masts, in order to connect the highlands and inland districts with the coasts, and the coasts with each other, even beyond the ocean. In this way civilization comes into hostile contact with the forests, and thus, under like circumstances, the country in which civilization is oldest possesses the fewest woods. Hence forests are more sparingly met with in the countries of the Mediterranean than northward of the Alps, and more sparingly in the center than in the north of Europe, so far as the climate is not an obstacle to the growth of timber. Have not, then, our descendants to expect a great deficiency of timber—a deficiency which may readily become disastrous? Many public economists and philanthropists have assumed this to be the case, and many do still assume it; they depict the future destitution of timber in the darkest colors, they loudly complain of the felling of wood, and they demand that Government should prevent in time the ruinous consequences by limiting the free use of wooded estates. Yet, even as I have striven to demonstrate the groundlessness of the idea of the danger which is feared of alteration of climate, by the diminution of forests in temperate countries, I hope also to be able in some measure to scatter the dark cloud which so many imagine they see hanging over future generations, in regard to the products of forests. That which is true of so many other inconv eniences following in the train of civilization holds also in this; it has its cure, in a great measure, in itself.—*The Earth, Plants and Man, by J. F. Schouw.*

The Sewer of Paris.

Imagine Paris, taken off like a cover; a birds-eye view of the subterranean net-work of the sewer will represent upon either bank a sort of huge branch engrafted on the river. Upon the right bank, the belt sewer will be the trunk of this branch, the secondary conduits will be the limbs, and the primary drains will be the twigs. This figure is only general, and half exact; the right angle, which is the ordinary angle of this kind of under-ground ramification, being very rare in vegetation. We shall form an image more closely resembling this strange geometric plan by supposing that we see spread out upon a background of darkness, some grotesque alphabet of the East, jumbled as in a medley, the shapeless letters of which are joined to each other, apparently pell-mell, and as if by chance—sometimes by their corners, sometimes by their extremes.

The excavation of the sewer of Paris has been no small work. The last ten centuries have labored upon it, without being able to complete it any more than to finish Paris. The sewer, indeed, receives all the impulsions of the growth of Paris. It is, in the earth, a species of dark polyp with a thousand antennæ, which grows beneath at the same time that the city grows above. The old monarchy had constructed only twenty-five thousand four hundred and eighty yards of sewers; Paris was at that point on the 1st of January, 1806. From that epoch, of which we will speak directly, the work was profitably and energetically resumed and continued; Napoleon built (the figures are interesting) five thousand two hundred and fifty-four yards; Louis XVIII., six thousand two hundred and forty-four; Charles X., eleven thousand eight hundred and fifty-one; Louis Philippe, ninety-seven thousand three hundred and fifty-five; the republic of 1848, twenty-five thousand five hundred and seventy; the existing regime, seventy five thousand one hundred; and at the present hour, two hundred and forty-seven thousand eight hundred and twenty-eight yards—a hundred and forty miles of sewers—the enormous entrails of Paris; obscure ramification always at work; unnoticed and immense construction.

Paris in 1806 was still almost at the figure of sewers published in May, 1663; five thousand three hundred and twenty-eight fathoms. According to Bruneseau, on the 1st of January, 1832, there were forty-four thousand and seventy-three yards. From 1806 to 1831, there were built annually, on an average, eight hundred and twenty yards; since then there have been constructed every year eight and even ten thousand yards of galleries, in masonry of small materials, laid in a foundation of concrete. At thirty-five dollars a yard, the hundred and forty miles of sewers of the present Paris represent nine millions. —*Victor Hugo.*

Correspondence

An Improved Stretcher for Army Use.

MESSRS. EDITORS:—I beg leave to call your attention to an improvement in "stretchers" which I wish to present to our Government; desiring no patent but simply to render to the noble men who may have to suffer on the battle-field this trifling tribute, and I shall feel fully repaid, if you deem it worthy of your attention and direct its use wherever requisite. I have understood that physicians on the battle-field are often compelled to amputate a limb, because there is no convenient means at hand to enable them to transport the patient safely after the limb is set.

Hence, I have invented the "pendent stretcher" described as follows:— A is a pole 10 feet long—the ends borne upon the shoulders of two men—from which hang four iron rods, *c c c c*, each three feet long. The lower ends of the rod may be attached to the handles of any ordinary stretcher. The stretcher thus becomes pendent from the shoulders of the men who carry it, and the main object gained is the support afforded to a broken limb, which can be placed in an anterior splint and supported by the cord, G, upon the pole, not only in much less time than that required for amputation, but with a saving of the limb and often of the life of the patient. Thus a patient could realize as much comfort, as regards ease in the position of the limb, as if at rest upon a stationary bed, I am sure. It remains to be tried.

I have had a pole and four bars made (the bars of three-eights of an inch iron, with a ring at each end by which they may be readily slipped over the ends of the pole and the hands of the stretcher), and presented them to Dr. C. C. Cox, our medical purveyor, for their introduction into the camp service. As they occupy so little space no regiment could object to so useful an addition to their baggage. The pendent stretcher would be useful in hospitals also. Please understand that I do not propose to make them, but to have the Government make them for the army; while I claim no fee for patent or right of invention. C. H. KEENER,

Supt. of Maryland Blind Institution.

