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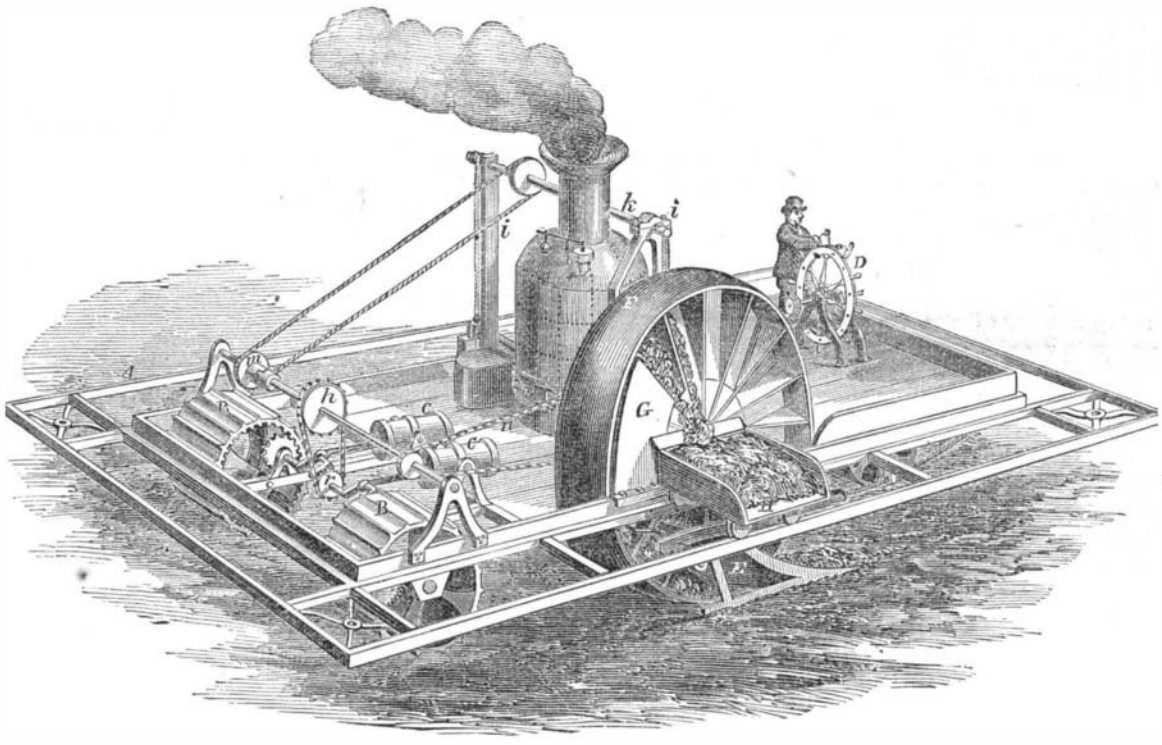
NEW STEAM EXCAVATOR.

The millions of dollars that are annually expended in excavating earth have attracted the attention of inventors to devise modes of aiding the operation by machinery; and large and costly machines have been made for excavating in certain situations, especially in deep cuts of soft sand, which work well, and perform the labor of many men. In all of the excavators which we have seen, the earth was deposited in carts for removal.

The use of the ponderous machine here illustrated is to excavate earth, and transport it to the desired place of deposit, it being intended to work in ground free from large stones or nearly so, and where the hills are not too steep for the ascent and descent of a locomotive running on broad wheels on the ground.

The rectangular frame, A, is supported on four wheels, two of which, B B, are the driving wheels propelled by the engine, C C. The two forward wheels are joined to the frame by means of a king bolt, and are connected by rack and pinious with the steering wheel, D, so that the machine may be guided in its course. As the machine is driven along, the plow, E, turns up the dirt, and rolls it into the radial chambers of the elevating wheel F. As the wheel, F, revolves, the dirt is held in the chambers by the plate, G, till it is carried above the edge of the plate, when it slides down by its own gravity, and falls into the car, H. The car shown in the cuts is only one of a series intended to surround the machine on a railway having turning tables at the corners; as each car is filled it is pushed along by hand, and thus all receive their loads, when the wheel, F, is raised so that it will not operate to lift the earth, and the machine is propelled under the guidance of the operator to the place of deposit, when the cars are emptied in the usual manner. The shaft of the wheel, F, runs in journal boxes, which are secured in the upright guides, *i i*, and are suspended by chains which are wrapped around the shaft, *k*, so that the wheel, F, may be raised by the power of the engine, by throwing the clutch, *m*, into operation, and thus turning the shaft, *k*. The wheel, F, is rotated by means of the chains, *n* and *o*, and the pulleys, *p* and *r*, as shown.



GOODALE & MARSH'S NEW STEAM EXCAVATOR.

This machine is the invention of W. G. Goodale and R. L. T. Marsh, to whom a patent was issued through the Scientific American Patent Agency, Dec. 20, 1859, and persons desiring further information in relation to it will please address Messrs. Goodale & Marsh, at Centralia, Ill.

THE ART OF TANNING.

The following extracts are taken from the second lecture of the Hon. Gideon Lee, on the above subject as published in the *Shoe and Leather Reporter*. The substance of his first lecture we published on page 384, Vol. I. (new series):—

"Saving is the order of the day. Each pound of gluten wasted, incapacitated, expunged, consumed, or otherwise lost, involves the loss or prevents the gain of nearly an equal weight of tannin, which the gluten so lost would otherwise have combined. I am satisfied that excessive soaking and softening is the incipient waste. But we must be equally careful to avoid the opposite extreme; for if our theory be correct, short or deficient softening is no less a cause of loss or waste than overdoing. The purest glue and the purest tannin have no more chemical affinity in a perfectly *dry* state than the two most repellant substances in natnre. It is only in a state of solution, or extreme softness approximating solution, that this affinity has active existence. Every ounce of the hide, therefore, which fails of that degree of softness requisite for the incorporation or union of tannin is no better than lost; it can never form the necessary union with the tannin in order to make leather; but it must remain in a state which, in technical phrase, we call 'horn' or 'starved hide.' Some tanners have fancied that the opening power of the lime, in the next stage of the process of preparation, may perform what the pure water and the softening mill had left undone. We know that lime is a powerful solvent, and in part it possibly may remedy the defective work of the water and the mill, but not fully. If then, ten pounds of hide in a hundred should fail of the requisite degree of softness, in the harder or thicker parts the leather will fail proportionably, both in weight and quality. The operation of a strong solution of lime, on the soft and raw hide, is powerful, opening the pores, loosening the hair, consuming the fatty particles, and distending and swelling the whole hide to double its natural thickness. It must be obvious to the most ordinary mind that a menstrum so cogent should be used with great discretion; we have good reason to apprehend it has done great waste to our trade in consuming the soft gelatine of which the raw hide is composed. Every tanner knows that all high limed leather is loose, porous, pervious to water, weighs light and wears out quickly; I ascribe the whole mischief in the process to the actual consumption of the soft and more delicate particles of the glutin. Let us suppose that ten pounds in the hundred are thus consumed. Why, we have not only lost the ten pounds of hide, but we have failed to gain the five, or seven, or ten pounds of tannin which should have combined with it! I shall say but little of another process adopted by a great number of our large tanners within a few years, commonly called *sweating*, which accomplishes, by the process of that fermentation natural to all dead animal substances, all the beneficial purposes of the lime; and, I am inclined to believe, with less waste of the raw material. Several practical tanners, in whose judgment I have very great confidence, say, that the sweating process, in comparison with the liming, 'requires less labor saves a portion of the hides, which, in the process of incipient putrefication, would be suddenly destroyed by lime, causes a greater gain in the weight of the leather; that it is more solid, finer texture, less pervious to water, and wears longer; but requires longer time in the tanning, and is very difficult for the shoemaker to sew or stitch.' The process called *bating*, which immediately follows the liming, is intended to expunge the lime and restore the texture of the hide, as nearly as may be, to what it was before the liming process It is, in its nature, that kind of fermentation which immediately precedes putrefaction, and the ultimate decomposition of all animal substances. This is perhaps the most delicate and critical operation in the whole range of the manufacture of leather, and requires in the operator the nicest perception, the most improved judgment, and constant watchfulness especially in variable weather. The next process is the *handling*. Here begins the actual tanning, in a solution of tannin, which, being a powerful anti-putrescent, instantly arrests the fermentation generated in the bate. I have good reason to believe that, in the *bating* process, a large portion of the substantive body of the hide may be 'run off,' without destroying its organic structure. I presume every reflecting tanner will support me in the

opinion that the waste of gl utin, in over-bating, is very great, but I have reason to fear that a greater loss is incurred by means of the *tardy* application of the tannin from the first handler to the last layer, than by all other wasting causes together. I have noticed the results of numerous experiments of both *slow* and *quick* tanning; and in all cases (the preparation of the hide for the ooze being equally well done) have found the *quick* tanned specimens of a firmer and closer texture, more solid, less pervious, vastly greater weight, and far more durable in the wear, than the slow tanned specimens. By *quick* tanning, I mean three to four months for light sole leather; five to six months for middling; and seven to eight months for very heavy; dating from the first handler. By *slow* tanning I mean any considerable additional time to the terms named. I believe a much quicker process might be had, that would give as great or greater weight; but it would render the leather too hard and ha sh in its texture to be conveniently worked up by the shoemaker. It will be observed, I am speaking of *sole* leather only, with which kind I am most intimate. The ordinary increase of weight among the large tanners of this State, on the *unsalted dry* hides, imported from Laguira, Angostura, Buenos Ayres, Rio Grande, and other parts of South America (and such chiefly make up their stocks) is such that each one hundred pounds of *dry* hide make one hundred and forty to one hundred and fifty pounds of sole leather. I may also repeat here that, when all the glutin composing the hide is entirely combined (saturated) with the tannin—when the union is perfectly formed—not a single additional ounce can be gained from the strongest ooze, whatever time you continue the process. I had a most satisfactory experimental proof of the correctness of this conclusion. I consider active and long-continued handling vastly important, not only in the acquisition of weight, but in point of firmness and durability. I would handle sole leather from eighty to one hundred and twenty days, according to the weight of the sides, and the subsequent *laying away* should be short and frequently repeated; a few days only for each layer, and in no case more than two-thirds the quantity of sides which is usually laid in each vat. I have ascribed the greatest loss or waste in glutin to the *tardiness* of the *tanning* stage of the manufacture. I am not able to satisfy my own mind precisely how or when it goes; I am rather inclined to think it does not separate and escape from the body of the hide, as in the process of softening and bating; but for want of an immediate conjunction with the tannin, I believe it somehow perishes, and becomes extinct in its original position, or becomes incapacitated ever thereafter to form the necessary union with the tannin. If these conjectures be well founded, then much handling will prove the best remedy. I believe that the glutin of the interior parts of the hide chiefly suffers this disqualification; for the exterior being brought into immediate contact with the tannin, the two surfaces are always first tanned, as every body knows. And it is somewhat curious to see the progress of the combination extending from the two surfaces inward—the interior remaining colorless, soft, raw hide, for months after the two surfaces have become firm, well-tanned leather; the glutin of the two surfaces having arrested and combined all the tannin before it reaches the interior."

The opinions of Mr. Lee, regarding the experiment of quick-tanned hides, are the very opposite of those generally entertained by almost every person *outside* of the tanning business.

DRAINAGE OF CITIES FOR MANURES.

A very valuable letter has lately been written by Professor Liebig, the eminent chemist at Munich, in Bavaria, to Mr. J. J. Mechi, the well-known enterprising English agrieulturist, in answer to a letter of the latter, which had been published in the London *Times*. We will give the substance of this letter, and request for it a careful attention, as the opinions expressed, and the information contained in it, are just as important to the citizens of all our large cities as to the inhabitants of London.

In reference to the use of sewerage matters for manures, he says:—I regard it as a fortunate event that a man of so eminently practical a character as yourself has now for the first time, in the interest of agriculture and the national welfare, taken up the question of the "sewerage of towns" with warmth, and in language adapted to produce conviction. I have labored many years to impress such views upon the public, but my efforts have not been attended with any perceptible results. The men to remove the difficulties which stand in the way of procuring manure from the "sewerage of towns" will certainly be found; and a future generation will look upon those men who have devoted their energies to the attainment of this end, as the greatest benefactors of their count y.

The ground of my small success lies clearly in the fact, that the majority of farmers do not know the extent to which their own interests are concerned in this matter, and because the views and conceptions of most men in regard to the circuit of life and the laws of the preservation of our race, do not generally rise above those of C. Fourier, the inventor of the phalanstery. He proposed, as you know, to supply the wants of the occupants of his phalanstery by means of eggs. He supposed it was only necessary to procure a couple of hundred thousand hens, each of which would lay thirty-six eggs a year, making as many millions of eggs, which, sold in England, would produce an immense income. Fourier knew very well that hens lay eggs, but he seemed not to know that in order to lay an egg they must eat an amount of corn its equal in weight. And so most men do not know that the fields, in order permanently to yield their harvests, must either contain, or else receive from the hands of man, certain conditions which stand in the same relation to the product of the fields as the hen's food does to the egg she lays. They think that diligent tillage and good weather are sufficient to produce a harvest; they therefore regard this question as one in which they are wholly unconcerned, and look forward carelessly and with indifference to the futu e.

It is true that the diligent tillage of the fields, sunshine, and timely rain, are the outward conditions, perceptible to all men, of good harvests, but these are perfectly without effect upon the productiveness of the field, unless certain things not so easy of perception by the senses are present in the soil, and these are the elements which serve for nourishment—for the production of roots, leaves and seeds—and which are present in the soil always in very small quantity in proportion to the mass of the soil itself.

These elements are taken from the soil in the products of the field, in the corn, or in the flesh of the animals nourished by these products, and daily experience shows that even the most fruitful field ceases after a certain series of harvests to produce these crops.

A child can comprehend that, under these circumstances, a very productive field, in order to remain *very* productive, or even simply productive, must have the elements which have been withdrawn in the harvests perfectly restored; that the aggregate of the conditions must remain, in order to produce the aggregate results, and that a well, however deep it may be, which receives no supply of water, must in the end become empty, if its water is constantly pumped out. Our fields are like this well of water. For centuries those elements which are indispensable to the reproduction of the field crops have been taken from the soil in those crops, and that, too, without being restored. It has only recently been ascertained how small a supply of these elements the soil really has. A beginning has been made to restore to the fields the loss which they sustain through the annual harvests, by introducing from external sources manures containing the same elements. Only a very few of the better-informed farmers perceive the necessity of this restoration, and those of them who have the means have zealously endeavored to increase the amonnt of these elements in their fields.

The loss of these elements is brought about by the "sewerage system of towns." Of all the elements of the fields, which in their products in the shape of corn and meat, are carried into the cities, and there consumed, nothing, or as good as nothing, returns to the fields. It is clear that if these elements were collected without loss, and every year restored to the fields, they would then retain the power to furnish every year to the cities the same quantity of corn and meat; and it is equally clear that if the fields do not receive back these elements, agriculture must gradually cease. In regard to the utility of the avails of the "sewerage of towns" as manures, no agriculturist, and scarcely an intelligent man, has any doubt; but as to their necessity, opinions are very various. Many are of the opinion that corn, meat, and manures are wares which, like other wares, can be purchased in the market; that with the demand the price may perhaps rise; but perhaps in half a century not one of those countries upon whose excess England has hitherto drawn, will be able to supply her with corn, and that too, from the natural law, that what is true of the smallest piece of ground is true also of a great country—it ceases to produce corn if the conditions of the reproduction of the corn which has been carried off are not restored to it.

In the United States the population increases at a still greater ratio than in other countries, while the corn production upon the land under cultivation has constantly fallen off. History teaches that not one of all those countries which have produced corn for other lands have remained corn markets, and England has contributed her full share towards rendering unproductive the best lands of the United States, which have supplied her with corn, precisely as old Rome robbed Sardinia, Sicily, and the rich lands of the African coast of their fertility.

Finally, it is impossible in civilized countries to raise the corn production beyond a certain limit, and this limit has become so narrow that our fields are no longer capable of a higher yield without an increase of their effective elements by the introduction of manures from abroad. By means of the application of guano and bones, the farmer of most limited capacity learns the real meaning of such increase; he learns that the pure system of stall or home-made manures is a true and genuine robbing system. In consequence of his restoring in the guano and bones but a small portion of the very same elements of seeds and of fodder which had been withdrawn from his fields by centuries of cultivation, their products are wonderfully increased. Experiments instituted with special reference to this end, in six different parts of the kingdom of Saxony, showed that each hundred weight of guano put upon a field produced 150 lbs. of wheat, 400 lbs. of potatoes, and 280 lbs. of clover, more than was produced by the same-sized piece of ground without guano; and from this it may be calculated how enormously the corn and flesh production of Europe has been increased by the yearly importation of 100,000 tuns, or 2,000,000 cwt. of guano.

The effect of guano and bones should have taught the farmer the real and only cause of the exhaustion of his fields; it should have brought him to perceive in what a condition of fertility he might have preserved his fields, if the elements of the guano which he has transported in the shape of meat and p oducts of his fields into the cities, were recovered and brought into a form which would admit of their being restored every year to his fields. But it is much simpler, he thinks, to buy guano and bones, than to collect their elements from the sewers of cities, and if a lack of the former should ever arise, it will then be time enough to think of a resort to the latter. But of all the farmers' erroneous opinions, this is the most dangerous and fatal. If it is considered that a pound of bones contains in its phosphoric acid the necessary condition for the production of 60 lbs. of wheat; that if the English fields have become capable, by the importation of 1,000 tuns of bones, of producing 200,000 bushels more of wheat in a series of years that they would have p oduced without this supply, then we can judge of the immense loss of fertility which the German fields have sustained by the exportation of the many hundred thousand tuns of bones which have g ne from Germany to England. It will be conceived that, if this exportation had continued, Germany would have been brought to that point that she could no longer have been able to supply the demand of her own population for corn. In many parts of Germany, from which formerly large quantities of bones were exported, it has already come to be the case that these bones must, at a much higher price, be bought back again in the form of guano, in order to attain to the paying crops of former time. The price of bones is now so high in Germany as to forbid their exportation.

In relation to guano, I have been assured that in 20 or 25 years, if its use should increase in even the same proportion as hitherto, there will not remain in South America enough to freight a ship. We will, however, suppose its supply and that of bones to continue for fifty years, or even longer—then what will be the condition of England when the supply of guano and bones is exhausted? This is one of the easiest of all questions to answer. If the common "sewerage system" is retained, then the imported manures, guano and bones, make their way

into the sewers of the cities, which, like a bottomless pit, have for centuries swallowed up the guano elements of the English fields; and after a scries of years the land will find itself precisely in the condition it was in before the importation of guano and bones commenced. A very little reflection will lead to the conviction that the relations of populations are governed by a great and comprehensive natural law, according to which the return, duration, increase or diminution of a natural phenomenon depends upon the return, duration, increase, or diminution of its conditions. This law governs the return of the harvest upon our fields, the maintenance and increase of the population, and it is easy to see that a violation of this natural law must exert upon all these relations a pernicious influence, which can be set aside in no other way than by the removal of its causes. If, then, it is known that certain existing relations work deleteriously upon the fields, it can be foreseen that their continuance must bring about the ruin of agriculture.

