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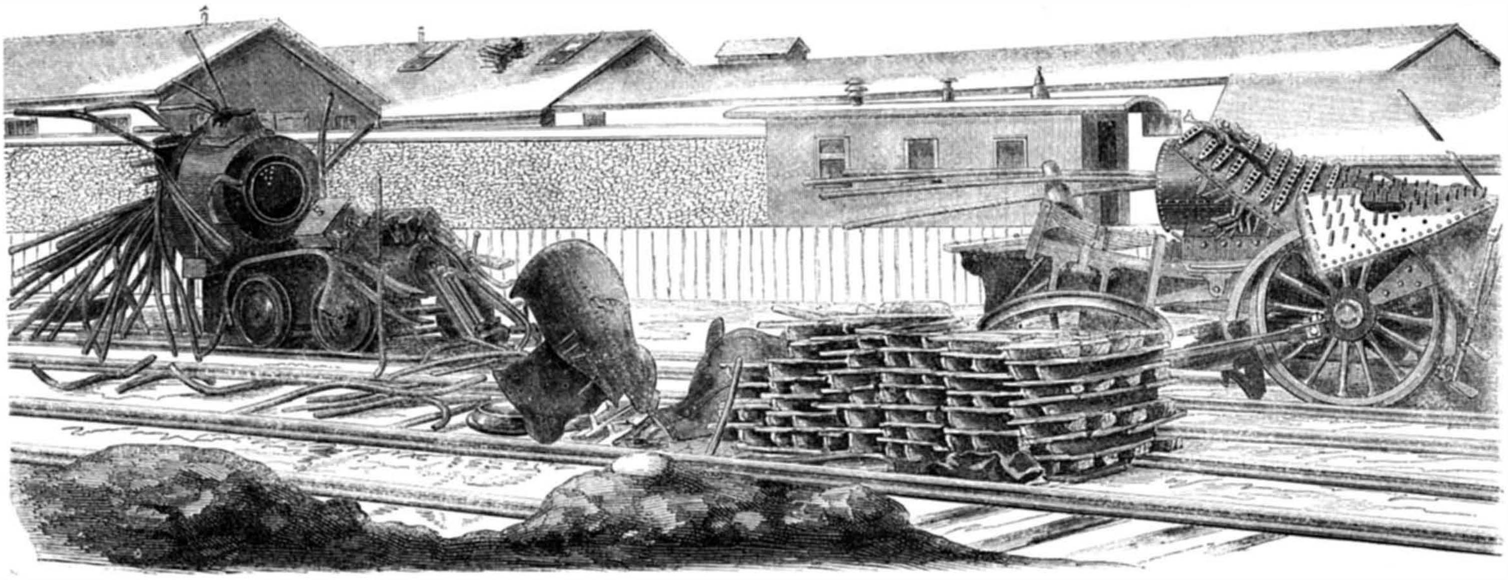
Explosion of a Locomotive Boiler.

We have seen the fragments of a great many exploded boilers, and the ruin and destruction they have scattered about, but we cannot recall any one instance where the wreck was so complete as in the case of the locomotive boiler which burst in Jersey City some five weeks since. We have received a photograph of the disaster, through the courtesy of Mr. Minot, of the Erie Railroad Company, the most essential parts of which we have had engraved for the benefit of our readers. By referring to the illustration it will be seen that there is not a single part of the engine or frame left in its normal position. The fire-box is opened out like a pocket-book, displaying every stay and socket bolt remaining in those portions ; the tubes are scattered like straws and bent into all sorts of shapes, the frame broken short off, and as for the shell of the boiler no one can say what has become of it, for we were informed by an engineer near the scene of the accident that no considerable portion of it had ever been discovered ; but the most singular freak of the whole affair was the fact that the forward truck and the cylinders, with the smoke box attached, were entirely blown off from the rest of the engine, thrown some twenty-five feet from it, and their relative positions completely reversed, just as it is shown in our picture, so that the smoke-box now looks back upon its former co-operator, the fire-box. A person who was on the spot shortly after the accident occurred says :—

"The explosion was the most terrific one of the kind ever known, and the shock, as if of an earthquake, was felt throughout the city. Houses near by were shaken, window glasses were shattered, and at the distance of a mile or more the windows and doors rattled so violently that it attracted the attention of all within. The report was heard at a great distance. The engine, which was a coal-burner of the largest kind, had been undergoing thorough repairs to her machinery, and her boiler had been supplied with a new furnace or fire-box."

The engine, No. 164, was lately brought down from the shop at Paterson, N. J. The man employed to take care of the engines noticed that the valve was blowing off steam very rapidly, and upon getting upon the platform saw that there was from 145 to 150 pounds of steam on ; he then ran her up and down the road for the purpose of reducing the steam. While so engaged the engineer, William Root, came and took possession of the engine. At that time there was 140 pounds of steam, which is 20 pounds more than is allowed by the instructions for running. The engineer also ran the engine up and down the road and finally ran down to a building for the purpose of having sand put on board. When two of the firemen and the oilman were engaged shoveling on the sand, the explosion occurred, instantly killed the engineer, two brakemen, and the oilman ; one fireman died half an hour later. The engine and boiler were broken into thousands of pieces, which were scattered in all directions for a great distance. A piece, nearly two feet square, was thrown over fifty rods and landed in the street. The axle of one of the large driving wheels was broken off, and the wheel was carried bodily over a ditch and landed twenty feet distant. A large piece of the boiler struck the wheels of a platform car, standing on a side track, and broke the iron axle. The tire of a driving wheel struck a box car and made a wreck of it. A chunk of iron went through a small house occupied by a flagman and just escaped his head ; another piece passed through the iron smoke-stack of a locomotive, and another whistled over the head of a man who was just entering his house some distance away. The rails under the driving wheels were broken into several pieces.

A coroner's jury was empaneled, and the evidence taken went to show that the locomotive was a first-class one, in complete repair, and was capable of sustaining over 200 pounds pressure to the square inch ; and that said explosion was caused by an excessive pressure of steam, which was allowed to generate while under the charge of the engineer. This, to engineers, is a very unsatisfactory verdict, although it may be the correct one. What causes a boiler to explode is a question that very few professional men will stake their reputation upon by answering decisively. Theories are propounded and suppositious cases discussed, nay, experiments which were supposed to be the most hazardous, have been made without danger, and yet we are as much in the dark as ever. Perhaps we never shall know until some human brain can see into a steam boiler upon the point of rupture, and discover unerringly the forces that work together for disaster. In this particular case the verdict of the jury seems correct ; the force of the explosion was not confined to any one point, no part, apparently, having sundered from the rest at first ; but, as if a mine had been fired under the engine, the pieces were hurled far and near. Our engraving shows the roof of one building shattered by the sand box which descended through it. We knocked off a fragment of the lower forward part of the fire-box, and it bears a white and brittle fracture, almost like steel ; the piece is also much laminated, this may have been done, however, in bending the slight curve which is in it. We do not pretend to assert that the character of the iron was the cause of the disaster ; too often much mischief is done by such hasty judgment, and it is no more a criterion, in most cases, to judge of the previous quality of boiler iron after an explosion, than it would be to decide upon the texture of a piece of broadcloth by looking at a greasy rag. The nature of the iron is entirely changed by the explosion, that is, in its general appearance. Iron broken one way will represent one quality, and the same piece fractured at a different angle will show an altogether different appearance. In the case of the boiler having given out in a particular place, we can then discover the cause of it—it may be in a bad sheet, in a burnt plate, or analagous causes ; but we think the most penetrating person would be puzzled to find out in this case what part gave way first. We should be glad to receive opinions on the subject.



THE EXPLODED LOCOMOTIVE BOILER AT JERSEY CITY, N. J.

An extraordinary balloon ascension is gravely proposed in England. Mr. Glaisher, whose remarkable account of an ascent to a hight of six miles was recently published in our columns, has been challenged by Mr. Simons to ascend with him to a hight of eleven miles ! Mr. Glaisher replied that he had no doubt that, by taking up sufficient oxygen, a higher point might be attained ; but he thought the risk far too great.

MANUFACTURE OF STEARINE AND PARAFFINE CANDLES.

The following are interesting condensed extracts taken from *The Grocer* (London), and contain an account of a visit to the extensive candle works of Messrs. Field, at Lambeth Marsh :—

These works have been in existence for about two centuries ; and wax, stearine and paraffine candles are made in them upon an extensive scale. The premises comprise extensive cellars and warehouses, filled with immense stores of paraffine made from Boghead coal, also wax, spermaceti, tallow and other animal fats, and palm oil. Two steam engines—one of 30 and the other of 10-horse power—are employed to work the hydraulic presses and do the pumping. For the manufacture of stearine candles Messrs. Field use a mixture of tallow and palm oil. It is pretty universally known now, that tallow and other fats and oils may, by boiling with alkalies, decomposing the soap formed by means of an acid, and subjecting the fatty mass to great pressure, be divided into two distinct portions—a liquid oil, which is termed *elaine* or *olein*, and a hard white solid, consisting of a mixture of stearic and margaric acids, and admirably suited for the manufacture of candles vastly superior to the tallow dips and molds of former days.

The process of saponification is effected here in the so-called " saponifying house." The fatty mass of tallow and palm oil is mixed with 15 or 16 per cent. of lime, in the form of milk of lime, in large iron vats, holding about ten tuns each. The mixture is boiled in the vats with free steam, which converts it into a hard and insoluble lime soap. This is removed from the saponifying vats into lead-lined vats, where it is treated with sulphuric acid, which decomposes the lime soap, forming sulphate of lime with the alkaline earth, and liberating thus the stearic and margaric acids. The liquor in the saponifying vats contains glycerine, or the sweet principle of oil, another valuable constituent of fixed fats and oils, which is turned to proper account for other purposes. The mixed acids form a mass of a deep-brown color, which is first washed with water, or refined, as it is technically termed, then drawn from the refiners, in the liquid state, into the tin-plate trays called caking-trays, in another part of the premises known as the caking-room. These trays are about two feet long, by ten inches wide, and one inch deep ; there are thousands of them in the caking-room, placed on suitable racks. In these trays the liquid mass is allowed to cool and solidify very slowly, to ensure the most perfect crystallization, which is absolutely indispensable to the success of the subsequent operation of the expression and removal of the olein from the mass ; since a less gradual cooling would be sure to lead to imperfect crystallization, and the amorphous portion of the mass would so firmly retain the enclosed olein as to defy the strongest pressure. The cakes obtained by this process are of a lightish brown color and crystalline structure ; they are, of course, very greasy to the touch. They are now taken from the caking-room to the cold press-room, where they are piled up in double columns, with mats and tin plates between every two of them, and subjected to the enormous hydraulic pressure of 340 tuns. It will readily be conceived, then, that the oily liquid or olein runs pretty freely from the cakes ; it is collected in suitable tanks beneath.

The cake of stearic acid comes from the press nearly white and hard, and reduced more than half in size. The operations of the press also require great skill and caution, as the oily liquid must be extracted very gradually only ; the sudden application of high pressure would simply destroy the crystallization of the mass, and would thus altogether fail to answer the intended purpose.

The cakes are now taken to the cold press cake-refining house, where they are boiled down again with free steam, after the addition of a small quantity of sulphuric acid, to remove the last traces of lime. After this operation the cakes are taken to the hot press-room, and inserted in serge bags, each of which is placed between two thick horsehair mats joined together at the bottom, like a book ; these again are placed between wrought-iron plates, and subjected to horizontal pressure in a cast-iron press, keyed with strong wrought-iron side bars, and with hollow sides for the application of heat, and a receiver beneath. This operation serves to remove the last portions of olein, the stearic acid being now left perfectly white and hard, and sufficiently pure for all practical purposes.

The olein in the receiver of the press-rooms contains a not inconsiderable admixture of stearic acid, which is lifted by steam power from the receiver into tanks, and thence conveyed, by a pump, into calico bags, eight feet long by two feet broad, and one inch in width, placed in a press in another department of the premises, called the " oil-press room," and confined there by suitable arrangements. The pressure applied is about 100 lbs. to the square inch ; the olein percolates freely through the bags ; the stearic acid remains deposited on the inside. From 10 to 12 per cent. of solid material is thus obtained, yielding about 60 per cent. of pure stearic acid. This raises the total amount of stearic acid obtained from the original mixture of tallow and palm oil to somewhere about 50 per cent.

The white hard stearine cakes, which are now sufficiently pure for all practical purposes, are taken to the molding-room, a spacious compartment, containing a number of Stainthorp and Co.'s patent candle machines, and several pans silver-plated inside, and suitably disposed for melting purposes. Each of these pans holds about three cwts. of material. The stearine cakes are broken into pieces, and melted in the pans. The melted mass is taken in tin cans to the candle machines. These consist of longitudinal cast-iron tanks, filled with water, and with a trough running on each side. The wicks are continuous, being wound round spools or bobbins. Each tank molds sixteen pounds of candles at a time (of various sizes, as may be required), which are forced up through the trough by levers, and allowed to cool, after which a fresh supply is poured in for the next molding, the wicks are cut, and the first series of candles removed.

The wax candle department is the oldest branch of the factory. The candles are made of bleached wax, with plaited wicks, and after the old fashion, entirely by hand. About forty wicks are suspended by strings from hoops, which again are suspended over capacious pans filled with melted wax. The wax is poured along the wicks with a ladle. As the wax gets colder as it reaches the end of the wick, it has a tendency to collect there in larger lumps. To counteract this, the wick is occasionally reversed. When the candles have attained the required thickness, they are removed from the hoop, and rolled into the proper cylindrical shape on marble slabs, with heavy boards made of lignum vitæ or mahogany, 20 inches long by 14 wide, and one inch thick. The slab is wetted with water, to prevent the wax sticking to it or to the board. The tops are finished by means of a fluted board. The colored wax candles made here are tinted only partially through, as they would not burn if colored right through.

In the so-called taper room, bougies and wicks are made by a process somewhat resembling wire-drawing. A double cotton wick is drawn through a bath of melted wax at one end of the room, made to pass through a perforated iron plate with cylindrical holes gradnated to the thickness required, and wound on a drum at the other end of the room. These articles are made, not by the yard, but actually by the mile, to the extent of some ten or twelve miles of bougies and thirty miles of wicks per week !

The whole of the wax consumed in the establishment for manufacturing purposes comes from the firm's wax-bleaching works at West Moulsey, Surrey, most probably the largest wax-bleaching works in England.