Baltimore, Md, March 14, 1863.

[The engraving and letter fully explain the inventor's object, and, while they do honor to his sagacity, are alike an evidence of his patriotism and benevolence toward those men who are suffering all—even death itself—for their country. We most sincerely hope that the stretcher will be adopted in every hospital and be found on every battle-field; it will go far toward ameliorating pain of the severest kind.—EDS.

Twinkling of the Stars.

MESSRS. EDITORS.—The twinkling in the fixed stars and its absence in the planets was noticed in the SCIENTIFIC AMERICAN of the 7th inst., but no satisfactory reason assigned for the distinction. If the vibrating undulatory theory be admitted we have a plausible explanation. The wave-like vibrations from a planet are too rapid in succession for separate detection, and, to the vision, become continuous; but the waves from a distant star have appreciable intervals. This action may be compared to the waves caused by a stone falling on a sheet of water, which move at intervals in proportion to the distance from the point where the stone fell. T. W. B.

Cincinnati, Ohio, March 16, 1863.

The Distillery Business—Fermentation.

[Continued from page 182.]

The difference in the effect produced by the two kinds of yeast (sweet hop yeast and lactic-acid yeast) is visible at once in the fermenting beer. Beer set with lactic-acid yeast will commence fermenting in a much shorter time than beer put into fermentation by the use of sweet hop yeast, and by this means the acetous fermentation will be greatly prevented, which always sets in rapidly, if the beer stands more than four hours before the yeast begins the decomposition. Beer set with lactic-acid yeast will never rise to a temperature of 91° Fah.—which is, as well known, the dangerous temperature creating vinegar rapidly on account of the alcohol in the beer—because it must be set at a much lower temperature, while beer set with sweet hop yeast, or any other yeast, must be set at a much higher degree to support the want of its natural power.

In the course of fermentation, the beer should incalesce about 20° to 25° Fah., if the yeast is of a good quality. When the temperature of the beer at the commencement of the fermentation is 76°, the required caloric will be apt to raise the beer to a degree which is very favorable to acetification; hence, great care must be taken to prevent a temperature exceeding 87° to 88° Fah.

In 14 to 16 hours the fermentation of the beer should have arrived at its highest point. From this time "fermentation is falling," and acidification sets in, the degrees of acidification appear with tolerable distinctness, if the fermentation is correctly managed; and whenever these certain degrees of acid in the beer are wanting, no good yield can be expected. Pistorius has constructed a very simple instrument, by means of which the degrees of acidification can be easily ascertained.

The self-raising temperature of fermenting beer during certain periods and the progressing degrees of acidification always indicate the quantity of of whisky to be expected, and both the self-raising temperature and acidification will serve the experienced distiller as signs by which he may judge where he has committed a mistake or been guilty of neglect. For this reason the fermenting room should be so located as to enable the distiller to observe and examine his beer constantly, and to ventilate the room at any time.

The consistency of the beer and the temperature of the fermenting room indicate the temperature required for the setting of the beer. Watery, thin beer must set warmer than thick, consistent beer; the former requiring more and stronger yeast than the latter. The sweeter the beer is, the more yeast it requires. If the fermenting tubs are small, the temperature of the beer, when set, should be lighter than when the reverse is the case. The lower the temperature is in setting beer and less exposed the fermentation to external influences, the better will be the yield, provided the yeast was of a good quality. Hence, the fermenting room should be a dry cellar of a uniform temperature—about 60° or 65° Fah., and not exposed to currents of air. The beer must not be dilute, for then fermentation will sooner cease and the diluted alcohol will be more apt to run into the acetous fermentation. The slop or swill of such dilute beer contains many strong acids which give origin to diseases among hogs or cattle fed with it. If atmospheric air be excluded from fermented beer no acetification will take place.

As already mentioned, carbonic acid gas is developed when sugar is decomposed by fermentation. The gas is always considerably impregnated with alcohol, and if a current of air removes this gas from the surface of the beer, a pretty large portion of alcohol is carried off, and the beer is deprived of part of its alcoholic value. Hence, also it is clear that the fermenting tubs should never be put up out of door, so as to be exposed to the changes of the weather and the currents of air.