It has been maintained that the recovering of the manure elements out of the sewers in the large cities is impracticable. I am not ignorant of the difficulties which stand in its way—they are indeed very great; but if the engineers would come to an understanding with the men of science in relation to the two purposes—the removal of the contents of the sewers, and the recovery of their valuable elements for agriculture—I do not doubt that a good result would follow. Intelligence, in union with capital, represents a power in England which has rendered possible and practicable things of much greater apparent difficulty. I look forward with deep concern to the solution of the "sewerage question." For if this question is decided in Great Britain without regard to the wants of agriculture, we can scarcely hope for anything better upon the continent.

Countries may be fruitful, and become capable of sustaining a large population, when certain resisting influences, which in their unimpeded working make the cultivation of the soil impossible, are overcome by human intelligence; or when a land has all the conditions of productiveness except one, and then receives the one which it lacked. If Holland were without her dikes, which must be kept up at great expense, she would produce neither corn nor meat; the land would be uninhabitable. In a similar manner the inhabitant of the African oasis protects his grain fields by dikes against the storms of the desert, which cover his ground with a barren sand. I know that the prophets of future evil have at all times been derided by their own generation, but if history and natural law can furnish any ground whatever for a just conclusion, then there is none which stands upon a firmer basis than this: that, if the British people do not take the pains to secure the natural conditions of the permanent fertility of their land—if they allow these conditions, as hitherto, to be squandered, their fields will at no distant day cease to yield their returns of corn and meat.

California Wine.—The Sonora *Age* gives the following information relating to the wine manufacture in that place:—"At Moussaud's vineyard, near the foot of Bald Mountain, they are pressing nearly their entire crop, and have 1,500 gallons of white wine already made. They will make 4,000 gallons in all. Mr. Peltret has made 500 gallons of excellent wine, and has still a lot of grapes on hand, preserved for table use. Madame St. Cyr makes 500 or 600 gallons of wine; and about the same quantity will be made by Madame La Carce. Uncle John Moss has made 160 gallons of excellent red wine from 1,837 lbs. of grapes. Besides the wine thus manufactured from the grape, some brandy and a large quantity of vinegar will also be made. It will be seen, from the figures given, that very nearly 6,000 gallons of wine will be produced this season by a few small vineyards in the vicinity of this town. This will readily sell from $2 to $2.50 per gallon, which, at the lowest figure, will net $12,000 for the whole."

Liquid Glues.—Dissolve 33 parts of best (Buffalo) glue on the steam bath in a porcelain vessel, in 36 parts of water. Then add gradually, stirring constantly, 3 parts of aqua fortis, or enough to prevent the glue from hardening when cool. Or dissolve 1 part of powdered alum in 120 parts of water, add 120 parts of glue, 10 of acetic acid and 40 of alcohol, and digest.—*Druggists' Circular.*

TESTIMONIAL FROM AN INVENTOR.

Gentlemen:—I was at last compelled to employ you as agents to "fix up" my re-issue papers for a sugar evaporator; and I must say it is well done, and would have saved much difficulty if I had employed you to attend to my case in the first instance. I am not sure but that my present application for an improvement in ——— will have to be fixed up by your firm yet. Respectfully, D. M. Cook.

Mansfield, Ohio.

[The above gentleman prepared his papers for a re-issue, and attempted to act as his own attorney. The consequence was, he got his case in such a "fix" that it was difficult, for a time, to determine where to begin to straighten them so as to get them in condition for the action of the Patent Office. But it was done, as seen by the inventor's statement above, and done to his apparent satisfaction.

While we recommend all inventors who are competent to prepare their own drawings and specifications and act as their own attorneys before the Patent Office, we counsel those who have had no experience in such business, and have an invention worth protecting by a patent, to employ some experienced attorney to act for them from the first—not to wait until they get their case in such a condition as to require more labor and expense to amend it than it would have cost in the first place to have had the business well attended to. The preventive of trouble is cheaper than the cost of cure in such cases, as the writer above can testify.—Eds.

DISCOVERIES AND INVENTIONS ABROAD.

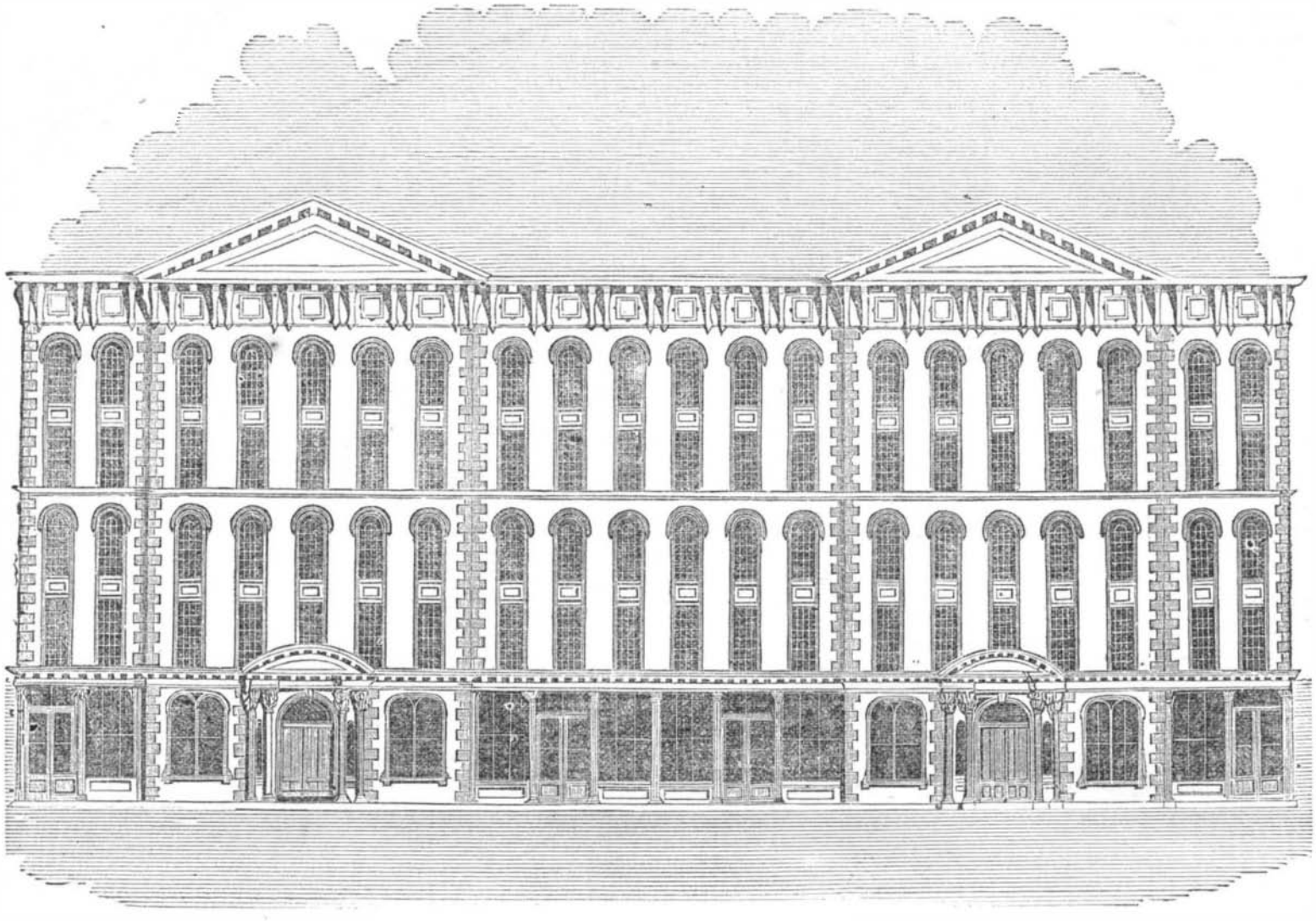
Substitute for Chloroform.—A considerable sensation has just been produced in Paris by M. Velpeau, an eminent surgeon, who has recently communicated to the Academy of Sciences the extraordinary fact that, if a brilliant object (such as a red bead) is placed near to the face of a person and between the eyes, and the gaze be fixed steadily upon it for a few minutes, the person will soon fall into a cataleptic state and become as insensible as if under the influence of chloroform. M. Rocco is stated to be the discoverer of this, and in making several experiments, persons were made to undergo surgical operations quite unconscious of pain. A correspondent of the Boston *Traveler*, writing from Paris, seems to bo enthusiastic on this discovery, and recommends its practice by the dentists of Boston in extracting teeth. We remember very well how this alleged new discovery was discussed in both the English and American papers about 20 years ago, as an explanation of the phenomena of animal magnetism and the cataleptic condition into which some persons may be easily thrown. It never can be used with certainty in surgery, in all cases, although it may be in some.

Red Dyes.—A patent has been taken out in England by R. A. Brooman (as a communication from abroad) for the preparation of red colors for textile fabrics from aniline. A mixture of aniline and anhydrous bichloride of tin are first heated up together to the boiling point and then boiled for fifteen minutes. At first the mixture is of a yellowish tint, but it finally becomes a beautiful red when held up to the light, although, in a very large quantity, it appears to be of a blackish crimson color. When hot, the liquor maintains its liquid condition; but on becoming cold, it assumes a jelly state. While still warm, the liquor is to be filtered to free the coloring matter from several impurities. By adding the tartrate of potash or the acetate of lead to the liquor while hot all the coloring matter is precipitated, and when it becomes cold it may thus be obtained solid, to be used like the extract of logwood in dyeing. The red solution of aniline thus obtained may be used with pyroligneous mordant, or the nitrate and acetate of lead in dyeing. To print calicoes with this preparation of aniline a very concentrated extract is required, which is mixed with dextrine or gum to make it into a printing paste. Acetic acid and alcohol will also precipitate the extract. The bichloride of mercury (corrosive sublimate), the protochloride of copper and the perchloride of iron can also be employed to mix with the anyline as substitutes for the bichloride of tin.

Aniline Blues, Lilacs and Drabs.—A patent has also been lately secured by Messrs. J. T. Beale and T. N. Kirkham, of England, for aniline in dyeing and printing. This invention consists in treating salts of aniline, or an acid solution of it, with hypochlorite of lime or common bleaching powder, to obtain fast colors. They take the nitrate of aniline, or the acetate, or a saturated solution of aniline in water, and add an equal quantity by measure of acetic acid. To this solution some hypochlorite or bleaching powder is also added, and a change in the color of the solution at once takes place. The shade of the liquor indicates the shade of color to be produced by it on textile fabrics. By varying the quantities of these substances different shades may be produced, from a blue to a lilac, purple, violet, slate and drab. It is well known to dyers that, by using the same substances in dyeing (only in different quantities—strong and weak), browns, drabs, &c., are colored; and so it is with using aniline of different degrees of strength, according to the shades desired. When preparing analine for dyeing, the chlorite must be added very cautiously until the proper shade is attained, because it is the re-agent which "tones" the colors. The following is the method of practically using the aniline:—Dissolve as much aniline as can be taken up in a certain quantity of water—say one gallon, and to this add one gallon of strong acetic acid and a pint of the hypochlorite of lime. The whole is then carefully stirred and the color of the liquor becomes a violet of an intensity proportioned to the amount of chlorine used, the greater the quantity of the latter the lighter the shades produced. According to the quantity of hypochlorite used, the shades of aniline will vary from a violet to a drab. With aniline liquors thus prepared, silk may be dyed various shades without mordants; with mordants, both wool and cotton fabrics may be dyed with the aniline thus prepared; and strong extracts may be employed for printing. We had been informed that aniline—which is a preparation of indigo with dilute nitric acid, and formerly called indigotic acid—had gone out of use, but these two patents afford evidence of it becoming more extended in Europe. None of these colors, so far as we know, have yet been introduced into this country.

Increasing the Strength of Paper.—We described a method of producing vegetable parchment on page 237, Vol. XIV. (old series) of the Scientific American, by steeping unsized paper for a brief period in sulphuric acid, slightly diluted. We learn from our able cotemporary, *Newton's London Journal of Arts*, that another method of producing vegetable parchment has been discovered and patented by Mr. T. Taylor, London. Paper—either sized or not—is taken dry and soaked in a concentrated neutral solution of chloride of zinc moderately heated; after which it is washed, dried and is ready for use, having the strength and appearance of parchment. The neutral solution of the chloride of zinc is formed by adding the carbonate or oxyd of zinc to a solution of zinc dissolved in muriatic acid, then evaporating the solution until it has arrived at the consistency of sirup when cold. In this state it has a high specific gravity, and the paper to be treated is immersed in it for a few minutes, then taken out, and the adhering zinc removed by a scraper. The paper is now thoroughly washed in clean cold water and afterwards pressed and dried. This treatment draws or *fulls* the fibers of the paper together, rendering the sheets smaller in size but much stronger and closer in the texture. The process described is conducted with cold liquors, and the paper is only partly rendered into vegetable parchment; when it is desired to produce the fullest change possible in the paper, the liquor is kept heated about 120° Fah. while the paper is immersed in it. Sheets of paper, when saturated with such a solution, may be joined permanently together by uniting their edges and passing a heated iron over them. The chloride of tin may also be used as a substitute for the zinc. Paper treated in this manner becomes much thicker, and can be glazed with a most beautiful surface.

Refining Sugar.—In introducing raw sugar for the purpose of refining, it is liable to sink down and come in contact with the heated steam pipes in the melting pan, whereby some of it is carbonized and more molasses produced than otherwise would be. To avoid this a patent has been taken out by Mr. John Aspinall, of London, for melting the raw sugar before it comes in contact with the steam pipes of the open heating pan; and he does this by placing the sugar upon a perforated false bottom which just comes in contact with the surface of the water in the pan, and dissolves it gradually before it can be precipitated to the bottom. The idea embraced in this invention is to melt all the raw sugar in the liquor before it can come in contact with the pipes which heat the pan.



THE NEW YORK PALACE HOME—FRONT ELEVATION.

MAGNIFICENT BUILDING SCHEME—PRACTICAL PLAN FOR REDUCING RENTS.

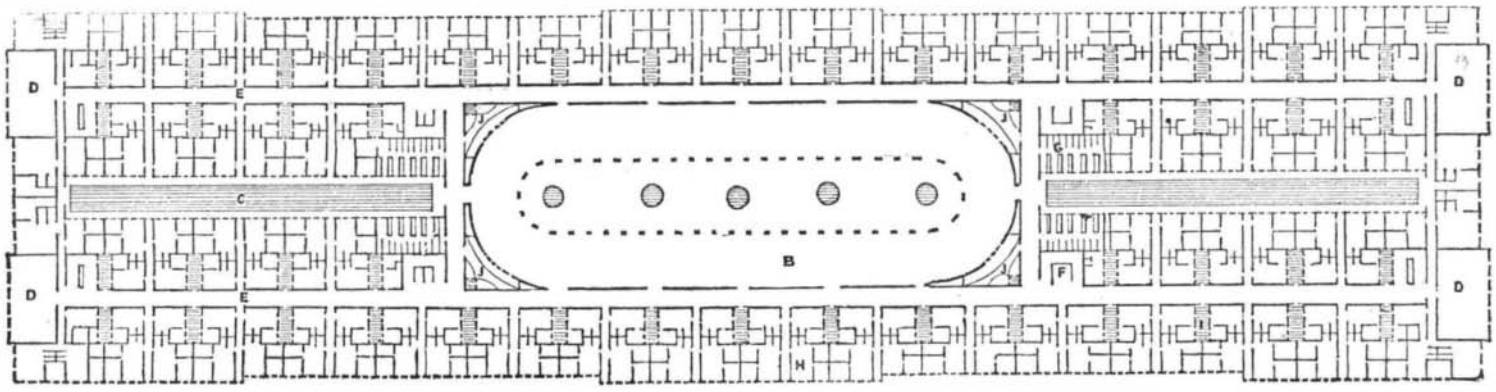
Is it possible in large cities to have comfortable, convenient, and genteel dwellings at a rent of $140 to $250 per annum, to reduce the expense of servants, and all other costs of living nearly or quite one half, and to combine the conveniences and freedom of the best hotels—if not their elegancies—with all the seclusion and retirement of private houses? Some shrewd business men answer these most important and interesting questions in the affirmative; and they say that a building nearly half a mile in circuit will soon be going up in this city to demonstrate the truth of their statements. The plan is to buy a block of ground in the neighborhood of the Central Park, 200 feet by 800 in size, extending from avenue to avenue and from street to street, and to cover the whole with one immense hotel for the occupation of private families. It is proposed that the occupants shall own the property, and have control of the management.

The amount of money requisite to complete the edifice and place it in working condition is $1,000,000, according to estimates accurately made. One-half this amount may be obtained from bonds paying 7 per cent interest secured upon the property. The other half is to be apportioned among the stockholders.

Each room or suite of rooms in the edifice will vary in value from $400 to $2,000, according to size and position. It will require, to complete the building, a thousand subscribers, averaging $1,000 each, who will have five years' time over which to arrange their payments, whilst during three out of these five years they may be at the same time tenants, having their rent paid ont of their stock dividends. It is proposed not to take any subscription for a less amount than a sum equal to the value of a room or suite of rooms. A single man or woman who in this way secnres a room at $500 will have a permanent home for the interest on that sum, which is $35 per year, at seven per cent, or $30 at six per cent, and with this home will be connected the advantages already enumerated. This point will be made more distinct in the by-laws of the association; these will provide that each suite of rooms be appraised and numbered in a manner similar to that adopted for church pews; each subscriber to take stock enough to cover the appraised value of such rooms as he selects; the payments on the stock to be extended over a period of five years, and the stock itself to be lodged with the executors of the association as security for fulfillment on the part of the tenant of the conditions of the lease; these conditions to provide for a proper observance of order.

It will be seen by our illustrations that the movement is so far advanced that plans of the building have been prepared. We present a view of the front, and a plan of the second story, with a full description of the whole.

The basement will be occupied by a kitchen and laundry in the center, to cover a space of 300 by 100 feet, lighted from the top by five domes, each 16 feet in diamter. Its hight will be 15 feet; it will be constructed thoroughly, and ventilated by a system adapted to carry away all odors arising from culinary operations, and generally it will be supplied with every well-tested improvement applicable to cooking on a large scale by systematic methods. The space beneath the sidewalks on the streets and avenues will be appropriated for storehouses, fuel depots, machinery for grinding and otherwise preparing food; a pumping engine, bakery, boilers, steam engine, ice-house, and gasometer. The remainder of the space will be occupied with workshops, of which there may be forty-six in number, 42 feet square each, lighted from the top by glass domes, 26 feet by 7, this being the size of the forty-six areas, which serve also to admit air and light to all the interior portions of the building.



PLAN OF THE PALACE HOME—SECOND FLOOR.

The ground floor will be covered with a garden in the central court, 240 feet long, by 28 feet wide, oval shape, around which will be built a hall or gallery of iron and

glass, two stories in hight. The first story, 20 feet high, will be divided into a music and lecture-room, 220 by 30 feet, shape nearly semi-circular. The reading-room and library will be of the same shape. The dimensions of the parlor will be 180 feet by 30; the natural history room and picture gallery will be 90 feet by 30; and the smoking-room will be 90 by 30; all of these may be united if desired. On this floor will be a number of stores and offices, say, at least, seventy, varying in size, but averaging about 20 feet by 45, with entrance from the interior arcade, as well as from the street. There will be located the business offices, two in number, 28 feet by 24 each, and four more of like size for janitors and stewards. Space will be reserved for a chapel, 100 feet by 24; for four vestibules, 20 feet by 26 feet, and six hall entrances 45 feet by 9 feet; two schoolrooms, 75 feet by 24; and sixty suites of rooms for families who may be in the city temporarily to visit friends residing within the edifice. From this floor to the upper story will ascend eight broad stairways, and four steam elevators will be in constant operation to serve those who prefer this mode of ascent over the more laborious one by stairways. On this, as on each other floor, ample provision will be made for water-closets and bathing-rooms, and every suite of rooms will be supplied with a faucet for water and a waste-pipe.