We now finally come to an article in which Messrs. Field claim the first place among English manufacturers—paraffine candles. Having been engaged since 1851 in the production and refining of the material, they in 1857 succeeded in presenting to the public the first paraffine candles made in England. Paraffine, or tar-oil stearine, is one of the multitudinous products of the distillation of coal tar. It was discovered first by Reichenbach. The extraordinary name which it bears is derived from two Latin words, *parum affinis*, which are meant to express that it has little or no affinity for other substances, the most energetic chemical re-agents, as strong acids, alkalies, chlorine, &c., failing to exercise the smallest action upon it. Oil of vitriol, for instance, which will speedily convert wax, spermaceti, stearic acid, &c., into a blackened mass, leaves paraffin entirely unaltered at ordinary temperatures. This affords an excellent means of detecting adulterations in paraffine candles : this debasement of the article may at once be detected by subjecting a small sample of the mass to the action of concentrated sulphuric acid, when the least blackening will afford a sure proof of adulteration. Paraffine contains only carbon and hydrogen, in the same proportion as in olefiant gas. It is derived by the action of heat upon many organic bodies, but on a large scale, for practical purposes chiefly, from a species of mineral coal, commonly known as Boghead coal or Torbane-hill mineral, obtained in Scotland. The candles made of this material are incomparably superior in illuminating power to all others. The light produced by 98 lbs. of paraffine candles is equal to that of 120 lbs. of spermaceti, 138 lbs. of wax, 144 lbs. of stearine, or 155 lbs. of the best composite candles.

Plaited wicks are used, of course, for all paraffine candles made at these works. There is a separate department, called the " tinting-room," where paraffine candles are colored right through with the most beautiful and delicate tints supplied by analine. Owing to the transparency of paraffine, the proportion of coloring matter required is so small as not in the least to interfere with the candle's illuminating power.

Condition of Sewing Women in London.

The London *Times* thus speaks of the condition of sewing women in London, and if it is not grossly exaggerated, it represents a state of things truly deplorable :—

The young female slaves of whom we speak are worked by gangs in ill-ventilated rooms, or rooms that are not ventilated at all, for it is found by experience, that if the air be admitted it brings with it "blacks" of another kind, which damage the work upon which the seamstress is employed. Their occupation is to sew from morning to night, and night to morning—stitch, stitch, stitch, without speech—without a smile—without a sigh. In the gray morning they must be at work—say at six o'clock, having a quarter of an hour allowed for breaking their fast. The food served out to them is scanty and miserable enough, but still, in all probability, more than their fevered systems can digest. From six o'clock then, till eleven it is stitch, stitch. At eleven a small piece of dry bread is served to each seamstress but still she must stitch on. At one o'clock twenty minutes are allowed for dinner—a slice of meat and a potato with a glass of toast and water to each work-woman. Then again to work—stitch, stitch, stitch—until five o'clock, when fifteen minutes are again allowed for tea. Their needles are again set in motion once more—stitch, stitch—until nine o'clock, when fifteen minutes are allowed for supper—a piece of dry bread and cheese and a glass of beer. From nine o'clock at night until one, two and three o'clock in the morning, stitch, stitch ! the only break in this long period being a minute or two—just time enough to swallow a cup of strong tea, which is supplied lest the young people should "feel sleepy." At three o'clock A. M., to bed ; at six o'clock A. M., out of it, again to resume the duties of the day. There must be a good deal of monotony in the occupation. But when we have said that for certain months of the year these unfortunate young persons are worked in the manner we describe, we have not said all. Even during the few hours allotted to sleep—should we not rather say, to a feverish cessation from toil ?—their miseries continue. They are cooped up in sleeping pens, ten in a room, which would perhaps, be sufficient for the accommodation of two persons. The alternation is from a treadmill (and what a treadmill !) to the Black Hole of Calcutta ! Not a word of remonstrance is allowed or is possible. The seamstress may leave the mill, no doubt, but what awaits them on the other side of the door ? Starvation, if honest ; if not, in all probability, prostitution and its consequences.

We suggest that the London *Times* and its American correspondent, Dr. Mackay, will do well to turn more of their attention from the Northern " barbarians " of America to the dreadful condition of the above-named class of British women. Bad as we are, we have no such uncivilized mode of treating the female race as is detailed above.

Breech-loaders versus Muzzle-loaders.

It has always been claimed that breech-loading cannon were the most effective pieces for service, in that they were more accurate and could be fired much faster than the muzzle-loading gun. The following, from the London *News* of Nov. 1st. would seem to contradict this impression :—

Some very interesting trials of 12-pounder field guns, rifled according to the different systems of Sir Wm. Armstrong and Mr. Whitworth, were made at Fort Twist, near Shorncliffe, last week, before Gen. Bloomfield, Inspector General of Artillery, and a large staff of officers. The Whitworth guns were four in number, and formed part of a battery of 12-pounder brass muzzle-loading guns, being the first guns rifled on this system which have been furnished for the service. The Armstrong guns were two of the ordinary 12-pounder field guns, such as were used in China, with certain improvements since adopted, and of course breech-loaders, made of iron on the plan employed in the construction of all the Armstrong guns.

This was the first occasion on which so direct a comparison has been made between these rival systems in regard to field guns, and the result was regarded as one of considerable importance by the officers of artillery and other scientific artillerists present at the experiment. The trials began by firing at a floating target distant 500 yards. As the shot fell in the sea, no very close comparison could be made as to the accuracy of the respective hits, but both at the 500 yards range, and afterward at the 1,200 yards, the shot from the Whitworth was the first to carry away the flag aimed at, and it was generally conceded that at both ranges this gun fired closer to the mark than the Armstrong. Both guns were then tried with shell, the Armstrong firing the compound percussion shells, and the Whitworth firing the new kind of shrapnel perfected under the superintendence of Colonel Boxer, which is now promising, so far, to surpass all shells hitherto invented, whether for the field or for piercing the sides of armor-plated ships. It was observed that a considerable number of the Armstrong shells burst in the air before reaching the mark, and, of course, without effect; but the Whitworth shell, being used with a time-fuse, which is ignited in front like the old shell by means of the ordinary Boxer time-fuse, was found to be more regular and effective in its action.

But perhaps the most interesting part of the experiments was a comparison made between the two different kinds of ordnance as to rapidity of fire. It has always been held that the one great advantage of the breech-loader was its superiority in handiness and quick firing. The result of this trial does not, however, confirm this opinion. The artillery-men were ordered to fire twenty rounds from each gun as rapidly as they could be served. The Whitworth gun finished the twenty rounds first, completing the task in thirteen minutes; the Armstrong followed two and a half minutes later. This superiority was attributed to the simplicity of the loading and serving the Whitworth gun; the drill being, in fact, precisely the same as in working one of the old smooth-bore guns, whereas the Armstrong drill requires three or four extra movements. All the guns were further tried by firing from each one hundred consecutive rounds. The Armstrongs were fired with lubricating wads, and were also washed out and had their breech pieces changed as often as they became heated so as to be unsafe; the Whitworths all completed their 100 rounds without being washed out at all, and without using any lubricating wads. It was remarked, too, that the loading was as easy at the last round as at the first.

The trial exhibited a practical proof of the value of brass muzzle-loading guns. The French artillery, it will be remembered, have always preferred these guns, as they are found very rarely to get out of order, either by injury in service or by the action of the weather. When rifled, as these guns were, upon the Whitworth system, and made without the complicated arrangement for loading at the breech, it is evident that they are capable of the most efficient service of any field-gun yet employed.

A large cupola war steamer is to be built at the Millwall Iron Works, London, for the Italian Government.

What is in the Bedroom?

The importance of ventilating bedrooms is a fact which every body is vitally interested in and which few properly appreciate. We copy the following from an exchange, which shows the injurious effects which must arise from ill-ventilated sleeping apartments :—If two persons are to occupy a bedroom during a night, let them step upon weighing scales as they retire, and then again in the morning, and they will find their actual weight is at least a pound less in the morning. Frequently there will be a loss of two or more pounds, and the average loss throughout the year will be more than one pound. That is, during the night there is a loss of a pound of matter which has gone off from their bodies, partly from the lungs, and partly through the pores of the skin. The escaped material is carbonic acid, and decayed animal matter, or poisonous exhalations. This is diffused through the air in part, and in part absorbed by the bedclothes. If a single ounce of wood or cotton be burned in a room, it will so completely saturate the air with smoke that one can hardly breathe, though there can only be one ounce of foreign matter in the air. If an ounce of cotton be burned every half hour during the night, the air will be kept continually saturated with smoke, unless there be an open door or window for it to escape. Now, the sixteen ounces of smoke thus formed is far less poisonous than the sixteen ounces of exhalations from the lungs and bodies of the two persons who have lost a pound in weight during the eight hours of sleeping; for, while the dry smoke is mainly taken into the lungs, the damp odors from the body are absorbed both into the lungs and into the pores of the whole body. Need more be said to show the importance of having bedrooms well ventilated, and of thoroughly airing the sheets, coverlids and mattresses in the morning, before packing them up in the form of a neatly-made bed?

Engineers, Attention!

In confirming the finding and sentence of a court martial called to try the first-assistant engineer of the screw steamer, *Huron*, off Charleston, S. C., on a charge of disobedience of orders, the Secretary of the Navy remarks as follows:

The court acquit the accused of any intention to treat his superior officer with contempt, by expostulating with him upon an order, the execution of which he believed would be attended by disastrous consequences. The extenuating circumstances which the court refer to, in explanation of their mild sentence, for the serious offence of disobeying an order, are not specified. Such an offence can be palliated only by the strongest and clearest reasons for failing or hesitating to obey. It will, therefore, be a sufficient reprimand for the first-assistant engineer to admonish him, as the Department now does, that whenever an order is practicable, and not manifestly and palpably unlawful, it is the duty of the subordinate, who receives it, to show the utmost willingness and readiness to obey; and even in a case where his own professional skill and experience might entitle his objections to weight, to state them, when necessity calls for them, in such a manner as to leave no possible room for supposing that they originate in any feeling of disrespect or insubordination.

Supposing a series of personal annoyances to be practiced by the chief engineer toward his coadjutor, such as treating him slightingly, pooh-poohing at his views after they are especially called for, in a word, committing numberless offences upon good feeling and good breeding, should the subordinate be obliged to resign his position or must he incur the odium of bringing a court martial against his senior in rank? Or, failing in these, if he vindicate his personal dignity by protesting against such treatment, is he liable to be publicly rebuked?

The Wakulla Fountain.

Mr. John P. Nesle, of Albany, N. Y., having seen a letter in a former number of this journal describing the clearness of the water in Lake Superior, sends us an account of a visit which he made in 1843 to the Wakulla Fountain, so called, in Florida. Of his experiments he says briefly :—"I armed myself with some twine and a piece of lead, weighing about a quarter of a pound, tied in a white cotton cloth just large enough to cover it. Arriving there I found the fountain the only source of supply to quite a rivulet—the basin or head of which is some two acres or more in extent, the stream running slowly toward the Gulf of Mexico. Taking a skiff I rowed gently toward the deepest part, and on looking down it seemed as though I was floating in the air; fish innumerable, from a foot to two feet in length being plainly visible at the bottom, which was fifty feet or more from the surface. But the great feature of the Wakulla is the sunken spring, so to speak, which appeared to be some five or six feet in diameter, descending at a slant of about 45° in what resembled limestone rock. Here I carefully let down the lead until it rested on the bottom, where it was plainly seen; the depth was 90 feet. Many of the sinks in that part of Florida are full of water but have no visible outlet, while others are quite dry."

All in Silver Bricks.

It is proposed in Virginia City, Nevada, to ship immediately to the East, for the benefit of the Sanitary Fund, the sum of $20,000, and in the novel currency of silver bricks. The *Territorial Enterprise* says :—

This shipment will be made in solid silver bricks, stamped with an appropriate inscription, and will prove the biggest advertisement for Nevada Territory that ingenious brains have yet conceived. These silver bricks will be curiously examined and commented on by many a man in New York who would forget in fifteen minutes after he heard it, the fact that $20,000 in gold coin or Treasury notes had been sent from the unknown land of Nevada.

MISCELLANEOUS SUMMARY.

Nebraska Salt Basins.—In the Nebraska Territory, about 50 miles west of the Missouri river, there is a remarkable salt region covering about 1,600 acres. It consists of four basins, depressed several feet below the common level. The bottoms of the basin are composed of black mud covered over in warm dry weather with a thin stratum of salt, causing them to look like magnificent fields of snow. The salt is collected by scrapers; occasionally a man will scrape up a wagon-load in a day. In and about those basins are numerous springs of strong brine boiling up. The farmers, from a hundred miles around go there and boil and scrape off enough salt for their own use. The salt is of excellent quality; the crystals are large and clear like those of the solar salt of Syracuse, N. Y.

Save the Rags.—When peddlers paid a cent and a half a pound, and that too in tin ware, for paper rags, there was little inducement for the housekeeper to save her scraps of cloth. But the times have changed, and rags are now worth at least five times as much in cash. Every prudent housekeeper should now save her rags, and even old newspapers, which have heretofore been used for kindling. The latter will readily sell for four cents and a half a pound. It may be added that now is the best time to dispose of any "hoards" of this marketable commodity which families may have. Bring them out, take them to the nearest rag merchant, and in this way you can soon make enough to take three newspapers into your family.

Singular Shot.—At the Navy Yard, on Friday last, we learn, an experiment was made with a 10 inch Dahlgren (smooth-bore) gun. A solid shot weighing 130 lbs. was thrown at an iron-clad target, at a distance of 500 yards, perforating the iron plating, four inches thick, as also ten-inch oak planking, passing out on the other side. The plating was torn into fragments, one piece flying backward into the joiners' shop, 200 yards in the rear of the gun, and 700 from the target.—*National Intelligencer.*

Stafford's Projectile.—There is a target on exhibition at the Merchants' Exchange, Wall street, composed of seven inches in thickness of iron and twenty-one inches in thickness of oak, which was completely riddled at West Point by Stafford's projectile, described on page 247, current volume, Scientific American. Very successful experiments were also made with this projectile at the Washington navy yard on the 24th ult.

Cement for Mending Cracks in Steam Boilers.—Mix two parts of finely powdered litharge with one part of very fine sand, and one part of quicklime which has been allowed to slack spontaneously by exposure to the air. This mixture may be kept for any length of time without injury. In using it a portion is mixed into paste with linseed oil or, still better, boiled linseed oil. In this state it must be quickly applied as it soon becomes hard.