In respect to acetous fermentation, so dangerous and frequent in distilleries, the distiller must guard particularly, and if this be overlooked, it will always be extremely detrimental. When a substance combines with oxygen it is said to be oxidized or to undergo oxidation. Burning wood or a lighted candle is an oxidation just as well as rust on iron or verdigris on copper; because oxygen has combined with these substances. So is acetous fermentation nothing but the oxidation of alcohol. This process is very much facilitated when the temperature of the beer is raised to 90° Fah. In many instances, when alcohol or fermented alcoholic liquids are acetified, the principle of the conversion is the combustion of the alcohol of these liquids by combining with oxygen, and oxidation is nothing but combustion—says an eminent chemist—be it by having a perceptible flame or not. The conversion of alcohol into vinegar never takes place, in the common process, without the presence of an albuminous substance and the condition favorable to all fermentations, besides the necessary access of air. Hence, every week spirituous liquid, which contains albuminous matter or any ferment, will, with the access of air and a temperature of from 60° to 70° Fah. produce vinegar. The acetic fermentation requires the presence of ready ferment, alcohol and air; the lactic-acid fermentation, on the contrary, proceeds with starchy or saccharine mixture, without the intervention of alcohol or of atmospheric oxygen. Wort of grain has a much greater tendency to form acetic acids than the malt worts. On account of this liability to acetification it becomes the important business of the distiller to oppose it, which is done by cooling down the mash as speedily as possibly to the temperature at which the beer is to be set. Hence, the most perfect cooling apparatus or arrangement will be always the most advantageous to the distiller, and hence, too, it is clear that where there is a want of cool water the yield will unavoidable sink considerably.

Fermentation, therefore, is the most important stage through which the material has to pass, and one which not only demands considerable skill and attention for the proper management, but also requires extensive knowledge, both of the principles of chemistry and of practical results. Unless the fermentation is governed with due care and dexterity a partial failure will surely ensue.

Lime is generally used to sweeten sour tubs; but lime in lumps (quick-lime) should be always freshly dissolved in water on every occasion of whitewashing the tubs and fermenting cisterns. Lime slacked by the influence of the air, and then dissolved in water, is almost of no effect. A small portion of common soda added to lime is very beneficial, and facilitates the washing down of it, even if it was kept for some time in the tubs. It is a very wrong practice to let the whitewash remain in the fermenting cisterns and run the beer into them, because this acetified lime will give the first impulse to the acetification in the beer.

[To be continued.]

Perpetual Motion.

MESSRS. EDITORS:—I have understood that you had a standing offer of some amount to any man that would bring a machine to your office that would run of itself, or, in other words, a machine that would run until it was worn out, or a perpetual motion. Have you ever had any machine brought to you for that purpose? If you have any, please inform me by letter all about how much the premium is and what the terms of the offer are. If the machine works according to expectation it will be brought to your office before taken to any other place, or applying for a patent. The man that is at work on it is very certain that it will run, and will have it ready in three or four weeks.

Camanche, Iowa, March 20, 1863.

[We print the above communication as there seems to be, from the innumerable letters we receive on the subject, a popular impression that we are desirous of obtaining a perpetual-motion machine, and that a premium has been offered by us for a satisfactory one. We are not particularly anxious to procure a machine for private use, but we will guarantee to find a purchaser for a machine that is what it purports to be—a perpetual mover. When that is found we shall immediately start on a journey to the moon with it.—EDS.

Wholesome Mixed Coffee.

MESSRS. EDITORS:—I have found the following substitute for coffee, in part, very satisfactory and economical. It may be of some value to your numerous readers. Take common peas, whole or split, and soak them in warm water about 12 hours and change the water three times. Now dry them slowly, and then brown them like coffee. Mix about from two-thirds to three-fourths of the peas with one-third or one-fourth of coffee made in the same manner as an infusion of coffee. R. A. GILMAN.

American Iron for Musket Barrels.

We lately directed attention to the importance of manufacturing suitable American iron for musket barrels, as we had been informed that Marshall's English iron was the only kind that was adapted and used for this purpose at the Springfield (Mass.) armory. We now learn from the *Sussex* (N. J.) *Herald*, that iron equal in quality to Marshall's is made at Trenton. The *Herald* says:—

"A fact of interest to the people of Sussex and Passaic counties, and of vast importance to the whole nation, is that the Trenton Iron Company have succeeded in producing iron suitable for gun barrels, of the standard required by the Government. Heretofore, during the present war, all iron for this purpose has been imported from England; but, after experimenting more than eighteen months, Messrs. Cooper & Hewitt have finally succeeded in producing an article not only equal, but much superior to the English iron, and it is now being turned out at the rate of twelve tuns per day. The ore is mined at Ringwood, in Passaic county, where the company have recently erected an extensive charcoal blast-furnace, which is necessary for smelting the ore. The national armory at Springfield now uses this iron, and every ounce of iron used in the construction of the celebrated Springfield rifles is mined and manufactured in New Jersey."

The Internal Revenue.

On Wednesday last an honest countryman came to the city and made quite a number of purchases, including hardware, dry goods, a hat, a pair of ready-made pantaloons, and some groceries. He got the things all conveniently packed in his wagon, and as he was about leaving for home he was accosted by a fellow who represented himself as a Government official, and who told the countryman that he must have an internal revenue stamp upon every article he had purchased. The countryman readily believed what was told him with such an air of sincerity, and in company with the self-constituted officer he repaired to a business house and purchased check stamps to the number of a dozen, and got up in his wagon and went about stamping every article he had in the wagon, to the infinite amusement of the crowd which the wag had summoned to witness the operation. Having thus complied with the law, which the countryman had obeyed without a murmur, he drove off towards the rural districts, thanking the wag for what he conceived to have been a kindly and well-meant suggestion. A bystander came near carrying the joke too far, by suggesting the propriety of putting a stamp upon a coon skin which the countryman had not succeeded in selling, and which he was carrying back to his home.—*Wheeling Intelligencer.*

British Navy and Army Estimates.