In the annexed plan of the second floor of this gigantic "palace of the people," A represents a court-yard, 280 feet long by 28 wide, with five glass domes to light the kitchen, which is located in the basement. B indicates an oval building constructed of glass and iron, two stories high, surrounding the court-yard; the first story will be divided into a number of public rooms, and the second will be used as a grand dining hall. Above the second story both A and B combine to form another and larger court-yard, 300 feet long by 100 wide; the marginal portion (built over the roof of the dining-hall) is to be used as a conservatory, and the central portion will be adorned with a grass plot and fountains. C is an oblong area designed to convey light and air to such rooms as have windows opening on the same; the rooms on the first story are to be appropriated for offices, schoolroom and chapel. Another similar area is visible in the other wing of the edifice. In each wing are also seen two parlors for general use, D D; the location of these will be changed to the center of the front, and each pair will be united into one apartment, 92 feet long by 26 wide. E E are two corridors, each 9 feet wide, intended to eventually extend from one end of the building to the other, and to pass through those portions now occupied by the rooms, D D, in order to secure thorough ventilation. F indicates a steam elevator and stairway; the former being for the use of invalids and others desiring a mode of ascent easier than the usual means; there are four of these, and also four other stairways, one near each of the parlors, D. The water closets and bathing rooms (of which there are four sets) are marked G. H represents various suites of rooms, comprising, in most cases, one parlor and two sleeping rooms; each of the latter containing a couple of closets. Every suite has four windows fronting on the street, and one (in the rear chamber) opening on an area, 26 feet by 7; there are, in all, 46 areas, which, in the annexed plan, are shaded to distinguish them from apartments. There are 186 suites on this floor, but some changes are to be made in the size and structure of the rooms. J, J, J, J, are four steam elevators for hoisting cooked provisions from the kitchen to the dining-hall, together with flues for carrying away the steam and odors from the kitchen.

On the second floor the dining room will be located. This will be a half-oval shape, 22 feet high, located over the music and reading rooms, covering a space 800 feet by 30, lighted from the side and top. Meals will be served here three times daily, on the European plan, the American plan (or *table d'hote*), and after the manner of the English club houses, so that families may choose between these, or have their meals in their own apartments if they prefer. This department will be in the hands of an experienced manager, under whom will be secured thorough neatness in the serving as well as cooking of the food. Also it is intended to introduce a system which shall effectually do away with opportunities for dishonesty, even on a small scale. The food will be pure and fresh, and will be served at prices far below that now paid by housekeepers. As an illustration may be cited the price and quality of milk, which can be supplied pure and fresh for 3½ cents per quart, throughout the year; eggs at 15 cents per dozen; and butter at 15 cents per pound, from farms and dairies conducted, organized and kept expressly to furnish these supplies. This floor will also contain four parlors for general use, each 46 feet by 26, and the remainder of the space will be appropriated for single rooms and suites; the single rooms varying in size, but occupying about 20 feet by 12; the suites containing two or more rooms, averaging 20 feet by 12, for the parlor or sitting room, and 12 feet by 10 for the sleeping rooms.

The other four stories will be divided in the same manner, except that the central area will be 300 feet by 100, and as there is to be a conservatory on the roof of the dining hall, 800 feet by 30, the top of this area will be covered with glass during the winter season.

The hight of the rooms will be each about 15 feet on the first floor, 14 on the second, 13 on the third, 12 on the fourth, 11 on the fifth, and 10 on the sixth. Ventilation will be so thorough that every room can have a stream of pure air from without, with facilities to expel impure air at the will of the occupants.

The building will be rendered thoroughly fire-proof throughout. The use of iron girders and iron beams, with brick-arching for the floor to rest upon—put in the place of the ordinary wood beam, joist and plank—prevents the possibility of danger in this respect. Every room in the edifice will be heated from apparatus centering in the basement; and each room will be lighted with gas. Efficient heads to the several departments will be obtained, that the order and system necessary to an organization of this character may be preserved.

Among the marked advantages which promise to grow out of this enterprise may be enumerated:—

1st. A family will obtain, for $1.50 per week, or $75 per year, a better home than can now be obtained in any part of New York city, for $250 per year, and the location of this edifice will be the best the city affords. A single man or woman, who now pays an average of $2 per week for an attic chamber, will have a better room for 75 cents per week. The difference between these prices will, in five years' time, pay for a sufficient number of shares to secure a *permanent* home.

2d. By the terms of arrangement for payments, it is within the reach of persons of very moderate circumstances to become shareholders; and when their shares are once paid for, the dividend thereon will pay their rent, which is tantamount to living rent free. In other words, the tenant becomes his own landlord, and the body of tenants choose their executives from among their own number.

3d. Servants may, to a considerable extent, be dispensed with; also the care of stoves, fires, ashes, back doors and barred windows, ash barrels and offal tubs, cockroaches and Croton water pipes, gas and fuel bills, grocers' and butchers' books, milk accounts, diseased children from the use of impure and unclean milk, door bells, beggars, burglars, hall thieves, kitchen thieves, rats and mice.

4th. The economy in expense for food will be to the extent of about one half the cost under the present system; an estimate carefully made, and based upon experiments made expressely to ascertain these points, proves that a family of four persons may live upon the ordinary run of hotel fare at an expense of about $12 per week, rent included.

Young men and young women, who find but inferior accomodations in boarding-houses, may here enjoy many home comforts which at present are denied them. The condition of children will become elevated from their present routine. Danger from fire may be averted; and in insurance alone, the economy will exceed $50,000 per year in the aggregate—a fact proved by calculations already made.

A suitable number of watchmen will be employed to guard the building by day and night.

The schools and gymnasiums for the children will be located in an eligible part of the building, adjacent to which will be an extended play-ground promenade in the open air.

More than one hundred individuals have already signified their wish to become regular inmates of this edifice.

Any further information in relation to the enterprise may be obtained by calling at the rooms (Nos. 13 and 15) of the association, in Appleton Building, 346 Broadway, this city.

FRESH AIR IN RAILROAD CARS.

The Court of Massachusetts has lately been called upon to decide a case arising out of a passenger persisting in letting a draught of fresh air into a railroad car against the wishes of the other passengers. The conductor remonstrated, and put the window down; the passenger broke the glass, and got ejected from the car. He brought suit for damages, and got $5, the price of the ticket; the Court ruling that the railroad company had a remedy by law against the passenger for destruction of property, and could not put him out except for persistent violation of the rules of the company. The New York *Journal of Commerce* reports a case nearly similar, in which a lady refused to close a window, though requested by an elderly gentleman, who sat on the next seat to her. The *Journal* remarks:—

"The comforts of railway passengers depend more on the courtesy and politeness of the parties than upon mere abstract legal rights. A proper regard for their convenience and of others will prompt either gentleman or lady to conform to their wishes in all ordinary circumstances, but if any are so rude as to refuse this, it is far better to allow them the enjoyment of their perverseness than quarrel over it. And when there is a lady in the case, the only prudent course is to surrender at once."

A better expedient than any mentioned by the *Journal* is for railroad companies to compel their employees to pay proper attention to the heating and ventilation of cars, after having provided the best facilities therefor. At present these important matters are left almost to chance, and cars are too frequently at an oven heat a portion of the time, and during the rest the atmosphere is of an Arctic frigidity.

Again and again have we directed attention to the necessity of properly heating and ventilating our railroad cars, and yet no good method has been adopted generally by our railroad companies. It is not because there are not efficient systems of heating and ventilation known, for several good plans have been brought before the public through our columns, but it is because there is such a conservative spirit prevailing in regard to old adopted systems, that changes are resisted even though founded upon the best and most approved principles. We remember well that when we first advocated the use of coal as fuel for locomotives on our railroads, there were plenty who defended the employment of wood, and it was a long time before our railroad companies could be driven from their old notions and practices. But now coal-burning locomotives are becoming the rule, and wood-burning engines the exception, especially in the eastern and middle States. On the Providence and Worcester Railroad coal alone is used on all the engines, and the cost for fuel is not quite one-half what it was five years ago.

BOILER EXPLOSION—ROTTEN IRON.

On the afternoon of Saturday, the 31st ult., a steam boiler on the sunken steamship *Granada*, which was used for working the draining pump, exploded with terrific force, and one man was killed by a fragment of the iron. The pump was used for pumping out the water in the vessel, and the explosion took place just after the furnace had been supplied with fresh fuel. The Coroner's jury, in the case of the person killed, rendered the following decision, on the 2d inst.:—

"That Luke Flannigan came to his death by the explosion of a boiler on board the steamer *Granada*, in the harbor of New York, on the 31st of December, 1859, and the jurors say that said boiler was defective and unfit for use previous to the explosion."

Here is a decision which criminates the owners of the boiler and steam pump, and the engineer in charge, yet what will be done to them? Nothing—nothing at all. Those who are placed in our courts to dispense justice, and are elected or appointed to execute our laws, are to blame for the great number of explosions which take place. If they did their duty, those who use steam boilers would not be so reckless in their management.

To Remove Clinkers in Stoves.—Persons troubled with "clinkers" adhering to the lining of their stoves or furnaces may be interested in knowing that by placing a few oyster shells into the grate, while the fire is ignited, the clinkers will become loosened so as to be readily removed without the danger of breaking the lining. We have tried this remedy; and while the chemical action is involved in mystery, it accomplished the result to our satisfaction. Who will explain the theory of the action of the gas emitted from the decomposition of the shells upon the clinkers?

RESULTS OF PRACTICAL SCHOOLING.

Of all schools the most prolific has been the school of difficulty. Smiles, in his admirable work on "Self Help," says:—"Some of the best workmen have had the most indifferent tools to work with. But it is not tools that make the workmen, but the trained skill and perseverance of the man himself. Indeed it is proverbial that a bad workman never yet had a good tool. Some one asked Opie by what wonderful process he mixed his colors. 'I mix them with my brains, sir,' was his reply. It is the same with every workman who would excel. Ferguson made marvelous things—such as his wooden clock that accurately measured the hours—by means of a common penknife, a tool in everybody's hand; but then everybody is not a Ferguson. An eminent foreign *savant* once called upon Dr. Wollaston, and requested to be shown over his laboratories, in which science had been enriched by so many important discoveries, when the doctor took him into a little study, and pointing to an old tea-tray on the table, containing a few watch-glasses, test-papers, a small balance, and a blow-pipe, said, 'That is all the laboratory that I have!' Stothard learned the art of combining colors by closely studying butterflies' wings; he would often say that no one knew what he owed to these tiny insects. A burnt stick and a barn-door often served Wilkie in lieu of pencil and canvas. Bewick first practiced drawing on the cottage walls of his native village, which he covered with his sketches in chalk; and Benjamin West made his first brushes out of a cat's tail. Ferguson laid himself down in the field at night in a blanket, and made a map of the heavenly bodies by means of a thread with small beads on it stretched between his eye and the stars. Franklin first robbed the thunder-cloud of its lightning by means of a kite made with two cross sticks and a silk hankerchief. Watt made his first model of the condensing steam engine out of an old anatomist's syringe, used to inject the arteries previous to dissection. Gifford, when a cobbler's apprentice, worked his first problem in mathematics upon small scraps of leather, which he beat smooth for the purpose, whilst Rittenhouse, the astronomer, first calculated eclipses on his plow-handle. In like manner Professor Faraday (Sir Humphrey Davy's scientific successor) made his first experiments in electricity by means of an old bottle, while he was still a working bookbinder. And it is a curious fact that Faraday was first attracted to the study of chemistry by hearing one of Sir Humphrey Davy's lectures on that subject at the Royal Institution. A gentleman, who was a member, calling one day at the shop where Faraday was employed in binding books, found him poring over the article 'Electricity' in an encyclopædia placed in his hands to bind. The gentleman having made inquiries, found he was curious about such subjects, and gave him an order of admission to the Royal Institution, where he attended a course of four lectures delivered by Sir Humphrey. He took notes of the lectures, which he showed to the lecturer, who acknowledged their scientific accuracy, and was surprised when informed of the humble position of the reporter. Faraday then expressed his desire to devote himself to the prosecution of chemical studies, from which Sir Humphrey at first endeavored to dissuade him; but the young man persisting, he was at length taken into the Royal Institution as an assistant; and eventually the mantle of the brilliant apothecary's boy fell upon the worthy shoulders of the equally brilliant bookbinder's apprentice."

COPPER MINES AND MINING IN ARIZONA.

The St. Louis *Republican* says:—In conversation with a gentleman who has just arrived here by the overland mail from Arizona, we have learned some gratifying particulars in regard to the copper mines and copper mining in that interesting territory.

There are on the waters of the Rio Mimbres, one of the principal streams there, four mines, some of which are known and others are believed to be very productive. One of them, the Santa Rita, has been worked now a little over twelve months, and at this time yields two tuns of metal a day. The means of smelting are not very complete, but the ease with which the copper is extracted is remarkable. The metal is of an excellent quality, superior to the Lake Superior, and comparing well with the best Russian. The veins of ore are numerous, and yield about 25 per cent of copper. This mine is owned by some Mexican proprietors. The Hanover mine has been worked rather less than a year. It shows a vein which, at twelve feet from the surface, is fifteen feet thick. This ore is very rich, yielding over 30 per cent. The daily make is one tun and a half. This mine is owned by Messrs. Hinckle & Thibault. The two others mentioned are very recent discoveries, but promise very well. In fact there is no doubt among the best informed in Arizona that copper mines of great richness and fine quality abound there, and that Arizona is destined to be as noted for its products of copper as for those of silver.

There is a good growth of timber on the RioMimbres; and no deficiency in the mining localities mentioned of either wood or water.

All that has ever been claimed for Arizona as a depository of mineral we lth seems on the point of being confirmed in full. The silver mines are yielding well, and recently a tin mine has been discovered.

[If the above-mentioned tin mine is rich in the metal, we look upon its discovery as far more important than the mines of either silver or copper. At present we are entirely dependent upon imported tin, while we export copper, gold and silver.—EDS.

CAST-IRON WATER TOWER AT LYONS.—A new iron tower has been erected at Lyons, France, on the hill of La Croix-Rousse, and it is designed to raise the waters of the Rhone to a height of 490 feet, for subsequent distribution on the high grounds of Fourvieres, St. Just, St. Irenee, Oullins, and Ecully. The volume thus raised amounts to from 540,000 to 660,000 gallons every 24 hours. The total weight of the structure is about 110 tuns. The tower consists of a center column, 2 feet 3 inches diameter, of hollow cast iron, around which are arranged in the form of a hexagon six smaller columns of about 9 inches diameter, braced and tied together with wrought-iron connecting-rods. On the the top of these columns is fixed a tank of wrought-iron, 11 feet 6 inches wide by 10 feet deep, having ascending and descending pipes of cast iron, 12 inches diameter. Beneath this tank is an open gallery, to which access is gained by a cast-iron spiral staircase winding round the center shaft. The height to the gallery floor is 180 feet, and the total height to the top of the tank is 199 feet. We may observe, in addition, that this tower only forms a small detail of the great works of water supply lately executed. These consist of:—1. A filtering apparatus, capable of filtering 5,500,000 of gallons per twenty-hours. 2. Three Cornish pumping-engines, of 170 horses' power each. 3. 98,370 yards of pipes' ranging from 3 inches to 3 feet diameter. 4. 21,860 yards (lineal) of sewers. 5. A system of supply at high pressure to the third story, in two services—low service and high service. 6. Monumental fountains, hydrants, street cocks, &c. The whole of this vast system of distribution cost $18,000,000; and, excepting some details, such as the tower we have been describing, was completed in the short space of three years.

THE WORK OF THE SPINNING JENNY.—A century ago the value of all cotton goods manufactured in England was estimated at £200,000; and when the spinning jenny was invented in 1767, by Hargreaves a carpenter, the yearly exports of cotton fabrics did not exceed that sum. In 1858 the total value of the cotton manufactures exported, including twist and yarn, amounted to 43 millions of pounds sterling. A century back the total value of the textile fabrics exported from the United Kingdom did not amount to 5 millions; whilst the value of such fabrics exported in 1858 exceeded 69 millions. At the beginning of the present century the quantity of raw cotton imported into England was 50 millions pounds weight. The quantity imported had increased in 1850 to 668 millions, and in 1858 to a thousand millions of pounds weight, of which the value exceeded 30 millions of pounds sterling.

LOOK OUT FOR FIRE!—There are few more terrible deaths than fire, yet it is extraordinary how little care is taken to prevent accidents. Many lives and dwellings might be saved from destruction by properly guarding the grates. Indeed, with the present fashion of ladies' dresses, in apartments of moderate size, this care is really necessary; for we fear that it will be long before fire-proof fabrics are brought into general use. We have adopted in our dwelling a brass fire screen, made so as to fit around the grate and cover the whole fireplace; thus this fierce element is in a manner caged.

BLANCHING CELERY WITH SAWDUST.—Having had some trouble in the winter of 1857 in keeping late celery from rotting in a new kitchen garden, where the soil was very retentive and damp, and the plants earthed up in the usual manner, I have since used sawdust for the purpose, and find that it answers perfectly. Last winter all the late celery here was earthed up with sawdust, and it kept quite sound till April, and no slugs or insects attacked it underground; the heads being very solid, clear, and crisp, and well flavored. I had some doubts that the sawdust from resinous trees might give the celery a disagreable flavor, but on trial I found that not to be the case, and the sawdust is now taken indiscriminately from the sawpits, where different kinds of trees are sawn up. Before the late severe frost occurred in October, I had just finished the earthing-up of all the late celery with sawdust, and I find it now wonderfully fresh, the frost not having penetrated far through the surface of the hearts. The practice of using sawdust may be new to some, yet I often hear of the difficulty of keeping late celery from rotting in winter, and the more extended use of sawdust may be of advantage to other gardeners who, like myself, have stiff and damp soils to manage.—*Correspondent of the London Gardeners' Chronicle.*

PEACH TREES FOR FIREWOOD.—It seems a monstrous proposition to grow peach trees for firewood, yet the California *Farmer* maintains that it will "pay" to the grower; and, if so, that is enough. The above paper says:—

"Firewood is a heavy tax, and the value and price will increase for years unless we have railroads to the mountains and woodlands, that we may have access to them. We have several times reverted to the value of the peach tree as firewood, and we ask a serious attention to what will be found true, that there is no tree that can be planted so cheaply, or that will grow so quickly, as the peach, and while it is maturing for firewood, the fruit will pay for the labor three or four times. A thousand acres can be planted on some land of little value, say a sandy, gravelly highland. The peach-pits can be planted in furrows made with a plow in straight lines, sixteen feet apart, and covered with the plow again. The fruit that falls the swine can eat, and nothing is better for a swine-pasture than a large peach-orchard. The good fruit can be gathered, cut and dried, and shipped abroad with profit. In six or eight or ten years the trees will have reached a size fit for firewood, and there is no wood grown on the earth that is superior to it. Whoever wishes to make his 'pile,' can do so with a little expenditure, for this will be done by somebody."

