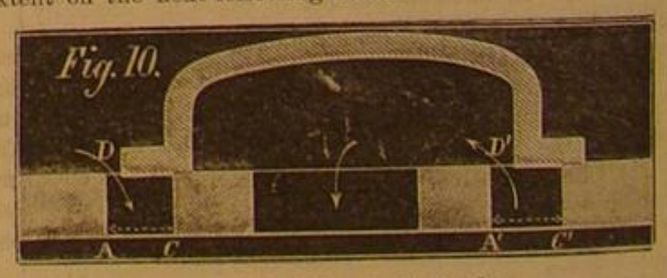
1. Piston up in full. Valve ⅜ down.
2. Piston ¼ down. Valve quite down.
3. Piston ¾ down. Valve ¼ up.
4. Piston $\frac{15}{16}$ down. Valve ½ up.

Fig. 9, exhibits the relative directions and positions during the whole *up* stroke of the piston.



1. Piston, down in full. Valve, ⅜ up.
2. Piston, ¼ up. Valve, quite up.
3. Piston ¾ up. Valve, ¼ down.
4. Piston, $\frac{15}{16}$ up. Valve, ½ down.

In order to obtain this motion the eccentric must in thi case have an "advance" of 30 degrees. As the reader wil notice, the exhaust steam is cut off at $\frac{15}{16}$ of the piston stroke But this is of little moment, as the back pressure of this smal quantity of exhaust steam, as proved by the indicator, is in significant, beside which, it is again utilized to a certain extent on the next following stroke.



The lead at any period of time is obtained:

1. For the entrance steam port, by dividing the hight o the aperture at the entrance port (D, Fig. 10) by the tota l hight of the port (A C, Fig. 10.)

2. For the exit steam port, by dividing the hight of the aperture at the exit port (D' Fig. 10) by the total hight of the port (A' C' Fig. 10).

Black Walnut Polish.

Take asphaltum, pulverize it, place it in a jar or bottle, pour over it about twice its bulk of turpentine or benzole, put it in a warm place, and shake it from time to time. When dissolved, strain it, and apply it to the wood with a cloth or stiff brush. If it should make too dark a stain, thin it with turpentine or benzole. This will dry in a few hours.

If it is desired to bring out the grain still more, apply a mixture of boiled oil and turpentine; this is better than oil alone. Put no oil with the asphaltum mixture, as it will dry very slowly. When the oil is dry, the wood can be polished with the following: Shellac varnish, of the usual consistency two parts; boiled oil, one part. Shake it well before using. Apply it to the wood by putting a few drops on a cloth and rubbing briskly on the wood for a few moments. This polish works well on old varnished furniture.—*Chem. News*

Improvement in Springs for Vehicles.

This improvement consists first, in the substitution of taper longitudinal ribs, A, (see engraving) for the ribs and slots in common use, which prevent lateral slipping of the leaves of carriage springs, and second in the application of India-rubber bearings—one of which is represented at B—to the cast metal seat of the spring, C, whereby much of the jar and concussion, when vehicles are in motion, is prevented from transmission to the spring, and greater play and elasticity also secured.

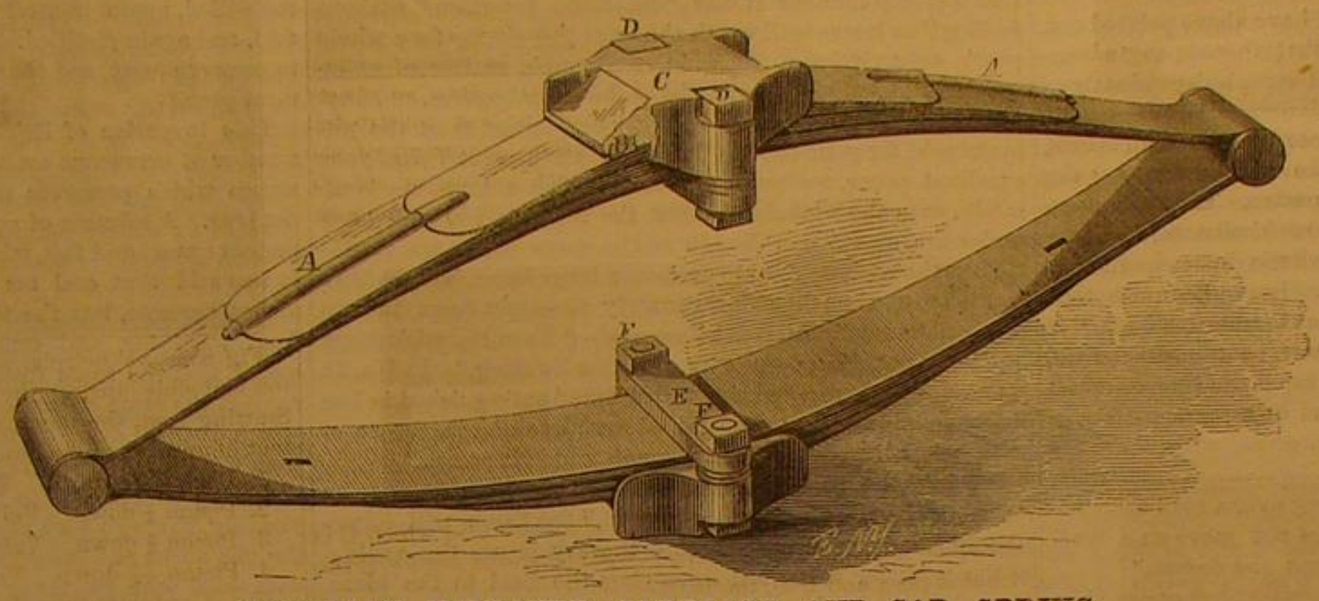
The ribs, A, are formed in the leaves by swaging, and are so made that the convex side of any leaf exactly fits the concave side of the leaf exterior to it, when the leaves are put together.

The cast metal seat, C, is fastened by bolts, D, passing through the bar, E, and held firmly by the nuts, F. The seat is so constructed that the rubber bearing, B, separates the leaf next it slightly from the seat, so as to admit of compression and expansion, corresponding to the motion of the spring. By this means considerable elasticity is gained over that attained by the ordinary method, and the force of violent shocks much weakened.

Beside the gain in elasticity this method is claimed to possess the following advantages over the old method. The form of the ribs gives greater strength to the leaves. Their tapering form limits the amount of the depression when heavily loaded, in consequence of the binding or wedging of the convex surface of each rib in the concave surface of the one lying upon it.

The spring can be made as light and graceful in appearance as those of the old style, and the number of leaves is entirely unessential to the application of the improvement, which is adapted to all springs from those of the heaviest locomotive to springs for the lightest buggy.

This improvement has been made the subject of two patents—the first bearing date, May 26, 1863, and the second June 2, 1868—both of which were obtained through the Scientific American Patent Agency, by George Douglass, whom address for further information, Bridgeport, Conn.



DOUGLASS' IMPROVED CARRIAGE AND CAR SPRING.

UTILIZATION OF BONES.

Not much more than fifty years ago old bones went to the refuse or dirt heap, being thrown away as a valueless substance, with the exception of a very small amount of them which was employed in the manufacture of glue.

In our day, however, the trade in bones has acquired a vast importance. From them are manufactured soap, glue, phosphorus, bone black, and valuable manures.

Many ships sail to distant parts of the world in order to obtain cargoes of bone. The battle-fields of Europe have even, in some instances, been dug up, and their long pent treasures sent to the bone mills to be converted into "superphosphate," which, applied to the wheat and fodder crops, has helped in the shape of bread and meat to support the present generation.

Men have thus actually been made to feed upon the remains of their ancestors through the speculative genius of the manufacturer of artificial fertilizers!

Bones are collected along with old rags in every country in the world, but the largest supplies are obtained from South America, where an immense number of cattle are annually slaughtered for the sake of their hides and fat.

The city of Hull, in England, is the principal depot for bone for the European market, and possesses many large and powerful crushing mills, where they are reduced into fragments of the desired size.

We shall limit ourselves to-day to the manufacture of soap and glue from bones; reserving for a future article the method of utilizing them in the production of phosphorus and of superphosphates.

Practical information being what is needed in this matter, we shall sum up the whole subject as concisely as possible for the benefit of our readers.

1. Place the bones in large baskets, or nets, in running water so as to wash off the adherent dirt.

2. Hang the baskets to dry and drip, or spread the bones on an incline so as to allow the water to run off from them.

3. Carry the bones to a crushing mill or to a stamp mill, and reduce them to the size of a hickory nut. If this be done between revolving, horizontal cylinders, these must have sharp-edged ridges about three-quarters of an inch broad on their outer surfaces.

4. Receive the crushed bones on a bottom formed of parallel rods which will allow fat and marrow to ooze through, without giving passage to the bone.

5. Place the crushed bones in wicker baskets in large vats or tanks, and cover them with water, the temperature of which must be from 120° to 140° Fah., *and no more.*

6. Skim the fat as it forms from the top of the warm water, and it is then ready, after mixing with alkalies to be boiled, into soap. *If the bones had been boiled,* the soap obtained would contain glue, be of inferior quality, dark-colored, and bad scented.

7. Take the baskets and their contained bones from the grease vats, and let them drip, after which suspend them in wooden vessels, into which pour muriatic acid, diluted with water, until it marks 7 degrees of Baumé's arcometer (spec. grav. 1·05.)

7. Leave the bones in this mixture until the upper ones are soft and pliable; this generally takes places is about six or seven days if the proportion of bone and acid has been well regulated.

9. Sink the baskets in a second set of wooden vessels, filled to half their hight with muriatic acid, diluted with water, till it marks 3° on Baumé's arcometer, and leave them in this solution until they are transformed into a soft, malleable, semi-transparent substance, out of which all the lime has disappeared.

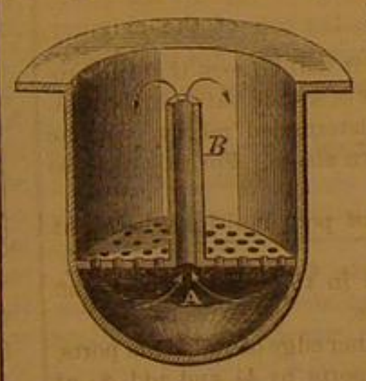
10. Wash the bones by running a stream of cold water over them for one-quarter of an hour.

11. Place the bones in a tank containing lime water to neutralize the acid, and after this, wash them again several successive times with cold water. The lime must be slaked in the water used, and 1 part of lime by weight employed to every 200 parts of water. The whole must be well stirred, covered, and allowed to rest for some hours.

12. The bones, after these last washings are completed, are now in a suitable state for the manufacture of the best quality of glue.

13. The acid, at 3° Baumé, used for the second operation, is suitable for conversion into that of 6° Baumé for the next first maceration.

14. Boil the bones in pans constructed as shown in the following cut. The bottom plate which supports the bones is perforated by small holes, and is surmounted by a pipe which reaches above their surface in the pan, so that when the water in A begins to boil it runs out through the top of the pipe, B, and flows over and through the mass of bones in a perpetually circulating stream. In large works the operation is performed in successive boilers, in each of which the degree of concentration is increased.



15. When boiled down to the proper consistency, run out the glue in flat, wooden molds, three feet long by one foot broad, which must be washed and wetted before the introduction of the glue.

16. Take up the glue sheets from the molds with a knife slipped under them, and cut it crosswise into six or seven lengths by means of a "special" glue cutter.

17. Dry your glue on twine netting, the strands of which must be $\frac{1}{2}$ inch in diameter. The netting is stretched on frames 6 feet long and 1½ feet broad. The temperature of the drying rooms must be maintained at from 59° to 77° Fah. When the outer air has this temperature, it is allowed to freely circulate among the layers of frames, through lattices situated all round the building, and which can be closed or opened at will. When dry it is ready for market.

18. The muriatic acid solutions are separately treated, in a manner we shall describe in a future article, in order to save the valuable phosphoric acid they contain.

Hydropathic Treatment of Railroad Stocks.

The *Merchant's Magazine* publishes the somewhat startling fact that twenty-eight of the leading railroads of the country have, within the short space of two years, increased their combined capital from 287 millions to 400 millions of dollars, showing an average inflation of 40 per cent. The editor argues, what is undoubtedly true, that it is impossible to adduce any really sound justification of the "watering" policy. It is, in most cases, simply a deceptive game played by speculative directors, who, after the inflation has been consummated, will be the first to forsake the bubble, and quietly wait to profit from the ultimate violent revulsion in values; while the attempt to draw out of the consumers of the country high charges for freight, so as to pay dividends on the increased stock, is a direct check to our material progress.

The Game of Croquet.

A counterpart to the railway velocipede, illustrated on another page, for the amusement of young persons, is the game of croquet, one of the out-of-door entertainments which has become very popular within a few years. It has the advantage over the railway velocipede in the matter of expense—the price of a set of croquet implements costing but a fraction of that of the railway; but where parties can afford it we recommend the introduction of both. The game of croquet is healthful, graceful, and social, and for young persons of both sexes we know of no open-air amusement that combines so many beneficial qualities with that of pleasure. The introduction of the game into schools is becoming quite common.

The manufacture of croquet implements has grown into an extensive business at Springfield, Mass., and the firm of Milton Bradley & Co., of that city, has become identified with the manufacture of the finest qualities of these goods.

Explosion of a Gasometer.

The city of Cincinnati felt the rumble and roar of a great explosion on the 24th ult. The *Commercial* says: "A great mass of black smoke rose above the Gas Works, then came a concussion that shook the windows, and immediately the smoke was crowned with a big, red flame-burst that shot up to an amazing hight. The shock was felt all over the city, except in the extreme limits, and probably not less than a third of the population realized immediately that something extraordinary had occurred.

"The gasometer, or holder, which burst, was a mass of boiler-iron of a quarter of an inch thickness, 127 feet in diameter, and 35 feet in height. It was an immense, inverted, circular tank, that rose and fell slowly, according to the amount of gas confined between its top and the surface of the water. Sunk into the ground, with a depth of 35 feet, is the tank proper, circular, of course, of stone, brick, and mortar. There were 375,000 feet of gas in the holder when the explosion occurred. We find it impossible to state the cause of the explosion, and difficult to convey any idea of the appearance of it. It appeared as if the roof of the holder was rent in twain from north to south, that as it rose and fell back the overwhelming sound was heard, and then the great bursts of flame and smoke arose. For an instant, for a square around, the breath of a mighty heat played. The woodwork of doors and windows was blistered and blackened. Men a hundred feet away found their faces, arms, and hands scorched to the flesh, and for many squares around, the close, stifling heat was felt, and then it was all over.