The sum voted for navy estimates this year by the British Parliament is £10,736,000—about fifty-three and a half million of dollars. This is a reduction of five millions of dollars from the estimates of last year. The total number of steam and sailing ships in the British navy on February 1, 1863, was 669. The number of screw steamers now afloat is 414 paddle steamers 108. Thirteen screw and two paddle steamships are building. The construction of 29 others is suspended. The effective sailing ships afloat are 103. There is also a slight reduction in "the British establishment of the regular forces," of about 4,000 men, and of about 2,000 on the Indian. The effective force of the former is about 148,000 men, and of the latter about 80,000. There is also in Great Britain a volunteer force, well disciplined and equipped, of about 120,000 men.

Tobacco.

Few are aware what a tobacco-loving people we are getting to be, even in New England. We not only smoke it, chew it and snuff it, but we grow the weed also. Ten years ago Massachusetts grew only a trifle over one hundred thousand pounds; now she grows nearly four millions of pounds. In 1850, Connecticut raised something over one million pounds, now she sends six or seven million pounds to market. Thus in ten years the rates of increase in production in Massachusetts was 2,361 per cent, and in Connecticut only 426 per cent. In glancing at the amount raised throughout the whole country, one almost begins to believe Secretary Seward spoke the truth when, in reply to why the luxuries of life should not be taxed, he remarked, tobacco is a necessary not a luxury of life. For in 1850 there were 99,752,655 pounds worth 20 cents a pound or $39,950,531; in 1860, 420,390,771 pounds, worth $5,878,354. In 1860, it cost this nation as much for tobacco as it did to run the national Government. These figures are stupendous, but they are true. We are a fast people, certainly, in the tobacco line. Smoke on, chew on, snuff on, and grow on, O Americans! and in 1870 you may rejoice over a production of a billion pounds of tobacco, and condole yourselves with the thought that $20,000,000 *might* be spent in a more injurious way. Truly this is wisdom.—*Greenfield (Mass.) Gazette.*

A Forest at Night.

Darkness makes the brain giddy. Man needs light. Whoever plunges into the opposite of day, his heart is chilled. When the eye sees blackness the mind sees trouble. In an eclipse, in night, in the sooty darkness there is anxiety even to the strongest. Nobody walks alone at night in the forest without trembling. Darkness and trees, two formidable depths—a reality of chimeras—appear in the indistinct distance. The inconceivable outlines itself a few steps from you with a spectral clearness. You see, floating in space or in your brain, something strangely vague and unsize-able as the dreams of sleeping flowers. There are fierce phantoms in the horizon. You breathe in the odors of the great black void. You are afraid and are tempted to look behind you. The hollowness of night, the haggardness of all things, the silent profiles that fade away as you advance, the obscure dishevelments, angry clumps, livid pools, the gloom reflected in the funereal—the sepulchral—immensity of silence, the possible unknown beings, the swaying of mysterious branches, the frightful twisting of the trees, long spires of shivering grass—against all this you have no defense. There is no bravery which does not shudder and feel the nearness of anguish. You feel something hideous, as if the soul were amalgamating with shadow. This penetration of the darkness is inexpressibly dismal for a child.—*Victor Hugo.*

Short Lines of Railroad.

There is in England a small locomotive which was built to run upon a railroad, the gage of which is only 20 inches. This little machine has cylinders 6 inches in diameter by 12-inch stroke, and has drawn a load of 14 tuns (colliery weight being 2,800 lbs. to the tun) up an incline of one in thirty, attaining a speed of about five miles an hour, although this latter feature is limited on account of the shortness of the road. The machine was built for the purpose of transporting coal from one point to another, and it was thought more feasible and economical for the business than horse-power. The result justified the expectation formed of it, and the engine is much better than any other substitute for it yet found. There are a great many places in this country where just such machines could be employed to good purpose; as, for instance, in quarries, collieries, on long wharves, in fact, in numberless situations, there are openings which would be filled advantageously by the substitution of steam for animal power. Those interested would do well to give the matter attention.

THE total receipts of coffee in the United States for the year ending December 31, 1862, were 98.558,680 lbs.; and the total consumption was 88,989,911 lbs., against a consumption in 1861 of 187,045,786 lbs., being a decrease of 98,055,875 lbs., or over 52 per cent.

Culture of Hemp.

A practical hemp-grower writes as follows to the *Country Gentleman*:—"There are two varieties of hemp, the common and China; the China is a later variety, and generally cultivated. When the seed can be had it will yield from 200 to 400 pounds per acre more than the common. I think the common hemp will do better in Central Iowa than the China.

"A deep, rich vegetable mold, new and free from weeds and grass is the best. It is not an exhausting crop, as it is cut before it ripens the seed, and does best on the same land. If corn land is used, it must be cleaned from stalks, trash and litter of all kinds. It grows well on clover sod turned under the fall previous. For seed, prepare the land, plant and cultivate it as you would corn, putting fifteen or twenty seeds in a hill or drill.