The American Bank Note Company, in this city, are issuing $100,000 in stamp currency per day. This is at the rate of nearly one-half cent each daily for the whole loyal population.

POLYTECHNIC ASSOCIATION OF THE AMERICAN INSTITUTE.

The Association held its regular weekly meeting on Thursday evening, Nov. 20th; the President (Mr. Tillman) in the chair.

PYE'S DOOR LOCK AGAIN.

Mr. CARTER—Mr. President, at the last meeting Pye's lock was before the Association, but the owner, Mr. McWilliams, was not present. He is now here, and I think that he ought to be allowed to make some explanation.

Mr. McWILLIAMS—Mr. President, I have been told that it was asserted here at the last meeting that my lock could be picked in 15 minutes. Now I make this proposition. I will put 100 or 1,000 dollars into a box if any other man will put in an equal amount, I will fasten it with one of my locks such as I sell for 12 dollars a dozen, and if the man can open the box he shall have the money that is in it; if he cannot open it I shall carry the box home with the money in it.

Mr. STETSON—I should like to know if the lock is to be one that is offered in market for a dollar; for if it is, I will put in the money and will bring an expert here who will open the box. It should be understood that one of the material points in burglar-proof locks is secrecy in regard to their construction. For 500 or 600 dollars a man may make a lock which is entirely different from any other, and he may keep the mode of its construction secret, but locks that can be sold for a dollar must be duplicated, and if a man undertakes to pick one, his first step is to go into market and buy a similar article and study its construction.

Mr. McWILLIAMS—Very appropriate remarks when applied to unchangeable locks, but not applicable to this. Our claim is for the double-bitted key which throws the tumblers both ways from the bolt. We put in the key and turn the tumblers and then run the saw through for the bolt to slide; thus fitting each lock to its key. We have no two locks alike. I made the calculation for one style of our locks, and found that it was capable of 42,000,000 of changes. I claim not only that the lock cannot be picked, but also that it cannot be got out of order; and I extend the proposition that if the man who puts his money with mine—either 100 or 1,000 dollars—is able in a reasonable time either to pick the lock or to get it out of order, he shall have the money.

The PRESIDENT—Our object is to understand the principle of mechanism presented here, and all bets in regard to any man's articles are out of place.

Mr. STETSON—That is true, Mr. President; still in the preliminary half hour, I suppose there would be no impropriety in making the test, and if the gentleman will bring his box here at the next meeting, I will have a man here who will open it before us all. It will be rather interesting.

SHAW'S SASH LOCK.

Mr. ALLEN—This is a model of Shaw's sash-supporter and lock. A pinion is secured in the window frame and works in a rack secured to the edge of the sash. The pinion is provided with a small catch to hold it from turning; the catch having a thumb piece for pressing it from its hold whenever it is desired to raise or lower the window. For a heavy sash a coiled spring is attached to the pinion, to counteract the weight of the sash. The arrangement is a great deal cheaper, more compact, and less likely to get out of order than the ordinary arrangement of cords and weights. It will save 175 per cent.

Mr. ADRIANCE—There is inaccuracy in the language in talking about a saving of 175 per cent. If a man saves 100 per cent he saves the whole and of course can save no more. If the old style of window cost $1 and this can be made for 25 cents, then this will effect a saving of 75 per cent. But if we wish to say how much more the old window costs than this, then we say it cost 300 per cent more. In one case the per-centage is reckoned on the dollar, in the other on the quarter.

PHOTOGRAPHIC PRINTING MACHINE.

Mr. FONTAINE—This is a machine for printing photograph positives from the negative. It looks, you see, something like a small wooden trunk. The negative is secured in the upper part of the lid directly below an opening through which the light enters, the light passing through the negative as usual, and forming a reversed copy or positive upon the sensitive paper below. The sensitive paper is wound on this shaft and is turned under the opening by a crank. The negative is secured by a spring at one edge, and is pressed down in contact with the positive paper for a moment while the paper is stationary, and at the same instant the orifice for the light is opened by the hole in the revolving plate above it coming over the orifice. It will print four pictures a second, which is at the rate of 14,400 per hour. These sheets were printed with the machine, and I will pass them around for inspection. By condensing the light by a lens, 30,000 pictures per hour may be printed.

The PRESIDENT—I see Prof. Seely present; will he please to give us his opinion of this machine?

Prof. SEELY—I admire the mechanical ingenuity displayed in the construction of the machine. The process employed is that which Talbott employed in 1840. It has been repeatedly tried, but is not now used to any extent.

Mr. FISHER—How much time is occupied in changing the sheets?

Mr. FONTAINE—With one assistant (my daughter who is 18 years old) I can print and finish 350 positives per hour.

Mr. STEVENS—Could this process be used for illustrating a book? I ask this question in reference to a work now in manuscript of an acquaintance who is delaying its publication on account of the illustrations. The work is on physiognomy. Heretofore works on this subject have been illustrated by portraits of different individuals, but the author of this wishes to illustrate all of the passions by a single countenance; showing its expression when in an amiable mood, again when distorted by anger, again in the pomposity of the military strut, and so on. What would be the price of pictures by the quantity if printed on this machine?

Mr. FONTAINE—They can be printed for two cents apiece. I sell them mounted on cards at four dollars per hundred.

Mr. FISHER—Can you print them on rolls of paper, or is there a limit to the size.

Mr. FONTAINE.—By having a slit across the box instead of a circular opening the printing might be done on a roll by continuous motion. I have a photograph made by this process that is $5\frac{1}{2}\times7$ feet.

The PRESIDENT—There would be no difficulty in making a large machine and driving it by a steam engine?

Mr. FONTAINE—There would not.

GEDNEY'S PISTOL.

Mr. TAYLOR—The novelty of this pistol is in the priming; the fulminate is formed in small cylinders about the thirty-second of an inch in diameter and an inch in length, and a small piece is cut off and carried under the hammer just before the hammer strikes the cone. The great advantage is the perfect safety of the weapon from accidental discharge. If it is dropped or struck by any hard substance there is no cap on the cone to discharge it. The priming is waterproof, and is not injured in fording streams or by becoming wet in any way.

Prof. SEELY—What varnish is used?

Mr. TAYLOR—Gum shellac; but the priming is waterproof independently of the varnish.

TALPEY'S SELF-FEEDING SAW.

Mr. TALPEY—This is a model of my self-feeding saw. It is designed especially for hand sawing, as it takes but little power. A man can easily saw with it an oak plank two inches thick. [We shall soon give an illustration of this novel and ingenious invention in the SCIENTIFIC AMERICAN.]

RECENT DISCOVERIES OF SILVER AND GOLD VEINS IN MARIPOSA.

Mr. CHAMBERS—Mr. President, I have here a communication from our old friend, Mr. Bruce. He used to take a great deal of interest in the American Institute and in the Polytechnic Association, and it seems that he has not forgotten us. One portion of his letter is of public interest, and I will read it. "At present there is a great excitement in Mariposa from the recent discovery of very valuable silver and gold veins which thus far surpass in richness any heretofore found. Large quantities of the ore have been sent to San Francisco for assay; the silver has turned out at the rate of $500 per tun, the gold much beyond that figure; and as they dig down, the richer it becomes. Speculators from San Francisco are here in squads, buying up the various interests. The discoverer is entitled to 500 feet of front, running back as far as the vein extends; all other claimants are entitled to 250 feet, and as it requires a large outlay of money to construct mills and machinery, none but great capitalists can profit much by this discovery, except by selling their interests to the best advantage to others, and in this way large fortunes are being made. My sons have some valuable claims."

IRON-CLAD VESSELS.

Mr. FISHER—As I proposed this question, I suppose it devolves on me to open the discussion with the remarks that I have to make. It has been found in England that solid plates are better than armor made of several thin plates. If the plate is solid and the iron is good, the force is expended in altering the form of the shot, but if the plate is weak, that gives way and the form of the shot is not changed. It has been found that wrought-iron shot is not as good as cast-iron, and it is now proposed to make the shot of steel. The main office of these plates is to keep out shells, as solid shot are not very destructive. Mr. Whitworth has sent a shell through a target like the side of the *Warrior*; the shell passing through the plate and bursting in the target, tearing it to pieces. The novel thing about this shell was that no arrangement was prepared for exploding the charge, it was fired by the concussion of the projectile as it struck. It could accordingly be handled with perfect safety, as dropping it, even into the hold of a vessel, would not cause it to explode.

Mr. DIBBIN—What then caused it to explode when it struck?

Mr. BARTLETT—This is one of the manifestations of the conservation of force. The heat is generated by the destruction of motion. The mechanical force or motion is converted into caloric.

Mr. DIBBEN—These target experiments are calculated to mislead, from the fact that the conditions under which they are made are very rarely realized in practice. The gun is placed in a position exactly at right angles with the target, the distance is short and is accurately known, and consequently the penetration or destruction is much greater than it would be in actual warfare. I think the plates yet have the advantage of the guns. No practically successful wrought-iron guns as large as 100-pounders have ever been made in any considerable numbers, and the best gun yet manufactured is the Parrott, or some one made on the same plan—that is a cast-iron core with bands of wrought iron. Mr. Parrott has made a large number of 200-pounder rifled cannon, and three which fire his shot weighing 300 pounds, and the proof of all of these guns has been eminently successful; the charge for the 100-pounders is one-tenth the weight of the shot, but that for the 300-pounders is a little less than one-tenth. So confident are Mr. Parrott and his men in the strength of these guns that in trying the first proof they stand in the immediate vicinity of the gun when it is fired.

The subject of "Recent Improvements in Warfare" was chosen for the next week, and the Association adjourned.

OIL REGION RAILROAD.—As an instance of the rapid progress of all works of improvement in these flush times, we may mention that the Oil Creek railroad, which was only projected in the middle of last spring, has been already finished and put in working order. It is twenty-seven miles long, running from Corry, at the intersection of the Philadelphia and Erie Railroad with the Atlantic and Great Western, to Titusville, the focus of the oil region. This puts the oil wells and dealers in direct connection by railroad with Erie and all the other ports on the lakes and with Boston, New York and other seaports.

AMERICAN STEEL.—We learn from the Pittsburgh *Chronicle* that Messrs. J. Parker & Brothers, of that city, are erecting extensive works for manufacturing steel. The lot on which the factory and its adjuncts stand covers some three acres, and has a river front of several hundred feet. The works are being erected under the superintendency of Mr. Blair, a gentleman of great experience, and they have advanced so far towards completion that they will soon be in operation. It is perhaps not generally known that large quantities of the cheaper qualities of steel are now manufactured at Pittsburgh.

THE LONDON EXHIBITION—PERFUMERY.

We have received from Mr. Septimus Piesse, of the world-renowned firm of Piesse & Lubin, London, the following very interesting communication in reference to the manufacture of perfumery and the specimens displayed at the Great Exhibition :—

PROCESSES FOR OBTAINING PERFUMES.

The popular impression is that perfumes are obtained by distillation, which, with regard to most flowers, is incorrect.

The odors of tuberose, jasmine, acacia, orange-blossom, violet, jonquil, &c., are only to be obtained in their natural fragrance by the process of enfleurage and maceration.

This process is based on a fact not generally known, namely, that pure grease, fat, butter or oil has the power to absorb the odors of flowers, and to become perfumed when in contact with fragrant blossoms. Grease absorbs odor as salt absorbs water from the atmosphere ; then if such odorated grease be put into rectified spirit, the odor leaves the grease and enters the spirit.

Nice, Cannes, and Grasse, in the south of France, are the present chief seats of this process, and there are annually scented there about 200,000 pounds of grease and oil.

The manufacture of perfumery for home use, together with the quantity exported, involves a trade at the present time of more than a million sterling per annum, and which in a great measure is dependent on this 200,000 pounds of grease made in France.

Now this scented fat is to the British perfumer what raw cotton is to the Manchester spinner.

Samples of grease, perfumed with jasmine, violet, rose, jonquil, orange-flower, and tuberose are exhibited by Messrs. Piesse & Lubin ; also oils of the same flowers.

ENFLEURAGE AND MACERATION.

The process of enfleurage and maceration may be described in few words. Greases thus perfumed were termed butters till within a period of the last twenty-five years, since which the word " pomade" has been more generally adopted ; we thus had violet butter, jasmine butter.

In the Duchess of Grafton's account-book, 1765, there are repeated entries, "Orange Butter, 6*s*."

During the death of the flowers, " when they with winter meet," the makers of these butters or pomades employ their time in purifying the grease which is to be perfumed. This is a labor of no little importance, and requires attention, as the fat has to be scrupulously cleansed from all animal tissue. Clarified fats are exhibited by J. Ewen.

The general plan is to melt mutton and beef fat, with the addition of alum, salt, and niter ; then to wash it continually under a stream of water ; finally, to re-melt the grease, with the addition of benzoin. This latter material has a very marked chemical action upon grease (not yet noticed by chemical writers), tending to prevent the grease from becoming rancid.

The flowers being now in bloom, the enfleurage commences.

Square or oblong frames, lined with glass, termed *chasses en verre*, are employed for this purpose ; these châsses resemble in make a window with one square of glass, and having a frame standing three inches each side above the glass.

The glass is now covered with the purified grease, about a quarter of an inch thick, and upon this the freshly gathered blossoms are sprinkled ; these châsses are then piled upon each other : thus the flowers become enclosed as it were in a flat box, with a surface of grease top and bottom.

The same grease remains, but the flowers are changed as often as they can be during the whole season of blooming of each particular plant, extending over a period of two to three months.

The perfumed grease is gathered together, melted and strained to free it from loose petals, &c., and put into tin canisters for exportation.

Arriving in England, the grease is now forced through a cylinder having slits in it at one end, which causes it to appear in the form of ribbon shavings ; having thus a large surface, it is now put into coppers of ten or twenty gallons' capacity, together with pure rectified spirit, in the proportion of about eight pounds of the butter to every gallon of spirit ; after standing together a month, the spirit is drawn off perfectly clear and bright, but containing all the odor that was previously in the grease.

DISTILLATION.

The odors which rank next in value are those distilled, but, with the exception of rose and lavender, few blossoms will yield odor by distillation.

Bark, wood, seeds and leaves, however, such as cassia, carraway, thyme, cedar-wood, &c., give up their fragrance by this process.

The almost endless variety of essential oils or ottoes in the market, are nearly in all cases the result of the distillation of the fragrant bearing part of the plant.

Few of the ottoes thus obtained are employed for handkerchief perfumes, lavender and rose excepted, but are principally used for scenting soap.