"The explosion is not accounted for by even the best informed gas manufacturers. When it occurred there was no fire near the holder, and no gas had been let into it for six hours. One theory is that of great expansion of the gas by solar heat on the holder, the consequent bursting of the roof, and flame communicated to the escaping contents from the stack of the Globe Rolling Mill. The idea has quite generally prevailed that there is no danger of an explosion to a holder. Several instances refute this. In October, 1865, a gasometer of the London Gaslight Company's works, at Nine Elms, Battersea road, exploded, killing ten men. It was twice the size of this. Not long since, we are informed, there was a similar explosion at Chicago. Both these explosions, however, were accounted for, the fire communicating from the governor in the first instance. How this ever occurred no one seems to know. The officers and employés of the works are puzzled, and cannot solve the mystery. So far as we can learn the only sufferers as to property, by this affair, is the gas company, whose loss is about $100,000, on which there is no iusurance."

Correspondence.

The Editors are no responsible for the Opinions expressed by their Correspondents.

Large and Small Cart-Wheels.

MESSRS. EDITORS:—Your correspondent, "F. W. B.," in No. 22, current volume, page 342, in his comments upon my communication in No. 20, of same volume, makes an amusing misapplication of a well-known law of friction, to prove that the friction between the axle and the hubs of cart wheels, moving the same distance, in the same time, with a given load, will be the same, whether the wheels are large or small.

The law which he invokes in support of this paradoxical proposition is laid down in the books in these words:

"The friction is entirely independent of the velocity of continuous motion."

All that this law establishes, in relation to the friction between the axle and hub of a cart wheel, is this: In moving the same cart, with the same load, a given distance, you will have the same amount of friction to overcome, whether it moves at a greater or less velocity; because there is the same amount of rubbing between the axle and its "circumscribing box or bearing," in the one case as in the other; and it makes no difference whether that amount of rubbing is performed in a long or a short time.

It is precisely this law that proves the correctness of my proposition; viz., that "by doubling the size of the wheels, you reduce the friction one-half."

To illustrate: Suppose the axle, on which the wheel turns, is six inches in circumference. It is manifest, that at each revolution, every particle of matter in the hub or box, which comes in contact with the axle, must move around the latter a distance of six inches, and with the friction due to the

weight of the load. Now, with wheels 6 feet in circumference in moving sixty feet there will be ten revolutions, and the surface of the hub or box in contact with the axle will travel around it the distance of five feet. But if you substitute wheels 12 feet in circumference, the wheels will make but 5 revolutions in moving 60 feet, and the rubbing surface of the hub or box will travel around the axle only a distance of two and a-half feet. The weight or pressure will be the same in both cases, and, consequently, the friction of each revolution will be the same, whether made in a longer or shorter time.

The law may be expressed in these words: If you move one surface over and in contact with another surface, under a given amount of pressure or weight, the friction to be overcome will be in proportion to the weight or pressure, and the distance which the moving body travels, without reference to the time occupied in traveling that distance.

I respectfully refer your correspondent to "Appleton's Dictionary of Mechanics," Vol. I. page 717, where he will find the law applicable to this subject clearly laid down, and fully sustaining my proposition.

After falling into the error which I have above pointed out, your correspondent goes on to show, that there is an "advantage" in large cart wheels over small ones, independently of any saving of friction; "and this advantage" he says, "depends on the road, whether there are obstructions, like stones, sand, mud, or the settling down of the road bed under the wheels," etc. This is begging the question. In my communication I did not say that the saving of friction was the only advantage gained by using large wheels instead of small ones, in traveling over common roads. My assertion was, that the difference in friction between the axle and the hubs, "is the only reason why a horse can draw, on a level plane, a heavier load, at the same speed, on large wheels than on small ones." I adhere to that assertion, it being understood, of course, that I mean an absolutely level plane, when there are neither obstructions to surmount, nor depressions into which the wheels may sink. But a cart moving over a road obstructed by stones, mud-holes, ruts, etc., does not move on a level plane. It must inevitably have its "ups and downs."

That large wheels will move over obstructions easier than small ones, is a proposition which I have never denied.

Washington, D. C. J. J. C.

Is Machinery Hostile to Mental Culture.

MESSRS. EDITORS:—Civilization always advanced in direct ratio to mechanical development; the remains of ancient Egypt, Greece, Rome, China, Peru, Mexico, and everywhere else, prove it incontrovertibly. As the laws of nature revealed themselves to men, they grew intelligent, and while some used the knowledge obtained for improvements in industries, others made it their aim to further explore the recesses of nature, from which all wisdom flows. In either case as the necessity for improved mechanical means became urgent, ingenuity was taxed to supply the want. Thus we have the progress in civilization through industry by mechanical means, deducted from the laws that rule the universe. Machinery, therefore, is the promoter of human progress, the great lever by which we open the portals that exclude our vista from the formerly unknown, and therefore mysterious regions, enlarges our knowledge, and dispels ignorance and intolerance.

Progress in knowledge is the certain road to perfection, to virtue, to further development of that intelligence in mankind, which only requires encouragement to expand over the immeasurable extent of the universe, finding there revealed the true source of all being; it directs to morality, to rectitude, through justice. On the other hand, the substitution of automatical work for hand labor relieves the mass from a great deal of soul-benumbing drudgery, gives each more time to reflect; and the observation of the numerous devices employed in itself promotes study, reflection, independent reasoning; the real and only source of true liberty, if joined to morality and justice. R. H.

New York city.

Excellent Copying Ink.

MESSRS. EDITORS:—In your issue of May 15th I notice a recipe for a new copying ink. Perhaps it may gratify some of your readers to be acquainted with another recipe which was published by me, in 1862, in *Wieck's Illustrated German Polytechnic Gazette*, and which will be found perfectly reliable.

Take one half of a pound of extract of logwood (Sanford's is best), two ounces of alum, four drachms of blue and as much of green vitriol, and one ounce of sugar; boil these ingredients with four pints of water, filter the decoction through flannel, and add to it a solution of four drachms of yellow chromate of potassa in four ounces of water, and finally two ounces of chemic blue in two ounces of glycerin. The chemic blue, also called "blue dye," is the solution of indigo in oil of vitriol, and otherwise used for dyeing wool.

You will notice that my composition differs from that given by you, in containing alum, instead of carbonate of soda, and sugar instead of gum arabic. Beside the ingredients of your ink, it contains chemic blue, and green and blue vitriol. In using these two salts I intend to effect a combination between them and the tannin of the extract of logwood. Your ink will probably just flow as well with one quarter less glycerin and one half less water of the quantity indicated.

New York city. ADOLPH OTT.

Why Large Wheels are of Lighter Draft than Small Ones.

MESSRS. EDITORS:—Your correspondent "J. J. C.," on page 311 of present volume, in answer to "F. R. P." criticising the latter's manner of explaining the reason why a cart with large wheels is of easier draft than one with small ones, gives an opinion I differ from as well as from that of "F. R. P."

The cause is change in the angle formed on the one side, by the line of draft from the axis of the wheel, and on the other side from the axis of the wheel to the top of any object in front and against the wheel. The axis of the wheel being the apex of the angle, it will be seen that the smaller the wheel the more acute this angle will be, the line of draft being then lowered comes more behind the object to be overcome and increases the draft. If the wheel be so small that the line of draft coincides with the line of resistance the cart cannot be moved at all. "J. J. C." says that a cart with wheels half the size of another will have double the friction at the axis because it moves twice as far in going the same distance as the large wheels, but "J. J. C." must recollect that draft has twice the leverage on the small wheels that it has on the large ones, therefore in this respect they would be equally balanced. G. B.

Princeton, Ind.

Extinguishing Kerosene Lamps.

MESSRS. EDITORS:—For the last ten years, I have hardly ever read a single number of the "Scientific American," without feeling that it was well worth the price you charge for a whole year's subscription. *E.G.*, in the simple matter of extinguishing kerosene lamps; to have the safest, easiest, and best plan, is worth more to any family, using lamps, than the pittance paid for your paper. In No. 8 of the present Vol. of your excellent paper, we read—"To extinguish a kerosene lamp safely, turn the wick down until the flame is low and blow under the glass." In No. 10 of the same paper, we read—"Turn the wick up so as to produce a large flame, but not high enough to smoke; then blow squarely *across* (not down) the top of the chimney." In No. 14 we read—"Turn the wick down until it is out, then turn it up ready for lighting." In No. 21 we read—"A kerosene lamp will be found extinguished in less than one minute from the time of complete disappearance of wick below the edge of tube through which it passes."

I think the above plans objectionable.—First, because by "raising the wick before blowing out," the flame will immediately run down to the tube and thereby injure the quality of the wick for afterward conveying the fluid to the blaze. Second, because "lowering the wick to extinguish the lamp," will produce a kind of gummy substance in the upper part of the tube, which will ere long interfere with the raising of the wick when a new supply is needed. Third because "blowing under the the glass" takes such hard blowing and throws the blaze and smoke against the side of the chimney and soils it.

Fourth because "blowing down the chimney" is unsafe and also tarnishes the glass. Other objections might be given, but let these suffice.

After experimenting in the matter, I *think* I can give an easier, quicker, and safer plan than any of the above, for "extinguishing kerosene lamps."

It is simply this:—Blow across the top of the chimney, without either raising or lowering the wick. Let the blowing be a kind of *puff* and inclined upwards, so that no part of the blast will go down the chimney.

This plan needs no previous or subsequent fixing of the lamp. Try it. GEO. BUCHANAN

Washington, Pa.

Vibration of Metallic Vessels Containing Water.

MESSRS. EDITORS:—On a recent visit to Port Sullivan, Milam county, Texas, my attention was called to a curious fact bearing on this subject.

The college bell had been taken down from the tottering belfry, and placed, with its frame, upon the floor of the portico, where it was still used for college and church calls.

Some of the mischievous students turned it up, and propped it, and then filled it with water. Its diameter is about 18 inches, and its contents some five or six gallons. They then undertook to ring the bell by slight blows of the clapper against its walls. They, however, got little response; and after a few blows it was discovered that the bell was cracked in several directions. In fact, the pieces came asunder after emptying the bell, and showed the bell metal to have been of the most compact quality. The fracture was granular, but each grain clear and glistening.

"What was the cause of the fracture? The bell was accustomed to much more violent blows for years before."

To the professor who asked this question, the writer gave this extemporaneous reply, without being very confident that it was satisfactory.

"Instantaneous vibration against the water inside was probably impossible, and hence the momentum of the blow forced a rupture; or more specially, when the clapper struck the concave rim of the bell, there should have been in the open air, or any elastic medium, an instantaneous yielding of the concave in the direction of the blow, and a corresponding retraction on the opposite end of the diameter, and the circle for the moment would have assumed an ovate form. But as water is practically inelastic, the yield to the blow is not compensated by retraction and change of form; and hence the bell would crack, probably at some point of minimum strength."

Experiments may readily settle the question, but we have a great scarcity of bells in Texas, and cannot afford to make these tests. C. G. FORSHEY.

Galveston, Texas.

Cosmos states that a committee has been formed at Copenhagen with the intention of erecting a suitable monument in honor of the great Danish *savant*, Hans Christian Oersted. A statue, representing the distinguished natural philosopher, is ordered to be made by a Danish sculptor, named Ferichau, and is to be placed in a prominent situation in Copenhagen.

(For the Scientific American.)

COAL TAR AND ITS PRODUCTS AS PRESERVATIVES FOR WOOD.

Ever since the establishment of gas works it has been considered a matter of great importance to find some useful application for their waste products, principally the coal tar The old custom was to use wood tar as a coat for common wood structures exposed to the inclemency of the weather, and it was soon found that coal tar resinifies, dries, and hardens quicker than wood tar. This circumstance led to experiments to ascertain the preservative nature of coal tar.

More than fifty years ago W. H. Hyett and others impregnated wood with gas tar, and reported that such wood, placed in a damp cellar, became moldy sooner than the same wood in its natural state, and that it showed fungi, particularly where the tar abounded.

In 1830, Reichenbach published his experiments, by which he obtained creosote from beech-wood tar. He subjected the tar to a fractional distillation, the heavier products, which distilled over by increased heat, were washed with an alkali, redistilled, again treated with lye, and then with sulphuric acid, and again distilled. The substance so obtained he found to preserve meat, and therefore called it "creosote," meaning meat preserver.

This invention of Reichenbach served as a nucleus for a number of erroneous conclusions. It was alleged that a substance which preserves meat also preserves wood, which is not true. A solution of common salt, for instance, serves to preserve meat and fish, while it accelerates the decay of wood It was said that coal tar is the same as wood tar, and furnishes creosote, but the truth is, coal tar differs materially from wood tar, and contains no creosote. It was further stated, that the mere distillation of coal tar is sufficient to convert the same or part of it into creosote, and the coal tar, which distilled over by increased heat, and was found heavier than water, was deceptively called "creosote," sold as creosote, and used as creosote to "creosotize" wood and preserve it yielding, through such misrepresentations, large revenues to the gas works and inventors of various processes to impregnate wood with gas tar or its products.

The first man whom we find engaged in the creosotizing patent business, and probably the most candid inventor, was Franz Moll in A. D., 1835. He found, by practical experiments, that the so-called "creosote of coal tar" was worthless to protect wood from decay. He ascribed its failure to the presence of other substances therein, with which the "pure creosote" is associated, and strongly recommends its previous purification with alkaline lye, similar to Reichenbach's process described above. When coal tar is heated in a still by gradually increasing heat, the product first obtained, which is lighter than water, is called by him "eupion," the heavier liquid obtained thereafter he calls "creosote." Merely coating wood or timber with coal tar or other tar, he finds of but little advantage.