"For lint, plow as early in the spring as the land will work well, and sow immediately, and harrow twice or cross plow in, and harrow until the land is smooth and well pulverized. From five to six pecks of seed is the usual quantity sown, according to the land, richer land requiring the most. Old seeds will not grow unless they have been well kept; they should be tried before sowing, by putting a few seeds in a little dirt that is warm and moist; they will sprout in two or three days if good. If you do not get a good stand, and all come up at one time, you cannot make a good crop. From 700 to 1,200 pounds of lint is about the average per acre for good hemp. One man will cut and prepare 8 acres for market."

Mining under the Sea.

Mining can hardly be a pleasant occupation. The absence of sun and all natural light, the dripping sides of the shaft, the danger of explosion from the fire-damp, of the fall of jutting rocks and numerous other perils, invest it with vague terrors to active imaginations. But when the shafts run under the sea, and the swell of the ocean is distinctly audible, it must suggest many fears to the diligent miners. The following graphic description is taken from an English paper:—

"We are now four hundred yards out under the bottom of the sea and twenty feet below the sea level. Coast-trade vessels are sailing over our heads. Two hundred and forty feet below us men are at work, and there are galleries deeper yet below that. The extraordinary position down the face of the cliff, of the engines and other works on the surface, at Bottallie, is now explained. The mine is not excavated like other mines under the earth, but under the sea. Having communicated these particulars, the miner next tells us to keep strict silence and listen. We obey him, sitting speechless and motionless. If the reader could only have beheld us now, dressed in our copper-colored garments, huddled close together in a mere cleft of subterranean rock, with a flame burning on our heads and darkness enveloping our limbs, he must certainly have imagined, without any violent stretch of fancy, that he was looking down upon a conclave of gnomes.

"After listening a few minutes a distant and unearthly noise becomes faintly audible—a long, low, mysterious moaning that never changes, that is fell on the ear as well as heard by it, a sound that might proceed from some incalculable distance—from some far invisible hight—a sound unlike anything that is heard on the upper ground, in the free air of heaven—a sound so sublimely mournful and still, so ghostly and impressive when listened to in the subterranean recesses of the earth, that we continue instinctively to hold our peace, as if enchanted by it, and think not of communicating to each other the strange awe and astonishment which it has inspired in us from the very first.

"At last the miner speaks again and tells us that what we hear is the sound of the surf lashing the rocks a hundred and twenty feet above us, and of the waves that are breaking on the beach beyond. The tide is now at the flow, and the sea is in no extraordinary state of agitation, so the sound is low and distant just at this period. But when storms are at their hight, when the ocean hurls mountain after mountain of water on the cliffs, then the noise is terrific; the roaring heard down here in the mine is so inexpressibly fierce and awful that the boldest men at work are afraid to continue their labor—all ascend to the surface to breathe the upper air and stand on firm earth; dreading—though no catastrophe has ever happened yet—that the sea will break in on them if they remain in the cavern below.

"Hearing this, we got up to look at the rock above us. We are able to stand upright in the position we now occupy; and flaring our candles hither and thither in the darkness, can see the bright, pure copper streaming through the gallery in every direction. Lumps of ooze, of the most lustrous green color, traversed by a natural net-work of thin red veins of iron, appear here and there in large irregular patches, over which water is dripping slowly and incessantly in certain places. This is the salt water percolating through invisible crannies in the rock. On stormy days it spurts out furiously in thin continuous streams. Just over our heads we observe a wooden plug, of the thickness of a man's leg; there is a hole there, and that plug is all that we have to keep out the sea!

"Immense wealth of metal is contained in the roofs of this gallery throughout its entire length, but will always remain untouched; the miners dare not take it, for it is part (and a great part) of the rock which is their only protection against the sea, and which has been so far worked away here that its thickness is limited to an average of three feet only between the water and the gallery in which we now stand. No one knows what might be the consequence of another day's labor with the pick-ax on any part of it."

English and American School Girls.

Anthony Trollope, in his new book on America, thus speaks of our school girls:—"I do not know any contrast that would be more surprising to an Englishman, up to that moment ignorant of the matter, than that which he would find by visiting, first of all, a free school in London and then a free school in New York. The female pupil at a free school in London, as a rule, is either a ragged pauper or a charity girl; if not degraded, at least stigmatized by the badges and dress of the charity. We Englishmen know well the type of each, and have a fairly correct idea of the amount of education which is imparted to them. We see the result afterwards when the same girls become our servants and the wives of our grooms and porters. The female pupil at a free school in New York is neither a pauper nor a charity girl. She is dressed with the utmost decency. She is perfectly cleanly. In speaking to her you cannot in any degree guess whether her father has a dollar a day or three thousand dollars a year; nor will you be able to guess by the manner in which her associates treat her. As regards her own manner to you, it is always the same as though her father were, in all respects, your equal."

Chicory.