Some odor-bearing fruits, such as lemon, bergamot, and orange, give up their odor by rasping and expressing the rind of the fruit ; these being dissolved in spirit are so very grateful to the olfactories that no less than 40,000 pounds of essence of bergamot are annually consumed in England.

TINCTURATION.

Another class of perfumes is prepared by simple tincturation ; that is, infusing the odorous materials, musk, vanilla, benzoin, and ambergris in pure spirit,

By these various methods the primitive odors are obtained, and their number actually in the market extends to about one hundred varieties.

PERFUMERY MANUFACTURE.

The generality of perfumes used for scenting the handkerchief are mostly of a mixed character, harmoniously blended from the primitive odors, and called bouquets and nosegays of euphonious titles, such as Perfume of Paradise, Frangipanni, Stolen Kisses, Hungary Water, &c., and it is worthy of remark that those odors containing the products of the orange tree are even more popular than the rose.

Dry perfumes, such as the gum resins which exude so prolificly from various plants indigenous to the East, were naturally the first fragrant materials employed by our early fathers ; and as such are repeatedly mentioned in the Scriptures, nearly every one of which are still in use in the laboratory of flowers, and give rise to considerable trade at the ports of Smyrna and the rocky city of Petra.

The incense burners depicted on the tombs of ancient Egypt, Meroë and Memphis are still represented at the International Exhibition of 1862 by the elegant sweet fumigation vase for burning or rather volatilizing the sweet savor of incense.

Perfumery manufacture does not confine its limits to dealing with fragrant substance. The dyer is not satisfied with the pristine whiteness of cotton, he stains it with aniline, archile or anatto, as fancy dictates ; so with the perfumery factor, inodorous bodies he makes redolent. Starch becomes Violet Powder, soap becomes Old Brown Windsor, glycerine becomes Crême de Mauve, which will make lank tresses as bright and crimp as a raven's wing. Water is impregnated with elder flowers, and fat is inoculated with orange blossoms, so that by the least deceivable of our senses we know not the one from the other ; these and other accessories to the toilet of fashion and beauty divide the manufacture of perfumery into about twelve sections, independent of the work of the flower farmer, who produces the raw odorated fats and oils before alluded to.

SMELLING-SALTS, &C.

Section 1 embraces the manufacture of smelling-salts and odorous vinegars ; samples of these are to be seen at the various stalls of exhibitors in Class IV. ; liquid ammonia and bicarbonate of ammonia constitute the base of smelling-salts, scented with various ottoes put into bottles either upon sponge or in a semi-crystalline state. Aromatic vinegar ; that is, concentrated acetic acid, aromatized with camphor, &c., is also put into smelling-bottles upon sulphate of potass, and in this state is called crystallized vinegar.

The manufacture of elegant gold, silver, and aluminium smelling-bottles to contain the above is of no mean importance as a branch of the jewelry trade.

Diluted forms of scented vinegar, under the names of Toilet Vinegar, Four Thieves' Vinegar, Cosmetic Vinegar are also extensively exhibited.

Mr. Rimmel makes a speciality of toilet vinegar.

SACHET POWDERS.

Section 2 embraces sachet powders, absorbent powders, &c.

The sachet powders consist of dried flowers, odoriferous gums, and precious spices. Almost every lady's wardrobe contains a sachet for perfuming the linen after the laundry process, or to prevent moths. There are about twenty-four varieties of sachet powder in Atkinson's list.

The absorbent powders, for drying the skin after washing, are an important class of toilet requisites, many tuns of which are manufactured from wheat, starch, and talc powder, and are used in the nursery of children.

COSMETICS.

Sections 3, 4, 5, include cosmetics proper, which are made either to "increase the force of beauty" or to arrest time stains.

Of cosmetics, cold cream of roses is perhaps the greatest favorite ; its reputation has lasted from the days of its inventor, Galen, 1700 years. The English perfumers appear happy in this manufacture ; cold cream anglaise is to be found throughout all Europe.

Milk of almonds, emulsion of pistachio nuts, olivine and jelly of jasmine are favorite preservers of the skin, and it must be admitted that they are of service ; the oil which these emulsions contain in a globular state, applied to the skin, preserves it against the inclemency of our seasons.

HAIR DYES.

It is difficult to ascertain what is the annual consumption of silver in the manufacture of hair-dye, but we have good reason to know that the quantity is far beyond the ordinary belief of those even who are used to abstract statistics ; still, from the difficulty of staining the living hair, the problem of making a universal hair-dye has yet to be solved, and some curious phenomena are occasionally seen in the way of green and purple hair, which results from the chemistry of the hair-cutting room. Mr. Condy, whose energies are devoted to the study of manganese, produces a most excellent brown hair-dye, consisting of permangate of potassa, under the euphonious title of Condy's Baffine Fluid ; but, though the article is excellent for its purpose, the public are rather uncertain whether the fluid is " to polish dining-tables," or is a " piquant sauce."

DRESSINGS FOR THE HAIR.

Sections 6, 7, 8, take in the manufacture of unguents, oils, balsams, hair-washes, bandaline and other dressings for the hair.

The mane of the British lion appears to give him a great deal of trouble to arrange and to beautify before he considers himself fit " to enter society." Atkinson has rendered himself famous for his bears' grease, but whether the article sold is the veritable fat of Bruin, ill-natured people doubt ; however there is a liberal show of it in this class, every one of the perfumers having some special panacea for making hair grow, and the most notable of our time appears to be pistachio nut oil, expressed from the kernels of the *Pistache vera* of Spain ; and such is the present consumption that pistachio nuts, to use a Mincing Lane phrase, have "gone up" from £5 per cwt. to £12, with every prospect of a " further rise."

Whether shampooing was ever an Eastern practice, we must leave to Mr. Layard and other oriental scholars to inform us ; but it is certain that this modern habit has been introduced from America by the Figaros of New York. American Bay Rum or Hair Water appears to contain hartshorn and cantharides with a scented spirit.

SOAPS AND SHAVING-CREAM.

Sections 9, 10, are important branches of the perfumers' trade, consisting of the manufacture of scented soaps for washing, which are or should be hard, and of shaving-cream, which is soft and honey-like.

The removal of the excise duty on soap gave a most valuable impetus to this trade. Refined scented soap was only known as a luxury, but now it is of universal employment, and ranges in price from 1*s*. to 20*s*. per pound. Some of the scented soaps varying in price from 4*s*. to 10*s*. per pound are very exquisite, such as rose soap, bergamot (commonly called spermaceti) soap, frangipanni soap, and numerous others ; Mr. Cleaver being the maker of the famous honey soap, scented with otto of citronella from Ceylon. Messrs. Low, Son, & Hayden are in high repute for their scented soap; Paris's Old Brown Windsor soap is still and will remain from intrinsic merit a favorite detergent. Pear's transparent soap, invented by the father of the present exhibitor, is worthy of notice; but the firm is prevented from obtaining the full benefit of the invention by the excise duty on the spirit which is necessary for its manufacture; the consequence is that German and American transparent soap is imported into this country, and the inventor is undersold at his own door.

Piesse & Lubin's specimen of cold cream soap is pressed into notice; it consists of a fine curd soap in which the free alkali is nearly all neutralized by the addition of wax and spermaceti.

There is a great variety of other named soaps, from the sublime "sultana" to the ridiculous "turtles' marrow."

DENTIFRICES, &c.

Sections 11, 12, combine the making of dentifrices, mouth-washes, opiates, tooth pastes, breath pastils, nail powder and rouge.

Dentifrices consist principally of antiseptic and astringent substances, and a hard base to act as rubbing material; such as Peruvian bark, cascarilla bark, cassia bark, bole ammoniac, burnt horn, precipitated chalk, charcoal mixed in various proportions with orris root and some peculiar perfume.

Mouth-washes and tinctures principally contain a spirituous infusion of cedar wood, gum myrrh, rhatany or cloves, to which are added otto of roses and peppermint.

EXPORTS AND IMPORTS.

The total value of perfumery exported in 1860 was £274,350.

The average annual importation of some natural productions used by the perfumer for the past five years has been given by Mr. Septimus Piesse in his work, "The Art of Perfumery," as follows:—

Musk	9,388 ounces.
Rose	1,117 "
Vanilla	3,525 lbs.
Ambergris	225 ounces.
Civit	355 "
Orris root	420 cwt.

PIESSE AND LUBIN'S FOUNTAIN OF PERFUME.

Among other goods exhibited is an elegant perfume fountain, designed by Mr. Septimus Piesse, and executed in terra cotta. It represents Christiana, daughter of Linnæus, watering some favorite plants with an arrosoir: the whole figure stands, without plinth, four feet high. The statue is so contrived that water or perfume may perpetually fall from the arrosoir, thus becoming a falling fountain—a pleasing tribute to the great botanist.

The European Iron-Clads at Sea.

England and France have as yet failed to produce an iron-clad frigate which will sail well during sea voyages. The *Warrior*, the *Black Prince* and *La Gloire* were comparative failures, and now the *Normandie* must be added to the same list. The *Normandie* sailed for Martinique, with a picked crew, and La Gravierre, the best admiral in the French service, was on board. She arrived at Martinique, indeed; but the Paris *Temps* admits that, though favored by magnificent weather, the *Normandie* rolled dreadfully—so much so that it was found necessary to constantly keep the guns lashed, to keep the hatches down, and to take every precaution in the cabin at meal times against sudden lurches. In addition, the want of air between decks was exceedingly marked, the ventilators being insufficient.—*Exchange.*

[This is precisely our opinion, and one of the causes which will, we think, prove a serious obstacle to their general introduction. It is unsafe, in the present history of the invention under consideration, to make any prophecies or predictions; these, like curses, come home to roost, but we trust we shall not be found greatly in error if we venture to say that different models of iron-clad frigates from those now in use must be made before they can be pronounced a success. At the present writing they are in no wise so.—EDS.

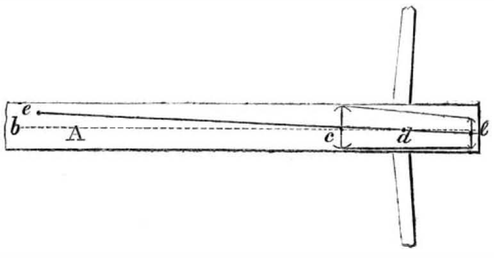
COAL ON THE READING RAILROAD.—If some of the railroads in Pennsylvania have carried but a small quantity of coal this year, it has been otherwise with the Reading line. Last year it carried 1,460,830 tuns; this year it has already carried an aggregate of 2,048,459 tuns.

Correspondence

Setting Carriage Axles.

MESSRS. EDITORS:—In the SCIENTIFIC AMERICAN of November 1st, I noticed the inquiry of Mr. O. N. Chapell, of Prattsburgh, N. Y., respecting the best mode of setting wagon axles to make the wheels run easily. I will give my experience and practice on the subject, and the rule usually pursued in this section of country by wheelwrights for making wooden axles, which are considered the best if put on properly.

The first thing to be ascertained is the dish of the wheel. To obtain this, take a "straight-edge" and lay it against the outside of the wheel, bearing against the felloes; then measure from the middle of the spokes to the edge, subtract half the thickness of the felloe, and the distance is the dish of the wheel.



Suppose the stick, A, is an axle-tree 3 inches by $3\frac{1}{2}$ inches square, the wheels 4 feet diameter, having a hub 9 inches long, and boxes $2\frac{1}{4}$ and $1\frac{3}{4}$ in diameter. First snap the line, *b*, in the middle of the stick, and measure 10 inches from the end, and mark a dot as at *c*; from this point mark another dot $4\frac{1}{2}$ inches toward the end. ($4\frac{1}{2}$ inches = one half the length of hub and middle of spokes. If the spokes are set "back," measure to the middle, always; if set bracing, take the face spokes which should be straight.) Now mark another point as at *d*; from this point measure toward the middle of the stick half the diameter of the wheel, which in this case is 2 feet, and set the dish of the wheel (previously obtained), toward the top of the stick. Suppose the dish to be 1 inch, set it up from the line, *b*, as at *e*, snap a line from *e*, so as to cross *b* at *d*. This I call the line of axis, on which and immediately above, *c*, draw the size of the larger box, and square the shoulder from the line of axis, also draw the size of the small box $9\frac{1}{2}$ inches from this shoulder on the line of axis which falls a little below the line, *b*. Draw lines from the peripheries of these circles, and you have the shape of the top and bottom. To form the right and left side of the horn, snap a line on top of the stick in the middle, set the large box to correspond with *c*, on the side, and the small box to correspond with *e*. It is usual to set the small box about one-eighth or one-quarter (according to the weight of the wheel) of an inch ahead to make the wheels gather a little, it being preferable to have the wheel run against the shoulder in stead of the joint-bolt. This should be observed in forward wheels and carts in particular. I put on all my axles by this rule, and they "talk on the road." To set out the left arm, measure 5 feet 5 inches from the point, *d*, and procede the point, *d*. When the arm is finished it should come directly after the middle of the spoke, which should stand plump up from the felloe below.

Iron axles are usually set from a wooden pattern on the same plan. A perfectly straight wheel is to be preferred, and the dish is a little more than half the felloe. W. H. BENNETT.

Warwick, R. I., Nov. 18, 1862.

Who will Invent a Writing Machine?

MESSRS. EDITORS:—The process of writing is the same that it has ever been; labor-saving apparatus has, I believe, never been applied to it. Is there any reason why the pen may not be driven with great speed and accuracy by machinery as well as is the needle? Cannot the same results which the pen produces slowly be produced with great rapidity by some other contrivance? The printing telegraph apparatus seems to prove that this is possible. Perhaps one of the ingenious readers of the SCIENTIFIC AMERICAN will invent an adaptation of that mechanism, or some better contrivance, that can put thoughts on pape economically, at the speed of ordinary utterance, and in the ordinary characters of our language—legible by all. It is not easy to think of a possible invention which would command more universal use than a writing-machine. It would be used in every legislative hall, in every court-room, in every assembly where reporters are now employed; and it would soon command a very much wider use. For all commercial correspondence—in which "time is money"—it would soon supersede much hand-writing, as the telegraph is superseding much letter-writing. No journalist, no merchant, no lawyer of large practice would be without an apparatus by which a clerk could put words on paper as fast as they were dictated and in a shape in which the document could be used without transcribing. It would make the learning to read and write as fascinating an employment to children as the learning to stitch upon a sewing machine now is, and it would become a necessary part of all educational apparatuses. Perhaps a writing-machine has been tried unsuccessfully; but so have many other things that are now triumphs of ingenuity. Why should it not be done? A. A.