Moll's British patent was granted in 1836, and is the more interesting, as his process is based on the best principle, so far known, to saturate wood with liquids, and as his specification accounts for the necessity of tedious operations, without which he finds the application of the products of gas tar of no practical advantage. His process is as follows: The wood is placed in a close chamber, which is connected with one or more stills. He begins the operation by heating the inside of the chamber by a steam pipe or elsewise, to about 100° Fah., and then increases the heat gradually till sufficiently warm, to assist in maintaining the vapors of eupion and creosote in a vaporous state. The water from the damp timber is then drawn off, and eupion, previously sufficiently purified, is heated in the still, from which the vapors enter the chamber. When the wood is considered sufficiently impregnated with the eupion vapors, the surplus vapor is drawn off, and vapor from a still containing creosote, also previously purified, is then admitted, and finally boiling liquid creosote is introduced into the chamber by a pipe in a quantity sufficient to cover all the wood therein. After the whole has become cold, the wood is removed from the chamber.

He describes the following experiment, made by him "on a balk of good oak which was rather in a damp condition, the same was fourteen inches square, and about ten feet long, which, on being submitted to the vapors of eupion for about six hours, when cut in two parts, was found to be impregnated proportionately, even to the heart, with eupion, and when the two parts were afterward submitted to the vapor of creosote, and boiling creosote, the same was found to have taken effect within 12 hours. But subsequent experiments have proved that it is better to submit the wood or timber for a comparatively short time to the action of the vapors of eupion and creosote, and depend more on the liquid bath as described, this process being less liable to crack the wood or timber than the vapors."

MOLL'S SIMPLIFIED PROCESS.

"Where it is not thought a matter of importance, whether the timber be chiefly penetrated with creosote or eupion, the former of which I consider the chief agent against dry rot, or where the operation is chiefly performed in order to prevent the effects of penetration of water into the wood, or where it is judged to be immaterial, whether these fluids convey any acidity into the timber, and when the proportion of eupion and creosote contained in the tar is well known, the operation may, of course, be much simplified by letting the vapors or liquid products of tar, or other matter containing eupion or creosote, or both, enter into the timber. But I am bound to state that the above-described method of washing the substances, and applying them separately, will be found far superior in use, as the volatility of the eupion and its fluidity will allow its rapid penetration into the timber more perfectly than when in combination with the cresote, whose entrance

the former will greatly facilitate when once lodged in the pores through the affinity of the two substances, and as by these means the quantity of eupion can be regulated which is to be absorbed by the wood; moreover, the antiseptic power of the creosote will be augmented by the washing and freeing from matters mixed with it."

LOUIS S. ROBBINS' PROCESS.

The process just described by Moll as his simplified operation, was reinvented thirty years thereafter and patented here, A. D., 1866, by Louis S. Robbins, of New York, and the patent was lately purchased by "The National Patent Wood Preserving Company," by whose order a pamphlet was published last year under the title of "Discovery of a Lost Art of the Egyptians."

Robbins, like Moll, uses a chamber, in which the wood is placed; Robbins also uses a retort, or still, in which, like Moll, he heats coal tar and introduces the vapors from the retort into the chamber by a gradually increasing heat, lets off the water from the damp wood, and impregnates the wood with the vapors of coal tar, which he calls "oleaginous vapors," while Moll calls the same "eupion and creosote." Robbins says further, that he does not limit himself to any particular form of apparatus, nor does he intend to limit himself to the removing of the surface moisture from the wood by means of oleaginous vapors, as there are various ways in which the same can be accomplished with the use of heat. "But what I claim as 'new' is the process consisting in first removing the surface moisture from the wood and then charging and saturating the same with hot 'oleaginous' vapors and compounds, also removing the surface moisture from the wood by means of hot oleaginous vapors."

We suppose that Robbins did not know of Moll's process, as he says in his specification: "From the above description it is apparent that by my process I am enabled to more completely saturate the wood with the preservative compound than has been, or can be done by any of the processes heretofore in use, for the reason that I cause the preservative compound to permeate the pores and fibers of the wood in a *vaporized state*, while in the others it is made to enter in a liquid state."

JOHN BETHELL'S PROCESS.

Patented in England in 1849. He applies the "creosote," or coal tar, in its liquid state, without any previous purification. The wood is placed in a pressure tank, from which the air is exhausted previous to the introduction of the "creosote," which is then forced into the pores of the wood by a pressure pump. Bethell's process, being the most simple and quickest in its operation, was extensively used, and of the results we have reliable reports.

David Stevenson, the eminent English engineer, states that although highly recommended to him by Bethell, he found such creosotized wood to be wholly unfit for use on piers or other water structures, as it was soon destroyed, perforated, and eaten off in places where the creosote abounded, though the most favorable location had been selected for trial, and every precaution used by Bethell in the preparation, the wood having been creosotized after being cut into the shape in which it was applied. (*Civil Engineer and Architect's Journal*, vol. 25, page 205. London, 1862.)

Wm. Jerry Walker Heath reports (*ibidem*, vol. 29, page 301. 1866) that square rail ties sent by Bethell for use in South America, even when laid on the best sandy ground, were soon totally destroyed.

John Bethell himself stated (*ibidem*, vol. 29, page 323) at a meeting of the association of the engineers, that he received from Belgium rail ties of the round shape back, which were previously creosotized by him in the best manner, and which were then found to be hollow like a cannon, the heart being all gone, and the outer part representing a black, hard mass.

FAILURE OF COAL TAR OIL FOR THE PRESERVATION OF WOOD.

The causes of the failure are explained by the fact that coal tar does not yield any creosote, even if treated in like manner as wood tar, which often yields as much as 25 per cent of creosote. The substance obtained by the treatment of coal tar is carbolic, or phenic acid, which differs materially in its properties from the real creosote. Being an effective disinfectant, carbolic acid does not prevent fermentation nor putrification; on the contrary, Ilisch, of St. Petersburgh, found that some substances impregnated with a solution of carbolic acid showed the formation of mold within a fortnight. This circumstance, taken in connection with the fact that coal tar resinifies and hardens quicker than wood tar, explains the failures observed by Hyett, Stevenson, Heath, and others, when used in a wet place, where the tar cannot quickly dry and form a hard coating. This also explains why nothing but a hard mass outside remained in the rail tie spoken of by Bethell, where all wood within was gone, leaving the resinified tar as the "hard, black mass." Such is similar to the experience of coachmakers relative to hubs, which, when painted with oil color before being well seasoned, soon rot on the inside. Experience and science seem to teach that the use of coal tar or its products is, in most cases, more detrimental than advantageous for the purpose of preserving wood.

Women as Farmers and Cattle Breeders.

At the annual meeting of the Northwestern Dairymen's Association, held in Elgin, Ill., on the 9th and 10th of February, the Hon. K. A. Willard, of Herkimer county, N. Y., made an address from which we extract the following:

Mr. Willard said he did not mean to advocate female field labor, such as is known among the lower classes in Europe, nor would he abridge one iota any female accomplishment; but he could see no objection to any man's daughter or sister taking her seat occasionally on the mowing machine, the hay tender, the wheel rake, the sulky plow or cultivator, or in the direction of some light farm machinery, where she can gain strength and health in the open air. He was confident women enjoy such things, and are much happier, stronger, and better, if they are taught that such work is not unwomanly, and the knowledge gained would be of immense service in after life, in assisting the father, brother, or husband with suggestions and advice. In their education we do not give our girls a fair chance in the race of life. The majority of American boys and girls do not like to make a choice of farming as a livelihood. The farmer's educated daughters of to-day prefer the town or city, and have little sympathy for the farm; and if they marry a farmer, often urge him to abandon the business for something more genteel. In England they have better tastes, where their women have more fondness for country life than ours. A well-bred English woman seems to take pride in the knowledge of business suitable to her station. Lady Pigott, the wife of Sir Robert Pigott, has one of the most noted herds of short horns in England. She has made it both a source of profit and reputation. A high bred American woman can hardly understand such a taste, and regards it with intolerable disgust. He did not care to discuss this question. He only asked that farmers try in some way to make farming pleasant and interesting to wives and daughters, that the farm may have their sympathy and influence, for without such help it is hard to make farming successful.

The Rubbish in the Patent Office.

"What rubbish!" is frequently in the minds, and not seldom on the lips, of those who daily throng the galleries of the United States Patent Office at Washington. A very little reflection will show to what a limited extent these but too carelessly-conceived thoughts, and these equally carelessly-uttered words, are just.

On the 15th of December, 1836, the General Postoffice Building at Washington was entirely destroyed by fire. In the upper portion of this edifice the United States Patent Office then had its home; its scanty rooms being filled to confusion and repletion with models, drawings, and specifications, coming from the inventive mind of the nation, and deposited there from the time patents were first issued by our Government. These models, drawings, and specifications were all destroyed with the postoffice building; ashes and melted or twisted fragments of copper, brass, iron, and steel being all that was left of that which had often been looked upon with a feeling akin to wonder by the thoughtful—wonder that so much time, thought, and money had been spent in elucidating and preserving plans and schemes (many of them could not be called inventions), never heard of, noticed, or seen outside of the rooms in which they had found a legal home.

Since the disaster of 1836, a new and spacious building, one of the striking ornaments of our national metropolis, has been erected for the use of the patent office; and this building, with a current issue of about three hundred new patents per week, is now filled almost to its utmost capacity with models of nearly every conceivable form and for almost every conceivable purpose.

How comes all this strange medley? this aggregation of odds and ends? and what are their uses? Man might be called a blundering animal, not guided by the unerring instinct that prevents the lower animals from making a mistake; not satisfied to follow the beaten track, he tries different modes of doing the same thing, often blundering most glaringly, but sometimes, in the result, reaping a full reward in fame and fortune by hitting upon and bringing out something invaluable to his fellow-man. Slow, and even obstinately unwilling as we are to change from old to new ways, "Let well enough alone," and, "It is good enough as it is," have been deeply fixed in our natures from the beginning. Hence, innovators have never met with favor, and instead of being helped and encouraged, they are but too often sneered at and hindered even by those who are most likely to be benefited by their labors. Many a really valuable invention or improvement has been persistently resisted and opposed at first by the very persons who, in the end, are to derive the most benefit therefrom; and ere a foothold could be gained, many a battle has been fought for years, against the most unfair odds, with those who should have been doing most to aid and assist in the advancement of the new idea. Even the workmen in charge of dangerous apparatus, and whose lives hang sometimes upon a thread, not only do not seek or care for greater safety, but they often persistently and willfully set themselves against the very thing they should do their utmost to help on as a good to themselves. It is a strange anomaly that it is in cases where life and property are most in jeopardy by defective modes of using some needed but highly dangerous thing, that the greatest apathy is felt; and those who thoroughly understand the question often make great opposition toward even a fair trial of a proposed improvement.

On the contrary, most of what is seen at Washington is the work of men often with little or no experience in the particular branch they have taken in hand. It would seem from this that those most familiar with a subject, may not be best calculated to improve it, simply because they do not care to get out of the old ruts. Hence, the innovator, and sometimes improver, is most likely he who lacks almost all knowledge of what has preceded him. On the other hand, hundreds of patents are rejected upon application, simply because an idea has been hit upon by the applicant quite new to him, and apparently valuable, but which, from some good reason, only learned by experience, has proved fallacious, and consequently has long ago been discarded.

It would be well for those who profit by the real improvements that come from the teeming brains of those who fill the galleries of the Patent Office with their curious labors, to keep back their too-ready shrug and sneer when new inventions are brought to their notice by some poor devil of a patentee, as innovators are but too often termed. Look at least with charity and consideration, upon a class to whom we owe so much. Help them when you can, and be not niggardly in kind words of encouragement, and with money, too, when you can do so out of your own excess. Remember that, since the time when man has needed anything, it is from just such men as these, whom you but too often discard unthinkingly, have come all the comforts we enjoy in our homes, in our business, and in every walk of life. To this ever-restless band we owe all of improvement that so strongly marks this epoch in the world's history. The minds of but few in the grand total of humanity have thus worked incessantly for our good, in the long past as in the present, and they should be treated, individually, and as a class, not as half-witted visionaries, but as the benefactors of our race. They have ever battled on against every discouragement and every hindrance, each, like the soldier in a forlorn hope, trusting that he might be the one to plant the flag on the parapet and reap the wished-for reward.

The work of these men—these martyrs as they may sometimes be called—can never be really known. Its record would take in all the failures, and it would also take in that much larger aggregate of all the brain-worn hours, which have left no mark except that deep one on the weary mind of the thinker, who, after all his labor, finds that he has only succeeded perhaps in, as it were, proving a fallacy. But we can measure the value of the work done—of the wheat winnowed from this large amount of chaff—by what we see of success all around us; and by these fruits we should know them, and with this knowledge we should ever be willing to admit that those who have piled up the rubbish in the Patent Office at Washington, are worthy of more honor and more reward than they usually receive.—*Lippincott's Magazine.*

The American Association for the Advancement of Science.

This Association has issued a circular announcing that the eighteenth meeting will be held at Salem, Mass., commencing on Wednesday, August 18th, 1869, at 10 o'clock, A. M. For the general good of the meeting it is hoped that all who can will be present at the organization.

On the afternoon of the first day of the meeting, the Association will be invited to participate in the dedication of the Museum of the Peabody Academy of Science, followed by a levee in the evening.

It will be the aim of the local committee to make the sojourn of the members of the Association in Salem pleasant, as well as profitable in a scientific point of view. The usual local courtesies will be extended. Special arrangements will be made for members wishing to collect marine animals for their cabinets.

The committee is giving attention to the facilities for coming to and returning from the city over all routes of travel, and it is hoped that arrangements will be made with the railroad companies by which half fare will be secured for those attending the meeting.

As the hotel accommodations in the city are very limited, special arrangements will be made with the proprietors of several boarding houses for the accommodation of members, and many citizens have signified their desire to extend the hospitality to members of the Association; but in order that all may be provided for without confusion or delay, it is requested that persons intending to be present at the meeting, will notify the local secretary at as early a day as practicable, and when possible state the day they will arrive. The committee will engage rooms for those who request such an arrangement to be made on early notice being received.

A prominent feature of the meeting will be the department of microscopy. The local committee, in order to give encouragement to the general and increasing interest in the use of the microscope, have decided to furnish rooms for the display and comparison of microscopes, objectives, accessory apparatus of all kinds, test objects, and objects of scientific and popular interest.

It is intended to have as complete a collection as possible of instruments of both American and foreign manufacture. Those who are possessed of microscopic stands, objectives, or accessory apparatus, in any way remarkable for excellence of performance or design, are requested to bring them to the meeting.