Chicory has been considerably cultivated the past season in some portions of Western Canada, as a substitute for coffee. The roots are dug the first autumn after sowing, cleaned, and partially dried, or cut up at once and kiln-dried for market. The manufacturers cut up the roots in small pieces, roast them, and grind them to powder between fluted rollers. The tops are also acceptable food to cows and sheep. Its leaves, blanched, are sold in the markets of the Netherlands, very early in the spring, as salad—long before lettuces are to be had. The roots are taken up on the approach of winter, and packed in cellars in alternate layers of sand, so as to form ridges, with the crowns of the plants on the surface of the ridge. Here, if the frost be excluded, they soon send out leaves in such abundance as to afford a supply of salad during the winter. If light be excluded the leaves are perfectly blanched, and in this state are known under the name of *Barbe de Capucin*. The plant is not without its faults. If all the roots are not taken from the ground at the first season, it springs up and spreads like a thistle the next. It is also very exhaustive of the soil.

ORIGIN OF THE WORD "MUSTARD."—The English word mustard is from the French *moutarde*, the origin of which is said to be as follows:—In 1382, the Duke of Burgundy granted to the town of Dijon the privilege of bearing his armorial ensigns, with the motto, *Moult me tarde* (I wish ardently), in return for a handsome contingent of 1,000 men furnished to him at his expense. Pleased with the ducal condescension, the authorities ordered the device to be affixed over the principal gate of the city. Time or accident at length obliterated the middle word, and the two remaining, *moult tarde*, were printed on the labels which the merchants of Dijon pasted on pots in which they sent this commodity all over the world. They had a way of grinding it up with salt, vinegar, and other ingredients, in order to preserve it, and for a long time almost monopolized the trade in this article of domestic consumption.

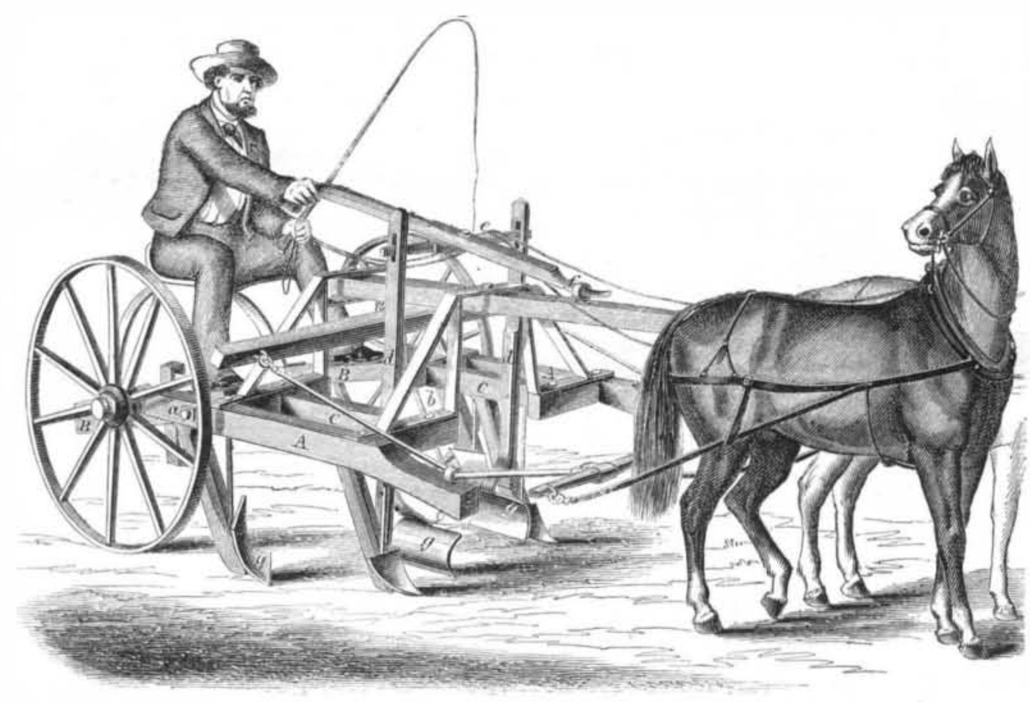
Artificial India-rubber.