What an English Ironmaster thinks of Us.

MESSRS. EDITORS:—As I shall not be able to visit New York, it is my desire to submit to the legionary readers of the SCIENTIFIC AMERICAN a few of my views upon what I have seen and thought while on a short "run" from my old home in England to this glorious but now distressed country.

I have been at the seat of war and have seen how a free people can pour out their blood and treasure to save the life of their country—how they can die that their country may live—that immense country which the American people have fondly flattered themselves was to be the refuge of all the oppressed men and women upon the face of God's earth. Never before has the world seen such devotion to a *principle* as I have seen among the hundreds of thousands of soldiers upon the "tented field" and in the hospitals. It touched my heart to see brave men, struck down by the agent of death, suffering patiently, often cheerfully and hopefully to the end. I wish that all my countrymen could have wandered with me among those scenes; then they would better understand the nature of this most dreadful and destructive of all civil wars. They should go into the humble tent of the private soldier—often (in America) an educated and cultivated gentleman—and ask him what he was fighting for, and why he was submitting to such hardships, wounds and death. Then Englishmen would understand why all this "brother-butchery" is engaged in upon such a wholesale scale.

I have also been all over the neighborhood of the great lakes, destined to be the happy homes of millions of free men. I went to the wonderful mineral districts around Lake Superior, and I saw what may be termed mountains of copper, and, more wonderful still, actual mountains of iron almost ready for the iron-worker. God intended all this lake district for a favored people. Iron, the great civilizer, exists in vast abundance; no where on all the habitable globe is the like to be seen. A wonderful commerce is transacted upon the lakes; and I have seen men—not very old ones—who told me they were living here when no steamers and only a very few sailing vessels found employment on those waters.

In passing through the thriving city of Buffalo my old tastes led me to visit the Union Iron Works, which are located on the river by the city; they are among the finest I have ever seen anywhere. There are two very large blast furnaces, using anthracite coal and making about sixty tuns of foundry pig iron per day, which iron is sent to points as distant as Cincinnati, and is sold at from $30 to $35 per tun. These works smelt the pure ores of Lake Superior, some from Canada, others from Oneida county, N. Y., and Lake Champlain. The coal is procured from the great Wyoming coal-field; and the limestone is quarried within the city limits. A very extensive and complete rolling mill is nearly ready for operation; and I was surprised to learn that all its fine machinery was constructed here. I am told that, owing to a want of experience on the part of the projectors of this establishment, their success at the commencement was not flattering; now, however, it is very much so, and it may be regarded as the pioneer to many others. At the present time it is "coining money."

I will now state some particulars furnished me by an acquaintance engaged in the lake and canal transportation business :—

Lake Superior ore (65 to 70 per cent) costs, on board, $1 50 per tun ; Oneida ore (40 per cent), on board, $1 per tun ; anthracite coal, delivered here, $4 50 per tun ; transportation of ore from Lake Superior, $2 to $2 50 per tun ; transportation of ore from Oneida, $1 per tun. Limestone is delivered at about 50 cents per tun ; but both ores and transportation charges are likely to be soon lower. We folks in the old country can make no iron of equal quality to this at these figures.

Iron gives power to a people ; England is indebted to her power of iron-making for her position in the family of nations ; and next to England comes America. I have seen your iron-clad navy—incipient as yet, but growing daily to be a "stern reality." Brave people, work out your destiny !

A Staffordshire Ironmaster.

Buffalo, N. Y., Nov. 17, 1862.

The Gold Mines of California of No Value to the World.

Messrs. Editors :—On page 297 of the current volume of the Scientific American my eye was attracted to an article entitled "The Gold Mines of California of No Value to the World." This is a startling caption and contrary to the general received opinions of mankind. If true, it is difficult to account for the acknowledged aphorism that "gold is the only deity universally worshiped without a single hypocrite." At the conclusion of the article, however, it is admitted that the proposition applies only to that portion of gold used as *currency*, while that portion of it used in the arts does increase the wealth of the world to an extent equal to the excess of its value above the cost of production. Hence I suppose the proposition would stand thus : "The Gold of California used as Currency of No Use to the World." Now the proof of this latter proposition may be shown to be insatisfactory and erroneous. I have always regarded the discovery of the gold mines of California as of incalculable use to mankind ; and I do not know that I have any reason to change my mind after reading through the article above-mentioned. Admitting that the amount of money necessary to effect the exchange of property or for business transactions is two per cent of the whole wealth of the country, that more than this is superfluous, and that less than this would enhance the value of the circulating medium, I think that no one need necessarily arrive at the conclusion that we should not be benefited by an increase of gold and silver.

There are two kinds of currency in circulation—first, paper money ; second, the precious metals. Of these two kinds, paper money constitutes by far the largest portion ; while, at the same time, it would be much better were it otherwise. The precious metals are of standard value, while paper currency is of representative value ; and if issues of paper are extended beyond the transactions required to be effected, the face value of the paper becomes merely a nominal value, and hence we have a depreciation. Previous to the discovery of the gold mines of California, commerce had much extended, business transactions had increased, and the amount of gold was not sufficient in proportion to paper money in circulation ; hence the great benefit resulting from the discoveries both in California and Australia.

The precious metals, being of standard value, should always be in a certain proportion to the amount of paper issued in order to render bank notes safe and give confidence in them as currency. By increasing the amount of specie in circulation we need not necessarily increase the sum total of currency of the country or make it more than the ratio of two per cent of the wealth of the country ; for, as the metals are increased, paper money could and should be made to disappear, and in proportion to its disappearance should we be benefited.

It is true that the price of an article is its relative value in regard to some metallic standard, such as gold, silver or platinum ; and it is also true that prices must vary with all changes of the relative value of such metals ; hence, at one time, a bushel of wheat may be worth an ounce of silver and at another time two ounces ; yet it does not follow, I think, that it would be better for the country if the amount of precious metals was diminished, even admitting that more work could be accomplished with less means or less weight of those metals, for in that case we should have less security for the soundness of our paper currency, which will continue to constitute a great proportion of our circulation as money.

Lastly : I do not see why the gold digger does not increase the wealth of the country, inasmuch as he furnishes a medium of exchange with which he can procure everything that administers to the wants of man, and which is more prized than any of the substantial forms of wealth. W. M.

Fairfield, N. Y., Nov. 24, 1862.

Messrs. Editors :—In your issue dated Nov. 8th (page 297) an editorial was published under the caption of "The Gold Mines of California of No Value to the World," in which it was asserted that all the gold that ever was dug in California (or at least all that has been used for currency) has not benefited and will not be beneficial to mankind. Now, I propose to state some reasons why I think the reverse.

In the year 1847 gold was discovered in California, in consequence of which thousands of young men from the over-populated Atlantic States rushed thither in quest of riches, all determined upon hard labor to accomplish their desires. The first work to be done was gold-mining, aided by little or no science. This vast concourse of miners had to be fed, clothed, provided with suitable tools, &c. Agriculture had demands to satisfy immediately, and then manufactures claimed the attention of moneyed men. Miners by hundreds flocked into the settlements for spades or shovels, boots, provisions and other actual necessaries, and paid their gold in exchange. General prosperity crowned the efforts of thousands of adventurers ; and the travel to California became so great that two or more lines of steamers were put upon the route between New York and San Francisco, an extensive railroad was constructed across the isthmus of Panama (costing hundreds of thousands of dollars, and giving employment to thousands of workmen), and, as the State became settled, school-houses were built, churches were erected, manufactures and agriculture flourished. Nearly a hundred flouring mills were in successful operation in California in 1855, and in that year $1,000,000 in breadstuffs alone were exported. In short, everything connected with civilization was brought into operation. If it was worth while to keep millions of money in circulation by the employment of labor in constructing railroads and steamships, in building up cities and towns and making California what she is—a noble State in a once happy sisterhood—then the gold mines of the Pacific *have been* of immense value to the world.

The steam engine theory (in the article referred to) is somewhat cloudy. If an engine costing $10,000 kept more men at work and fed more persons than the getting of $10,000 in gold dust, then the former has been of the greatest value to mankind ; but if this engine is standing still, doing nothing, it is like money in a miner's treasure chest will admit, however, that, if this iron monster has always plenty of work to do, and constantly calls to its aid human agencies commensurate to its power, then, of course, it is of much more benefit to the world than all the dormant money in existence—all that which is not employed in some business transaction whereby it will be exchanged over and over again, and thus satisfy the wants of each owner in his turn.

H. W.

Silver Creek, N. Y., Nov. 26, 1862.

[Our correspondent (H. W.) misapprehends the leading ideas of the article in question. It is not to be doubted that the desire to obtain gold in California incited thousands to active labor and enterprise, and developed a vast amount of usefully-applied industry ; but the idea inculcated was, that all the gold dug *beyond* that which is required for the arts, and that which is absolutely necessary for the purposes of exchange in currency, is like adding useless weight to a steam engine.—Eds.

The paper mills of the State of Maine are forced to stop manufacturing for the want of rags.

Forgery of Bank of England Notes.

The Bank of England has had another serious alarm. The recent robbery of its water-marked paper from the Tavistock Mills has set the Government of the bank upon the watch for the culprits ; but while engaged in this search, the photographic counterfeits of the notes suddenly came up in a shape still more serious than the paper robbery. The London *Review* says :—

A few years ago something was heard of photographic forgeries of bank notes. These were undoubtedly done in a very skillful manner, but, at the same time, no persons who had ever examined a genuine bank note could have been led astray by them ; and while it was conceded that the imitation was very good, the idea that photography could ever be seriously employed by the forger was generally dispelled at the first inspection of these photographic imitations. Since then the matter has been lost sight of by the public, and the greatly extended facilities which recent photographic discoveries have placed at the disposal of the forger have been apparently overlooked by those who should be most upon their guard.

It may, therefore, be with some little surprise that the bank authorities will learn that photographic processes are not only known, but are actually in constant operation, by which *fac-similes* of their notes might be produced so perfectly as to defy detection by the most practiced expert. It is admitted that the image of a bank note produced in the camera is as absolutely perfect as the note itself. Every stroke and line, each accidental flaw or secret mark is as easily produced as the most common place design. The optical means employed can, in fact, transfer on to the prepared plate as exact a *fac-simile* of the bank note as would be found on the plate from which the note was in the first instance printed. As far as the negative is concerned, there never has been the slightest difficulty in the way of successful forgery ; but so long as the means of reproducing copies from such a negative was confined to the ordinary process of photographic printing, no successful imitation could be expected. Here and there an unwary person might be taken in, but the risk of detection would be far too great to induce any one to embark in this dangerous pastime. Recently, however, discoveries have been made by which it is possible to transfer the negative image from the glass plate in all its minute integrity and exquisite accuracy on to metal or stone ; and this once effected, impressions can be worked off in printer's ink of absolutely the same tint and material as that used in printing the original note. The photozincographic process of Sir Henry James, as practiced at Southampton for the production and reduction of maps, and the photolithographic process of Mr. J. W. Osborne, employed for a similar purpose at Melbourne for the colonial Government of Victoria, have each been brought to a sufficiently high state of perfection to render the successful forgery of a bank note mere child's play to any one possessing the manipulatory skill of either of the above gentlemen.

The editor of the *Photographic News*, in drawing attention to the specimens of these processes exhibited in the International Exhibition, gives it as his firm opinion that, by these means, copies of Bank of England notes might be produced which would entirely defy detection. It so happens that these notes offer very especial advantages for imitating in such a manner. The design is clear, bold, and well marked ; they are produced, not from engraved plates in intaglio, printed at the copper-plate press (the printed impression of which always presents a slight amount of relief which may be felt by the finger) ; but by block printing at an ordinary typographic press. Such an impression can, therefore, be imitated by a photolithographer without difficulty, and in such a manner that, if printed on the proper paper, the bank authorities themselves would be incapable of detecting the imposition.

Elias Howe, Jr., the inventor of the sewing machine, carries the daily mail from Washington to the camp of the Seventeenth Connecticut Regiment, in which he is a private.

A new volcano has been discovered in a mountain in Iceland, the top of which is covered perpetually with snow.

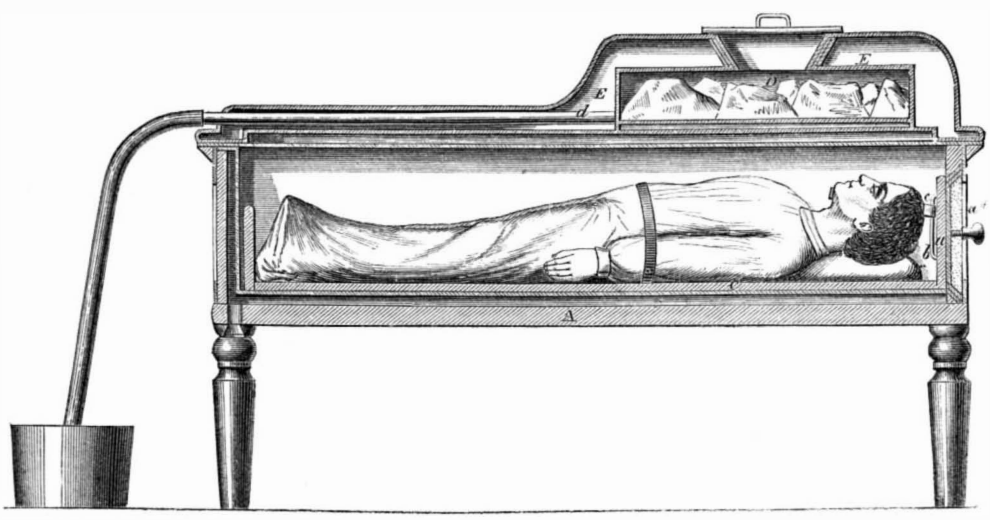
Improved Corpse Preserver.

Many plans have been proposed to prevent decomposition of the human body after death; of these methods the preservation by cold is the simplest, and for that reason the most popular. A convenient arrangement for this object is herewith illustrated, and may be easily comprehended by reference to the letters.

It consists of a wooden box or case, A, lined with some metallic substance, resting upon legs, so attached that they can be quickly removed if desirable. This box forms the body chamber and should be made so as to exclude the air as much as possible.