The objects of this exhibition will be to assist the progress of scientific research, by social intercourse and a full comparison and discussion of whatever is new and important in microscopical investigation, and to encourage the manufacture and use of this valuable instrument.

New Process for Manufacturing Beet Root Sugar.

The eminent French chemist, Payen, has recently communicated to the *Société d'Encouragement*, in France, a new and simple process for manufacturing sugar from the beet root, which has been successfully practiced during the last sugar campaign by Mr. Champonnois. It is as follows: The beet root is reduced to pulp by the ordinary process, and treated by the Perrier, Possoz, and Call process of double defecation and carbonatation. After crystallization, the remaining sirups are reduced to a density of 10·40, or about equivalent to that of the original juice. The temperature is then raised to 158° Fah., and this diluted hot sirup added to a second portion of fresh pulp. This is allowed to drip, and treated in the same manner as the first. A repetition of these operations is effected ten times in succession with new bodies of pulp and residual sirups. The sirups obtained each time are clear and limpid.

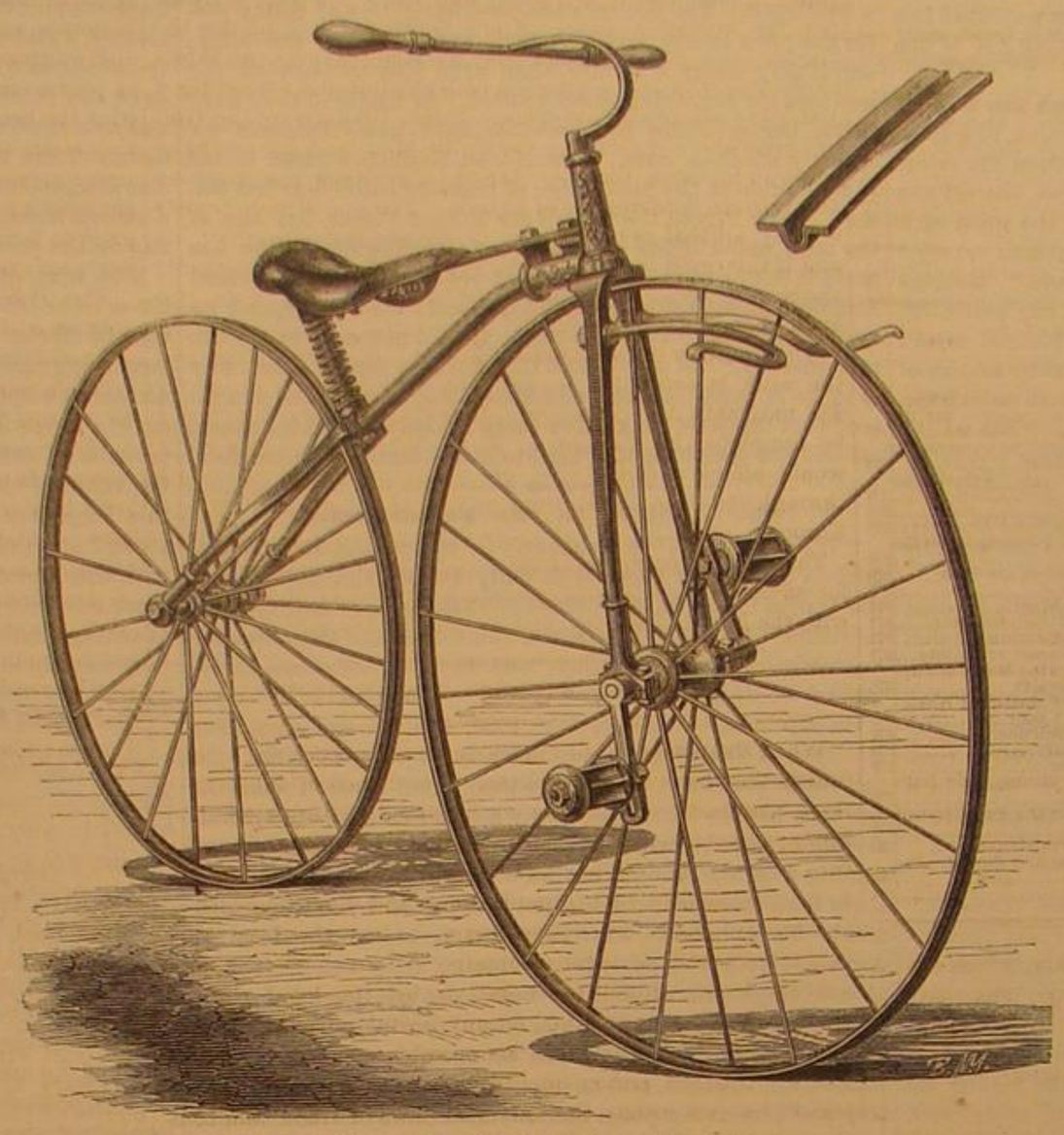
The salts contained in the beet root, and a large portion of the nitrogenized substances are left in the pulp by coagulation and by dialysis during the application of this method.

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.



PRICE'S IMPROVED BICYCLE.

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 or 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 certain and 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 into 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 generally 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 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 hand mirror. If this be really so, the article herewith illustrated and described must be a boon, which to the science of hairdressing 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.

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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 fœtid 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

except by more constant and systematic observation than has ever yet been attempted.

The Smithsonian observers make only three observations per day: viz, at 7 A. M., 2 P. M., and 9 P. M., and even these meager observations are not entirely reliable. Observations ought to be made at least hourly, and at once transmitted to headquarters. The postal telegraph will, upon its establishment, afford facilities for this observation, and with a system of symbols specially adapted to the purpose, it might apparently be done with little trouble.

Editorial Summary.

A BUSINESS FACT.—The mechanical engravings that embellish the weekly issues of the SCIENTIFIC AMERICAN are generally superior to those of any similar publication, either in this country or in Europe. They are prepared by our own artists, who have had long experience in this branch of art, and who work exclusively for us. There is one pertinent fact in connection with the preparation and publication of an illustration in our columns that needs to be better understood by many inventors and manufacturers who pursue a short-sighted policy in bringing their improvements to public notice. They often go to a large expense in printing and circulating handbills, which few care either to read or preserve. Now, we undertake to say that the cost of a first-class engraving, done by our own artists, and printed in one issue of the SCIENTIFIC AMERICAN, will amount to less than one half the sum that would have to be expended on a poorer illustration printed in the same number of circulars, and on a sheet of paper in size equal to one page of our journal. A printed handbill has no permanent value. Thousands of volumes of the SCIENTIFIC AMERICAN are bound and preserved for future reference—beside, we estimate that every issue of our paper is read by no fewer than one hundred thousand persons. Considered, therefore, as a mere advertisement, an illustration in the SCIENTIFIC AMERICAN is a paragon of cheapness.

ACCORDING to the *Tribune*, everything at the approaching Boston Musical Peace Jubilee, promises to be upon a lovely scale of largeness. The big drum to be used upon the occasion has been finished, and O'Baldwin, the Irish giant, has also been engaged to beat it. This mastodonian drum is three feet through from head to head; the heads are about eight feet in diameter; for the skins, two mammoth oxen yielded up their hides, it being found impossible to procure the hide of an elephant, and upon each head is ironically painted "Let Us Have Peace!" Whether this drum will make any more noise than six smaller ones beaten in unison we do not know, but we are sure that it will cut a much larger figure in the advertisements.

A COMFORTABLE CHAIR.—Mr. F. A. Sinclair, of Mottville, N.Y., has sent to this office a specimen of the chairs made at his manufactory, which, he says—and we believe him—meets the requirements of a recent inquirer in the *American Builder* for a good chair. The specimens received are of the same primitive style as those of the days of our grandmother. The seats are of split ash, very capacious in size, and the chair, with its high arms and easy-fitting back, is a perfect embodiment of comfort.

NEW PUBLICATIONS.

STEAM VADE MECUM. A Compendium of Simple Rules and Formulæ, based on Original Investigation for the Solution of all Problems in the Application of Steam, with Examples. By Julien Deby, Civil and Mechanical Engineer. Late Professor at the *Ecole Centrale*, Brussels, and at the Georgia Scientific Institute. New York: Julien Deby, 37 Park Row.

We have been favored by the author with the advance sheets of this publication, which is now in press, and shortly to be issued. We have not yet found time to review the numerous formulæ, based upon the law of steam, which the author claims to have discovered, and an enunciation of which was published on page 246, current volume, of the SCIENTIFIC AMERICAN. The formulæ, of course, stand or fall with this law. If it prove in future to be a fallacy, its truth has not yet been disputed, so far as we have learned. The formulæ seem concise, and are in each case interpreted and expressed in plain language, so as to meet the wants of the practical man as well as the mathematician. A supplement is also added containing useful tables and a short essay on boiler explosions.

THE MISSISSIPPI VALLEY: its Physical Geography, including Sketches of the Typography, Botany, Climate, Geology, and Mineral Resources; and of the Progress of Development in Population and Material Wealth. By J. W. Foster, LL.D. Illustrated by Maps and Sections. Octavo, cloth. Price, $3·50. Chicago: S. C. Grigg & Co. London: Trubner & Co. Sold in New York city by D. Van Nostrand.

This work is the production of an earnest worker in the field of science, and is deserving of a cordial welcome as a valuable addition to our treatises on natural history. Every topic in a range of subjects singularly wide is discussed with such a mastery of its essential features that the reader is always presented with a clear, sharp, and well-defined mental conception of the author's arguments. Possessing, as it does now, so important a bearing, and destined to exercise a still greater influence on the industries, commercial and material, not only of the United States, but of the civilized world, the region of the Mississippi is eminently deserving of careful study. The student, the agriculturist, and the engineer will find in Mr. Foster's book facts and phenomena, as observed by a disciplined mind, of great practical utility; while the physicist and the political economist will discover therein food for much profitable thought, and a key to the solution of not a few problems in their respective spheres of investigation. In order that the work might be adapted to all clases of readers, the learned author dispensed with technicalities so far as was consistent with perspicuity. The typography and binding do credit to the publishers.

HAND-BOOK OF CHEMISTRY FOR SCHOOL AND HOME USE. By W. J. Rolfe and J. A. Gillet. Boston: Woolworth, Ainsworth & Co. New York: A. S. Barnes & Co.

The attempt to reduce the science of chemistry to so elementary a form as to make the science generally available to youth is worthy of praise. This book seems to be as successful an effort to accomplish that desirable object as we have met with. We have always been doubtful, however, whether such facts as may be given in the form adopted by books of this character could not be better taught by familiar lectures, illustrated by such simple experiments as may be necessary, without the employment of text-books at all. Certainly there is no science to which the principles of object teaching can be more successfully applied than this, or one which is more difficult to acquire by the use of books alone.

HAND-BOOK OF NATURAL PHILOSOPHY FOR SCHOOL AND HOME USE. By W. J. Rolfe and J. A. Gillet, Teachers in the High School, Cambridge, Mass. Published by Woolworth, Ainsworth & Co., 117 Washington street, Boston, and 111 State street, Chicago.

A small elementary treatise like the one before us, fully brought up to the latest discoveries in physics, is very much needed in the public schools of the United States. So far as we have found time to examine it, this book seems well calculated to supply this need.

THE ELEMENTS OF THEORETICAL AND DESCRIPTIVE ASTRONOMY FOR THE USE OF COLLEGES AND ACADEMIES. By Charles J. White, A.M., Assistant Professor of Astronomy and Navigation in the United States Naval Academy. Philadelphia: Claxton, Remsen & Haffelfinger, 819 and 821 Market street.

We have carefully examined this work, and regard it as one of the very best elementary text-books we have seen. It is an octavo of moderate thickness, bound and printed in an excellent manner.

GUIDE TO THE STUDY OF INSECTS. By A. S. Packard. Price, 50 cents. Published by the Essex Institute, Salem, Mass.

We have received part of this truly valuable work. It is full of interesting and useful information pertaining to the propagation and habits of all kinds of insects. The number before us contains nearly one hundred illustrations.

MANUFACTURING, MINING, AND RAILROAD ITEMS.

The Commissioners have reported upon the Central Pacific and Union Pacific Railroads. They compute that, at the date of their examination, in February last, an expenditure of $2,800,000 would be required to bring the Central Road up to a first-class road and equip it for through business with rolling stock, depots, machine shops, engine houses, etc. Two of the Commissioners, Messrs. Warren and Blickersdefer, also think an expenditure of $1,600,000 is required to improve its location. Upon the Union Pacific road they report that at the time of their examination, the sum of $6,700,000 was necessary to complete and equip the 1,035 miles, according to the first-class standard, since which time the Company has been constantly at work completing the road and placing upon it the material necessary fully to equip the same according to the requirements of the Commission and the law. The report states that the haste in which the roads have been constructed has resulted in defects of location and construction, which must be remedied to bring the roads to the standard of efficiency required by law.

An English paper says that much light is thrown on the interesting question, whether railway traveling is injurious to health, by the statistical investigations of Dr. Wiegand, of Halle. His inquiries are based on the reports of thirty-eight companies, and the results for 1868 are as follows: Of 11,125 engine drivers, stokers, and other officials traveling with the train, 119 or 1·972 per cent died; while of the 43,853 other officials employed, only 408 or 0·931 per cent died in the same period. It will be seen that the rate of mortality is somewhat higher in the first than in the second class, but the difference is not great enough to lead us to suppose that the occupation is more than usually dangerous or unhealthy.

The *Omaha Republican* says that moss-agate jewelry is becoming quite fashionable in the West. The delicate moss-like tracery observed in them is exquisitely beautiful, and when properly set in a ring or pin is an ornament that can hardly be surpassed for looks. The opening of the Pacific Railroad has brought these stones from the mountains into the market.

The President of the St. Louis Iron Mountain Company, has received a dispatch from the President of the Memphis Commercial Convention, informing him that the people will subscribe the 1,000,000 acres asked for the extension of the Iron Mountain Railroad to Memphis.

The Commissioner of Mining Statistics estimates, in his report, the bullion product of the whole country at $37,000,000. This is a decrease of $3,000,000 from the total returns of 1867, which showed a falling off of about the same amount as compared with the product of the year before.

The people of the Neosho valley have organized a company to build a railroad from Emporia, Kansas, to Holden, Missouri. This will put Southern Kansas in connection with St. Louis by a route 150 miles shorter than the railroad connection of the same region with Chicago.