MANAGING AND FEEDING WORKING OXEN.—Oxen working on a stone-drag, on the foot of a plow, on the sled tongue, cart spire, or twitching stones or timber, should carry their heads up, as this enables them to do this work much easier: those that work as leaders, forward of other oxen, should carry their heads low, and have the yoke the right length, let the bows suit the neck; the yoke and bows to the leaders should set a little snugger than the nib oxen. Never use the whip but from necessity. When about to strike the young steer or ox, ask yourself, "Will he know what I strike him for?" Let each ox have a name, and be sure he knows his name. Never speak a word to an ox without meaning, have a particular word to start your team by, that all may pull together. Never hurry your team while riding behind them, lest they learn to haul apart. Oxen should be shod with a broad shoe, to travel on hard roads; the shoe on the fore-foot should set back at the heel, nearly half an inch further than the hoof bears upon it. Oxen are frequently lamed by reason of short shoes. The best feed for oxen at hard work, is to give to each two quarts of meal, wet mixed with good chopped hay, three times a day, and as much hay as he will eat; this is the highest feed working oxen ought to have, and on this they will work every day.—*Yankee Farmer.*

LATENT LIGHT.—At the last meeting of the British Scientific Association, Sir D. Brewster exhibited a piece of chalcedony, within which a minute landscape could be seen. If kept in total darkness for four hours, this marvelous picture vanished, but re-appeared as vivid as ever on ten minutes exposure to the sunlight; proving that not only could a design be mysteriously insinuated into the interior of the mineral, but that light could be stored up therein and produced at will. It was surmised that this effect had been produced by the action of nitrate of silver.

DISSOLVING INDIA-RUBBER.

Messrs. Editors:—Having just received the last number of the first volume (new series) of the Scientific American, I cannot refrain from snatching time to express my deep gratification. It is now nearly nine years since I first subscribed to your paper; and I can say of it (what I can of none other of the number that I regularly take), that, in all those years I have seen only *one* article that has not been fair, honest and manly, disinterested and sound. This is strong praise; but I feel that it is deserved. Nor is this all. From circumstances of my life I am one who is compelled to look deeper than a mere scientific man would look at the drift of the various positions and assertions in their bearing upon revealed (scriptural) truth; and it is a sincere gratification to be able to say that in all scientific questions, in which far too many are found to set against each other revealed truth and discovered truth, *you*, Messrs. Editors, have invariably taken the sound conservative ground of assured harmony between the two; and hence I feel that the influence exerted by the Scientific American is not only for the eularging of the bounds of knowledge, but for the establishing of the grounds of religion.

And now that I have expressed the gratification that I have felt in review of my past years of subscription, and of your constant progress in the value and excellence of your paper, let me add a few lines respecting a point mooted by two of your correspondents, in which they seem to contradict each other, and yet it appears that they are reconcileable. I mean, respecting dissolved india-rubber. One asserts that rubber dissolved in turpentine will not dry, and another maintains that it *will*. Allow me to suggest that both are right. Your last correspondent, who spoke of applying this varnish to boots, and of its drying there, has supposed absorption to be dessication. Thin varnish of india-rubber will dry when applied to any substance which will sufficiently absorb a portion of the adhesive matter; but as a mere varnish applied to any hard body or non-porous substance it will *not* dry. Rees, in his "Encyclopædia," speaks of this in reference to balloons; Mackenzie, in his "Compendium of Varnishes," said the same. In the one case absorption assists the process of dessication. Will not this reconcile the apparent discrepancy?

R. W.

New Berlin, N. Y.

[Our valued correspondent informs us that the "one article" which he says did not wholly please him, was one respecting perpetual motion. The particular article, however, he does not name, but it is of no consequence. The praise he bestows upon the Scientific American is exceedingly gratifying.—Eds.

HISTORY OF IRON SHIPS.

Messrs. Editors:—On page 406, Vol. I. (new series) Scientific American, in answer to a correspondent, it is stated you had been informed that a small iron steamer was launched in London in 1821. The first iron boat built, so far as I know, was a row-boat, in the year 1821, on the river Tyne, at Gateshead, England. The inventor was Samuel Thyue. Three brothers and two other persons joined him; when their employer, Sir Robert Shafto Hawks, found out what they were buying sheet iron for, he gave it to them, likewise a silk flag. A small iron anchor was gilded and fastened to the top of the flag-staff; cannon were fired, and quite a demonstration made when she was launched. She was very light, and one of the partners, who still had doubts of her floating, early on a summer's morn, when the painter was going to decorate her, carried her down to the water, and solved the problem. She successfully ran races against wooden boats of the same capacity. Some of the party or their acquaintances getting drowned at the "Barges" (an annual corporation festival held on Ascension Thursday on the river Tyne), caused them to lay her up, and she rusted away.

I have the anchor which was carried on the flag-staff of this boat; and I recollect reading an article, a few years ago, in *Chambers's Edinburgh Journal*, speaking of this boat on the Tyne as being the first ever built. Samuel Thyne, the inventor, is an old man in poverty, now living at South Shields, England. All his reward, hitherto, is the knowledge that thousands of his fellow-beings are getting a good living out of his invention.

Pittsburg, Pa. W. T. G.

COATING ELECTROTYPE PLATES WITH IRON.

Messrs. Editors:—The following process I have successfully employed in coating electrotype deposits with a coating of pure iron; thereby rendering them little inferior to steel plate engravings, as regards durability.

Dissolve 1 lb. of sal ammoniac in 1 gallon of rain water, then add 2 lbs. of neutral acetate of iron, boil the solution in an iron kettle for two hours, replacing the water lost by evaporation; when cold, filter the solution and keep it in close covered vats (when not in use) to prevent oxydation.

The iron plate used in the decomposition cell must be of the same surface as the plate to be coated with iron; a Smee's battery of at least three cells, charged with 1 part sulphuric acid and 60 parts water, being used for the decomposition.

To ensure success the following rules must be observed:—1st, The plate must be thoroughly freed from any greasy matter by immersion in a solution of caustic soda, then rinsed in clean cold rain water, after which dip it in dilute acetic acid, and immediately transfer it to the solution of iron; this will ensure perfect adhesion between the metals. 2nd, The solution must be filtered previous to use, to remove the oxyd of iron formed by exposure to the atmosphere. After the plates have been coated with iron they must be well rinsed in clear warm rain water, then in a weak alkaline solution, well dried with a piece of clean soft cotton, and slightly oiled to prevent oxydation.

The coating of iron is very hard and brittle, resembling the white iron used by manufacturers of malleable iron. Should any of the surface be damaged, the whole coating of iron may be removed by immersion in dilute sulphuric acid, and re-coated again by the above process.

R. W.

Newark, N. J.

Cashmere Goats.—The most beautiful shawls in the world are made from the long silky hair of the Cashmere goat, and it appears to us that this animal may be acclimated in many of the southern States. We are glad to learn that attempts are being made by enterprising planters in the South to acclimate it. We learn from the Savannah (Ga.) *Republican* that a small flock of the pure breed has recently been imported by the Hon. W. H. Stiles, of that State, and that, in all likelihood, they will be as much at home in Georgia as on the mountains of Asia. This is the second importation of such goats into Georgia, the first having been made several years ago, from which a number of flocks, especially half breeds, have been raised, all of which are prospering; and they promise, at some future day, to supply our markets with a manufacturing material which has made the name of Cashmere famous throughout the world.

Citric Acid in Acute Rheumatism.—Dr. Hartung states that this substance acts more efficaciously than lemon juice in acute rheumatism. He forms a mixture with six drachms dissolved in five ounces of water, and sweetened with two ounces of sirup. This is to be taken in from 15 to 36 hours, the patient also drinking as much cold water as he pleases, and the parts being wrapped in wadding. Of 45 cases of acute rheumatism, some of them very bad ones, so treated, in two only was the result not satisfactory. Sometimes, even after 24 hours of treatment, there is a notable diminution in the pain and fever, although, in most cases, from two to three days are required to produce this amendment. The remedy does not induce diarrhea, and it favors transpiration.—*Druggist's Circular.*

Steamboat Disasters on Western Rivers.—The St. Louis (Mo.) *Democrat* gives the losses for 1859, as follows:—Steamboats sunk, some of which were subsequently raised, 62; steamboats burnt, 26; steamboats lost by explosions, 4; steamboats exploded steam-pipes, 2; lives lost by steamboat disasters, 396; estimated loss of property, $2,383,000. The sinking of the sixty-two steamers was the result of the following causes: Encountering snags, logs, sawyers and stumps, 25; ice, 3; foundered in storms, 3; collisions with hidden obstructions, 31. There were, in all, collisions of boat with boat, or with river banks, bridges and wharf boats, causing disaster or considerable damage, 28.

A COLUMN OF VARIETIES.

Lord Ross' great telescope is a reflecting telescope; the concave mirror or speculum is 6 feet in diameter, 5½ inches thick at the edges and 5 inches thick at the center, and weighs about 3 tuns. It is composed of copper and tin—126 parts of copper to 57½ of tin. Its focal distance is about 54 feet. It was ground with emery under water by the power of a small steam engine, and the process of grinding occupied 6 weeks. The whole telescope weighs 15 tuns.....The mode in which the celebrated philosopher, Du Buat, measured the velocity of water at the bottoms of rivers was by throwing in a gooseberry, as nearly as possible of the same specific gravity as the water. It was carried along the bottom almost without touching it.....The action of a mixture of sulphuric and nitric acid on cane sugar forms a glutinous soluble mass, which, when first washed with water and dried, and then highly heated, explodes without residue. It is known as explosive sugar.....Many rivers, by the deposit of solid matters held in suspension in their waters, are constantly raising their banks. The surfaces of many rivers in alluvial districts are considerably higher than the land at a few miles on either side of them.....The roof of Westminster Hall, London, constructed of sweet chestnut timber, is 460 years old.....Wooden sailing vessels have occasionally remained sound after 100 years' active service.....Iron and wooden ships are, other things being equal, insured at equal rates.....The term "Sicilian Vespers" is generally used in reference to a terrible massacre of the French rulers of Sicily which took place in an insurrection of the people in 1282.....At the time when the battle of New Orleans was fought, Jan. 8, 1815, a treaty of peace had been signed in Europe between Great Britain and the United States, but the news of it had not reached this country.....The very common notion that the breastworks at the battle of New Orleans were formed of cotton bales is a mistake; they consisted almost wholly of earth.....The remark, so generally attributed to General Taylor at the battle of Buena Vista, "A little more grape, Capt. Bragg," was not uttered at the time, as was publicly stated by Captain Bragg just after the election of Taylor to the Presidency.....The exclamation so often attributed to Wellington at Waterloo, "Oh! for night or Blucher," is stated, on good historical authority, never to have escaped the lips of the Iron Duke.....There is a form of charcoal known as mineral charcoal, which is found associated with coal. Fine specimens have been obtained near Glasgow from the neighborhood of trap-dykes and blind-coal.....In Tuscany and other parts of Italy and Sicily, volumes of steam, called fumaroles, issue in large quantities through openings in the earth.....Locomotive tires are gradually extended in circumference by the friction to which they are subjected. They often become so loose upon the wheels as to require to be taken off and set anew.....In testing the ashes from coke, burned in the copper fire-boxes of locomotives, a considerable quantity of copper has been found. No such deposit was detected when white ash coal was burned.....Dr. Joule found that the power derived from the combustion of one pound of coal in a furnace was equal to that obtained by the decomposition of 9 lbs. of zinc in a galvanic battery.....If a small quantity of a solution of starch be exposed for a short time to the light of the sun it will be converted into grape sugar.....The surface of a stream flowing with any considerable velocity is always higher in the middle than at the sides.....The *Industry*, a timber-built steam vessel, launched on the Clyde in 1814, is still in existence.....Water, in passing from the solid to the liquid state, converts 140 degrees of sensible into latent heat; in passing from the liquid to the aeriform condition it absorbs about 1,000° of heat, rendering it latent. Alcohol, in evaporating, absorbs 374° of heat: ether, 163°; and spirits of turpentine, 138°.....Ehrenberg, who is called the father of microscopy, differs from nearly all the microscopists of the world in regard to certain little organisms being animal or vegetable; they move along with a slow steady motion through the water, and Ehrenberg calls them animals, but it is generally regarded as settled that they are vegetable.....Many animals, some microscopic and some visible to the naked eye, are fastened permanently to the rock on which they grow, and so nearly resemble a plant that no casual observer would take them to be animals.....Some of the microscopic animals resemble very closely a string of square beads, a part of them joined merely at the corners.

IMPROVED SHINGLE MACHINE.

The well-established superiority of rived and shaved shingles over those which are sawed, and the vast amount of manual labor which is annually expended in shaving shingles by hand, has called forth a great deal of inventive effort to devise some mode of accomplishing the same results by means of machinery. We have seen some large and expensive machines which made very handsome shaved shingles, but it is of course very desirable to supersede them by others smaller, cheaper and more simple. Such is the object of the invention which we here illustrate.

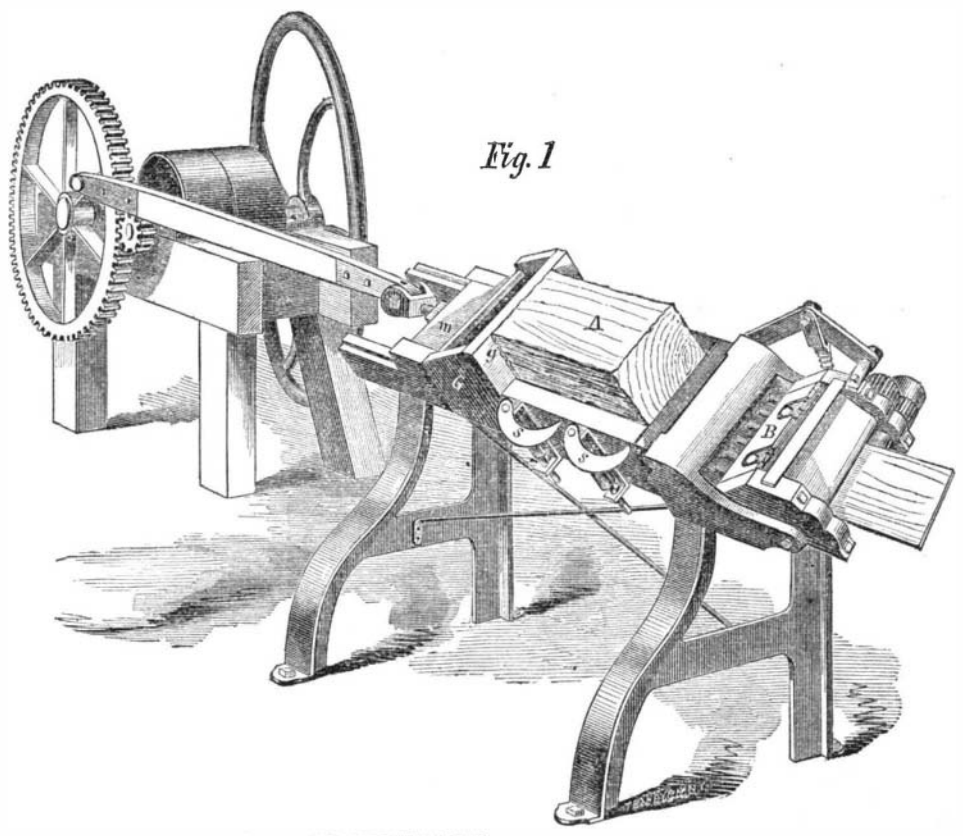


Fig. 1

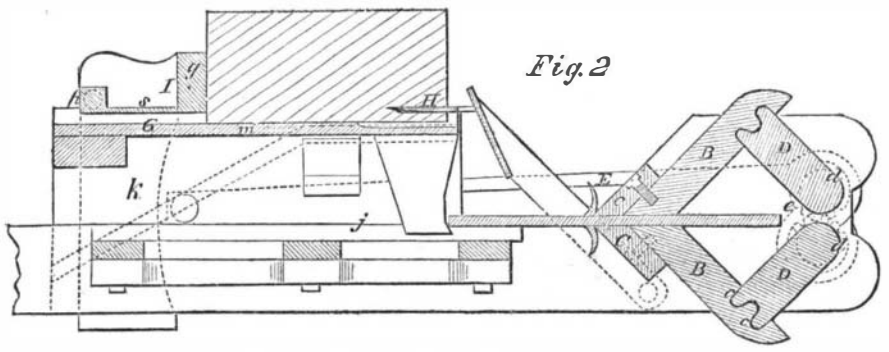


Fig. 2

A is the bolt from which the shingles are to be rived, previously got out in proper size and form, now placed upon the inclined bed of the machine, as shown. The bolt remains stationary, merely dropping down as the shingles are rived from its lower side, while the knife, H, Fig. 2, is fastened to the right hand end of the bed, *m*, which receives a reciprocating motion from the crank, *r*, Fig. 2. The shingle is split off as the knife is being drawn back from the right to the left, dropping down upon the slats, *j*, ready to be pushed forward through the shaving knives on the return of the bed, *m*. The slats, *j*, are about an inch in width and an inch apart, and are stationary, while the reciprocating bed, *m*, is furnished with similar slats sliding freely between the slats, *j*. The square ends of the moving slats coming against the end of the rived shingle press it between the planing knives. As the bed, *m*, moves from the right to the left, the crescent-shaped plates, *s s*, turn in between the parting shingle and the remainder of the bolt, and support the bolt till the stroke is completed; when the bed, *m*, returns from the left to the right it presses the plates, *s s*, out from beneath the bolt, allowing it to fall down upon the bed, *m*, in front of the riving knife. In this motion of the bed from left to right, the shingle is planed in the proper wedge shape by being pushed between the knives, C C, which are gradually brought more nearly together during the passage of the shingle. This motion of the knives is effected by bolting them securely to the slides, B B, and imparting to these slides a short reciprocating motion by means of the cranks, D D. These cranks are secured to the axles, *d d*, which gear together, as shown at e, and receive a rocking motion from the lever, E, shown in dotted lines, which is attached to one of the axles, *d*. This lever has a forked elbow at its end which grasps the inclined ledge, *g*, which ledge is fastened upon the further side of the sliding bed, *m*, and as it moves along, raises and lowers the end of the lever, thus alternately drawing the knives, C C, apart and pressing them together with great force. By varying the inclination of the different portions of the ledge, *g*, the shape of the shingle may be regulated at pleasure. These combinations make a compact, simple machine which produces a very handsome shaved shingle. It is complete in itself, requiring no engineering skill to place it, and the several motions are effected by such arrangement as to make them very certain in their relations to each other.

The patent for this invention was issued through the Scientific American Patent Agency, Dec. 13, 1859. The inventor is E. R. Morrison, who assigned the invention to S. C. Hills, to whom the patent was granted and who may be addressed for further information in relation to the matter at No. 12 Platt-street, this city.

HATCH'S BED BOTTOM.

This is a bed bottom of sacking or canvas, attached to the bedstead by elastic spiral springs, and supported in the middle by an elastic bar, with an improved mode of attaching the sacking to the springs.

In the annexed cut, Fig. 1 represents an ordinary bedstead with strips of wood secured firmly to the insides of the side and end rails. To these strips small cylindrical rods are fastened by means of screws with solid ring heads, through which the rods pass. Wrapped around these rods are the spiral springs, *a a a a*, one end of which is pushed into the strip beneath to keep the rod from turning, and the other end projects upward and inward towards the middle of the bed, and is bent to form a hook. To these hooks the sacking is attached by means of the metallic loops, *b b b*, illustrated on a larger scale in Fig. 2. These loops may be made of malleable iron, and fastened to the lower side of the sacking with thread or twine. A hand hook is used to stretch the sacking in placing the loops upon the hooks of the spiral springs, and when the sacking becomes stretched by use, it may be tightened by catching the cross bars of the loops upon the hooks. Fig. 3 shows the end of the middle bar, C, which is stretched longitudinally below the sacking to prevent the sagging of the bed in the middle. This bar is divided near each end, and joined by the elastic webbing, *d*, which with its own elasticity, prevents it from being too rigid and thus incommoding the occupants of the bed.