The chamber, A, is fitted with a door at one end to receive the cooling board, C; upon this the corpse is laid out, the head piece, *a*, of said board being provided with staples, *b*, to retain a band, *c*, passing around the jaw of the deceased, and thus keep it closed. It will be seen that the door, a^2, is beveled on its faces; these faces are lined with felt or india rubber, so that when it is closed and kept up to its place, a perfectly air-tight joint is made. The walls of the head-piece are double, and a filling of charcoal should be interposed as a disinfectant.

At the top of the chamber is the ice-box, D, and air chamber, E; these are constructed of thin sheet metal, and so placed that the influence of the cold will act principally upon the parts of the corpse most liable to speedy decay, namely, the bowels and chest. The small pipe, *d*, runs into the refrigerator and discharges the waste water from thence into any common pail or tub. The ice-box and chamber may be made with double walls which can be left in communication with the air space of the body chamber. A continuous circulation is at all times thus maintained.



BUNN'S CORPSE PRESERVER.

This apparatus may be made in several sections if desired, so that it can be put up in any place where the doors will not allow of its entrance; convenient access can also be had to view the deceased at all times.

The patent for this invention was procured through the Scientific American Patent Agency, Oct. 28, 1862, and further information in relation to it may be obtained by addressing Lewis D. Bunn, of Morristown, N. J.

WHY A LAMP WICK DOES NOT BURN.

If we take a piece of lamp wicking and place it in the flame of a lamp it is immediately consumed, but the same kind of wicking placed in the lamp and lighted at the top, lasts the whole evening, and if the lamp is supplied with alcohol the wick is not even charred. The cause of this was a perfect mystery until a hundred years ago, when Dr. Black, of Glasgow, discovered the principle of latent heat. As the oil or the alcohol comes near the flame it is evaporated, and by this change in its form a large quantity of heat is destroyed, or rather is rendered latent, so that it does not manifest itself in any way. It requires a great quantity of heat to change a liquid into vapor, so that evaporation always cools surrounding objects. The wick is cooled by the evaporation of the oil or alcohol below the temperature at which it will combine with oxygen—in other words, below the temperature at which it will burn.

Dr. Black's discovery suggested to Watt his great improvement in the steam engine; condensing the steam in a separate vessel from the cylinder. Watt attended Dr. Black's lectures.

A Word about Military Matters.

It does not yet appear to be a part of the Government programme to cut off railway communication between the city of Richmond, Va., and the more southern States. Not one well-concerted effort has yet been made to accomplish this great undertaking—one which, if successful, would do more damage to the enemy than a battle and a victory for the Federal army. To thus isolate Richmond would constitute one of the most splendid achievements of modern warfare. It is said that the Federal army in Western Virginia is preparing to go into winter quarters at the Gauley river, no enemy being near at hand either to annoy or fight. Now, why cannot this very army work its way down to the railway at some point and destroy it? There are, doubtless, obstacles to this movement; but "wherever there's a will there's a way," and it seems to us that if our Government or the commanding officers were in earnest about this matter, a great deal more could be accomplished. We are tired of those shoulder-strap gentry who do nothing. It is said that General Banks (who is now in this city, preparing a most formidable expedition) is pestered continually by applicants for "light and comfortable" situations on his staff—situations where little labor and no risks are required; but the applicants have no objection to an unlimited amount of pay. Gen. Banks has had too much experience to be caught by such fellows. He well knows that the energies of the whole nation are now being wasted needlessly by such leeches. We are glad to know that Gen. Halleck has determined to dismiss them from the service in disgrace and publish their names.

HUTCHINSON'S FAMILY CIDER MILL.

In our issue of November 22d we published a request for a family cider or wine mill, one that should

on demand give down the rich juice of whatever fruit was submitted to its embrace. No sooner had our call gone forth than the response to it came in the shape of the article itself. Mr. C. B. Hutchinson, of Auburn, N. Y., has a combined mill and press, of this sort. We have seen it at work and can give personal testimony as to its efficiency, having had it in operation at our office. All the labor consists in turning the handle to grind the apples into pomace or the grapes into must, as it is applied to either cider or wine manufacture; the juice then flows, by the combined operation of pressing and grinding, in a continuous stream at the rate of nearly a barrel an hour into the tub below. This press can be adapted to a great variety of uses, and seems one of those universal machines which the public need. The family cheese can, by its pressing attentions, be solidified and condensed, the lard extracted from the scraps, the wool crowded into close quarters, and all farm produce that requires any operation of this kind can be compressed with ease. Clothes may be squeezed dry, herbs cured in masses, in fact, the range of its uses seems illimitable. The machine is made wholly of iron, occupies but little room, and weighs about 160 pounds; a stout boy can readily work it. It has been used in a great number of cases, and the inventor assures us that he sold over 100 of them in two weeks, and those who have used them are well pleased with their performances.

The patent for this mill and press was procured through the Scientific American Patent Agency, and an application is now pending for other improvements.—Any further information concerning the sale of the patent or the price of the mill can be obtained from the manufacturer, Mr. C. B. Hutchinson, at Auburn, N. Y.

The Horsfall Gun.—Several inquiries having been made respecting what is called the "Horsfall gun," which first smashed the great iron target in pieces in England, we would state that it is the largest gun yet constructed in Britain, and in some respects it is the most wonderful piece of ordnance ever produced. It has a bore 13 inches in diameter, and the gun weighs four tuns. It is made of wrought iron, and was forged solid at the Mersey Steel and Iron Works, Liverpool, England, and is entirely different from what are called "built-up guns." It is seven years since it was first tried, and upward of 8,000 lbs. of powder have been blown out of it, but the bore appears to be uninjured.

Tinning Metallic Copper.—W. Wollweber, of Frankfort (*Archiv. der Pharmacie*, July, 1862), recommends for still-worms copper tubes tinned inside in the following manner:—To a solution of Rochelle salts a solution of salts of tin is added; a precipitate of stannous tartrate is formed, which is washed and then dissolved in caustic lye. The copper tube, which has first been rinsed with sulphuric acid and then washed, is then filled with the alkaline solution, warmed a little, and touched with a tin rod which causes the deposition of a coat of metallic tin.

Bursting of a Fly Wheel.—A large fly wheel, 20 feet in diameter, at the rolling mill of Rowland & Co., Philadelphia, lately burst while moving at the high velocity of 200 revolutions per minute. It was used on machinery for rolling steel plate for saws, springs, &c. A portion of the wheel passed up through the roof of the building. One young man was killed. The machinery connected with it was broken to pieces before the engine could be stopped. The velocity of a wheel twenty feet in diameter, making 200 revolutions per minute, is over 140 miles per hour.

Dahlgren and Rodman Guns.—We notice that all our daily papers call the new 15-inch navy guns "Dahlgrens." They are really "Rodman" guns, because they are cooled upon the principle invented by Capt. Rodman, as fully explained by us in our description of the Fort Pitt Works, and the manufacture of those guns, on page 393, Vol. VI. (new series), Scientific American.

Dry sheets of photographic paper are now used by traveling artists for taking pictures of scenery. They may be prepared for months before they are used, and may be carried to any part of the world.

The Scientific American.

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VOL. VII. NO. 23.....[NEW SERIES.]....*Eighteenth Year.*

NEW YORK, SATURDAY, DECEMBER 6, 1862.

SEVENTEEN THOUSAND PATENTS SECURED THROUGH OUR AGENCY.

The publishers of this paper have been engaged in procuring patents for the past seventeen years, during which time they have acted as Attorneys for more than SEVENTEEN THOUSAND patentees. Nearly all the patents taken by American citizens in FOREIGN countries are procured through the agency of this office.

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For further particulars as to what can be done for inventors at this office, see advertisement on another page, or address MUNN & Co., No. 37 Park Row, New York.

SUPPLY AND DEMAND.

For every article of value in the world the demand always exceeds the supply. In other words, every kind of property is wanted by a great many people who are not able to get it. For instance, houses form one kind of property, and what hosts of people there are in every community who would like to own a house but who never do! The same is true of horses, of silks, of broadcloths, and, in short, of every valuable commodity. If we take in the whole human race we shall find that the demand exceeds the supply as truly for the meanest and most common articles as it does for brown stone houses. The great mass of the agricultural peasantry of Europe obtain an insufficient supply of food, and there are whole races among the Asiatic islands who are destitute of even the cheapest kind of clothing. Even in the most prosperous of these United States, the writer of this has seen an able-bodied and middle-aged man walking erect in a crowd of his fellow Indians, but with manifest mortification at his destitution, as naked as when he was born.

The reason why people do not all have fine houses and horses, and all of the other articles which contribute to the comfort and convenience of man, is not because they do not want them, but because they a re not able to get them.

If a man should establish a calico manufactory in Ceylon or Borneo, he would find in the savage inhabitants of those islands an eager desire for his colored fabrics, and if he was willing to receive shells gathered from the sea-shore, he might obtain some little value for his goods. There would be a demand for all of his calicoes, but at a very low price. On the other hand, if a manufacturer offers his wares in a civilized community he will find an equal demand, and he will be able to obtain very much larger values in exchange.

If a man produces an excess of food or clothing or any other valuable commodity, above the quantity required to satisfy his wants, he will find in every community a demand for this surplus, but the amount of values which he can obtain in exchange depends upon the amount of such values produced by the community.

If the supposed calico manufacturer should offer his goods to the natives of Ceylon for one shell a yard, he would probably sell all that he could manufacture, but if he should hold them at twenty cents a yard, he might not find a dozen natives in the whole island who could purchase a single yard. The amount of goods which he would sell would depend upon the price at which they were held, and this applies to civilized as well as to savage communities.

A hundred years ago the sale of cotton fabrics was very small because the fabrics were difficult to procure and the price was high, but with the introduction of the cotton gin, spinning jenny and power loom, the price of cotton cloth was reduced several fold, and the sales multiplied several hundred-fold. Generally variations in the price of an article affect the sale in a very much larger ratio than the change in the price, as it influences the choice of people in making their purchases. At the present time we hear a great deal about the small demand for cotton cloth, the result manifestly of the great advance in price.

As every man desires to exchange the surplus of his own productions after using sufficient for his own needs, for other articles of value, as a general rule he finally fixes the price at such a point that the exchange is effected. This point, as we have seen, depends upon the relative quantity of his own article and that of all other articles produced by the community. It is the latter which determines the *exchangeable* demand.

The price, thus fixed by the relation between the supply offered for sale and the exchangeable demand, secures the most desirable distribution of every commodity. When cotton was very abundant, both cotton cloth and paper were used freely for a multitude of purposes, but as the quantity grows more limited it is desirable that it should be saved for the more important purposes; that the publication of trashy literature, for instance, should cease, in order that the SCIENTIFIC AMERICAN may continue to be printed. And this is certainly and easily effected, without any disputes or arbitrary ordinances, by the advancing price. It affords an impressive proof of the admirable working of the natural laws of trade, which are similar in their character to all of the laws of the wise and beneficent Ruler of the universe.

MISMANAGEMENT OF STEAM FIRE-ENGINES.

Our attention has been called to an abuse which has grown up in regard to the management of our steam fire-engines that calls for correction. We refer to the unnecessary delay in getting them ready for service again whenever they need to be repaired.

No one can deny the advantages the steam engines possess over those worked by hand; nor is there any reason why their cost of maintenance should be proportionately greater if they are properly managed. A steamer throws more water than a hand engine even with pumps of a smaller caliber, for the reason that its action is continuous, while that of the latter is spasmodic, or at any rate, depends for its efficiency upon the will and endurance of the fireman. Those who have seen these men subduing conflagrations know how heartily and energetically they enter upon their heroic work.

Steam fire-engines carry high pressures, and have boilers which generate vapor rapidly. In order to do this, the fire surfaces must be large and the water spaces comparatively small; consequently great care and attention are requisite in their management. Engines and pumps of this class are also necessarily light so as to run easily; but if these unavoidable features are an objection, there is certainly no excuse for want of superiority in engineering skill.

For want of this talent some of our steam fire-engines are for long periods of the year inactive. We know of certain engines which have not only been to the machine shops for repairs several times in the year, but have also remained there untouched and unattended to, while large and important commercial portions of the city were left at the mercy of the old hand engines. We might name some instances where engineers have been absent for weeks from the city, and left their machines covered with dust, regardless of the public welfare. How far these men are controlled by higher authority we do not know, but we assert that a little personal knowledge of their construction, two good files and a vice bench, would have finished repairs on some engines, for the want of which the steamers were laid up in the "hospital."

It is not rational to suppose any man can run a steam fire-engine and keep it in order simply because he is a good fireman. The only resemblance that the new agent has to the old machine in quelling conflagrations is that it throws more water, if that be any salient point of similarity. Consequently, those who conduct the former must have an accurate technical knowledge of their business, and be trained to it; or at all events, these qualifications should be in demand, and while we have before mentioned that incapable men held these responsible places, we know also of steam fire-engines which are run by practical engineers, whose repairs have been very small in proportion to those made upon engines not so conducted.

CAST IRON FOR PIERS AND DOCKS.

Inquiries have lately been made of us respecting the durability of cast iron in sea water, with the purpose in view of using it in the construction of piers and docks if it possesses sufficient durability to warrant its application to such objects. The docks of the city of New York are formed of cradles of logs, filled in with loose stones and dirt. Foreign skippers, when they first arrive, are struck with surprise at beholding such a vast shipping port and such a wealthy city provided with such defective docks. Their timbers decay so rapidly by the action of the salt-water borer—*teredo navalis*—that several docks may constantly be seen sinking beneath the water, and as many others undergoing reconstruction. The piers of timber bridges exposed to salt water are subject to like evils. From the very moment they are erected they begin to decay and become dangerous. The very extensive and almost exclusive use of timber in the docks and piers on our navigable rivers is due to the former great abundance and low cost of wood. Until within a few years it was found in abundance adjacent to all our seaports, and it was the cheapest and most convenient material that could be employed. But its increasing scarcity and cost has directed attention to the employment of a more durable substitute. Stone, when formed into solid walls of masonry, possesses the desired durability; but as it has to be quarried, then cut into the desired sizes and forms with hammer and chisel, its cost is enormous. Some more accommodating material has been sought, and cast iron has been fixed upon, as it can be cast in any form and of any size. But a question has arisen regarding its durability in sea water, as it is well known that wrought iron rusts and decays almost as fast as timber when exposed to saline influences. The new iron bridge at Harlem, near this city, is being built on cast-iron hollow columns, but as these are filled with concrete, they will stand erect even though the iron should rust away in a few years by the action of the salt water. It is certainly very desirable to know how long cast iron will endure in salt water, for upon such information important issues may depend. Happily such information has quite recently been given to the public through the columns of the London *Civil Engineers' and Architects' Journal*, by E. B. Webb, C. E., and we will give the substance of his article on this question.