The Navy Department continues the reduction of the number of its vessels. It is expected that all the supernumerary war vessels and transports owned by the Government will be disposed of before the end of summer.

The Northern Pacific Railroad Company are making preparations for sending out an exploring party to pass over the entire route from Lake Superior to Puget Sound. The general agent of the company has called on General Sherman to arrange for a military escort for a portion of the distance.

The fastest time between California and Massachusetts has been made by a gentleman who arrived in Boston on Saturday from San Francisco, having accomplished the journey in seven days and eleven hours, including seventeen hours detention on the way.

An effort is to be made to employ capital on the immense water power in the eastern part of Maine, in other manufacturing than that of lumber. Several wealthy companies have recently purchased water powers with the intention of erecting manufacturing establishments.

The feasibility of lighting tunnels by electricity is to be tested. One hundred Bunsen elements, with Serrin's automatic regulator, are about to be used to give light to the workmen employed in the Ste. Catharine tunnel, near Rouen, France.

M. Coudier has been commissioned to construct a bridge over the Nile, at Cairo. The length of this structure will be about 2,000 feet, and the cost will be about $400,000. It is to be completed in two years.

The Hartford and New Haven Railroad Company have been authorized by the legislature to increase its capital stock $3,000,000 by a new issue, one half of which will be expended in repairs.

The miners of Scranton, Pa., held a formal meeting on May 23, on the question of question of suspension. The vote stood—for suspension, 969; against suspension, 40. This is decisive; there will be no suspension there.

A bill has been adopted in the Canadian Parliament for the establishment of a telegraph line from Montreal to England by way of Greenland and Iceland.

A firm in Dalton, Mass., have made three thousand reams of bank-note paper for the Italian government. They have another large order from the Brazilian government.

The Newfoundland seal fishery has been very successful during the past season. The number of seals landed at St. John is nearly 150,000.

There are 80,000 tuns of brimstone used annually in England, and the total amount exported from Sicily is 500,000 tuns a year.

On May 18, Brigham Young broke the first ground for the Utah Central Railroad near Weber river, immediately below Ogden City.

American silver cannot be taken into the Dominion of Canada in larger sums than five dollars without the payment of duty.

Last year, in Madison, Wis., one firm sold $500,000 worth of reapers, and it has orders for six thousand machines for the coming season.

APPLICATIONS FOR EXTENSION OF PATENTS.

DESIGN FOR AN INKSTAND.—Barnet L. Solomon, of New York city, executor of the estate of Myer Phineas, deceased, has applied for an extension of the above patent. Day of hearing August 2, 1869.

MACHINE FOR ELECTROTYPING.—Joseph Alexander Adams, of Brooklyn, N. Y., has petitioned for the extension of the above patent. Day of hearing, August 16, 1869.

REFRIGERATORS.—D. W. C. Sandford, of New Orleans, La., has applied for an extension of the above patent. Day of hearing October 18, 1869.

REAPING AND MOWING MACHINE.—Henry Waterman, of Brooklyn, N. Y., has petitioned for an extension of the above patent. Day of hearing, Aug 9, 1869.

WASHBOARD.—Joseph Keech, of Waterloo, N. Y., has petitioned for the extension of the above patent. Day of hearing, Sept. 27, 1869.

MACHINE FOR TRIMMING BOOKS.—M. Riehl, of Philadelphia, Pa., has petitioned for the extension of the above patent. Day of hearing August 9 1869.

Business and Personal.

The Charge for Insertion under this head is One Dollar a Line. If the Notices exceed Four Lines, One Dollar and a Half per line will be charged.

Answers to Correspondents.

CORRESPONDENTS who expect to receive answers to their letters must, in all cases, sign their names. We have a right to know those who seek information from us; beside, as sometimes happens, we may prefer to address correspondents by mail.

SPECIAL NOTE.—This column is designed for the general interest and instruction of our readers, not for gratuitous replies to questions of a purely business or personal nature. We will publish such inquiries, however, when paid for as advertisemets at $1·00 a line, under the head of "Business and Personal."

☞ *All reference to back numbers should be by volume and page.*

J. M., of N. Y.—To ascertain the amount of horse power which is the equivalent of the steam delivered through a pipe into a tank containing water, the best way for you will be first to ascertain the evaporative power of your boiler in relation to the amount of fuel consumed. From this you can ascertain the horse power of your boiler and the amount of fuel it takes per horse power. Then ascertaining the amount of fuel saved by cutting off the tank during a given time, under average circumstances you can compute from that the horse power delivered.

P. D., of Va.—Straw is bleached by simply exposing it in a closed chamber to the fumes of burning sulphur. An old flour barrel is the apparatus most used for the purpose by milliners; a flat stone being laid on the ground, the sulphur ignited thereon, and the barrel containing the articles to be bleached turned over it. There is no English work on chemistry applied to the arts fully up to the times. Muspratt's chemistry is perhaps as good as any.

H. R., of Ill.—The diagram you send us and the explanation accompanying it lead us to suppose that in the construction of your trunk a too common error has been committed. Both the pipes and the wooden trunk are too small, to give you water enough when the level in the dam is low; you should increase their capacity to 400 inches and put a stand pipe in your bulk head as high as the level in your dam when it is full. This will remove the difficulty.

C. E. R., of Ill.—The exact hight of a column of mercury that will be sustained by a pound of pressure per square inch anywhere, is a column that contains one pound of mercury for every square inch of its base, provided the column be of equal size throughout. This hight will vary for all different temperatures, the question you ask us cannot therefore be more definitely answered.

R. J. H., of Mo.—The traveling glass blowers use gas sometimes, but more commonly good sperm or lard oil burned in a lamp with a large wick, perfect combustion being secured by means of a foot blowpipe. The glass used is a peculiar kind of soft glass made specially for that and other purposes. It can be purchased of dealers in chemical apparatus.

E. E. W., of N. B.—We find upon inquiry of practical rubber men that the difficulty you experience in getting your cement, made by dissolving rubber in naphtha, to harden readily, is not met with by them, and they do not use any other substance to accelerate the hardening. The benzine in evaporating leaves pure rubber and of course it possesses the usual elasticity of that material.

W. H. S., of Pa., asks if we can inform him of any substance that will keep insects from destroying an entomologist's collection. According to the *Entomologist*, the insects which do the principal part of destruction in cabinet specimens are small beetles, difficult of extermination. As a preventive none but very tight boxes should be used for the cabinet. Camphor should be always kept in the boxes and the specimens frequently examined. When a collection has been attacked pour a solution of corrosive sublimate on the cottom of the boxes. It will kill all the bugs that touch it.

L. H. H., of Vt.—We see no reason why you should not be able to remove borax, after brazing, with simple hot water. There is no occasion for using nitric acid. Are you not mistaking the film of solder for borax?

J. K., of N. Y.—You must use more tin in your solder to get the required brilliancy, from 1½ to 2 parts tin to 1 of lead, instead of equal parts each.

S. W. R., of Mass.—We understand that the term "monkey" as applied to a hand wrench is merely a nick-name. Its use is entirely meaningless so far as we know.

C. C. R., of Kansas.—Your suggestion to support foot bridges across rivers by means of balloons is not new. It is impracticable.

J. B., of N. J.—Permanent agencies for the general sale of patents have not been very successful. One good invention will usually occupy the undivided attention of the agent until it is sold. Hence the difficulty of keeping a shop full of models.

Recent American and Foreign Patents.

Under this heading we shall publish weekly notes of some of the more prominent home and foreign patents.

MOP HEAD.—Samuel Gantz, Beaver Creek, Md.—The object of this invention is to provide for public use a simple and cheap mop head, which can be conveniently operated, and which will hold the mop securely.

BOOT CRIMPER.—John B. Aikin, Somerton, Ohio.—The object of this invention is to provide for public use a boot crimper which can be very quickly and conveniently operated, and which will crimp the boot without wrinkling the leather at the instep.

WASING MACHINE.—B. Breeden, Lexington, Va.—In this invention a set of vertical beaters are employed, operated by a rotary shaft, and combined with a revolving tub, an apparatus for raising all the beaters at once, and a heater for keeping the water at any desired temperature during the operation.

COOKING RANGE AND STOVE.—H. R. Robbins, Baltimore, Md.—This invention consists in so combining an air chamber with the ovens and fire space of a cooking range or stove that the heat generated in the fire space shall not only serve for the cooking of food, but also for the warming of air during its passage to other apartments in the house.

ICE-CREAM FREEZER.—Joseph Sissons, Town of Horncastle, England.—The object of this invention is to provide for public use an apparatus which will freeze cream in a less time than by the ordinary freezers now in use, while at the same time it produces a finer article of manufactured ice cream than has heretofore been made by machines for a similar purpose.

CHURN.—James S. Huffman, Brownsburg, Va.—This invention is a novel and convenient attachment for operating the common upright churn, so constructed as to be adjustable to the hight of the operator, and to have the means for adjusting the stroke of the dasher so that the latter can be operated with more or less power and velocity, and with different lengths of stroke. It can be used with any upright churn, new or old, without any change therein.

MACHINE FOR BORING POSTS AND POINTING RAILS.—John Young, of C. Fair View, and C. I. Grumbine, Frederick, Md.—This invention relates to the machine patented by John Young, of C, July 10, A.D., 1855, No. 13,343, and consists in making the augers, employed in that machine, adjustable, to adapt them to crooked as well as straight posts; in providing two rotary knives, of peculiar construction, to sharpen the rails and in the novel construction of the device which operates the clamps that hold the rail, whereby it is more easily and effectively managed than in the old machine.

HEATING APPARATUS.—Francis Raith, Calumet, Mich.—The object of this invention is to utilize the heat of the products of combustion in a wood or coal-burning stove, and to thereby economize fuel. The invention consists in a novel arrangement of air passage, by which the air is carried through the stove and through the smoke pipe to become heated.

COMBINED RAKE AND HOE.—N. Harper, Philadelphia, Pa.—This invention relates to a new manner of constructing a combined rake and hoe, by forming the same of one single piece of metal.

COMPOSITION BOWL FOR MANGLES, WASHING MACHINES, ETC.—Thomas Hardcastle, of the Bradshaw Works, near Bolton, England.—This invention consists in manufacturing bowls for starching, and other mangles, washing machines, squeezers, calenders, and other articles, of cocoanut fiber, or coir, or other fibers of palm trees.

AUTOMATIC DOUGH RAISER.—John Stark, Thomasville, Ga.—The object of this invention is to produce an apparatus in which dough can be caused to rise to the requisite hight without requiring to be guarded by an attendant, and without any danger of its rising higher than desired. This apparatus will be very useful, not only to bakers, but also, and chiefly, in households, as the dough can be put in in the evening and can rise during the night, so as to be ready for the oven the next morning.

PLOWS.—E. Wiard, Louisville, Ky.—This invention relates to a new plow, in which the share is composed of three parts, in such manner, that if any one of the parts becomes destroyed by wear or otherwise, it can be readily replaced without requiring the whole share to be renewed. The invention consists chiefly in forming a standard and landside support on the mold board of the plow, so that the landside can, by means of but one bolt, be securely fastened to the same.

VELOCIPEDE.—L. H. Soule, Mount Morris, N. Y.—This invention relates to a new manner of arranging a velocipede, so that the two hand wheels can be readily brought together or apart, in order to produce a two or three-wheeled instrument. The invention consists in attaching the rear wheels to hinged arms, which can be swung more or less together at the pleasure of the operator, to produce the desired effect while the instrument is at rest or in motion.

CORPSE PRESERVER.—John L. Clark, Providence, R. I.—This invention relates to a new corpse preserver, which is so constructed and arranged, that the ice will be prevented from melting rapidly, and that the dead body will be surrounded by constantly circulating cold air. The invention consists in the general arrangement and construction of parts, the main feature being that the body is laid upon a perforated plate, and not into a box, as usually, the box being in this case put over it, when it has been properly placed upon said plate.

TUBULAR STEAM BOILER.—James Howard and Edward Tenney Bousfield, Bedford, England.—The main object of the present invention is to facilitate the removal from boilers of the scum that is thrown up by the water employed in certain localities, to improve the connections between the vertical and horizontal tubes which compose the boiler, and also to facilitate the detachment and removal of any one or more of the vertical tubes when required.

DRAWERS.—Enos B. Johnson, Milwaukee, Wis.—This invention has for its object to improve the construction of bureau drawers, stand drawers, table drawers, sliding doors, etc., so that they cannot bind or stick when being drawn out or pushed in.

TURBINE WATER WHEEL.—V. M. Baker, Preston, Minn.—This invention has for its object to improve the construction of water wheels so as to make them more effective and convenient in use, and enabling them to utilize a larger per cent of the power of the water, and to be more conveniently operated than when constructed in the ordinary manner.

HAY AND COTTON PRESSES.—L. Dederick, New York city.—This invention has for its object to improve the construction of hay, cotton, and other baling presses so as to make them more convenient and effective in operation, the follower being made to move up and down with a uniform movement in all its parts, and with increased power as the bale is compressed more and more.

COMPOSITION FOR CLEANING MARBLE, STONE, ETC.—Alpheus C. Ford, Lynn, Pa.—This invention has for its object to furnish a simple and effective composition for cleaning tombstones, and other marble and stone articles.

MOUNTING THE PORCELAIN ROSE FOR DOOR KNOBS.—Charles L. Bates, New York city.—This invention has for its object to furnish an improvement in mounting the porcelain roses of door knobs, by means of which they may be more securely and durably secured in place, and may not be liable to become loose.

WASHING MACHINE.—Ira A. Newhall, Crooked Creek, Pa.—This invention has for its object to furnish a simple, convenient, and effective washing machine, doing its work quickly and well, and without injuring the articles being washed.

HORSE HAY RAKE.—Steven J. Halstead, Margarettville, N.Y.—This invention relates to certain improvements in the manner of arranging the levers for swinging the rake head, and to a new device for adjusting the teeth at any desired distance from the ground, and also to a new manner of attaching the teeth to the rake head.

SAFETY ATTACHMENT FOR RAILROAD TRUCKS.—Patrick S. Devlan, Jersey City, N. J.—This invention has for its object to furnish an improved attachment for railroad trucks.

CORN SHOCK BINDER.—John E. Hunter, Mechanicsburg, Ohio.—This invention has for its object to furnish a simple and convenient machine for drawing the stalks of a corn shock together to receive the band.