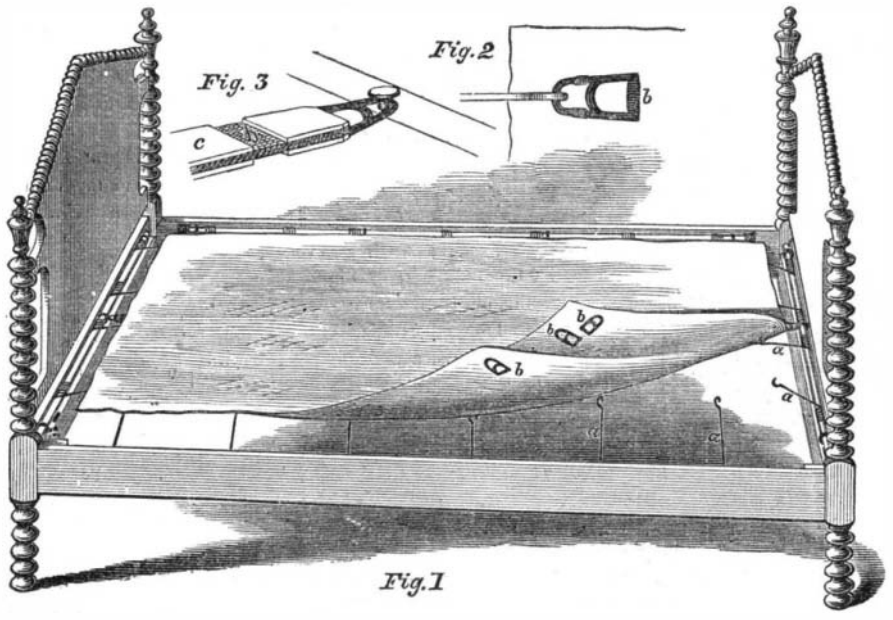


Fig. 2

Fig. 3

Fig. 1

Elastic canvas or sacking bed bottoms are particularly adapted to warm climates or hot seasons, especially for invalids who are confined for a long time to their beds. It will be seen that the mode of connection here described renders it very easy to attach this bottom to berths in ships and steamers, and to bedsteads of any width. We have seen a child's crib, constructed after Mr. Hatch's patent, and we consider is well adapted to such an application.

The patent for this invention was issued, through the Scientific American Patent Agency, to Royal Hatch, Aug. 30, 1859, and persons desiring further information will please address the manufacturers, Henry C. Hatch & Co., Strafford, Vt.

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VOL. VI., No. 3.....[NEW SERIES.]....*Sixteenth Year.*

NEW YORK, SATURDAY, JANUARY 18, 1862.

AGRICULTURAL IMPROVEMENTS.

EVERY department of American industry has been greatly improved within a very few years, and this is especially the case with agriculture. This affords cause for gratitude, because all those who are engaged in the professions, commerce and the common arts are dependent upon the surplus products of agriculture for sustenance. The present year has been unexampled in productiveness; the fields have yielded abundant harvests, and the orchards have been bowed down with heavy loads of golden fruit. "These blessings," as one said to us recently, "have put our farmers in good heart," and we judge from the cheerful tone of several discussions which have lately been held at agricultural society gatherings, that prosperity is acting as a wise stimulant to further enterprising action. With the great amount of intelligence which is now widely disseminated on agricultural subjects, old defects and new wants are becoming more generally known. This may surprise many persons who have imagined that the field for agricultural inventions was almost fenced in. Owing to the great number of patents which have been issued of late years for farmers' implements and machinery, many inventors have considered that the range for their efforts in this department was very circumscribed. We assure them such is not the fact, and the past affords us good grounds for this opinion. Fourteen years ago, the yearly issue of agricultural patents was 78; in 1859, it was 664, which is an increase of eight and a half times in these few years. When there were only 78 patents granted in one year, many persons thought that the end of improvements had arrived—that the plow had surely attained to perfection. In his report for 1846, Examiner Dr. Page indulges in a sort of lamentation over the paucity of agricultural inventions for that year, and he concludes with the mournful apothegm, "farming is up-hill work." Perfection cannot be attained without severe toil, and "there is no royal road to knowledge." Farming may be "up-hill work," but the toil of ascending the mountain peak is all forgotten when the summit is gained and the world seems spread out before our vision. Similar results have animated those who have devoted themselves to agricultural improvements. No field for the inventor's exploration has brought so many rich rewards for new discoveries; and yet we think it is just about as inviting as it was fourteen years ago. Although the McCormicks, Mannys, Peelers, Pitts and others have become rich as Crœsus by their patent harvesters, plows and grain separators, they have not exhausted the subject, and it is to this particular point we wish to direct attention.

On page 266 of the present volume of the SCIENTIFIC AMERICAN, we quoted the opinions of a writer in the New York *World*, respecting the defects of common plows and the benefits which would result from an entire revolution in the mode of preparing the soil for planting. A machine which would dig up and thoroughly pulverize the soil was recommended as a superior substitute for the common plows, which merely turn it over in furrows. This subject was also brought up at the meeting of the Farmers' Club, held in this city on the 22d ult., at which the secretary stated that, as there was to be another World's Fair in London in 1862, he "hoped some ingenious American citizen would invent a practical tilling machine which would rapidly pulverize the soil and put it in good condition for planting, and present it at the international exhibition." "There is now," he said, "no machine in existence capable of performing this labor, but I trust one will be brought out at the exhibition which will reflect credit upon American genius and industry." Here is a new want which inventors are called upon to supply by those specially devoted to agriculture. And if this is the case with such a venerable operation as that of plowing, it is reasonable to infer that many other operations in farming, as commonly practised, may also be greatly improved by a new class of machines, which will produce a revolution in the modes of executing them.

LIGHTING MANUFACTORIES BY WATER POWER.

The experiments with Way's electric light have demonstrated that a brilliant and constant light may be maintained without any other expenditure than that of mechanical power; but if the power is obtained by a steam engine, the cost of the fuel makes the light expensive. As our cotton and woolen manufactories that are driven by water power, almost all have a surplus of power in the winter months, the only season during which they are lighted, would not the owners find this the best and cheapest plan for lighting their establishments?

An hour glass, containing a supply of mercury, would be placed in the middle of each room, just under the ceiling, and insulated wires, passing perfectly air-tight through the glass, would lead to a magneto-electric machine in any convenient part of the establishment. The wires would connect with the mercury in each end of the glass, and when the magneto-electric machine was turned by the water wheel, the current of electricity passing along the wires, would run through the slender stream of mercury flowing down from the upper chamber of the hour glass to the lower, the light being given out by the electric current as it darted from drop to drop of the mercurial stream. When the mercury had nearly all run down from the upper bulb of the glass to the lower, it would be necessary to turn the glass over, for which purpose it might be connected to simple clockwork, and the wires would be brought out of it through the axle on which it was hung. A separate machine would probably be required for each light, and the power demanded would be considerable, but the room would be filled with such a flood of light as was never yet seen in a manufacturing establishment, and all the current expense would be the very trifling outlay required to keep the apparatus in repair.

We expect to see before long the Lowell and Manchester manufactories illuminated at night as brilliantly as by day by the use of electricity in some manner, and most probably by the magneto-electrical machine and mercury light of Professor Way.

MOROCCO LEATHER DRESSING.

Although enameled oilcloth, having its surface finished to imitate morocco leather, has come into very extensive use during the past five years, still it does not seem to have injured the manufacture of the genuine article. Morocco dressing establishments are still increasing in number and extent. Real morocco leather is made of tanned goatskin; but the term is now, in a general manner, also applied to tanned sheepskin, which is colored and dressed with a polished and corded surface in imitation of morocco. Having been informed that the manufacture of sheepskin into colored leather was carried on extensively, and in a superior manner, in Albany, N. Y., by the firm of A. Williamson & Sons—old and experienced leather dressers—we recently embraced an opportunity of visiting their establishment, while briefly sojourning in the capital of the empire State. It is situated near the upper extremity of a street called Broadway, and although this street is very unlike its great namesake in New York, it can boast of a good morocco factory, in which some new and improved processes are carried on. Colored sheepskin is principally used for shoe bindings, and, in this establishment, the majority of the pelts are obtained green from sheep and lambs slaughtered in the vicinity. About 100,000 skins are dressed annually in it, and from these about half a million pounds of wool are obtained and sold.

The first process through which they are made to pass is that of soaking and softening by water, to fit them for receiving the unhairing preparation. Formerly hydrate of lime was sprinkled in the inside of each pelt; it was then folded over with the wool side out and laid down on the floor, sometimes called "the pit." In this manner a whole pile or heap was made, and a heating action was engendered by which the roots of the wool were loosened, so that the fleece could be easily pulled or scraped off on a table afterwards. This method of loosening the roots of the wool was tedious, occupying several days to complete, and the skins required constant watching, as they were liable to overheat and injury both to the wool and the gelatinous tissue. This was especially the case in warm weather; but a remedy for this trouble and these ills was lately introduced by the senior member of the firm, and is one of the most important improvements made, for many years, in this art. This is effected by a calcium orpiment compound, which they import and have also introduced among other manufacturers. It is made up into a thick creamy consistency, then applied to the inside of the skins which are folded over, wool side out, and laid in a heap, as before described. In twenty-four hours afterwards the skins can be deprived of their wool, and if they have to lie longer, no injury will result. In all cases the depilatory action is certain without injury to wool or skin tissue.

The next operation is that of washing the skins prior to unwooling them. This latter manipulation is executed by placing them upon an inclined bench, and rubbing off the wool with a blunt tool. The flesh side of the skins is also scraped to remove slime and loose flesh, after which they are ready for the liming operation. They are now placed in vats containing milk of lime (slacked lime mixed with water), in which they are treated for about two weeks. The office of the lime appears to be that of a corrosive agent for the removal of grease in the skins, as it would prevent the action of the tannic acid afterwards. The lime does not act upon the gelatinous tissue, which alone forms the leather when combined with a tanning agent. A new discovery to shorten and cheapen this part of the process would be invaluable.

The next operation consists in passing the skins through a bath of hen or pigeon manure, mixed with water, which softens them. After this they are washed and passed through a sour of dilute sulphuric acid, which neutralizes all the lime that may remain in the pores of the skin, converting it into a sulphate, which is easily removed by a good washing in moderately warm water. After this they are dipped into a solution of common salt, sewed up at the edges with the grain side out, to form bags partly filled with tanning liquor, inflated and tied. They are now placed in a tub containing an extract of Sicily sumac, in which they float and are kept in constant motion for several hours; and when they have absorbed a sufficient amount of the tannic acid in the sumac to convert the skin into leather, they are taken out, drained and rinsed; and if not to be colored, they are ripped out and dried in the atmosphere in sheds constructed for the purpose. They are stretched on boards, rubbed out to render them smooth, and tacked down so as to dry without wrinkling. These skins are generally filled three times with fresh liquor to tan them fully.

The next operation is that of coloring. If the color is to be applied topically by putting it on the surface with a sponge, the skins are first dried. If they are to be dyed in liquors, they are sewed so as to have the grain side out, then mordanted, and afterwards handled in a tub containing the coloring agents. Prussian blue colors are imparted by handling the skins first in a dilute solution of nitrate of iron for about an hour, then in a warm bath containing the cyanide of potash and a little sulphuric acid. A beautiful blue is thus dyed. A scarlet is prepared with a mordant of the muriate of tin and cream of tartar; the red color is afterwards obtained by handling them in an extract liquor of cochineal. Purple is dyed by applying a cochineal color on the top of a Prussian blue. Bronze is obtained from a strong extract of logwood and alum. After being dyed, the skins are rinsed, stretched on boards, rubbed smoothly down, tacked around their edges and dried.

Topical applications of color are given to the grain surfaces in many instances. They simply consist of a strong extract applied with a sponge or a piece of cotton

cloth; almost any color can thus be put on. A scarlet color is made by a topical application of an extract of turmeric upon a dyed cochineal red. To enable some of the coloring agents to go on evenly, milk and the white of eggs are frequently mixed with them. These applications also serve to impart a metallic luster to the surface. Prior to rolling, the dyed skins are slightly shaved on the wrong side and trimmed at the edges.

The subsequent finishing operations consist in rolling the skins on a table under a small weighted roller having a grooved face, and which is attached to a suspended arm which the operator moves back and forth until the roller has traversed the entire surface. This operation imparts a glossy cordovan surface to the leather. A second rolling, with the grooves running in an angular direction, gives the surface a diamond corded finish—the true morocco style. Formerly these skins were all finished by hand labor. The operatives stretched them on inclined boards, and rubbed over their surface with grooved balls of ebony held in the hand. Sometimes an extra finish is still imparted in this manner to skins.

In this factory we saw the first aniline (popularly called Magenta) colors on morocco that have been applied in this country. The senior partner had been on a European tour last summer, and obtained the new color from abroad. It produces the most beautiful shades of purple, lavender and lilac upon leather. No coloring agent hitherto known can equal it.

All processes for making leather from skins is not tanning, although most persons so term them. White leather is prepared with alum, and in some instances with a paste of flour. These are tawing, not tanning processes. It requires an agent, such as hemlock, oak or sumac, containing tannic acid, brought into contact with gelatinous tissue, to constitute the tanning process.

Heavy sheepskins are frequently split by machinery, and for some purposes such leather is more suitable than any other kind. In this factory, a new machine for splitting had just arrived from England, and we were surprised to learn that, although it did not split so many skins in the same space of time as the American splitting machines, it was preferred because its work was of a superior quality. The cutting knife moves with a reciprocating sawing action, and is driven with a very high velocity.

We have in this brief description of morocco dressing mentioned three new improvements not to be found in works published on the subject, viz.: the depilatory process, the cleansing operations with dilute sulphuric acid, and the new styles of colors. Morocco leather dressing proper is principally carried on in our cities on the seaboard or in their immediate vicinity, as the goat skins are all imported from India, Africa, &c., and the sumac for tanning them from the island of Sicily—that land to which the eyes of the whole civilized world have recently been directed, on account of the wonderful exploits of Garibaldi and his heroic followers, fighting for the freedom of Italy.

Wear of Railway Car Wheels.—An examination made last year, on the Reading Railroad, in England, showed that, of all the wheels in use on all descriptions of cars since 1852, the average wear had been that of 58,094 miles, before the wheels were renewed. The life of the wheels under the passenger cars was ascertained to be 117,706 miles, a fact which shows not only the superiority of the wheels used under passenger cars, as compared with those under freight and coal cars, but also the advantage of good springs, those under the passenger cars being much the easiest on the road. The coal trains have been rnn at from 8 to 15 miles an hour; the passenger trains at from 25 to 40 miles. These results, as to wear, were carefully ascertained, and are of value to other railroad companies.

California Mechanics.—We learn from our California cotemporaries that the Fair of the Mechanics' Institute held in San Francisco in the month of September last was an entire success. The *California Farmer* says respecting it:—"We say that the mechanics of California have reason to be proud of the exhibition they have made of their skill and progress, and every observer should also be proud that our State can show such enterprising and skillful operators."

Thomas T. Strode.—The address of Mr. Strode is Mortonville, Pa.

DISCOVERIES AND INVENTIONS ABROAD.

Trussing Casks.—In trussing casks, coopers generally make a fire of shavings inside of them, for the purpose of slightly warming the staves and thus enabling them to be driven up more easily. A patent has been taken out in England by Thomas S. Cressy, of Burton-on-Trent, for a heating furnace for casks. This furnace is secured between jointed levers and raised up in the inside of the casks, and also lowered, with the greatest facility, to supersede the trouble of making a new fire of shavings for each cask to be trussed. This improvement deserves the attention of all coopers.

Transferring Pictures to Glass.—A patent has been granted to Willoughby Smith, of Dalston, England, for the following process relating to transferring prints. He takes the print of any picture produced on paper and treats its surface with three coats of collodion. When this is set and hard, the paper is washed off, when the ink or color will be found firmly attached to the film of collodion. To effect this operation perfectly, the print should be first stretched on a board and receive the coats of collodion, then put into water to soften it, when it may be easily rubbed off, leaving the design firmly fixed upon a transparent coat of collodion, which is then allowed to dry and afterwards receives a thin coat of transparent varnish. Collodion may be rendered tough and transparent by adding about three per cent of castor oil and the same amount of Canadian balsam to it and boling them together in a close vessel until they are thoroughly incorporated. The printed film of collodion is now ready for mounting upon glass. This is done by placing it between two plates, pressing them close together, and cementing their edges by pasting a strip of paper around them. By this process any printed pictures may be transferred, rendered transparent, and fitted for the slides of magic lanterns. These collodion transfer pictures may also be pasted on single strips of glass and covered on the back with transparent varnish, and in this manner ornamented windows may be easily made by almost any person.

Hardening Spindle Caps.—In spinning and doubling machinery, the spindle cap consists of a cylinder of cast iron, polished on the outside and placed on the spindle. Being made of cast iron the caps are easily damaged by a blow or by falling on the floor. To remedy this defect and render them more enduring, W. Smith and P. Smith, of Keighley, England, have taken out a patent for hardening them in the same manner that steel tools are treated; that is, they heat them to a red heat, then dip them in a bath of cold salt brine.

Deep Sea Telegraphs.—In a communication to the London *Mechanics' Magazine*, Thomas Allan, Esq., a distinguished electrician, states that of 12,000 miles of submarine cable which have been laid in various parts of the world, only 1,200 miles are in working order, at present. He asserts that the success of any ocean telegraph depends entirely on the nature and construction of the cable, and that those companies (such as the Atlantic, of famous memory) which have failed have themselves to blame, because they persisted in dogged adherence to the use of cables which were suited only for shallow waters. An ocean cable, he says, should have great internal strength and low specific gravity—lightness—and it should be made of such materials as will permit it to be thorougly tested before it is laid down. There were upwards of 1,500 joinings in the Atlantic cable, and it never was tested under water until the cable reached the bottom of the sea.

Cast Iron Enameled Water Pipes.—The pipes which are employed to convey water in cities are made of cast iron and are very liable to rapid corrosion, when placed in the vicinity of leaky gas pipes. To obviate this evil, cast iron pipes for conveying water are now being made with imperishable surfaces, by Messrs. Salt, of Birmingham. Cast iron pipes thus treated will be more expensive at first, but cheap in the end, as they will last for a hundred years, whereas, in many situations, common cast iron water pipes have to be renewed every seven years.

The Sun: Is it a Sphere of Fire?—M. Leverrier, of Paris, believes that the spots seen on the snn's disk are clouds in its atmosphere. His opinion is that the sun is not a luminous body on account of its high temperature, but that it is a huge solid or liquid body surrounded by an atmosphere. A common opinion respecting the constitution of the sun is that it has a luminous atmosphere but an opaque body, and that the spots seen on the sun are open spaces formed by unknown causes in the luminous atmosphere. This subject is still shrouded in mystery, and on this very account it excites more general interest.