Cast iron in sea water is liable to deterioration by absorption of oxygen, and some qualities of it soon become very soft on the surface. R. Mallet exposed unprotected cast iron freely to the weather, in Dublin, and it corroded nearly as fast as other specimens placed in clear sea water. When cast iron is exposed alternately to sea water and air, oxidation goes on more rapidly than when it is entirely covered with sea water; as moluscs, in the latter case, soon cover the entire surface, and these afford protection against the absorption of oxygen. There are several examples of cast iron being immersed in sea water for a number of years, without the least signs of injury. Three pairs of dock gates have been in use at the dockyard at Sheerness since 1821. Their heel posts, miter posts and ribs are of cast iron, and they are sheeted from top to bottom with water-tight cast-iron plates, and they are still in perfect condition. No portion of the cast iron has ever been replaced in consequence of the deterioration of the metal, and no plate has given way, although exposed to a head of 26 feet of water at spring tides. These three gates of cast iron have resisted the action of sea water uninjured for more than forty years, and a fourth pair of a similar character, in the same place, have been in usefor thirty-five years. This is important data relating to the question.

The pier at Herne Bay, England, three-quarters of a mile in length, was designed by the distinguished T. Telford, C. E., and was built of timber in 1831. After standing seven years the timber piles were found so much injured by the worm that it was decided to use cast iron to a great extent in its repairs. Accordingly a large number of square cast-iron piles were driven down in 1838. These were examined recently by Mr. Webb, and found in a perfect state. The angles of the piles were sharp, and the surface as smooth and sound as when the castings left the foundry. About half of the piles only are of cast iron, and upon these not a penny has been expended since they were put down. The wooden piles have nearly all been cut down by the sea worm, and have required constant repairs and renewals. Mr. Telford had proposed cast iron in the first place for the piles of this pier, and had these been used, the whole structure would have been as sound to-day as when it was constructed. With the exception of the cast-iron piles which have been in the sea water 23 years uninjured, this pier may be termed a ruin. In the extension of Southend Pier, England, by James Simpson, C. E., in 1844, cast-iron piles were used. These have been under sea water for 17 years, and are perfectly uninjured.

As some kinds of cast iron become soft when exposed to water and in damp situations, the kind of metal to be used for docks and piers forms a most important consideration, as it is an undoubted fact that the several cases cited prove that cast iron has withstood the action of sea water perfectly for periods ranging from seventeen to forty years. With respect to the quality which should be employed in sea water, Mr. Webb states that James Simpson, C. E , the successful constructor of one of the piers mentioned, stated that grey cast iron, having a good surface, experienced little injury from the action of sea water. Iron composed of large crystals, and especially if these are irregular, is subject to rapid deterioration in sea water. The softer the iron, the greater is its liability to decomposition. A quality of iron between the limits of extreme softness on the one hand and extreme hardness on the other should be selected by the engineer. Hard cast iron is the most durable, but when very hard it is too brittle. Chilled cast iron corrodes faster than green-sand castings. The glazed skin produced by the sand of the mold in casting should be carefully protected from being broken, cut with a tool or otherwise removed, when the casting is to be placed under sea water. This glazed skin is like a coating of unchangeable silica. Lead, copper, and all metals less oxidizable than iron should not be permitted to come in contact with it, because a positive and negative metal, connected together in water, form a galvanic pile, and the positive metal then oxidizes with great rapidity.

PRESENT CONDITION OF THE "ROANOKE."

As some erroneous statements are going the rounds of the press concerning the iron-clad battery *Roanoke*, we paid a visit to the Novelty Works a few days since, in order to ascertain the facts in the case. The vessel is at present completely covered with her armor, as far as the hull is concerned, with the exception of one or two pieces on the sides; the plates are not beaten with immense sledges, nor are they of the same thickness in all parts, there being a vast difference between the bow and stern, and the side armor above the water line. The deck plating of 1½ inches is being placed in position as fast as possible, but the operations are tedious, involving the execution of many details, such as handling the plates, drilling or punching, and then relaying them. The turrets (three in number) are being bored for the guns; some of the ports are all finished. They are cut out of the solid eleven-inch wall by a machine rigged up for the purpose. The first cut makes a hole 15 inches in diameter; as the ports are oblong, however, there are two holes bored, and the space intervening removed by the same tool, which is necessarily very strongly made and powerful in its action. It runs continually without cessation. In fact all the work is prosecuted with the utmost vigor at all times—night and day, Sundays not excepted. A large force of men are in attendance doing all that can be done. It is undecided as yet whether the gun ports will be enlarged any from the original drawing. So far as regards the *Roanoke's* draft of water, it is less now than it was when she was a wooden frigate, so much has the removal of the guns, spars, top-hamper and two decks relieved her. When fully rigged she formerly drew at least, twenty feet of water; whereas at the present time, with her side armor all on board, and a great part of the deck plating and turret machinery (without the turrets, however), her present draft is 16½ feet forward, and nearly 20 feet aft. She will probably come down to the 20-foot mark, as the ram is fixed at that line.

The turrets are finished but are not set up on deck. Large quantities of additional machinery are being made for the *Roanoke*, such as condensers, turret engines, blowing engines, pumps, &c., these will occupy much time in their execution, and it is thought the frigate cannot be got ready before the expiration of three months at the earliest.

The Novelty Works are also busily engaged on the engines for the Italian iron-clads now building by Wm. H. Webb, Esq., in his yard at the foot of Sixth street. These are very massive engines in their design and execution; being much the same as those furnished to the *Grand Admiral* now in the Russian Navy. Two large beam engines of respectively 100 and 105 inches diameter of cylinder, and 12 feet stroke, are also in hand for the Pacific Mail Company, and, under the able superintendence of the foreman, Mr. James Van Riper, are progressing rapidly.

VALUABLE RECEIPTS.

Composition for Leather.—One of the very best compounds known to us for rendering leather boots and shoes almost perfectly water-proof, and at the same time keeping them soft and pliable, is composed of fresh beef tallow, half an ounce, yellow bees-wax, one ounce and one-eighth of an ounce of shellac. Melt the tallow first and then remove all the membrane from it; add the bees-wax in thin shavings and when it is melted and combined with the tallow, add the shellac in powder and stir until it is melted. Bees-wax is one of the best known preservatives of leather. This compound should be applied warm to the boot or shoe, and the soles should receive a similar application to the uppers. In using it a rag or a piece of sponge should be employed, and the boot or shoe held cautiously before the fire or stove until the compound soaks into it. Care must be exercised not to expose the leather too close to the fire. If the boot be blackened and brushed until it becomes glossy before the application of this preparation it will remain black and shining for a long period after it is applied. A little vegetable tar mixed with the foregoing composition makes it more adhesive and improves its quality for walking among snow. A liberal application of this composition every two weeks during winter will keep boots and shoes that are worn daily water-proof and soft.

Glazed Leather.—The basis for glazed or what is called "enameled leather" is boiled linseed oil. The oil is prepared by boiling it with metallic oxides, such as litharge (oxide of lead) and white copperas (sulphate of zinc) until it acquires a sirupy consistency. Five gallons of linseed oil are boiled with 4½ pounds of white lead and the same weight of litharge until the whole becomes thick like cream. This mixture is then combined with chalk in powder, or with yellow ocher, is spread upon the leather and worked into the pores with appropriate tools. Three thin coats are thus applied, each dried before the other is put on, and when the last is perfectly dry the surface is rubbed down with pumice-stone until it is quite smooth. A mixture of the prepared oil without ocher or chalk, but rendered black with ivory-black and thinned with turpentine, is now put on in one or two thin coats according to circumstances; then dried. The final coating consists of boiled linseed oil and copal varnish thinned with turpentine and colored with lamp-black. The apartment in which such leather is dried is maintained at a temperature ranging from 134° to 170° Fah. White enamelled leather is prepared in the same manner; but white lead and chalk is exclusively used to thicken the oil. Copal varnish colored with lamp-black, will make very good enameled leather if it is put on in several thin coats and dried after each application.

Preparing Kid Leather.—Yelk of egg is largely used in the preparation of kid leather for gloves in France, to give it the requisite softness and elasticity. The treatment of the skins in this manner is called by the French glove-makers *nourriture*. As a substitute for the yelk of egg the brains of certain animals, which in chemical nature closely resemble the yelk of egg, have been used. For this purpose the brain is mixed with hot water, passed through a sieve, and then made into dough with flour and the lye of wood ashes. The glove leather is also steeped for a short period in a weak solution of alum. The Indians of our forests employ the brains of deer and buffalo, mixed with a weak lye of wood ashes, and after this they smoke the skins; the pyroligneous acid of the wood in the smoke accomplishes the same object as the alum used by the French skin-dressers. Indian-prepared skins stand the action of water in a superior manner to French kid. Furs dressed in the same manner resist the attacks of insects. It is believed that the carbolic acid in the smoke is the preservative principle which renders the skins tanned by the Indians superior to those tanned with alum and sumac in the usual way. The skins are rubbed with the mixture of the brains of the animals and the lye by the squaws; then dried in the open air. Three and four such applications are necessary before they are smoked in pits covered with the bark of trees.

Tanning Nets, Sails and Cordage.—The cloth of awnings, sails, also nets and cordage may be prepared in a simple manner to endure for a far greater length of time than is usual with such articles. Take about 100 pounds of oak or hemlock bark, and boil it in 90 gallons of water until the quantity is reduced to 70 gallons; then take out the bark and steep the cloth, sails or cordage in the clear liquor for about twelve hours; then take it out and dry it thoroughly in the atmosphere or in a warm apartment. The cloth should be entirely covered with the tan liquor, and should lie loose in it, so as not to press the folds too closely together. By boiling the cloth or cordage in the tan liquor it will be ready in a shorter period. Sail and awning cloth so prepared will resist the action of damp for years in situations where unprepared cloth will decay in a few months.

FOREIGN SCIENTIFIC ITEMS.

French Aniline Colors.—A complicated law trial has lately terminated in France on suits for the infringement of the patent of M. Renard, of Lyons, for manufacturing *rouge d' aniline*. One of the pleas of the defense was that this color had been discovered by Professor Hoffman, of London, and an account of it published six months before Renard's patent was taken out. Upon evidence it was shown that Professor Hoffman while making some experiments submitted one part of bichloride of carbon and three parts of aniline for thirty hours to a heat of 180° in sealed tubes, and casually noticed that a substance of a splendid crimson remained in dissolution, but he took no very special notice of it then. Renard not only produced the color and applied it to dyeing, but discovered several agents for producing this aniline red, and took out a series of patents for each discovery. He exhibited at the International Exhibition and received two medals—one in the class of dye-stuffs, the other for chemical productions. The following is the pedigree of aniline colors:—Coal, when distilled, produces tar; distilled tar produces benzine; benzine, treated with nitric acid, produces nitro-benzine; nitro-benzine, treated by certain reagents and notably by hydrogen, produces aniline; aniline, treated by reagents (under divers patents), produces fuchsine, azaleine, analeine, &c.; fuchsine, azaleine, analeine, &c., treated by ammoniacal agents, produce the pure coloring principle or rosaniline. Fuchsine, azaleine and analeine are the different salts of this one base—rosaniline. The French court decided in favor of Renard's patent, and awarded him several thousand francs in damages.

An Ancient Oven containing Loaves.—A correspondent of the London *Athenæum*, writing from Naples, states that a baker's oven was lately discovered in Pompeii. He was present when the iron door of the oven was removed, and he says: "We were rewarded with the sight of an entire batch of loaves which were deposited in the oven seventeen hundred and eighty-three years ago! They are eighty-two in number, and are, so far as regards form, size and every characteristic except weight and color precisely as they came from the baker's hand. They are circular, about nine inches in diameter, rather flat and indented (evidently with the elbow) in the centre; but they are slightly raised at the sides, and divided by deep lines, radiating from the center into fragments. They are of a deep brown color and hard, but exceedingly light."

MAKING CHEESE.—Professor Voelcker, of the Agricultural College, Cirencester, England, has been devoting considerable attention to the manufacture of cheese, and especially the celebrated Cheshire qualities. He states (through the journal of the Royal Agricultural Society) that some English cheese-makers have adopted the use of the centrifugal drying-machine for separating the whey from the curd; and he relates the following incident connected with a trial between machine and hand made cheeses:—"In an experiment 80 gallons of milk were made into four cheeses by hand; 80 other gallons were made with the centrifugal machine. The hand-made cheeses weighed, when sold, 75 pounds; the machine-made, 67 pounds, All were sold at 7d. per pound when only five weeks old, and no perceptible difference in those fine, full-flavored cheeses could be noticed. It seemed strange that the hand-made cheese should weigh more by 8 pounds than the machine-made. Equal quantities of milk had been measured out; the machine-made cheese contained rather more water than the other, as was exactly ascertained. Quite by chance, the dairy-maid—who was determined not to be beaten by the machine—was caught incorporating cheese-parings of the preceding day's make, from a large supply she kept under the cheese-tub!" He asserts that a skim-milk cheese always deteriorates when kept more than two months; whereas, a rich Cheddar is gradually improved by keeping for many months. The Cheddar system is the best for producing good marketable cheeses everywhere. In Cheshire where the best cheese is made, the curd is but slightly heated. "The finest-flavored cheese which I ever tasted," says Dr. Voelcker, "was made at Ridley Hall, near Crewe, Cheshire."

POISONOUS CHEESE.—Professor Voelcker, in the course of his experiments on cheese-making, has discovered that not only is cheese made poisonous by a compound of white vitriol, infused to give it the flavor of old cheese, and of blue vitrol, to prevent it swelling, but that under certain unknown influences, cheese becomes poisonous without any particular offensive taste or smell or color. In 1861, a quantity of Cheshire cheese, purchased from a respectable farmer by a factor, was returned from the workhouse at Warrington as poisonous. The people who had eaten it were seized with sickness, vomiting, &c. A specimen having been sent to Cirencester College, a piece of the size of a hazel-nut made the professor ill for four hours; and both his assistants, who took each not more than a quarter of an ounce, five hours afterward were seized with vomiting and violent pains in the bowels. One was ill all night and the next day. Careful analyses on large quantities failed to detect even traces of zinc, copper, mercury, antimony, arsenic, or any of the metallic poisons. The professor thinks that the poison generated in this modified decay of cheese is identical with the sausage poison sometimes found in German sausages.