ADJUSTABLE BED AND FRAME FOR DROPS, TRIP-HAMMERS AND DRILLS.—Nathan P. Maker, Providence, R. I.—This invention relates to a new device for adjusting the bed of a power or hand drop, press, trip-hammer, upright drill, or other similar machine, so that said bed may at will be placed into a horizontal or slanting position, as may be desired.

COAL SCUTTLE.—John L. Ellithorp and Peter Sloan, Canajoharie, N. Y.—The object of this invention is to produce a portable coal scuttle, which will not spill coal or other contents when in use, and which can be made at an inconsiderable additional expense above a common scuttle.

STOVE PIPE SHELF AND OVEN.—J. A. Miner and H. J. Torrey, Wellsville, N. Y.—The object of this invention is to provide a stove pipe shelf and oven or cover, for use with cooking stoves for keeping articles warm, and so arranged that the shelf may be readily attached to or detached from the pipe, and be rotated thereon if required.

WAGON JACK.—J. Newton Thatcher, Martinsburg, West Va.—This invention consists in the arrangement upon a suitable stand, of an elevating lever having an adjustable fulcrum on the said stand for vehicles of different hights, and a holding bar for holding the lever when the vehicle has been raised up.

VEGETABLE KNIFE.—Wm. Veber, Jr., Shingle Creek, N. Y.—This invention relates to improvements in knives intended to adapt them for paring vegetables, such as have depressions in their surfaces, especially potatoes.

HAY RAKER AND LOADER.—Albert Clark, Cadiz, Ohio.—This invention consists in an improved raking device applied to the rear of a cart having an elevating chute up which the rake is caused to move when loaded, and deliver the hay to the rear of the rack, behind which the cart is attached.

AUTOMATIC CUT-OFF AND GOVERNOR VALVE.—Charles A. Condé, Indianapolis, Ind.—This invention relates to improvements in valves, for admitting and cutting off, to steam engines, more particularly designed for governor valves, for throttling the steam and for an automatic stop valve to cut off the steam in case of accident. The invention consists in a sliding, sectional, and open cylinder valve operating longitudinally in its chamber, in connection with suitable ports in a properly constructed seat or chamber.

FEATHERING PADDLES.—Wm. C. Rice, Oquawka, Ill.—The object of this invention is to provide a paddle wheel for propelling vessels, in which the floats or buckets are feathered, that is to say, made to remain in a perpendicular position with reference to the plane of the water.

MEASURING FUNNEL.—G. B. Massey, New York city.—This invention relates to a new and improved liquid measuring funnel, and consists in indicating the quantity on a wheel revolved by either a coil spring or weight and by a float which rises with the liquid, and also in a valve on the bottom of the funnel, which is opened and closed from the top of the funnel.

TIRE-SETTING MACHINE.—Francis Mills, Mount Vernon, Ind.—This invention consists of a table for supporting the wheel on which the tie is to be set, so arranged on a suitable frame that when the hot tire has been placed on the wheel, the table may be turned on an axis to present one portion of the wheel into a trough of water, and allow it to be to be turned on a central pin supporting the wheel in its eye, so as to pass the rim of the wheel through the water for cooling it.

WATER WHEEL.—J. C. Smith, Mahanoy, Pa.—This improved wheel is similar in its construction, and the mode of its operation, to the wheels patented by Andrews, Andrews & Kalback, and Haag & Smith. It differs from the wheels just mentioned, as also from any other horizontal wheel with upward discharge, chiefly in the form of its buckets.

WASHING MACHINE.—J. M. Shuck, Oskaloosa, Iowa.—This invention relates to improvements in washing machines, and consists in the arrangement of a pair of vibrating wash boards, operating in conjunction, the one having a surface corrugated horizontally and vertically, and the other composed of vertical bars, arranged at suitable distances apart, the spaces between coinciding with the vertical lines of protuberance on the first-mentioned board.

DEVICE FOR MULTIPLYING MOTION ON A SINGLE SHAFT.—Lemuel Scudder Fithian, Brooklyn, N. Y.—This invention relates to a new and useful combination of cog wheels, whereby motion may be increased on a single shaft, thereby greatly simplifying the methods in common use for that purpose, and it consists in arranging a series of face and pin, or communicating wheels, on a horizontal shaft.

FRICTION CLUTCH AND BRAKE.—Darius Banks, New York city.—This invention relates to improvements in friction devices for connecting or disconnecting a driving pulley, or other wheel fixed loosely on the driving shaft, having constant motion, so as to stop or start the said wheel at will, or to vary the motion thereof. It relates also to a friction brake mechanism, so combined with the clutch devices as to be operated by the same moving power, and to act in conjunction therewith.

FORMING THE EYES OF NEEDLES.—Abel Morrall, Studley, England.—The object of this invention is to form the eyes of all kinds of needles in such manner, that the thread or sewing material may be securely retained in the eye, without stopping, during the time the needle is employed in its work. The invention consists in forming a kind of double eye, or an eye having a double curve, which from its shape forms two separate eyes that are connected together, the upper part being by preference nearly round and smaller than the lower part, which is by preference of an oval or loop shape, so that the double eye is not unlike the sole of a boot or shoe in form.

RAILROAD SCHEDULE, ETC.—Sidney E. Allen, Company Shops, N. C.—This invention relates to a new and useful improvement in facilitating the transaction of business, on railroads, and at railroad stations, whereby much time and trouble is saved, and consists in arranging in a compact manner, a list of stations on any railroad, a passenger and freight tariff and time table, with classification of freight, inclosed in separate compartments in a case of convenient and novel construction.

APPARATUS FOR HOISTING HOSE.—J. J. Lovell, New York city.—This invention relates to an improved device to be used in hoisting hose over buildings for throwing water upon fires, to facilitate the said hoisting and protect the cornices and the hose. It consists in an adjustable pulley support, capable of attachment to any cornice, provided with a grooved pulley, over which the hose may be drawn with much less effort, than when the same is drawn over the edge of the cornice as is commonly done, and without damaging either the cornice or the hose, as now frequently happens.

CRANKED AXLE FOR WAGONS.—T. E. Lutner, Philadelphia, Pa.—This invention relates to improvements in cranked axles for wagons, trucks, etc whereby it is designed to provide such a construction of the same as will admit of more room between the vertical portions of the axle, without increasing the distance between the wheels, than is afforded by the present construction.

WATER-CLOSET VALVE APPARATUS.—John Keane, New York city.—This invention relates to improvements in apparatus for governing the flow to and from, the basins of water closets, whereby the water valve is worked automatically, and regularly by a standing cylinder.

DISTILLING AND CONDENSING APPARATUS.—Albert Gray, New York city.—This invention relates to new and useful improvements in apparatus for producing fresh water for use on shipboard and for other purposes, from salt water and from other impure water, and aerating the same.

NEEDLE SHARPENER.—A. S. Dinsmore, New York city.—This invention has for its object to furnish an improved needle sharpener designed especially for sharpening sewing machine needles whose points have been broken off.

COAL BREAKER AND SEPARATOR.—L. P. Garner, Ashland, Pa.—This invention consists in an improved arrangement of breaking rollers, separating hopper, grate and screw, also certain improvements in attaching the spokes to the breaking wheel or cylinder.

DETACHABLE CALK FOR HORSE SHOES.—Kingston Goddard, Richmond, N. Y.—This invention has for its object to furnish an improved horseshoe calk, which shall be so constructed and arranged that it may be conveniently attached when required for use, and as conveniently detached when no longer required.

ADJUSTABLE BED-BOTTOM.—Elihu Hoag, Coxsackie, N. Y.—This invention has for its object to improve the construction of bed-bottoms in such a way that the part of the bed bottom towards the head of the bedstead may be conveniently and gently raised and lowered, and securely held at any desired angle for convenience in changing the position of invalids.

DUMB WAITERS.—Arnout Cannon, Jr., Poughkeepsie, N. Y.—This invention has for its object to improve the construction of dumb waiters so as to make them stronger, safer, more durable, and more easily controlled, so that they will remain stationary in any position in which they may be placed, both when loaded and when empty.

CARBURETERS.—C. F. Dunderdale, New York city.—This invention has for its object to furnish an improved carbureter for attachment to brackets, chandeliers, pendants, or other gas fixtures, and which shall be so constructed and arranged that the air to be carbureted may be heated by the flame which it is intended to feed.

WAGON SEAT.—Andrew Sheline, Edon, Ohio.—This invention has for its object to furnish an improved seat for wagons, carriages, etc., which shall be so constructed as to ride easier and steadier, be more durable, and less liable to break or injure the clothes of those riding upon it than the spring seats constructed in the ordinary manner.

HOISTING ATTACHMENT TO PORTABLE HORSE POWERS.—Peter Cary, Coeymans, N. Y.—This invention relates to a new and useful improvement in method of loading and unloading portable horse powers, used in thrashing grain, and for other purposes, and it consists it attaching to the rear end of the ordinary endless chain horse power a transverse shaft with ratchet and pawls with ropes or chains connected therewith for hoisting.

REVOLVING CHRISTMAS TREE.—F. A. Geisler, Bristol, R. I.—This invention relates to a new and improved device for exhibiting toys, jewelry, and other articles on Christmas eve, and at other times, and consists in a vertical shaft having shelves attached thereto, with a windwheel on its top end, and made to revolve by rarifying the air beneath the wind wheel.

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90,332.—MODE OF ELECTRO-PLATING WITH NICKEL.—Isaac Adams, Jr., Boston, Mass.

90,333.—COMPOSITION FOR STUFFING LEATHER.—Rob't Andrews, Milwaukee, Wis.

90,334.—PROCESS OF CURING AND PUTTING UP FISH.—John Atwood, Jr., Provincetown, Mass.

90,335.—MODE OF COLORING AND TINTING RUBBER GOODS.—Jos. Beck, Trenton, N. J.

90,336.—RAILWAY HOSE PROTECTOR.—J. H. Bellamy, Charlestown, assignor to himself and L. M. Faxon, Boston, Mass.

90,337.—ALLOY FOR FORMING EYELETS.—G. B. Brayton (assignor to ("The Novelty Eyelet Company"), Boston, Mass.

90,338.—CHUCK.—G. E. Brettell, Rochester, N. Y.

90,339.—BRICK PRESS.—T. J. Burke, Sandwich, Ill.

90,340.—TUCK CREASER AND GUIDE FOR SEWING MACHINES.—G. F. Clemons, Springfield, Mass.

90,341.—POTATO DIGGER.—Ira Cooper, Middlefield, Ohio.

90,342.—COOKING STOVE.—E. J. Cridge, Troy, N. Y.

90,343.—FAUCET.—Geo. T. Dalton, New York city.

90,344.—BAG HOLDER.—Geo. Dare, Auburn, N. Y.

90,345.—SLIDING DOOR SHEAVE.—M. L. Deering, New York city.

90,346.—FURNACE FOR STEAM AND OTHER PURPOSES.—C. H. De Lamater, New York city.

90,347.—COMPOUND FOR THE CURE OF DIPHTHERIA, ETC.—A. J. Denison, Paris, Mich.

90,348.—FASTENING FOR GLOVES.—Theodore Deschamps, Paris, France.

90,349.—APPARATUS FOR PRESERVING BEER.—Wm. Dietrichsen, Newark, N. J.

90,350.—BANJO.—G. C. Dobson and Wm. McDonnell, Boston, Mass., assignors to G. C. Dobson.

90,351.—CARRIAGE.—J. L. Dolson, Charlotte, Mich.

90,352.—DEVICE FOR ATTACHING AND DETACHING HORSES.—G. L. Du Laney, Mechanicsburg, Pa.

90,353.—CORSET.—D. H. Fanning, Worcester, Mass.

90,354.—SEWING MACHINE FOR QUILTING.—T. O. Foot, Newburg, Ill.

90,355.—ROAD SCRAPER.—Jas. Gorton, Cohocton, N. Y.

90,356.—LAMP POST.—J. W. Graham, Chillicothe, Ohio.

90,357.—BASE BURNING STOVE.—Wm. Hailes, Albany, N. Y.

90,358.—COOKING STOVE.—Wm. Hailes, Albany, N. Y.

90,359.—MANUFACTURE OF COLORS.—Eberhard Harrsch, New York city.

90,360.—ICE PRESERVER AND WATER COOLER.—Rober Heneage, Buffalo, N. Y.

90,361.—FIRE-PROOF BUILDING.—R. M. Hoe, New York city.

90,362.—HORSE-RAKE.—Jas. Hollingsworth, Chicago, Ill.

90,363.—GUIDE FOR MEASURING THE PERSON AND CUTTING OUT LADIES' DRESSES.—Louisa L. Jackson, Richmond, Ind.

90,364.—HEDDLE FOR LOOMS.—E. G. Jelley, Pawtucket, R. I.

90,365.—SAW AND SAW TOOTH.—Jno. M. Johnston, Mayfield, Cal.

90,366.—CURTAIN FIXTURE.—A. H. Knapp, Newton Center, Mass.

90,367.—FERTILIZER.—Wm. Lalor, Utica, N. Y.

90,368.—STUFFING FOR MATTRESSES.—F. A. Lane (assignor to himself and L. S. Lane), Swanzey, N. H.

90,369.—FRUIT DRYER.—Minnie E. Lloyd, New York city, Antedated May 8, 1869.

90,370.—MANNER OF APPLYING ROLLERS TO ROCKING CHAIRS.—A. Lodeman and M. Desenberg, Kalamazoo, Mich.

90,371.—STEAM-ENGINE LUBRICATOR.—J. A. Lynch (assignor to himself R. K. Huntoon, and C. S. Lynch), Boston, Mass.

90,372.—MANUFACTURE OF IRON.—W. M. Lyon, Pittsburgh, Pa.

90,373.—MANUFACTURE OF WROUGHT IRON.—Wm. M. Lyon, Pittsburgh, Pa.

90,374.—HORSE COLLAR FASTENING.—M. F. McIntyre, Girard, Pa.

90,375.—SPRING FOR WAGON SEATS.—G. H. Mittan, Dewitt, Ill.

90,376.—FENDER FOR CULTIVATOR PLOWS.—W. E. Moore, Crawfordsville, Ind.

90,377.—LOCKING NUT.—Wm. Morehouse, Buffalo, N. Y.