Earthquakes.—Within the memory of man, earthquakes have been principally confined to a few localities, such as Aleppo, in Turkey, Portugal and Calabria, in Europe, and Chili, in South America. Most of the people in Europe and we, dwellers in North America, have congratulated ourselves that there was no danger to us of such trepidations of the earth producing like sensations in our sensitive hearts. According to Dr. Ansted, of London, however, we are admonished not to be quite so secure in our reflections of immunity from earthquakes, and the quake which vibrated through New England and Canada, last week, affords him argument for his opinions. He tells the people of London, in the *Chemical News*, that "earthquakes have frightened our forefathers, and may overwhelm us. The fatal explosion may happen this or next year; it may not happen in this century. It may originate beneath our very feet, or at the bottom of the ocean near our shores, or it may take place so far away that we hear only the faint distant echoes of the convulsive throe, but we are not the less certainly living over a mine ready to be sprung, and no one can tell when or where the fatal match will be applied."

Wooden School Slates.—Since the manufacture of wooden nutmegs, in the State of Connecticut, has ceased, the people have turned their attention to the manufacture of all sorts of Yankee notions, from patent sewing birds, in the manufacture of which a fortune has been made, and wooden clocks, in which fortunes have been made and lost, down to campaign medals, of which one manufacturer turns out ten thousand per diem. About the last invention contrived by one of these ingenious people is the manufacture of school slates out of wood. Not long ago, Messrs. Dean and Munger, of New Haven, Conn., took ont a patent, through this office, for the manufacture of this article, and from their manifest superiority over the old stone slate, they are going into almost universal use. They are made of three thicknesses of veneering glued together and covered on both sides with a black coating of just the proper degree of roughness to receive the impression from the pencil, and are then framed in the usnal manner. Their most striking peculiarities are their extreme lightness and durability; they may be thrown down and even stamped upon without being broken. The manner of polishing these slates is illustrated on another page. The same firm also make blackboards with the same covering.

The Oil Region of Pennsylvania.—A correspondent of the Boston *Post*, writing from among the oil works of Pennsylvania, says:—

"The hotels are crowded, people often sleeping three in a bed, and one hears nothing talked of but "petroleum," "surface indications," "boring," territory," "pumping," &c., landlords, doctors, lawyers, ministers, blacksmiths, and almost everybody has an interest in a well bored, or being bored. As to the election, it is entirely forgotten in the eagerness of securing a fortune. A politician drove up to old Father Raymond's Rural House, in Franklin (the old man has two wells pumping fifty barrels daily) and after getting his dinner, commenced pumping the old gentleman by asking, "How is politics?' "Don't know any such well aronnd here," replied Father Raymond. "But," says the stranger, "what is the prospect for Douglas or Breckenridge?" "Oh," says Boniface, "I don't know, it all depends on whether there are any surface indications." "But," continues his guest, "will fusion go down among you old diggers?" "Fusion," exclaims the landlord, "well, I don't know, some of these chaps called geologists say that there must be fusion below, but my opinion is that the devil has something to do with it down there before we get it." "But," says the politician, "are you not in favor of squatter sovereignty in the Territories?" "No; I will shoot anybody who dares to squat on any of my territory, and I own four miles on Sandy Creek!" "Give me my horse," says the stranger—and vamoosed.

Several mines are new being worked with success in the White Mountains, N. H. About four tuns of charcoal iron are turned out daily at the Franconia iron mine. The ore is magnetic oxyd of a very superior quality.

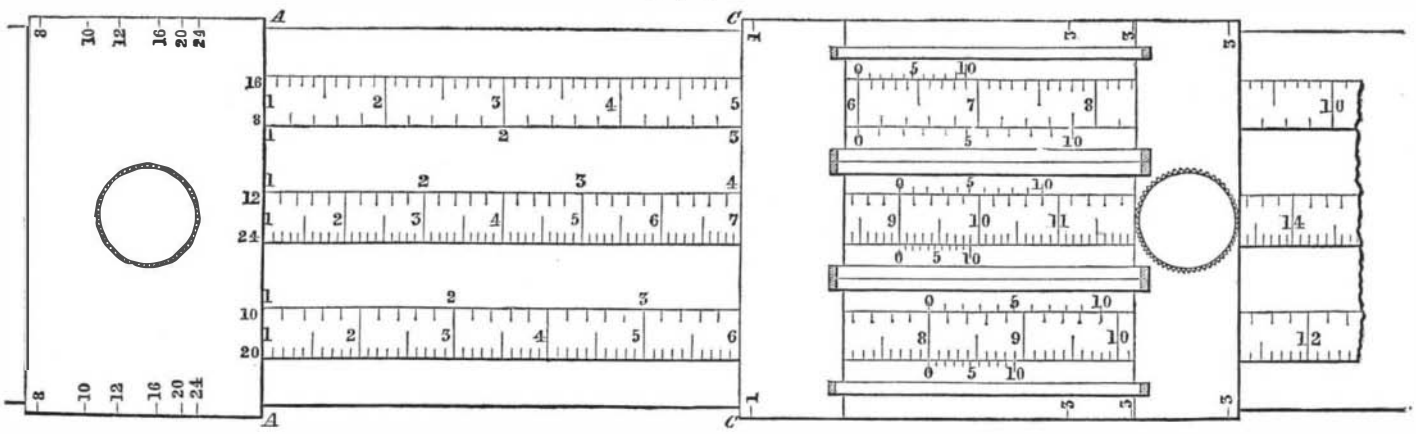
PROTRACTING TRIGONOMETER.

The annexed engravings represent an improved instrument for protracting maps and for other uses of draughtsmen, recently invented and patented in the United States and in Great Britain by Josiah Lyman, who may be addressed in relation to it at Lenox, Mass.

Fig. 1 shows the scale plate in its true size and proportions, except in length. Accompanying the trigonometer is a draughting board with a metallic border, easily rendered, by its adjustments, *exactly rectangular*.

Fig. 2 gives a vertical view of the entire instrument, the parts being shown in their true proportions, except that the scale plate and rule are both represented as broken. The engraving is a little more than one-third the true size.

Fig. 1



LYMAN'S IMPROVED PROTRACTING TRIGONOMETER.

The metallic plate, E (Fig. 2), has a lip projecting downward from its straight edge, to be placed against the edge of the draughting board in the usual manner of this class of protractors, when the angle is measured by the position of the iudex upon the graduated arc.

The principal feature, however, in this invention is the arrangement for measuring the lengths of the lines. For this purpose, a graduated brass plate is fitted to slide upon the long arm or rule of the protractor, and upon this plate is a shorter one furnished with adjustable verniers, called a "guide." Fig. 1 represents a section of the rule with a slide upon it. The slide is placed with the proper one of its zero points (marked 8, 10, 12, 16, 20 or 24) at one end of the line, and the guide, C, is slipped with its edge to the other end of the line, when the length is indicated by the proper scale and vernier to the thousandths of an inch.

This beautiful instrument is a twofold achievement. While it is strictly a scientific combination—uniting in one instrument the protractor, draughting rule and sliding vernier scale plate—the accuracy and skill apparent in the arrangement and construction of its mechanism are a triumph in art. For such are the peculiarities of its construction, though simple, that it enables the operator completely to eliminate the unavoidable errors of manufacture, and hence actually to lay down upon paper the data furnished by his field notes, and measure the varied parts of his work with mathematical precision.

The protractor and rule are connected by a common pivot, the divisions on the limb of the former being made to half degrees. To the attached end of the latter is fastened an adjustable, double, direct vernier, reading to minutes. The given angle and its complement are obtained at one setting of the instrument, and each of them can be taken in *two positions* of its vernier: hence, an azimuth motion of 90° gives 180°; the bearing and reverse bearing of a line always having the same line of direction. Hence, also, by reversing the instrument, every angle may be tested. The scale plate is used on *either side* of the ruler, or *separately*, as occasion may require. In the common instruments, it has graduated upon it *six decimal scales*—the units being 10-8ths, 10-10ths, 10-12ths, 10-16ths, 10-20ths and 10-24ths of an inch.

On the scale plate of the best class of instruments there are graduated *nine* scales instead of *six*. This is done by merely bisecting the subdivisions of the three finer scales, changing the figuring and appending an additional vernier to each of the three corresponding vernier pieces. The units of the additional scales are 10-32ds, 10-40ths and 10-48ths of an inch. The 10-40th inch scale furnishes an even ratio between the inch and mile; the inch in this case representing 4, 40, 400, 4,000, 40,000, &c., chains. The French scale, with 5, 10 and 20 millimetres for the units, will be substituted for either of the systems above described whenever the demand shall require it. The same assurance is given in regard to any other scale which shall be largely demanded.

The trigonometor thus constructed is not only four times more reliable than the chain and compass, but furnishes the best means yet discovered for detecting their errors. It lays down or measures, at the same time, both the angle and distance, rendering unnecessary in all trigonometrical calculations to five decimal places the use of logarithms, and, in all cases, the traverse tables. It thus saves half the time and labor in the mensuration of all forms of triangles and trapeziums, areas of irregular fields, and of hights and distances. For all purposes of draughting the trigonometer is wholly unrivalled, and needs only to be known to render its use a necessity to every surveyor, architect, draugbting machinist, map maker and teacher of these branches—in a word, to *every draughtsman*. And its cost is such as to place it within the reach of every practical man.

These facts are fully substantiated by the mathematicians, surveyors, teachers, &c., in various parts of the country who have had an opportunity to examine the instrument, among whom are the following:—Edmund Blunt, Esq., manufacturer of philosophical and astronomical instruments, and First Assistant in the United States Coast Survey; Professors Tatlock, Hopkins, Hubbard, Helsey, Snell and Curtis, of Massachusetts; Messrs. O. C. Wright, Z. Richards, C. H. Norton and A. C. Richards, of Washington, D. C.; Professor J. S. Benedict, Civil EngineerNew York Free Academy; Professors H. A. Newton, W. H. Norton, C. S. Lyman and Alex'r C. Twining, of Connecticut; J. H. French, Esq., Superintendent of the New York State Map; George P. Bond, Esq., Observer at the Cambridge Observatory; Professor O. M. Mitchell, Director of the Cincinnati Observatory; mathematical instrument makers, delineators in the United States Coast Survey and Land Offices, as well as other practical surveyors, architects and distinguished teachers in various sections of the country.

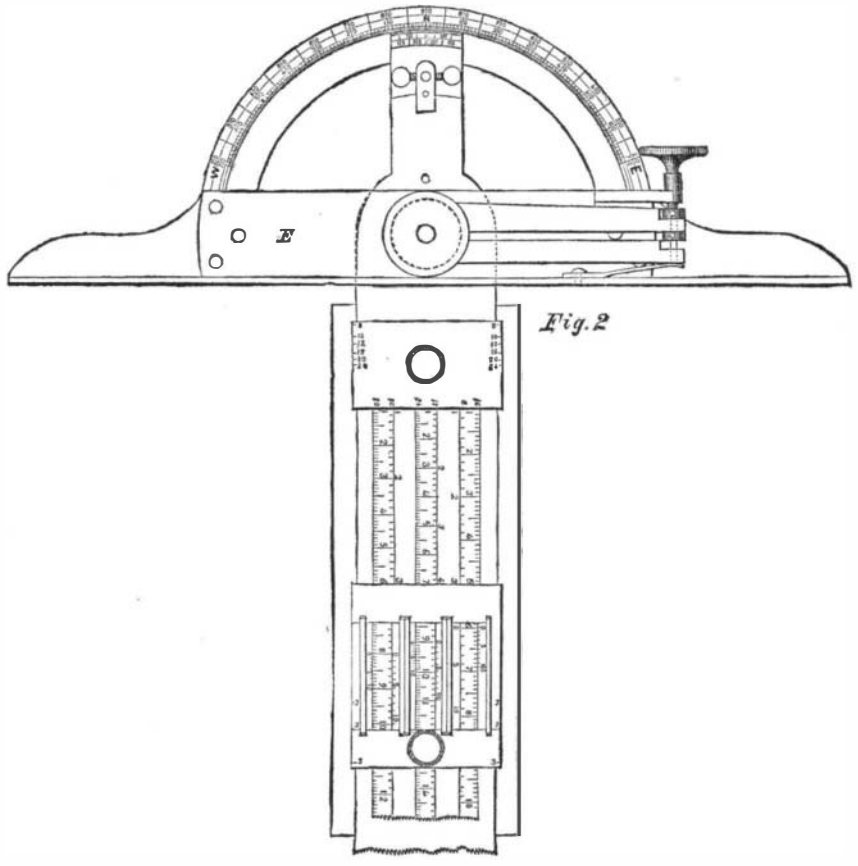


Fig. 2

DIFFICULTY OF DISTINGUISHING A PLANT FROM AN ANIMAL.—The more naturalists know of the plants and animals of the globe, the more difficult have they found it to distinguish one from the other. Among the little organisms which are invisible to the naked eye, there are large numbers about the character of which there has long been a fierce dispute, they being claimed by the botanists as plants and by the zoologists as animals. Many of the plants in certain stages of their growth, swim about in the water and look and act so nearly like animals that they would probably have always been classed as such had they not been observed to branch out and grow up into perfect plants. There is no single character by which the animal or vegetable nature of an organism can be tested; but the safest guide in the doubtful cases is furnished by the mode in which the nourishment is taken. Animals are nourished by organic matter, which they take in some way into the interior of their bodies; while vegetables have the power of absorbing their food from inorganic elements on the exterior.

IMPROVED WATER WHEEL.

In regard to the wheel here illustrated the inventor says:—

My improved water wheel is designed, and, from practical experience, does use water very economically under varying heads with a given amount of work, and also as well under a constant head and a varying amount of work.

For example, I have a mill with four run of stones, driven with one wheel, all of which can be run during one-half of the year; but for a large portion of the other half, there is no more water than would do a fair business with one run of stones, with a wheel just adapted to the single run and the water. Now, this water that will do a fair business in this way, if applied to the larger wheel—of ordinary construction—would not move the stone, the runner being raised clear of the bedstone. Now, what I want understood is, if one of my wheels were used capable of driving the four runs of stones, one run of stones can be driven by the same wheel with a trifle over one-fourth of the water used to drive the four runs.

In support of the above, I give some data of their practical working. My first wheel took the place of a 4½-feet whirlpool wheel (so called), drawing 228 square inches of water. This wheel would fairly drive a large heavy grindstone, 5-feet diameter, for grinding files; and could be stopped with heavy 1½-inch wide files.

My wheel, which took the place of the old one, is 30 inches diameter, and is limited to 216 square inches of opening. With 40 square inches of water it run the stone, doing a good business, and could not be stopped; the more it is slacked the harder it pulls.

This wheel also ground 10 bushels of meal in an hour, when there was so much backwater as to reduce the head to 3 feet 5 inches; the wheel being over six feet under water.

The second one is used to drive a batting mill, containing the necessary machinery, consisting of two of Calvert's willows, two five-cylinder dusters, a lapper, and 12 old-fashioned woolen cards, with workers and strippers; working off 20 bales of batts per day. There is about one hundred feet of shafting, besides counters and wheel shaft. The head is 8 feet 8 inches. The wheel is 30 inches in diameter, and has 216 square inches of gate opening, which will vent about 160 inches of water. Twenty-four square inches of water will run the shafting and loose pullies up to usual working speed. Twelve square inches will start the same, and seven inches will just barely turn it. One hundred and thirty square inches of water drives all the work up to speed, and is the most I have seen used of late. 21.13 cubic feet of water per second is the solid amount of water used by measurement.

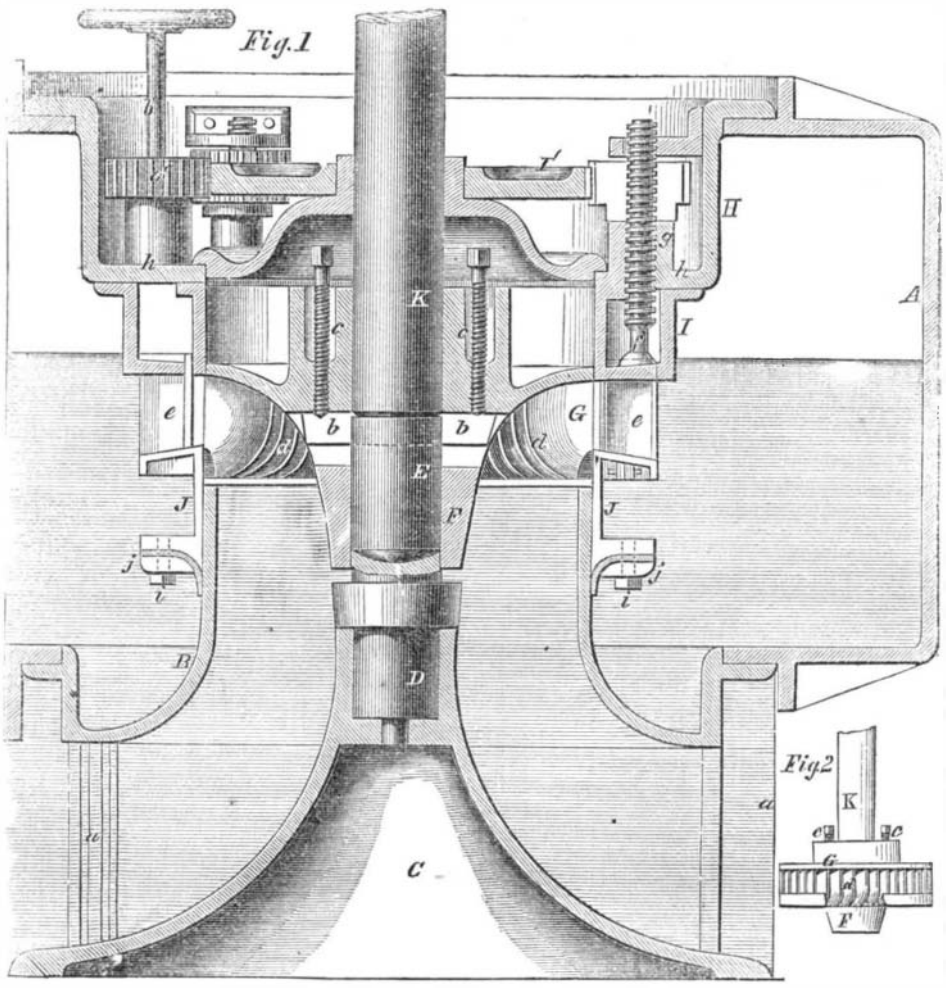
The third wheel drives Messrs. Calvert & Sargent's mill at Graniteville, Mass. Length of mill, 180 feet; width of mill, 50 feet; hight of mill, 2 stories. One end—80 feet in length—is occupied by the owners as a machine shop, in which are planers, engine and hand lathes, and circular saws, giving employment to from 35 to 40 hands.

The other 100 feet is occupied by the Abbott Worsted Works, with 1,310 spindles, 5 cards, with the necessary combing and picking apparatus, employing 35 hands and using 1,000 lbs. of stock per day.

The head is 18.82 feet. Wheel, 30 inches diameter, with a capacity of discharge of 160 square inches. Square inches used, 82. Cubic feet discharged per second, 19.7; being equal to 42.13 H.P. of water used, and a trifle over half the full capacity of the wheel. If anybody can beat this, I should like to see the apparatus.

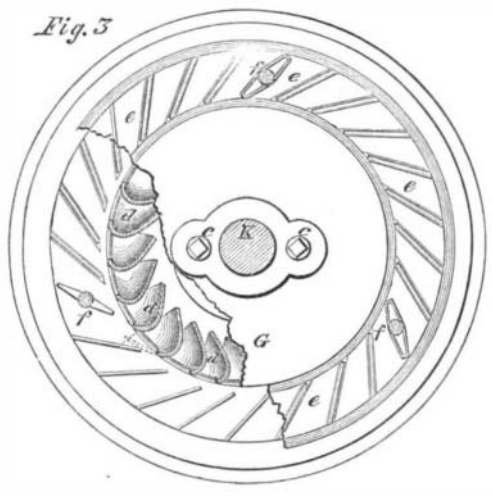
This wheel was patented May 15, 1860, and was put through by the Scientific American Patent Agency in the short space of six weeks, from the day the specification was signed until the Letters Patent were in my hands. It seems to me that that is about as satisfactory as one could wish for.