In the chemical department of the Sheffield Literary and Philosophical Society were shown specimens of a new and valuable invention, patented by Mr. A. Parkes, of Birmingham, and called after him "Parkesine." It is a compound of oil, chloride of sulphur and collodion, and may be used as india-rubber and gutta-percha. In its plastic state it is easily pressed into molds; and when set becomes hard and durable. It may be produced of any color, and also made to imitate ivory. If this latter substance can be successfully imitated, Mr. Parkes will have accomplished what many men have long tried to do, and on which some have in vain sacrificed fortune and health. The inventor only shows the articles as the work of an amateur and to give some idea of the capabilities of the material, which he says can be produced in quantities at 1s. per lb. Allied to this is another substitute for india-rubber, "Campticon," an invention of Mr. Frederick Walton. This remarkable substance is formed by the oxidization of linseed oil. Plates of glass are dipped into linseed oil, and allowed to dry. The plates are again dipped and dried, until a sufficient film has accumulated, and then it is removed. In describing his invention, Mr. Walton says:—"I soon found that by crushing the solid oxidized oil obtained in sheets, as described in my patent, and working it thoroughly in hot mixing rolls, I produced a substance which required only the cohesive nature which exists so strongly in india-rubber. The addition of a small proportion of shellac soon gave that which was wanting; and I found in my power a material singularly like caoutchouc when worked into dough; and which could be rolled on to fabrics in the same manner, and with the same facility. Pigments could easily be added to give color, and the addition of the resins gave other or rather varied proportions of adhesion, useful in affording the means of uniting fabrics as by rubber. Fiber, whether flock or cork, mixed in and rolled into sheets, gave me samples of kamptulicon and other floor-cloths." Not only has this singular product been thus assimilated to rubber for uses on fabrics, or combined with fiber for floor-cloths; but, still more strange, it is capable of being worked with pigment and vulcanized exactly as india-rubber has been described to be, and forms a hard compound like vulcanite and ebonite, excepting that the sulphur is not necessary. It will readily be seen how valuable a substance is here represented; for while it possesses in so great a degree all the qualities of india-rubber, it may be produced at a much less cost. The specimens which Mr. Walton has sent for exhibition show the material in its different stages of manufacture, from the films that are removed from the glass to the masses ready for manufacture into any of the articles above enumerated.—*Sheffield Independent.*

[Some three or four years ago, Dr. R. F. H. Havemann, of New Brunswick, N. J., secured patents in this country and in Europe, for an imitation of ivory, produced by the action of chlorine on india-rubber or allied gums. By his process solid lumps of india-rubber or gutta-percha are dissolved in one of the well-known solvents used for the purpose, and this solution is brought in contact with chlorine by passing streams of gaseous chlorine into the same. When the combination of the gum with the chlorine is perfected, the solvent is removed by evaporation at a low temperature. After removing the liquid by filtering or evaporation, the composition of gum and chlorine is well washed with alcohol and then pressed and dried, when it forms a white hard mass similar to ivory in appearance and elasticity. We have seen billiard balls made of it, but we think they lacked the weight necessary to render them equal to ivory; for many purposes, however, it is an excellent substitute for ivory.—EDS.

Improved Cultivator.

The subjoined engraving represents one of that large class of agricultural machines now so generally used throughout the Western States for cultivating standing crops. The invention consists of the frames, A and B; the former being joined to the latter at *a*. The frame, A, carries the plows or cultivators, attached to the upright legs. The great peculiarity of this cultivator over others that we have seen is comprised in the attachment of an apparatus to the upper frame, whereby the movement and operation of the plows, laterally, can be changed at the will of the driver. This apparatus consists of the upright bars, *d*, fastened to the square timbers, *c*; these timbers have a journal at *b'* which enables them to turn on their axis. There is a cross-bar, *e*, connecting the uprights together at the top, and this bar is furnished with a lever; one end of this lever is grasped by the driver, while the other works in the eye bolt, *f*, on the draught pole. The operation of the cultivator is as follows:—When the team is started, traveling between the hillocks of corn, the plows and shares, *g*, throw up the furrow against either side, the extent of the furrow and the direction of it being controlled by the driver through the apparatus just mentioned. When it is necessary to bring the plows, clear of the ground, the driver throws his weight backwards, which, acting as a force on the leverage afforded by the frame, elevates the excavators so that they no longer enter the soil. This machine appears to be easily controlled, and, if the driver's weight is sufficient to effect the object alluded to, the method is certainly a very simple one. This invention was patented, through the Scientific American Patent Agency, Nov. 18, 1862, by John L. Ellis, of Concord, Ill. Further information may be had by addressing Dangerfield & Ellis as above.



ELLIS'S PATENT CULTIVATOR.

The "Indianola."

The destruction of the gun-boat *Indianola*, seems to be fully confirmed by late dispatches from Admiral Porter. A "turreted monster" was the awful engine of war which accomplished this result. After the rebels had obtained possession of the boat, a coal barge was sent down the river by some of our forces, provided with an old wooden house and the condemned chimneys of a transport. This dreadful affair so worked on the sensibilities of the rebels, that, foreseeing certain destruction, they immediately laid a train to the *Indianola*, and blew her up. The experience of the chivalry with iron-clads is not the least singular feature of the present war. The *Merrimac*, the *Arkansas*, the *Louisiana*, and the *Indianola* have all gone to the bottom. The vaunted prowess and skill of our foes seem to be unequal to the task of managing them properly.