90,378.—ROVING FRAME.—E. P. Morgan, Saco, and J. H. McMullan, Biddeford, Me.

90,379.—LEVELING HYDRAULIC GAS MAINS.—Peter Munzinger, Philadelphia, Pa.

90,380.—CHIMNEY CAP.—Elijah Myrick, Harvard, Mass.

90,381.—BREECH-LOADING FIREARM.—J. D. S. Newell, Tensas parish, assignor to himself, A. G. Brice, E. Tomatis, and Thos. Pickles, New Orleans, La.

90,382.—DEVICE FOR SETTING BUTTON HOOKS.—J. S. Palmer, Providence, R. I.

90,383.—FILTER.—G. O. Parkman, Lincolnville, and John M. Trussell, Belfast, assignors to themselves, and Ambrose Strout, Belfast, Me.

90,384.—SPRING BED BOTTOM.—J. F. Peck, Springfield, Mass.

90,385.—WIND WHEEL.—Walter Peck, Rockford, Ill.

90,386.—COFFEE ROASTER.—H. W. Persing, Chicago, Ill.

90,387.—APPARATUS FOR MAKING TEA AND COFFEE.—H. W. Persing, and J. F. Pease, Chicago, Ill.

90,388.—DENTAL INSTRUMENT.—W. R. Pomeroy, Millersburg, Ohio.

90,389.—ABDOMINAL SUPPORTER.—J. L. Porter, Kirksville, Mo.

90,390.—CARPET CLEANING MACHINE.—E. S. Poucher, New York city.

90,391.—WASHING MACHINE.—S. G. Rice, Albany, N. Y.

90,392.—APPARATUS FOR TREATING HYDROCARBON OILS.—L. M. Rice, Hartford, Conn., and S. E. Adams, Charlestown, Mass.

90,393.—MANUFACTURE OF FLEXIBLE HOSE, TUBE, OR PIPE FOR CONVEYING FLUIDS UNDER PRESSURE.—J. P. Rider, Brooklyn, N. Y.

90,394.—HORSESHOE.—David Roberge, Moores, N. Y.

90,395.—PAINT FOR SHIPS' BOTTOMS.—Henry Roundy (assignor to T. M. Cash), San Francisco, Cal.

90,396.—WINDOW.—G. A. Russell, Chicago, Ill.

90,397.—MANUFACTURE OF HOSE, TUBING, AND OTHER RUBBER FABRICS.—Junius Schenck, Brooklyn, N. Y.

90,398.—TREE BOX.—Stephen Scotton, Richmond, Ind.

90,399.—REIN HOLDER.—J. L. Shillito, and W. M. Walker, Wellsville, Pa.

90,400.—METALLIC DOOR STRIP.—A. D. Smith, Grafton, Ohio.

90,401.—FLUE STOPPER.—Henry Smith, Southington, Conn.

90,402.—FLY TRAP.—Warren Smith, Alexandria, Ind.

90,403.—TRUSS ROCKER BEAM.—W. B. Snow, and W. A. Elmendorf, Chicago, Ill.

90,404.—POTATO DIGGER.—Simon Soules, Dowagiac, Mich.

90,405.—FILTER.—Thos. Stewart (assignor to himself and W. C. Stiles), Philadelphia, Pa.

90,406.—NECK YOKE.—Charles E. Sweney, Genesco, Ill.

90,407.—DEVICE FOR SHARPENING THE CUTTERS OF MOWING MACHINES.—Warren Tanner, Chicago Ill., assignor to himself and Oliver Bascom, Whitehall, Vt.

90,408.—TORPEDO FOR OIL WELLS.—Henry H. Thomas, Titusville, Pa.

90,409.—AMALGAMATOR.—James Thompson, Gibsonville, Cal.

90,410.—RAILWAY CAR WHEEL AND AXLE.—Charles D. Tisdale (assignor to himself and Joseph H. Clapp), Boston, Mass.

90,411.—BROOM HOLDER.—L. W. Turner, Yalesville, Conn.

90,412.—ATTACHING HANDLES TO AXES.—T. H. Tyndale, Belleville, Ill.

90,413.—CHURN DASHER.—O. A. White, Norwalk, Ohio.

90,414.—CHURN.—A. G. Wilkins, G. N. Crodle, and F. L. Niner, Cooperstown, Pa.

90,415.—ALE, BEER, AND WATER COOLER.—Lewis John Wolf Port Richmond, Philadelphia, Pa.

90,416.—WASHING MACHINE.—J. B. Woolsey, Bloomfield, Iowa.

90,417.—INK POWDER AND DYE FROM ANILINE COLORS.—John Zengeler, Chicago, Ill.

90,418.—POCKET CASE FOR RAILROAD SCHEDULES.—Sidney E. Allen, Company Shops, N. C.

90,419.—TURBINE WHEEL.—V. M. Baker, Preston, Minn.

90,420.—ROSE FOR DOOR KNOBS.—Charles L. Bates, New York city.

90,421.—GATE.—Francis C. Brown and Cyrus Allen, Palmyra, N. Y.

90,422.—DUMB WAITER.—Arnout Cannon, Jr., Poughkeepsie, N. Y.

90,423.—HOISTING ATTACHMENT FOR PORTABLE HORSE POWER.—Peter Cary, Coeymans, N. Y.

90,424.—CREAM PUMP.—T. A. Case, Ellington, N. Y.

90,425.—HAY RAKER AND LOADER.—Albert Clark, Cadiz, Ohio.

90,426.—CORPSE PRESERVER.—J. L. Clark, Providence, R. I.

90,427.—GOVERNOR STOP-VALVE FOR STEAM ENGINES.—Chas. A. Condé, Indianapolis, Ind.

90,428.—LAMP.—Abel Crook, New York city.

90,429.—VEGETABLE CRUSHER.—Reuben Daniels, Woodstock, Vt.

90,430.—HARNESS BUCKLE.—F. W. Dean, Tremont, Ill.

90,431.—HAY AND COTTON PRESS.—Levi Dederick, New York city.

90,432.—RAILWAY CAR TRUCK.—Patrick S. Devlan, Jersey city, N. J.

90,433.—NEEDLE SHARPENER.—A. S. Dinsmore, New York city.

90,434.—MINER'S LAMP.—W. G. Dowd, Scranton, Pa.

90,435.—KNITTING MACHINE REGISTER.—William V. Dubois (assignor to himself and W. A. and J. G. Sangster), Covington, Ind.

90,436.—CARBURETER.—C. F. Dunderdale, New York city.

90,437.—COAL SCUTTLE.—John L. Ellithorp and Peter Sloan, Canajoharie, N. Y.

90,438.—COMPOSITION FOR CLEANING MARBLE, STONE, ETC.—Alpheus C. Ford, Lynn, assignor to himself and Robert B. Swisher, Springville, Pa., and William C. Larzelair, Blairstown, N. J.

90,439.—COAL BREAKER AND SEPARATOR.—L. P. Garner, Ashland, Pa.

90,440.—APPARATUS FOR COLLECTING AND FORCING GASES FROM BLAST, PUDDLING, AND OTHER FURNACES.—David H. Geiger, St. Clair, Pa.

90,441.—REVOLVING CHRISTMAS TREE.—F. A. Geisler, Bristol, R. I.

90,442.—DETACHABLE CALK FOR HORSESHOES.—Kingston Goddard, Richmond, N. Y.

90,443.—COMPOSITION FOR MAKING IMITATION IVORY, WOOD, HORN, ETC.—Solomon Gradenwitz (assignor to B. Ollendorff), New York city.

90,444.—APPARATUS FOR DISTILLING AND PRODUCING FRESH POTABLE WATER.—William Albert Gray (assignor to J. Howard Wainwright), New York city.

90,445.—GAS MACHINE.—J. W. Groat, Fremont, Ohio.

90,446.—HORSE RAKE.—Stephen J. Halsted, Margarettville, N. Y.

90,447.—COMPOSITION BOWL FOR MANGLES, WASHING MACHINES, ETC.—Thomas Hardcastle, of the Bradshaw Works, near Bolton, England.

90,448.—BLANK FOR RAKE AND HOE COMBINED.—Nathan Harper, Philadelphia, Pa.

90,449.—ADJUSTABLE BED BOTTOM.—Elihu Hoag, Coxsackie, N. Y.

90,450.—STEAM GENERATOR.—James Howard and Edward Tenney Bousfield, Bedford, England.

90,451.—CORN SHOCK BINDER.—John E. Hunter, Mechanicsburg, assignor to himself and T. Martin, Catawba, Ohio.

90,452.—DRAWER FOR FURNITURE, ETC.—Enos B. Johnson, Milwaukee, Wis.

90,453.—WATER CLOSET APPARATUS.—John Keane, New York, assignor to himself and George H. Brown, Millbrook, Washington Hollow, N. Y.

90,454.—EAVES PROTECTOR.—Joseph J. Lovell (assignor to himself and George W. Millar), New York city.

90,455.—CRANK AXLE FOR WAGONS.—Thomas E. Lutner, Philadelphia, Pa.

90,456.—DROP PRESS.—Nathan P. Maker, Providence, R. I.

90,457.—MEASURING FUNNEL.—G. B. Massey, New York city.

90,458.—DEVICE FOR SETTING WAGON TIRES.—Francis Mills, Mount Vernon, Ind.

90,459.—STOVEPIPE SHELF AND OVEN.—J. A. Miner, and H. J. Torrey, Wellsville, N. Y.

90,460.—SEWING NEEDLE.—Abel Morrall, Studley, England.

90,461.—MACHING FOR DRESSING MILLSTONES.—Samuel Prettyman Mumford and John Wallis, Greenwich, England.

90,462.—WASHING MACHINE.—Ira A. Newhall, Crooked Creek, Pa.

90,463.—HAY AND MANURE FORK.—L. D. Pitcher, Pitcherville, Ill.

90,464.—COAL STOVE.—Francis Raith (assigns one-third to Edmund F. Krellwitz), Calumet, Mich.

90,465.—PADDLE WHEEL.—Wm. C. Rice, Oquawka, Ill.

90,466.—WAGON SEAT.—Andrew Sheline, Edon, Ohio.

90,467.—WASHING MACHINE.—J. M. Shuck, Oskaloosa, Iowa.

90,468.—WATER WHEEL.—J. C. Smith, Mahanoy, Pa.

90,469.—WATER WHEEL.—Wm. H. Snyder, Phelps, N. Y.

90,470.—VELOCIPEDE.—L. H. Soule, Mount Morris, N. Y.

90,471.—AUTOMATIC DOUGH-RAISER.—John Stark, Thomasville, Ga.

90,472.—SUBMERGED CENTRIFUGAL PULP-WASHER.—Richard R. Sylands (assignor to himself and John S. Reeve), Millburn, N. J.

90,473.—CARRIAGE JACK.—J. Newton Thatcher, Martinsburg, West Va.

90,474.—KNIFE FOR PARING VEGETABLES, ETC.—William Yeber, Jr., Shingle Creek, N. Y.

90,475.—PLOW.—Edward Wiard, Louisville, Ky.

90,476.—MODE OF MELTING, CASTING AND HARDENING NICKEL.—Isaac Adams, Jr., Boston, Mass.

90,477.—BOOT CRIMPER.—J. B. Aikin, Somerton, Ohio.

90,478.—IRON FRONT FOR BUILDINGS.—John Alexander, Greenpoint, and Nathaniel J. Burchell, New York city.

90,479.—FLUID METER.—C. W. Baldwin, Boston, Mass.

90,480.—STEAM ENGINE.—Edwin P. Ball, Chicopee, Mass.

90,481.—FRICTION CLUTCH.—Darius Banks, New York city.

90,482.—FEED TABLE FOR PRINTING PRESSES.—Henry Barth, Cincinnati, Ohio.

90,483.—AUTOMATIC VALVE.—F. H. Bartholomew, New York city.

90,484.—LAMP CHIMNEY.—J. F. Bartlett, Winstead, Conn.

90,485.—BELT AWL.—S. Y. Beach, Seymour, Conn.

90,486.—HOT CLOSET FOR STOVE PIPES.—Nelson W. Beckwith, McDonough, N. Y.

90,487.—LATHE CHUCK.—Wm. Bellows, Cincinnati, Ohio.

90,488.—PLOW CLEANER.—Andrew C. Black, Kaukauna, Wis.

90,489.—VELOCIPEDE.—P. J. Boris, Boston, Mass.

90,490.—WASHING MACHINE.—Branson Breeden, Lexington, Va.

90,491.—COFFIN.—Webb Broomhall (assignor to himself and Acker King), Circleville, Ohio.

90,492.—MACHINE FOR BENDING METALS EDGEWISE.—Geo. W. Brown, Galesburg, Ill.

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90,495.—DITCHING MACHINE.—M. E. Burtless, Seneca Falls N. Y.

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90,503.—SPRING WHIFFLETREE.—G. N. Compton, Canton, O.

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90,505.—PROCESS OF MAKING ORNAMENTAL SIGNS, ETC.—J. H. Crane and C. W. Crane, Charlestown, Mass.

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90,508.—MACHINE FOR MAKING TATTING.—C. O. Crosby, New Haven, Conn.

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90,525.—METAL PULLEY BLOCK.—G. W. Gregory, Watertown, N. Y.

90,526.—MANURE HOOK OR DRAG.—Henry Gross, Middletown, Pa.

90,527.—MANURE HOOK OR DRAG.—Henry Gross, Middletown, Pa.

90,528.—SEWING MACHINE.—Julius Gutmann, Berlin, Prussia.

90,529.—TIME LOCK.—L. A. Haines, Wakefield, Md.

90,530.—SKATING ROD AND STOOL.—Wm. Hall, Jr., North Adams, Mass.

90,531.—IRON GRINDING PLATE.—Daniel Halladay and B. H Ruggles, Batavia, Ill.

90,532.—ORE CRUSHER.—John Hamilton, L. E. Hanson, G. W. Hamilton, and Joseph Hamilton, Wheeling, W. Va.

90,533.—MECHINE FOR THREADING RODS, BOLTS, ETC.—Wm. Harris, Washington, Mo.

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90,535.—WATER METER.—T. C. Hargrave, Boston, Mass.

90,536.—MACHINE FOR FINISHING GALVANIZED TACKS.—Russell Hathaway Jr., and J. D. Stetson (assignors to the American Tack Co.), Fair Haven, Mass.