This wheel is one of the modifications of the turbine which are coming in such numbers from the busy brains



SWAIN'S IMPROVED WATER WHEEL.

of our inventors. It is represented in the annexed cuts, of which Fig. 1 is a vertical and Fig. 2 a horizontal section. A represents a cast iron case, which encloses the wheel and the parts pertaining thereto. This case is of scroll form, and is supported by standards, *a*, and a



curb, B, which are cast with a bell-shaped base, B, as shown clearly in Fig. 1. In the top of the bell-shaped base, C, there is placed an iron block, D, which forms a step to receive a wooden block, E, that is fitted to the lower end of the hub, F, of the wheel, G. Transversely through the hub, F, and block, E, a bar, *b*, passes, said bar having screws, *c*, bearing on it, one near each end. These screws, *c*, pass up through the center or hub of the wheel, and by adjusting them the wheel may be raised or lowered, as desired.

The wheel, G, has its floats, *d*, cast of a single piece of metal. The face sides of the floats, *d*, where the water impinges are of paraboloidal form, whose axes are tangents to a circle to which the guides, *e*, are also tangents, as well as to the curve at or near the outer circumference of the wheel. The bottoms of the floats are formed by revolving the curves on their axes. Into the top of the case, A, a curb, H, is fitted. To the bottom of this curb there is attached an annular chamber, I, which may be termed a hydrostatic chamber. The bottom of this chamber is slotted to receive the guides, *e*. These guides are plates attached to or cast with a ring or cylinder, J. Three of the guides, *e*, are enlarged to allow rods, *f*, to pass through, and the upper parts of said rods have screws, *g*, formed on them, said screws passing through a flanch, *h*, at the inner side and bottom of curb, H. Each screw, *g*, has a nut, *h'*, on it, said nuts being pinions, into which a spur-wheel, I', gears; the wheel, I', being concentric with the shaft, K, of the wheel, and having a pinion, *a**, gearing into it, the pinion being a shaft, *b**, which is surmounted by a hand wheel.

The chamber, I, is made tight, with the exception of the slots, to receive the guides, *e*, the water entering and forming a complete stuffing box, by means of which adjustable tapering shutes are obtained, these shutes being formed by the bottom of chamber, I, guides, *e*, and top of cylinder, J. The ring or cylinder, J, encompasses the top of the lower curb, B, the lower part of the cylinder being provided with packing, *i*, which is secured to the bottom of the cylinder by a ring, *j*.

From the above description it will be seen that, by turning the shaft, *b**, the wheel, G, and pinions, H, will be turned simultaneously, and the guides, *e*, raised or lowered, as desired. These guides, in connection with the lower and upper surfaces of J J, form shutes which direct the water properly to the buckets, and by raising and lowering them, the volume of water admitted to the wheel may be increased or diminished at will, and the capacity of the wheel regulated as occasion may require. These adjustable shutes also form a gate by which the water may be entirely cut off from the wheel.

The floats, *d*, may occupy one-third the radius of the wheel, and have a depth of three-sixths of the same. The width of space occupied by the guides, *e*, may be the same as the floats. The sum of the shortest distance between the guides may be nine-fifths the diameter of the wheel. This, together with the number of the guides, determines the narrowest section of each guide, and also the angle at which the water strikes the float, and also determines, in a measure, the paraboloidal curves of the floats.

The inner and lower edge of the chamber, I, and upper edge of the ring or cylinder, J, are turned true, so that, when J is drawn up, it will make a complete water-tight joint, and keep all water from the wheel. When J is lowered the water strikes the floats with all the velocity and force due to its head directly under the rim of the wheel, which is so curved as to force the water down rapidly on the lower curved parts or bottoms of the floats, the water not leaving the wheel until its force has been properly expended on it. The water is discharged down between the curb and wheels and lower curb, H, and is turned outward by the base, C.

The particular angle which the guides, *e*, have in relation to each other is the same as that which the bottom of the chamber, I, and the top of the cylinder, J, bear to each other; to wit, about 13½° and not more

than 15°. Whatever the size of the wheel may be, no less than 24 guides and not more than 27 are used. The number of floats used will depend on the size of the wheel, but never less than 23 and not more than 4 inches apart for a wheel of any diameter.

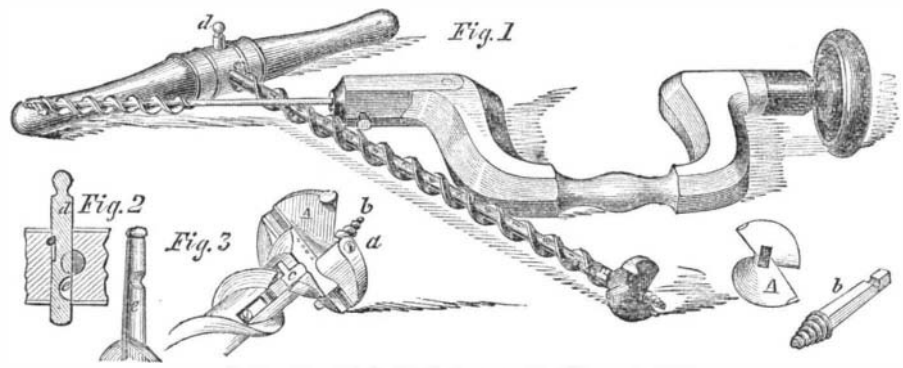
The advantages claimed for this wheel are, 1st, The wheel has not a great weight of water bearing on it to wear the step away; 2d, The wheel may be readily raised without removing it from its proper working position; 3d, All parts are very accessible for repairs and removable at pleasure; 4th, It is very light, and may be started with little water.

Further information in relation to this invention may be obtained by addressing the inventor, A. M. Swain, at Lowell, Mass.

IMPROVED COMBINATION AUGER.

Augers with adjustable cutters, by which holes of different sizes can be bored with a single tool, are no new invention, and the one here illustrated claims to be only an improvement on those heretofore in use.

The shaft is constructed of a solid cylinder, cast of malleable iron, and the flange that surrounds it is made sharp on its edge, as seen in Fig. 1, in order that it may cut in pieces any chips that, if left whole, might choke either the entrance of the auger or the escape of the chips. Said flange, as will be seen, runs the whole length of the shaft, so that it can be bored in the whole length if desired, without taking it out to clear it. The number or measure in inches is put upon the center column of the shaft, so that the user may know the exact depth of the hole without otherwise measuring it. The cutter, as represented in Fig. 3, is made round and flat, with two cutting edges which project below the body of the cutter, similar to the iron or cutting part of a plane,



HATHAWAY'S COMBINATION AUGER.

and having projecting spurs or lips similar to other augers. By this shape of cutter, all the chips are drawn out when the auger is withdrawn, so that, if it is necessary to bore deeper, there are no chips left at the bottom of the hole to hinder the feed screw and cutter taking hold readily. The cutter is held to the shaft, as seen in Fig. 3, by a dovetail tenon made upon the shaft, and a dovetail groove made into the cutter. It is made to extend or not. When not made to extend, the cutters are made with simply a square hole in the center for the end of the feed screw, *b*, to pass through; in which case a different sized cutter must be put on for each sized hole required. But when the cutter is made to extend, there is a set screw, *a*, that runs through one shoulder of the cutter, which screws against a shoulder made upon the shaft adjoining the dovetail tenon, and points are made into the shoulder for the point of the set screw to enter (see Fig. 3), so that it is held firmly wherever placed. Upon the opposite shoulder of the shaft (as will be seen in Fig. 1) is marked a guide or measure, and the other shoulder of the cutter runs against this shoulder as it is slid upon the dovetail, so that the cutter is readily set to cut any sized hole required. The hole in the cutter for the feed screw is elongated to allow the cutter to slide when the feed screw is in. When the cutter is in a central position with the auger, the tool bores the smallest hole within the limits of its capacity, and when moved the distance of one mark, it will cut—supposing the marks divided into 1-64 of an inch—a 1-32 of an inch larger hole, and so on to any desired size. Different sized cutters are put on, so that it is only necessary to have two augers or shafts and five cutters to bore from half an inch to a two-inch hole; and if each hole is 1-32 of an inch larger than the other, they will bore no less than 49 different sized holes. But if not made to extend, the same number of augers or shafts, with seven cutters, will be required, allowing the difference in the holes to be ¼ of an inch, the same as is usual with a set of common augers; making this a very cheap and convenient set of boring tools. The feed screw is made movable, not only to allow the taking off and putting on of the cutter; but different threaded screws can be put in to bore, if in very hard wood, very slow—if in soft wood, very fast. In common augers, if one cutting side or the feed screw breaks it is good for nothing, and must be replaced at the expense of a whole augur; but if such an accident should happen to this auger, a few pennies will purchase a new cutter or feed screw, and then it is as good as when new. The augers and cutters can be made to cut any size from ¼ of an inch to 12 inches, or if necessary, a six-feet hole; in fact, no round hole need hereafter be cut out with a chisel. A shipbuilder can bore for his anchor chains, his port or cannon holes, through the side of a vessel, or bore through the decks for the smoke pipe.

Fig. 2 represents an improved mode of fastening handles to augers, secured by a separate patent to the same inventor. The portion, *e*, of the shank which enters the handle is made round, and being turned, is of course in exact line with the rest of the auger. A semi-circular notch is cut in the side of this part of the shank to receive the pin, *d*, Figs. 1 and 2, and when the shank is passed into its place in the handle, this pin is pushed down so as to enter this notch and hold the shank from either turning or drawing out of the handle. In order to admit the shank without removing the pin entirely from its hole in the handle, a semi-circular notch is made in the side of the pin similar to the one in the shank of the auger, so that, when this pin is drawn back sufficiently to bring this notch opposite the hole in the handle, the way is clear for the admission or withdrawal of the auger shank. The pin is kept in place by making a short flat place on the side of it, as seen in Fig. 2, and a screw runs through the handle against this flat place in the pin, which prevents it from falling out, at the same time allowing the pin to be shoved in sufficiently to fasten, or if withdrawn, to release the auger.

This mode of fastening is equally applicable to the fastening of bits in braces of all kinds; also drills in chucks for lathes, and all socket tools whatever. It is as applicable to ordinary square-shanked tools, as to those which are made round. It will readily be perceived that one handle is all that is necessary for a whole set of augers. By making augers with round shanks a great saving of time and trouble to the manufacturers will be effected. Besides the manifest advantages spoken of which this auger has, we will name another which is by no means a small one, and that is its portability. A carpenter having to go a long distance from home to do a job of work, which is very often the case, and not knowing the exact boring tool he will require, instead of loading himself down with the common augers and handles so as to be certain of having the right size, he can simply take his handle and auger shafts and, wrapping them up in a piece of paper, put them under his arm or into his overcoat pocket, if he wears one, and putting his cutters into his breeches pocket, he goes prepared to bore any sized hole he can possibly require.

The patent for this combination auger was granted Sept. 4, 1860, and the patent for the mode of securing the auger to the handle and bits into braces, &c., was granted Aug. 21, 1860.

Further information in relation to them may be obtained by calling on or addressing the inventor, J. M. Hathaway, No. 169 Center-street, corner of Canal, New York, second floor, corner room.

Oiled silk is manufactured by coating it with some quick-drying boiled oil, and drying it in a warm room. Two or three successive coats are sometimes put on, each being perfectly dried in succession.

CUTTING PILES UNDER WATER—AN INGENIOUS APPARATUS.

To obviate the necessity of constructing a coffer dam in the Schuylkill, so as to build a pier for the Pennsylvania Railroad bridge, an ingenious contrivance has been put in operation to prepare the foundation of the pier. The water, at the spot where the pier is being constructed on the west side of the river, is about 17 feet deep, and after driving the piles, they have to be cut off level with the mud at the bottom. To do this, a long iron shaft is firmly secured to the uprights of the machine that drives the piles, and is driven by the steam engine ordinarily used for the pile-driver. This shaft, which is hollow, has secured to its extreme lower end a circular saw, 4 feet in diameter; the entire shaft being suspended by a rope passing over a pulley at the top of the uprights. Another rope, which passes around a drum, regulates the precise hight at which the shaft must be secured to saw the pile accurately at the length desired. The driving pulley on the shaft is made movable, so that at each change of the elevation, as required by the rise and fall of tide, its position is changed to suit the line of belting from the driving engine. The precise elevation of the shaft, and consequently the saw, is fixed for every pile by instrumental observation, taken from the shore with a spirit-level; and, with all the difficulties, it is surprising to witness the rapidity with which the work is done—some 60 piles being cut off on Saturday last. In one instance, by accident, the elevation of a pile head, after being cut, was found to be 1½ inches too high. The saw was again applied, and the 1½ inch neatly taken off in one slice, as was proved by the piece floating to the surface. Yesterday the whole number of the piles were cut off and made ready to receive the stones for the pier. The management of the scow on which the apparatus rests is under the superintendence of Mr. Vanhorn, and great care and skill are necessary to prevent accidents. By guy ropes anchored from different points of the scow—each with a man to attend to it—the position of the scow is regulated nicely, and, at the same time, works the feed for the revolving saw. This work of sawing piles is sometimes attended with great difficulty, and is only well adapted for rivers where the surface is not much disturbed, as a heavy wind, or even the passage of our river tug-boats, interferes with the operation, as the scow upon which the machine is erected should he held quietly in position during the process of sawing; otherwise, a fracture of the saw would result. Mr. Vanhorn has endeavored to counteract, to some extent, the effects of a light wind or slight undulation of the water surface, by attaching to the side of the pile-scow, two flat-boats heavily laden with stone; but still, when steamboats pass, the operation of sawing ceases. The whole work is well worth witnessing.—*Philadelphia Ledger.*

A New Discovery in Egypt.—A Paris correspondent writes that a letter received therefrom Mons. Aug. Mariette, the eminent Egyptian antiquarian, states that a very important discovery has been made in Egypt:—"The excavations made at Memphis have brought to light a metal founder's workshop. We have already discovered his tools, about 40 pounds of unrefined silver, gold medals, 20 silver medals never seen before, and other objects destined to the crucible."

The Polytechnic Association.—The meetings of the Polytechnic Association, during the fair of the Institute, were suspended, chiefly for the reason that the president and several of the prominent members are occupied in their duties as managers. The fair closed on the 6th inst.

Something Interesting to Come.—In our next number we shall commence the publication of Professor Faraday's six lectures, on the various forces of matter. They are exceedingly interesting and instructive, and will be fully illustrated by spirited engravings.

ISSUED FROM THE UNITED STATES PATENT OFFICE

FOR THE WEEK ENDING DECEMBER 24, 1861.

Reported Officially for the Scientific American.

*** Pamphlets giving full particulars of the mode of applying for patents, under the new law which went into force March 2, 1861, specifying size of model required, and much other information useful to inventors, may be had gratis by addressing MUNN & CO., Publishers of the SCIENTIFIC AMERICAN, New York.

NOTE.—The following list of claims is the balance of the issue for December 24th, the first portion of which appeared in our last number.

3,020.—J. A. de Brame (assignor to himself and Jeremiah Gurney), of New York City, for improvement in Revolving Ordnance:

I claim the combination of the screw, F, constructed as set forth, so as to serve as nipple vent and cylinder presser, with the frame, A, and revolving chamber, C, all as set forth.

I also claim the combination of the perforated disk, G, with the said screw, F, frame, A, and cylinder C, as set forth.

[This invention consists in combining with the frame which contains the cylinder and carries the barrel, and on which are the trunnions of a revolving cannon, a screw so applied to screw through the said frame in rear of the cylinder and with its axis in line with the axis of the bore of the barrel, that it serves to press the cylinder directly up toward the barrel to make a tight joint between them, and, in case of the chambers of the cylinder being bored through its rear, to close and constitute a breech to the chamber, in line with the barrel.]

3,021.—J. A. de Brame (assignor to himself and Jeremiah Gurney), of New York City, for Improvement in Breech-Loading Ordnance:

First, I claim the axis pin, a, having a shoulder, r, and fitted to the cylinder frame, F, and rotating many-chambered cylinder, substantially as described, and furnished with a screw thread, receiving a nut, M, applied in rear of the cylinder frame, to operate substantially as set forth, for the purpose of making a tight joint between the open rears of the chambers and a breech formed by the rear end of the cylinder-frame.

Second, The combination with the rotating many-chambered cylinder, H, of the ring, N, the lever, ●, the spring-tooth, W, and the stop-pin, Z, said tooth and pin operating in combination with notches, y y, in the cylinder, substantially as and for the purpose specified.

[This invention consists in a certain mode of applying a rotating many-chambered cylinder, in combination with the carriage, and with a fixed barrel, and in certain means of rotating the said cylinder to bring the several chambers successively in line with the barrel.]

3,022.—B. A. Mann (assignor to Jedediah Wilcox and H. H. Miller), of West Meriden, Conn., for Improvement in Machines for Clasping Hoops to Ladies' Skirts:

First, I claim the inclined hopper, F, and feeding plate, G, when arranged so as to be adjusted by the rods, D, I, and used in connection with a clinching device, for the purpose set forth.

Second, The bars, i, j, placed obliquely on the feeding plate, G, provided with grooves, l, and used in connection with the slot or opening, p, substantially as and for the purpose set forth.

Third, The passage way for the clasps, K, formed of the plates, m, m, attached to the head or bar, H, and groove, n, made therein, when said passage way is used in combination with the feeding plate, G, and the clinching device, and arranged therewith, as and for the purpose specified.

Fourth, The clinching device, formed of the plate, J, attached to lever, B, or its equivalent, and provided with the ledge, w, having a concave or grooved upper surface, in combination with the clasp-sustaining plates, I, I, attached to the head or barrel, H, and arranged in relation with the plates, m, m, and groove, n, substantially as and for the purpose set forth.

[The object of this invention is to obtain a machine by which the hoops of ladies' skirts may be rapidly clasped to the tapes thereof, and the work performed in a superior manner. It consists in the employment or use of a hopper and feeding plate, the latter being peculiarly constructed, and used in connection with a clinching mechanism, all being so arranged that the clasps, as the machine is operated, will be fed down in a proper manner to the clinching device, which is operated by the foot of the attendant, and made to perform the desired work, the parts to be connected, the hoops and tapes being presented to the machine by the hands of the attendant.]

3,023.—Conrad Marquardt (assignor to M. L. Marquardt), of Rhinebeck, N. Y., for Improvement in Whiffletree Attachment:

I claim attaching or connecting the whiffletrees, D D, to the double tree, A, by means of the links, E E, racks, B B, and the spring, F F, arranged substantially as set forth.

[This invention relates to a novel means employed for attaching the whiffletrees to the doubletree, whereby the whiffletrees may be readily adjusted on the doubletree, near er to or further from its bolt, and the draft regulated for either horse, as occasion may require.]

3,024.—J. F. Leitch (assignor to O. D. Carter), of Green, N. Y., for Improved Fan Blower:

I claim the circumscribed fan-room scroll air passage and wind cut-off, all in combination, as and for the purpose specified.

3,025.—R. B. Pullan (assignor to J. D. Pullan), of Cincinnati, Ohio, for Improvement in Lamps:

I claim the making of the double concentric tube, a b, constituting the inner and outer walls of air passage, c, by striking it up from a single plate of sheet metal, in the manner described.