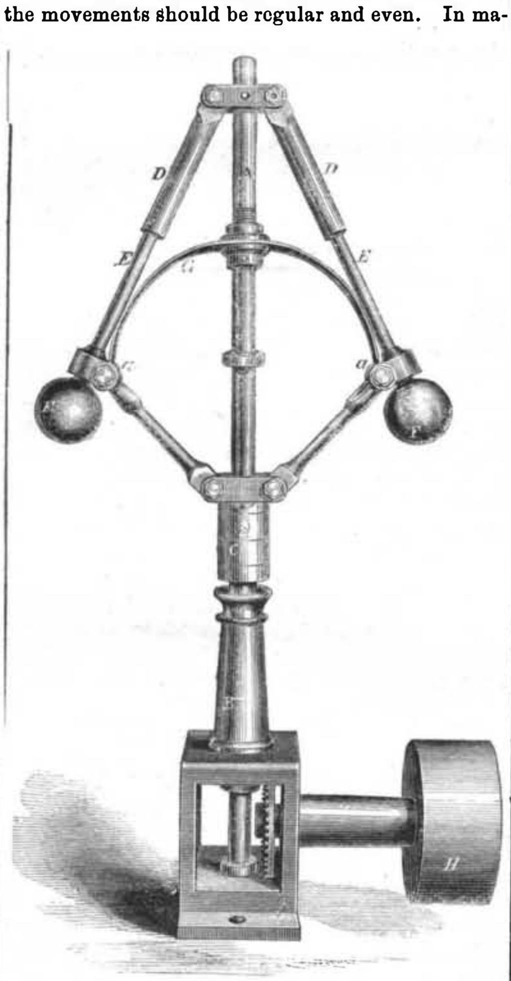
Steam on City Railroads.

Two bills are now pending before the Legislature at Albany, relative to the adoption of the dummy engines on the Brooklyn Central Railroad, and it is reported that the members generally are in favor of the machines. It is to be hoped that the bills will be passed and that the steam cars will come into use forthwith. The advantages arising from them are too palpable and apparent to every intelligent person to be here discussed. A new era of things has been inaugurated by using steam for the fire-engines, and it only remains to extend the principle to the city railroads, to make it extremely popular. It has been proved that cars can be run by steam as safely and much more economically than by horse-power, and should we have such a system as the one here advocated, we may look for a lower fare for the same distance than is now charged.

Erratum.—In our comments on the letter of Mr. J. M. Cooper, (page 166, current volume of the Scientific American) on the manufacture of fine steel in this country, the types made us say that we were "gratified to learn that the business of manufacturing *from* steel has obtained a good foothold in this country." It should have read "the business of manufacturing *fine* steel," which makes much better sense. The types are sometimes guilty of making curious work with men's ideas.

CLINE'S PATENT GOVERNOR.

In nearly every motive-power it is essential that the movements should be regular and even. In ma-



chine shops and rolling mills, also in flouring mills, this is of great importance, as the load on the engine or other motor varies greatly. The governor here illustrated is intended to impart a uniform velocity, by regulating the amount of steam supplied to the cylinder when attached to a steam engine. The following description will render its construction and operation intelligible:—

The spindle, A, runs in the usual step at the bottom, and also in the column, B. The collars, C, are made fast to the spindle, but the one to which the arms are attached moves freely up and down. The upper arms, D, are tubular and have the rods, E, inserted in them; to these rods the balls, F, are fastened. The spring, G, is secured to the spindle by two nuts—one above and one below it, and its ends embrace the joints of the lower arms at *a*. The other features of the governor are not peculiar. The operation of this machine is as follows:—

When the balls are rotated by a belt on the pulley, H, they recede from the center and carry the sliding collars on the spindle with them; to these collars the valve rods are connected by levers, as usual. The motion of the balls to or from the center depends upon the velocity with which the machine moves—if it is not great enough to overcome the gravity of the balls, they remain inert; but on an increase of speed, vary their position accordingly. The sensitiveness of this governor is materially increased by the action of the spring on the arms. As the arms are expanded they slide up in the tubes at the top; shorten the arms and consequently decrease the velocity at which they move; between the combination of centrifugal force and this peculiarity the governor should possess extreme sensitiveness when made so as to slide easily in the upper tubes. This regulator is the invention of J. C. Cline, of Philadelphia, Pa.; and was patented, through the Scientific American Patent Agency, on Feb. 10, 1863. For further information in regard to it address Michiner & Morris, manufacturers, Philadelphia, Pa.

A Hint to Correspondents.

A correspondent at Washington, D. C., sends us a long account of some recently-patented improvements in firing rockets under water, causing thereby the destruction of any object they may come in contact with. We are always pleased to receive communications of this kind, but we hope that those favoring us in this respect will make their articles as brief as possible. We are often obliged to reject interesting matter solely on account of its being too diffuse and general in statement. Our time and space are both limited and we cannot spend the former in revising and correcting every manuscript that comes to us. Send us brief communications on interesting subjects, but make them as pertinent as possible or they may be consigned to the waste-paper basket.

Wooden Piles versus Iron-clad Ships.

Another grand but ineffective attack on the diminutive rebel sand-battery, called Fort McAllister, on the Ogeechee river (Ga.), has been made by three of our turreted iron-clads. The gun-boats hurled their 15-inch shot and shell at the fort for three days, from a distance of less than a mile, without doing or receiving any particular damage. *That same row of wooden piles* still remains in the river—a standing excuse on the part of our officers for their want of success. None of them appear to have gumption enough to blow up, break down, saw off or otherwise clear out those provoking sticks. Won't some of our inventive readers take pity on the navy, and show them how to get rid of such obstructions?

Exports of Petroleum.—From the first of January to the 5th inst., 4,257,999 gallons of petroleum have been exported from New York.