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90,538.—SAWSET.—Charles Herrmann, Evansville, Ind.

90,539.—COVER FOR DRINKING VESSEL.—John Heuermann, Davenport, Iowa.

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90,541.—BRANCH STOP-COCK FOR MAINS.—R. A. Hill, Washington, D. C.

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90,544.—CHURN.—J. S. Huffman, Brownsburg, Va.

90,545.—PROCESS OF DRYING MALT.—W. W. Hughes, Philadelphia, Pa.

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90,547.—RATCHET DRILL.—Geo. Hutchins, New York city.

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90,552.—SEWING MACHINE.—J. T. Jones, New York city.

90,553.—LADIES' WORK BASKET.—R. V. Jones, Canton, Ohio.

90,554.—SMOKING PIPE.—F. J. Kaldenberg, New York city.

90,555.—BRICK MACHINE.—John Keller (assignor to himself, F. J. Fairbank, and J. W. Cole), Paducah, Ky.

90,556.—COMBINED SEED DRILL AND FERTILIZER.—John F. Keller, Hagerstown, assignor to Hagerstown Agricultural Implement Manufacturing Co., Hagerstown, Md.

90,557.—RAILWAY STOCK CAR.—John S. Kendall, Northfield, Minn., assignor to himself, Ralph Emerson, and William A. Talcott Rockford, Ill.

90,558.—SASH LOCK.—Geo. King, Frederick, Md.

90,559.—STAKE PULLER.—Richard Knott, Suisun City, Cal.

90,560.—DOOR FOR GRAIN CARS.—S. E. Knott, Chicago, Ill.

90,561.—MACHINE FOR REAPING AND THRASHING GRAIN.—L. B. Lathrop, San José, Cal.

90,562.—MOP.—Joseph Law, New York city.

90,563.—VELOCIPEDE.—B. S. Lawson, New York.

90,564.—COMPOSITION FOR RENDERING FABRICS WATER REPELLENT, AND FOR FIXING THEIR COLORS.—R. O. Lowrey, Salem, N. Y.

90,565.—PROCESS FOR SEPARATING IRON AND OTHER METALS FROM POTTERS' CLAY.—William John Lynd, Golden City, Colorado Territory.

90,566.—PREPARATION OF PAPER STOCK.—G. E. Marshall, Louisville, Ky.

90,567.—NUT LOCK.—Harvey McCown, Enon Valley, Pa.

90,568.—BEDSTEAD FASTENING.—Peter McIntyre, Norwich, Conn.

90,569.—AUTOMATIC CAR COUPLING.—John McLain and Jared Kelsey (assignors to themselves and Snyder Filson), St. Mary's, Ohio.

90,570.—FANNING MILL.—Ellis Michael, La Porte, Ind.

90,571.—CURTAIN FIXTURE.—Benjamin Moser, Philadelphia, Pa. Antedated May 19, 1869.

90,572.—LAMP EXTINGUISHER.—Carlton Newman, San Francisco, Cal.

90,573.—CAR COUPLING.—W. B. Parsons, Short Tract, N. Y.

90,574.—CORN HUSKER.—O. S. Perkins and L. A. Crandall, New Haven, Conn.

90,575.—SPRING BURGLAR ALARM FOR DOORS.—Geo. W. R. Pollock, Boston, Mass.

90,576.—PUMP.—A. J. Pritchard, Liverpool, Ohio.

90,577.—CAKE MACHINE.—Joseph Repetti, Philadelphia, Pa.

90,578.—LIGHTNING ROD COUPLING.—W. S. Reyburn and E. A. W. Hunter, Philadelphia, Pa.

90,579.—VELOCIPEDE.—James Reynolds, Brooklyn, N. Y., assignor to himself and J. J. Marshall, New York city.

90,580.—VENTILATOR.—M. M. Reily, New Haven, Conn.

90,581.—WASHING MACHINE.—M. W. Riker and D. T. Torrey, Hastings, Mich., assignors, by mesne assignments, to D. T. Torrey.

90,582.—GRAIN DRILL.—J. L. Riter, Brownsville, Ind. Antedated Nov. 25, 1868.

90,583.—COOKING RANGE.—H. R. Robbins (assignor to himself and J. J. Moran), Baltimore, Md.
90,584.—STEP COVER AND WHEEL FENDER FOR CARRIAGES.—John Roberts, Cincinnati, Ohio.
90,585.—VELOCIPEDE.—P. C. Rowe, Boston, Mass.
90,586.—NON-CORROSIVE CAST-IRON PUMP.—J. A. Rumsey, Seneca Falls, N. Y.
90,587.—SKATE.—R. J. Russell, Wheeling, West Va.
90,588.—MEAT CUTTER.—F. S. Rutschman (assignor to himself, John Rutschman, and Wm. Rutschman), Philadelphia, Pa.
90,589.—METALLIC ROOFING.—David Saunderson, St. Louis, assigns one-half his right to A. B. M. Thompson, Webster Groves, Mo.
90,590.—PROPELLER.—Christian Sharps, Philadelphia, Pa.
90,591.—APPARATUS FOR MOLDING PIPE.—Frederick Shickle (assignor to Shickle, Harrison & Co.), St. Louis, Mo.
90,592.—HORSE RAKE.—A. J. Shunk, Millersburg, Ohio.
90,593.—METHOD OF MAKING SERRATED SICKLE SECTIONS.—G. F. Simonds (assignor to the Simonds Manufacturing Co.), Fitchburg, Mass.
90,594.—ICE CREAM FREEZER.—Joseph Sissons, Horncastle, England.
90,595.—VELOCIPEDE.—Joseph Simpson, Newark, Ohio.
90,596.—DIE FOR RAISING AND TRIMMING METAL.—Samuel Simpson, Wallingford, Conn., assignor to Simpson, Hall, Miller & Co.
90,597.—RAILWAY RAIL.—A. F. Smith, Norwich, Conn.
90,598.—WASHING MACHINE.—C. P. Snow, Freeport, Ill.
90,599.—PAPER CUFF.—G. K. Snow, Watertown, Mass.
90,600.—CHIMNEY COWL.—T. S. Speakman, Camden, N. J.
90,601.—VELOCIPEDE.—Charles Spring, Hyde Park, and Andrew Spring, Weston, Mass.
90,602.—MACHINE FOR POINTING BOLTS OR RIVETS.—John Stacker (assignor to Franklin Moore and Edward Clark,) West Winsted, Conn.
90,603.—ROLLER SKATE.—G. K. Stillman, Cincinnati, Ohio.
90,604.—PLOW POINT.—O. O. Storle, Norway, Wis.
90,605.—BAND CUTTER FOR THRASHING MACHINES.—Levi Sumner, Oskaloosa, Iowa.
90,606.—CAP FOR FEEDING BOTTLES FOR INFANTS AND INVALIDS.—John Thompson and J. G. Ingram, London, England; said Ingram assigns his right to John Thompson.
90,607.—METALLIC CARTRIDGE.—Wm. Tibbals, South Coventry, Conn.
90,608.—TOILET PIN CASE.—T. R. Timby, Saratoga Springs, N. Y.
90,609.—GAS-LIGHT GOVERNOR CASE.—Nathaniel Tufts, Boston, Mass.
90,610.—HARNESS ORNAMENT.—Wm. Ulrich and Chas. Hachmeister, Newark, N. J.
90,611.—FENCE POST SOCKET.—George Unger, Danville, Pa.
90,612.—BRIDLE BIT.—Adrien Viridet, Glasgow, Ky.
90,613.—PIANO STOOL.—Hugo Vogel and Victor Vogel, St. Louis, Mo., assignors to Hugo Vogel and Frank Justin.
90,614.—BREECH-LOADING FIREARM.—Friedrich Von Martini, Frauenfeld, Switzerland.
90,615.—STEAM BOILER FURNACE.—L. R. Wallace, Adrian, Mich.
90,616.—REFINING SUGAR.—C. F. L. Wandel, Waldau, near Bernburg, North German Confederation, assignor to F. O. Matthiessen and W. A. Wiechers, New York city.
90,617.—PURIFICATION OF ANIMAL CHARCOAL.—Carl F. L. Wandel, Waldon, near Bernburg, North German Confederation, assignor to F. O. Matthiessen and W. A. Wiechers, New York city.
90,618.—PRUNING IMPLEMENT.—G. F. Waters, Boston, Mass.
90,619.—BIRD CAGE.—J. H. Williams, New York city.
90,620.—LATHE FOR GRINDING AND POLISHING PIVOTS OF WATCH WORK.—C. V. Woerd, Waltham, assignor to American Watch Company, Boston, Mass.
90,621.—HARVESTER.—Geo. W. N. Yost (assignor to Corry Machine Co.), Corry, Pa.
90,622.—MACHINE FOR BORING POSTS AND POINTING RAILS.—John Young of C. Fair View, and C. I. Grumbine, Frederick, Md.

REISSUES.

25,632.—HANGING RECIPROCATING SAWS.—Dated October 4, 1859; reissue 3,451.—Thomas Bakewell and John Lippincott, Pittsburgh, Pa., assignees, by mesne assignments, of Pearson Crosby.
88,845.—PICKER FOR LOOMS.—Dated April 13, 1869; reissue 3,455.—A. H. Carroll, Baltimore, Md.
87,025.—FOLDING DESK.—Dated February 16, 1869; reissue 3,456.—Aaron Chandler, Davenport, Iowa, and S. F. Estell, Richmond, Ind.
68,288.—HORSE RAKE.—Dated August 27, 1867; reissue 3,457.—A. W. Coates, Alliance, Ohio.
48,632.—LAMP SHADE.—Dated July 4, 1865; reissue 3,458.—C. B. Curtiss, Bridgeport, Conn., assignee, by mesne assignments, of C. St. John.
29,281.—GAS AND WATER-PIPE JOINT.—Dated July 24, 1860; reissue 3,459.—Edward Gwyn, Tiffin, Ohio, assignee of C. W. Isbell.
18,975.—MOWING MACHINE.—Dated December 29, 1857; reissue 3,460.—S. E. Jackson and M. P. Jackson, Booneville, N. Y.
31,084.—MACHINE FOR SOWING FERTILIZERS.—Dated January 8, 1861; reissue 1,718, dated July 5, 1864; reissue 3,461.—J. F. Keller (assignor to Abraham Miller, W. H. Protzman, A. R. Appleman, and Wm. Updegraff), Hagarstown, Md.
62,697.—STRAINER FOR COFFEE AND TEA-POTS.—Dated March 5, 1867; reissue 3,462.—G. A. Lawrence, Springfield, Mass., assignee, by mesne assignments, of Michael Simons.
87,948.—BED BOTTOM.—Dated March 16, 1869; reissue 3,463.—R. O. Lowrey, Salem, N. Y.
25,443.—SEEDING MACHINE.—Dated September 13, 1859; reissue 3,464.—S. G. Randall, New Braintree, Mass.
84,370.—EXHAUST NOZZLES FOR STEAM ENGINES.—Dated November 24, 1868; reissue 3,465.—John Sanders, Harrisburgh, Pa., administrator of the estate of Richard Norris, deceased.
16,337.—MACHINE FOR PRESSING THE LOCKS OF SHEET-METAL PLATES.—Dated January 6, 1857; reissue, 3,466.—The S. Stow Manufacturing Company, Plantaville, Conn., assignees of J. J. Laubach.
15,701.—HARVESTER.—Dated September 9, 1856; reissue 3,467.—C. Wheeler, Jr., Auburn, N. Y., assignee of W. P. Maxson.
20,108.—PIPE FOR RAILWAY WATER TANK.—Dated April 27, 1858; reissue 3,468.—John Wilkeson, Buffalo, N. Y., assignee, by mesne assignments, of Benjamin of M. Van Derveer.

DESIGNS.

3,507.—DOOR OF A BOOK CASE.—Simeon Taylor, Worcester, Mass.

EXTENSIONS.

MACHINE FOR SPLITTING WOOD.—J. A. Conover, of New York city.—Letters Patent No. 12,857, dated May 15, 1855.
SEED PLANTER.—E. M. Stevens, J. B. Crosby, and J. W. Pearson, of Boston, Mass.—Letters Patent No. 12,924, dated May 22, 1855; reissue No. 3,278, dated January 26, 1869.
MACHINERY FOR SPINNING.—T. J. Silsby, of Boston, Mass., administrator of Arad Woodworth, 3d.—Letters Patent No. 12,889, dated May 15, 1855.
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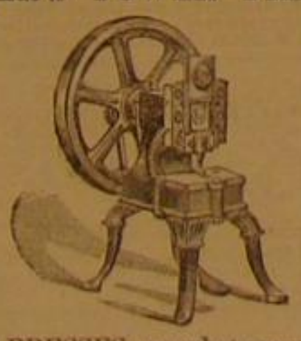

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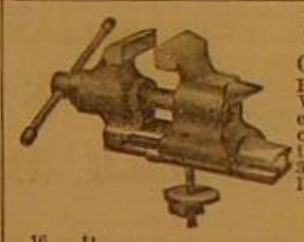

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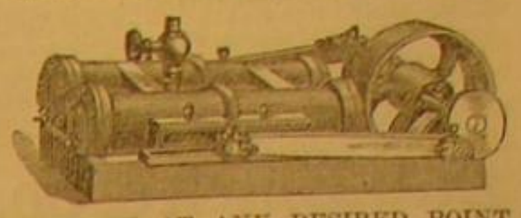

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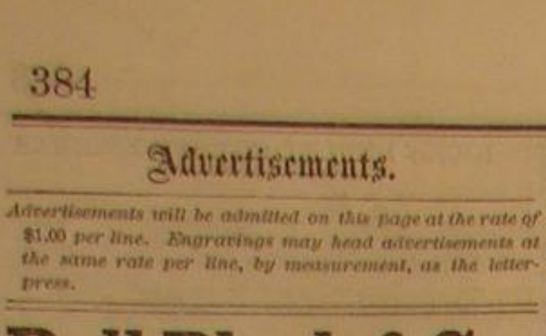

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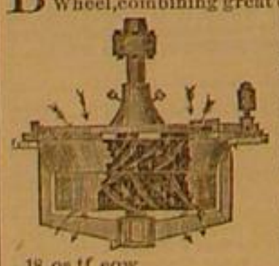

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