I also claim the combination of the bayonet catch, F, with the arm, f, of the traveling nub, d, both as a fastening for the wick tube and as a means of raising and lowering the wick, substantially as described.

3,026.—E. D. Rosecrans (assignor to himself, J. S. Hull and Nelson Gates), of Cincinnati, Ohio, for Improvement in Lamps:

I claim the employment of atmospheric pressure upon the surface of the fluid in the reservoir, x x, by means of the air pump, w w', when used with the tubes, o o f f, and valve at d', in a lamp, substantially as described. I claim the air pump, w w', when used in combination with the reservoir, x x, filling tube, p, and escape tube, r, in the manner and for the purposes substantially as set forth. I claim the employment of the burner and heater, when constructed with curved wings, b b, as described, when used with the tube, a, having an opening, a, in the manner substantially as set forth.

3,027.—C. H. Sayre (assignor to himself and C. E. Barnard), of Utica, N. Y., for Improvement in Projectiles for Rifled Ordnance:

I claim the employment, in combination with a leaden or other soft metal band, applied to a cast-iron projectile, of a lining tube, b, of wrought or malleable iron or other suitable tough or tenacious metal, attaching the said band to the head or body of the projectile, in the manner substantially as specified.

3,028.—Thomas Shaw (assignor to himself and B. Hart), of Philadelphia, Pa., for Improvement in Revolving Firearms:

I claim the combination of the pall, G, with the arm, K, substantially as described, and for the purpose set forth.

3,029.—Joseph Young (assignor to J. B. and J. Young), of Varick, N. Y., for Improvement in Machines for Removing the Husks from Corn:

I claim the combination of the cutting apparatus with the fan-blast and separator, arranged and operating substantially as and for the purpose set forth.

3,030.—Edwin Corner, of Columbus, Ohio, for Improvement in Beehives:

I claim hinging the comb frames in steps, so that the several frames may be swung open at the same time, as described, in combination with the hinged door and stationary central frame, substantially as and for the purpose specified.

3,031.—John Dean, of Worcester, Mass., for Improvement in Mats for Daguerreotypes, &c.:

I claim forming from sheets of metal mats, with their corners clipped or cutoff, and finishing the said corners so as to conform with the outer bevel, and to form supports for sustaining the said mats upon the photograph or other plates, in the manner and for the purposes set forth.

3,032.—G. F. Holland, of Leominster, Mass., for Improvement in Mode of Attaching Breeching to Shafts of Carriages:

I claim the particular combination and arrangement described, the same consisting of a spring clutch attached to the harness, and a fixed stud or standard permanently affixed to the shaft, the two operating together, substantially as described.

3,033.—G. W. Keene, of Lynn, Mass., for Improvement in Heels for Boots and Shoes:

I claim, as an article of manufacture, a heel formed of successive rises, united by nails, which are driven and clinched at the time the heel is compressed, as set forth.

3,034.—Robert Kershaw, of Philadelphia, Pa., for Improvement in Gig Mills:

I claim, as an improvement on James Shaw's patent of Aug. 28, 1860, raising a nap on textile fabrics, by means of two or more card rollers, the latter being caused to revolve at such a speed, and the fabric being so guided by plain rollers that an alternate slackening and tightening of the said fabric will take place, thereby causing the wires of the rollers to penetrare the fibers, and effectually raise the desired nap.

3,035.—J. O. Doris, of Philadelphia, Pa., for Improvement in Fertilizers:

I claim the improved fertilizing compound, composed of coal ashes, animal manure, animal matter and vegetable matter, such as named, in the manner and the proportions specified.

3,036.—Sylvanus Sawyer, of Fitchburg, Mass., for Improved Fuse Hood for Shells:

I claim the employment of a hood or other equivalent device, in combination with a fuse, substantially in the manner and for the purpose described.

3,037.—Sylvanus Sawyer, of Fitchburg, Mass., for Improvement in Mandril for Loading Case Shot, &c.:

I claim, first, The loading mandril, constructed substantially as described, as an instrument for loading ordnance shells, or any other analagous use.

Second, The employment, in combination with the loading mandril, of a case or sheath, substantially as described.

3,038.—N. W. Spaulding, of San Francisco, Cal., for Improvement in Saw Gummers:

I claim, first, Pivoting or hinging the double-edged punch to the double-edged die, as recited, whereby the double shear cut may be made by the gummer.

Second, I claim, in combination with the double-edged die the double seed punch, as described, whereby the one end may be substituted for the other, as and for the purpose described.

3,039.—T. W. Adams (assignor to himself and C. H. Slicer), of Baltimore, Md., for Improvement in Men's Hats:

I claim, in the construction of men's hats, when the brims are of flexible or yielding material, giving the front and side curve to the brim, by means of a frame of cane, metal or other material, confined within or attached to the brim, at or near its circumference, substantially as and for the purpose set forth.

I claim, in combination with a hat brim, constructed as claimed in the preceding clause, the head band, O, for the purpose of preserving the symmetry of the body of the hat, substantially as described.

3,040.—R. N. Eagle, of U. S. Army, for Improvement in Saddles:

I claim attaching the stirrups to a saddle by variable points of suspension, in the manner explained, or in any other manner, substantially equivalent.

EXTENSION.

5,399.—J. F. Winslow, of Troy, N. Y., for Improvement in Rolling and Compressing Puddler's Balls. Patented Dec. 18, 1847:

I claim the method, substantially as described, of compressing or shingling puddler's balls or loops of iron into blooms, by the combination of the cam-formed compresser and two or more rollers, substantially as described.

Second, I claim the spring or yielding cheeks for setting up the ends of the blooms, in combination with the combined cam-formed compresser and rollers, substantially as described.

And, finally, I claim the feeder and discharging follower, in combination with the combined cam-formed compresser and rollers, in the manner and for the purpose described.

RE-ISSUES.

144.—A. A. Hotchkiss (administrator of Andrew Hotchkiss, deceased), of Sharon, Conn., for an Improvement in Projectiles for Rifled Ordnance. Patented Oct. 16, 1855. Re-issued July 2, 1861:

I claim, first, Constructing a projectile in three parts, one of them of flexible or plastic material in the form of a ring interposed between the other two parts, formed of a harder material, and so arranged that in the act of loading or firing, or of both, the resistance or the explosive effect of the powder, acting on a larger sectional area of the part, E, than the section of the ring, C, shall cause the latter to be so expanded or distended that it shall take the impression of the grooves, and be made to fit the bore of the gun, as described.

Second, Locking or securing the expansive material to the body of an expansive projectile by means of one or more lips or projections extending outward from the body of the shot into corresponding recesses in the expansive material, as at i, or of one or more grooves or recesses in the body receive internal lips or projections from the expansive material, as at e or e'.

Third, The tail piece for securing the cap to the body of the shot, and as a guide to the cap in its forward motion, in the manner described.

145.—C. M. Wilkins, of West Andover, Ohio, for an Improvement in Cheese Vats. Patented Nov. 22, 1859:

I claim, first, The arrangement of the pipe, W, heater, F, and chamber, L, substantially as and for the purpose specified.

I claim, second, The combination of the valve, N, arm, M, to which it is attached, and the lever, R, arranged for operating substantially as shown, and for the purpose described.

I claim, third, Arranging either or both the valves, N and O, in combination with their respective pipes over the firebox of the heater, substantially as and for the purpose specified.

I claim, fourth, The use of the truss braces, J J J, in the manner and for the purpose described and shown.

146.—I. P. Frink, of Newark, N. J., for an Improvement in Reflectors. Patented April 17, 1860:

I claim, first, The employment of an oblong pyramidal reflector, lined with glass or other diaphanuous material, substantially as shown and described.

Second, The combination of the cover, B, with a pyramidal reflector, substantially as shown and described.

Third, The combination of the hinged adjustable section, C, with a pyramidal reflector, substantially as shown and described.

Fourth, the combination of the beads, b b', with a pyramidal reflector, substantially as shown and described.

Fifth, The combination of the cover, B, and hinged, adjustable section, C, with a pyramidal reflector, with or without the beads, b b', substantially as shown and described.

147.—Cyrenus Wheeler, Jr., of Poplar Ridge, N. Y., assignee of R. T. Osgood, of Orland, Maine, for an Improvement in Grain and Grass Harvesters. Patented Feb. 17, 1852:

First, I claim two independent driving and supporting wheels on a common axle, carrying a rectangular main frame located between said wheels, and suspended from and nearly balanced on said axle, in combination with the cutting apparatus hinged to said main frame, substantially as described.

Also, Balancing the main frame, and mounting the two driving and one main gear wheel on a common axle, in combination with a ratchet wheel for each driving wheel rigidly affixed to the axle, each driving wheel carrying a pawl that will stand in gear with its ratchet wheel when the machine is advanced, and out of gear when the machine is backed, substantially as set forth and described.

Also, The down hangers, as points of attachment for the hinges, and to bring the hinges below the main frame, substantially as described.

Also, Arranging the hinges by which the finger beam is connected to the main frame, and thus advanced over the ground, on opposite sides of the center of motion, and at opposite ends of the main frame, substantially as and for the purpose set forth.

Also, Giving the hinges, by the finger beam is thus connected and advanced over the ground, a common center or axis of motion, though located at opposite ends of the main frame, substantially as described.

Also, So connecting the cutters with the crank that four vibrations of the cutters will be given for every single revolution of the crank, substantially as described.

Also, In combination with the two independent driving wheels, and a hinged cutting apparatus, a balance wheel, to equalize the motions of the cutters, and give steadiness of motion to the gearing, substantially as described.

Also, The combination, in a harvesting machine, substantially as described, of a hinged tongue, the main frame, two main supporting wheels, and the hinged cutting apparatus, for the purpose set forth.

Also, in combination with a finger beam, an adjustable sole, substantially as described.

Also, In combination with a finger beam, and an adjustable sole, a lever, so arranged that the driver can by it, when in his seat, and with the machine in motion, raise or depress the cutting apparatus at pleasure, substantially as and for the purpose described.

148.—Cyrenus Wheeler, Jr., of Poplar Ridge, N. Y., assignee of R. T Osgood, of Orland, Maine, for an Improvement in Grain and Grass Harvesters. Patented Feb. 17, 1852:

I claim, first, The combination with the main frame of two independent driving wheels, and a hinged cutting apparatus, whereby the cutters are kept in operation, when the machine is turned either to the right or left, and the cutting apparatus, or either end thereof, is free to conform to the inequalities of the ground, independent of the up and down motions of the driving wheels, substantially as described.

Second, The combination in a mowing machine, in the manner set forth, of the following elements, viz., A hinged tongue to draw and steady the machine, a frame to carry and support the driver and gearing, two independent driving and supporting wheels to carry the frame and give motion to the cutters, and a short finger bar so hinged to the main frame that its progressive movement over the ground will be controlled by the main frame, and the upward and downward movements of the entire finger beam, or of either end thereof, independent of the other end, by the undulations of the ground over which it is drawn, substantially as described.

Third, Arranging the hinges, by which the finger beam is connected to the main frame, and advanced over the ground, above the plane of cutters, substantially as and for the purpose described.

Fourth, In combination with the main frame and finger beam, so arranging the coupling arm, Y, that while that end carrying the beam can be brought close to, so as to permit the finger beam to travel on the ground, its other end, together with the hinges, will be carried above the ground, and free of obstructions, substantially as described.

Fifth, In combination with the main frame, and its supporting wheels, the hinged cutting apparatus located on one side of the center of motion, and the gearing, located on the opposite side thereof, substantially as and for the purpose set forth.

Sixth, In combination with the main frame, mounted on two independent driving and supporting wheels and a hinged cutting apparatus connected with the said main frame, a seat for the driver, so located that the cutters will travel in advance of the driver, substantially as and for the purpose set forth.

149.—Cyrenus Wheeler, Jr., of Poplar Ridge, N. Y., assignee of R. T. Osgood, of Orland, Maine, for an Improvement in Grain and Grass Harvesters. Patented Feb. 17, 1852:

I claim, first, A hinged finger beam, so connected to or with the main frame, that while it receives its advancing movements from the main frame, it will in its upward and downward movements conform to the surface of the ground over which it passes, substantially as set forth.

Second, In combination with the main frame and finger beam, the intermediate hinged coupling arm, whereby the progressive movements of the finger beam and cutters shall be controlled by the main frame, while in their upward and downward movements they may conform to the undulations of the ground over which they pass.

Third, The short finger beam in combination with the intermediate hinged coupling arm, substantially as described.

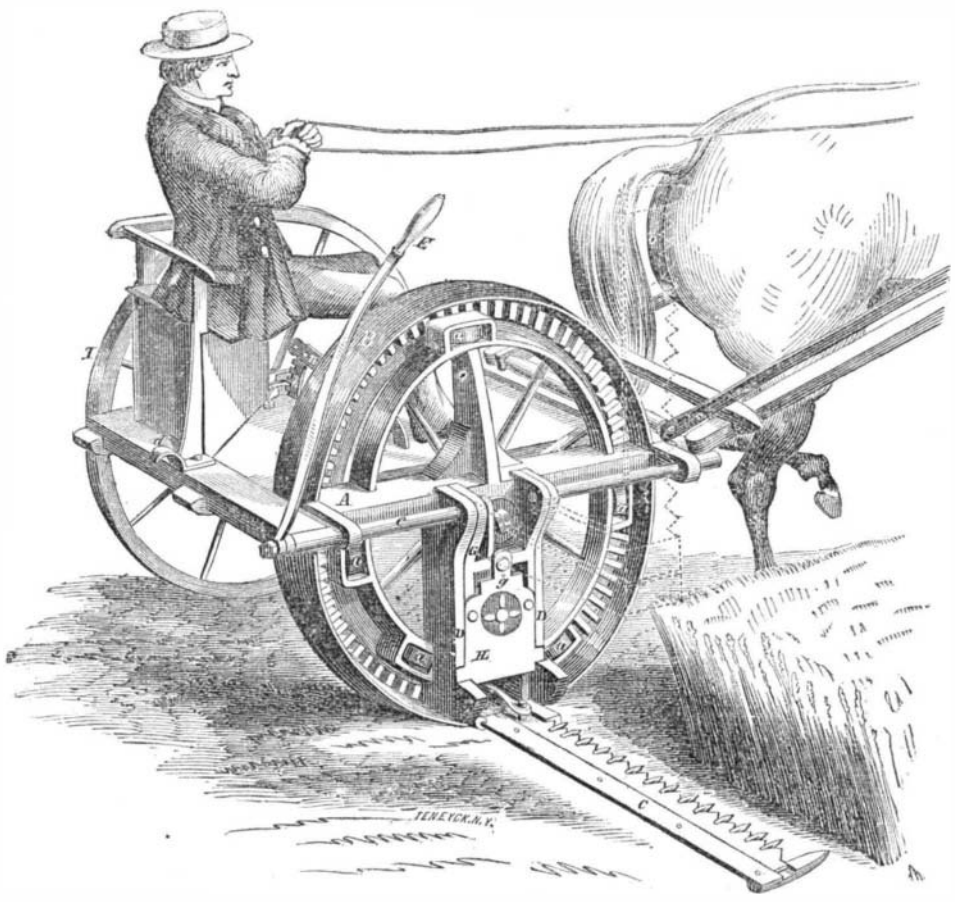
DESIGN.

142.—Thomas Lyons, of New Britain, Conn., assignor to Russell and Erwin, Manufacturing Co., of New York City, for Design for a Horse Spur.

IMPROVED HARVESTER.

The accompanying illustration represents a mowing machine or harvester in which the several arrangements for imparting motion to the cutter, for adjusting its hight, and for turning it out of the way when not in use, are of an entirely novel character. It belongs to that class of machines which have vibratory cutters, and will be readily understood by examining the cut.

The circular frame-work, A, which supports the cutter

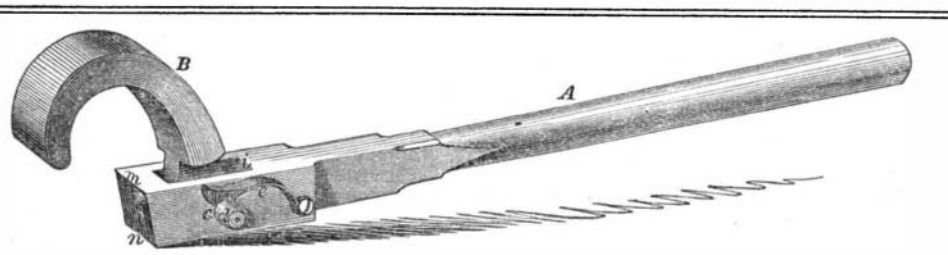


LUTHER'S IMPROVED HARVESTER.

with its driving parts, is secured to the end of the axle outside the driving wheel, B, friction rollers, *a a a a*, being interposed to allow the wheel, B, to revolve easily inside the frame, A. Motion is imparted to the vibrating cutter, C, by means of a small pinion which meshes into the gear on the driving wheel, the shaft of the pinion having a crank which works the small rod, *c*. The cutter is attached to the frame, G, which is hinged upon a rod at the top, and may be turned up into the position shown by the dotted lines, by bringing down the lever, E, under the catch, *d*, and thus removed out of the way of obstructions when the machine is being taken to and from the field. When the frame, G, is dropped back into place, between the two uprights, D D, of the circular frame, A, it is held in place by the latch, H; in turning the frame, G, up, this latch is lifted out of its catch by means of an arm, *r*, on the end of the rod, *e*, which is bent back and presses one end of an elbowed lever, the other end of which passes loosely through the latch, at *g*.

The axle of the carriage is made in two pieces, the piece, *n*, which has the driving wheel and frame, A, at its end, being bent so as to pass up through a slot in the floor of the carriage, and having the curved rack, *k*, attached to its opposite end. This piece of the axle is joined by a hinge near the wheel, B, to the end of that piece of the axle which carries the wheel, I, at its opposite end. The rack, *k*, is held in place by a spring catch, and may be raised or lowered at pleasure, thus inclining the frame, A, and cutter, C, to adjust the latter to cut the grain or grass at such hight as may be desired. This adjustment is easily accessible to the driver as he sits in the seat, L.

The patent for this invention was obtained through the Scientific American Patent Agency, June 7, 1859, and any further information may be obtained by addressing the inventor, H. H. Luther, at Warren, R. I.



SMITH'S PATENT PIPE-NIPPERS.

The annexed cut represents an improvement in nippers for grasping and holding or turning cylinders, whether solid or tubular, particularly designed for gas-pipe; it was invented by a practical mechanic, and is well adapted to its work.

The metal bar, A, has the hook or claw, B, secured in the slot, *i*, by means of the pin, *d*. This pin has a groove, *c*, around its projecting end, in which groove the spring, *e*, fits so as to hold the pin in place. The pipe is grasped between the edge, *m*, of the end of the bar, and the curved end of the hook. The end of the bar is inclined at a small angle from a right angle, so that when the hook is placed in the slot on the opposite side of the bar, the distance from *n* to to the end of the hook will be less than the distance from *m* to the end of the hook, and thus the implement will be adapted to grasp a cylinder of smaller size. Several hooks of various sizes are furnished with each bar; and the peculiar arrangement of the pin, *d*, and spring, *e*, renders the changing of the hooks a very quick and easy operation.

The patent for this invention was secured through the Scientific American Patent Agency, Dec. 20, 1859, and persons desiring further information in relation to it may address the inventor, George Smith, No. 169 (in the rear) East Twenty-sixth street, this city.