PROPELLERS FOR BALLOON NAVIGATION.—Dr. Isaac Ashe, M.A., read a paper before the British Association for the Advancement of Science, at their meeting lately held at Cambridge, on the employment of screw propellers for guiding balloons. His proposition was the of a very light screw, capable of elevation and depression through an angle of about 150° so as to be capable of being hoisted while the balloon should be on the ground, of being used horizontally as a propeller or vertically underneath the car, to cause a temporary ascent, as for the purpose of crossing a mountain range without loss of ballast or a descent without loss of gas. Such a screw, he considered, could be worked at small elevations—2,000 feet—by the exertions of the aëronaut, and its advantages would consist in the conferring of definite direction and also of steering power, and in obviating the objection to hydrogen balloons, which consisted in the expense of the gas, as the descent could be effected without loss of gas. Hence smaller and much more manageable balloons might be constructed than those now used, and propulsion would be so much easier. He proposed to steer by means of two small screws connected by a cranked axle placed at right angles to the axle of the propeller, and in front, so as not to interfere with the hoisting of the propeller. These steering screws should have their spirals turned the same direction, and by revolving them in one direction or the reverse, the balloon might be made to rotate vertically, as might be desirable. The disagreeable rotation incident to balloons would also be thus obviated. Dr. Ashe suggested the employment of balloons in investigating aërial currents, and for the exploration of unknown continents, as Australia and Africa. This is exactly the method not only proposed but used, during several balloon ascents made twelve years ago, by Capt. J. Taggart, of Roxbury, Mass. We examined his balloon with the propellers on it, in Jersey City, in November, 1850; it is described on page 61, Vol. VI. (old series) SCIENTIFIC AMERICAN.

ILLUSTRATIONS OF ENLARGED PHOTOGRAPHS.—At the closing soiree of the British Association at Cambridge M. Claudet, exhibited, by the aid of the oxyhydrogen light, the enlarged images of the solar camera thrown on to a screen. A number of *cartes de visite* were enlarged showing the great perfection of proportion and the natural expression which may be imparted to portraits when they are taken in a very short sitting. In order to show the working of the solar camera, it was placed in a room adjoining the great hall, and M. Claudet exhibited in this manner pictures of persons enlarged to the size of nature, and some considerably larger from small *cartes de visite*. The effect was very striking and beautiful. He also exhibited some photographs, taken by the Compte de Montizon, of all the most curious animals of the Zoological Gardens, and some views of Java, taken by Messrs. Negretti and Zambra, with instantaneous views of Paris by Ferrier, showing the Boulevards full of carriages and people, as they are in the middle of the day. One of the principal objects of M. Claudet was to explain how it is possible to trace or draw with pencil on canvas those enlarged portraits when they are to be painted, and for this purpose how it is even more advantageous to apply the colors, not on a surface containing the chemical substances of photographic pictures, but on the usual medium employed by artists without the black shadows forming the delineation of photographs.

THE PROPER USE OF FUEL.

In order to obtain a full equivalent for the capital expended upon this necessary and expensive item in manufacturing, more economy in its use and management should prevail. In the navy, reports are required from the engineers as to the amount in pounds of coal burned, and the gallons or cubic inches of water evaporated by the same. In this way an approximate idea may be formed as to whether the full duty of the fuel is obtained. Different sorts of coal produce opposite results, wholly proportioned, of course, to the purity of the article. The kind used, therefore, must be specified, and a relative idea can then be formed of its value for generating steam. The same plan might be pursued on land, as indeed it is in a few instances. A general adoption of this system, however, would, we think, give great satisfaction to manufacturers. Waste in a great measure might be detected, dirty fires would cease to be in vogue, and carelessness, in an important particular of engineering, would be arrested. There are, however, many minor matters in relation to the economical burning of coal beneath steam boilers that depend upon other features than the quality of the fuel used, and these are contained in the disposition of the heating surfaces of the boiler, its location, whether exposed to cold currents of air, the loss by radiation from its vast surfaces, and, in fact, an almost endless category of technicalities which must be considered when the questions of economy in fuel are balanced. One thing is certain, that coal, as burned beneath steam boilers in this city, in a great majority of cases which have fallen under our observation, is not properly used; nor are the distinctive brands, such as nut, stove or egg, or even pea coal, applied to the particular work for which they are most suitable. This, of course, is no fault of the engineer, but is a matter of consideration for the manufacturer. A little careful experimenting will soon determine the particular size required.

MASON JONES, THE IRISH ORATOR.

Ireland has long been celebrated for her orators. Curran, Grattan, Burke, Sheridan, Canning and O'Connell were among the most noted orators that ever lived. Mason Jones, a young and educated Irishman from Dublin, has just come to our shores to deliver a series of lectures on the great men of history, and several of these have already been given in this city. His delivery is unlike those of our lecturers in general, because he is untrameled with notes of any kind. He rushes into his subject like a steed going up to the charge at the sound of the bugle. Sometimes he is vehement, thrilling with Celtic fire; then again he is soft, tender and pathetic. The principal fault which we find with him is an inclination to be rather flowery in style and rather violent in gesticulation. His orations are pervaded with a high moral tone and a genuine love for liberty. We heard him lecture on John Milton—the greatest poet, next to Shakespeare, that ever lived, and the greatest man, next to the prophets and apostles. He did full justice to the great Englishman, who like Moses, forsook the pleasures of irreligion and the royal party, and cast in his lot with the despised Puritans. Mr. Jones is an able critic and his orations are certainly rich intellectual entertainments.

BOYNTON'S HEATER.

Mr. Boynton and the firm with which he is connected, Messrs. Richardson, Boynton & Co., 260 Canal street, New York, are very widely known to the public in connection with their many admirable inventions pertaining to stoves and heaters. The present improvement is the embodiment of many years' practical experience and study of the calorific art. To produce a complete and reliable heater—one that is simple of management, economical to the last degree in fuel, seldom requiring replenishment or looking after, and above all one that will not, under any circumstances, clinker up—this is the problem that has long puzzled the wisest of the stove makers. Such heaters are wanted in almost every household, conservatory, store or manufactory. Unless we are greatly mistaken, Mr. Boynton has, in this new invention, found the solution of the above problem. By an ingenious combination of parts, which we could not render intelligible without an engraving, it is alleged that he makes a single charge of coal last for 24 hours, no clinkers are formed and the fire may be kept burning the whole winter through, if desired, giving out much or little heat, according to the variable necessities of the weather. We predict great popularity for this invention.

How a Western Editor made Ten Dollars.

The Fishkill *Journal*, referring to the great advance in the price of printing paper and the necessity of publishers increasing their subscription prices, says:—We notice that our old and valued friend, the SCIENTIFIC AMERICAN, is among the number, and that on and after January 1st., the price of single subscriptions to that paper will be $3, with a corresponding reduction to clubs, as heretofore. An acquaintance of fifteen years with it, however, warrants us in saying that it is well worth the money, and we have often wondered that a paper containing so much valuable information could be afforded at the low price of $2. The SCIENTIFIC AMERICAN is one of the very best journals of its class in the world—containing something instructive and useful for all. In its typographical appearance, as well, it is not excelled by any publication, and charms the eye while it instructs the mind. We remember that several years ago, while an apprentice in a western city, our employer obtained from its columns a receipt for which a sleepy cotemporary paid ten dollars. So much for taking a good paper.

ILLINOIS COFFEE.—It is said that Mr. Hoffman, of Illinois, raised two bushels of coffee last year. The seed was sent to him from Australia. The plants were unproductive the first year, but the second they bore slightly, and the third year witnessed the result set forth above, that is, two bushels. Mr. Hoffman thinks thirty bushels per acre can be grown. This last production of Illinois is certainly somewhat startling. With corn, cotton, wheat, tobacco, sugar and coffee, we think she may be literally classed as the Garden State.

RECENT AMERICAN INVENTIONS.

The following are some of the most important improvements for which Letters Patent were issued from the United States Patent Office last week. The claims may be found in the official list.

Mode of Heating Gold and Silver.—This invention consists in placing or arranging a steam chest or chamber within the pan of an amalgamator in such a manner that the pulp or crushed ore within the pan will be gently heated while the process of amalgamation is going on, and the steam chest or chamber be capable of being readily removed, when worn by the agitator or mixer, so as to be unserviceable, and a new one adjusted in its place, the pan at the same time not being subjected to any wear, and consequently lasting an indefinite period. The inventor of this improvement is W. A. Palmer, of San Francisco, Cal.

Horse Rake.—The object of this invention is to obtain a simple and efficient horse rake which may be constructed at a small cost and by any one of ordinary ability familiar with mechanics' tools, and, at the same time be capable of being operated, that is to say, have its teeth raised and lowered for the purpose of discharging the load and adjusting them again in proper working position with the greatest facility. This invention is intended as an improvement on a horse rake on which a patent was granted to the same parties on May 13, 1862; and it consists in the arrangement of a double-armed lever in combination with the axle to which the rake teeth are secured and with a clearer suspended by means of staples from said rake teeth in such a manner that by the action of said lever the rake teeth can be raised and at the same time the clearer is made to slide out toward the point of said teeth whenever it is desired to discharge the load gathered up by them. B. Mellinger, S. Mellinger and J. Mellinger, of Mount Pleasant, Pa., are the inventors of this improvement.

Slide Valve for Steam Engines.—This invention relates to that kind of valve which may be termed the oscillating segment valve, that is to say, which is constructed with its face in the form of a portion of the periphery of the cylinder, and is arranged to oscillate about a fixed axis in a seat of corresponding form. The improvement consists principally in combining the valve with the pendulum or oscillating arm to which it is attached by means of a flexible and elastic plate which constitutes a portion of the back of the valve, and which, while it allows the greater portion of the pressure produced by the steam on the back of the valve to be transmitted to a fixed bearing at the axis of oscillation, at the same time permits the valve to be pressed against the seat with sufficient force to counteract the tendency to lift the valve, which is produced by the pressure of the steam in the ports during portions of the stroke of the valve. Alexander Buchanan, of New York city, is the inventor of this improvement.

Air Engines.—The first part of this invention relates to that class of air engines known as Stirling's, in which the air is heated in two vessels connected with opposite ends of the working cylinder, by being transferred from one end to the other of the said vessels alternately by means of plungers working therein; the working cylinder being double-acting. In such engines, as heretofore constructed, the aforesaid plungers have been so connected that one always ascended while the other descended, and *vice versa*, and the time occupied by the stroke of each has been generally equal to that occupied by the stroke of the working piston, and the consequence has been that the pressure of the air has been made effective upon the working piston through but a portion of each stroke. The object of this part of the invention is to render the said pressure effective throughout the whole stroke of the working piston; to this end it consists in so operating the two plungers that the one in either operating vessel is stationary in its uppermost position, with the space below it full of heated air, while the working piston is making the stroke from the end of the cylinder in connection with that vessel; the plunger in the other heating vessel, which is shut off from the cylinder, making both its upward and downward stroke in the meantime, and causing the latter vessel to be filled with heated air to produce the return stroke of the working piston, by which means a more uniform and greater power is caused to be developed in the operation of the engines and its working is effected with greater economy. The second part of my invention consists in an improvement in the packing of the stuffing boxes, through which the rods of the plungers of the heating vessel work, applicable also to other stuffing boxes, for the purpose of making the oil or other lubricating material employed therein serve, in a novel manner, to aid in preventing leakage. John R. Peters, of New York city, is the inventor of this improvement.

Ventilating Apparatus.—This invention relates to the arrangement and construction of a simple automatic apparatus to be fixed in the roofs or ceilings of public halls, churches, dwelling-house apartments, ships' cabins, railroad cars, and other places, for the purpose of securing efficient ventilation therein; that is to say, to provide for a steady influx of pure atmospheric air, and for the discharge of the air which is vitiated by respiration, combustion or other causes. The apparatus consists, essentially of two tubes arranged concentrically, and opening at their lower ends into the space or apartment to be ventilated. These tubes communicate with the external atmosphere at different levels, the vitiated air rising up the central tube and passing off at the higher level, whilst the fresh air enters the annular passage between the inner and outer tubes at a lower level, and descends into the space and apartment below. Both passages are provided with suitable valvular mechanism for regulating the currents, that of the outer passage at the same time serving to deflect the downward current of fresh air, and spread it out horizontally so as to prevent partial draughts. This invention, by John McKinnell, of London, England, is assigned in full to John Hyslop, of Bradford, England, who may be addressed in relation to it at No. 247 Spring street, New York city.

Who to Write To.

As there are many persons who may desire to communicate with the different bureaus of the War Department, a memorandum of the proper persons to address may be useful:—

All letters relating to pay of soldiers on furlough or in hospitals should be addressed to General B. F. Larned, Paymaster General.

Applications for back pay and the $100 bounty of deceased soldiers should be addressed to Hon. B. B. French, Second Auditor.

Applications for pay of teamsters, employés of the Quartermaster's Department, or for horses killed in service, should be addressed to Hon. R. I. Atkinson, Third Auditor.

Applications relating to pay and bounty in the marine or naval service, should be addressed to Hon. Hobart Berrien, Fourth Auditor.

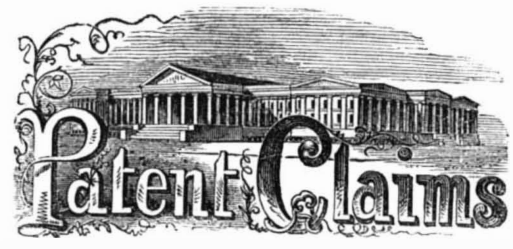
Letters concerning soldiers in the army should be addressed to Adjutant General Lorenzo Thomas.

Explosion of a Lard Tank.

At the packing house of Pulcifer & Williams, in Chicago, a large iron lard tank exploded recently with a terrific force that threw it from the first floor clear through the other four stories above to the roof, wrecking that portion of the building and descending to nearly its former location. Another full tank stood near, which was thrown from its foundation and its contents spilled. At the time of the explosion there was no one in the building but the engineer, who escaped with his life, but was severely scalded about the face and body. The building was closed at the time, and the effects of the concussion upon it were such that a portion of the west wall sprung out several inches beyond the windows in the upper stories, and the whole edifice—a very large one—was terribly shaken. No satisfactory reason for the explosion can be given at present.

In the valley of Saginaw, Mich., there are 45 saw-mills, which produce annually 90,000,000 feet of lumber. In 1861 there were shipped from East Saginaw 600 cargoes of lumber. The pine of the Saginaw valley, it is stated, cannot be exhausted in fifty years.

The Great Exhibition in London has proved a financial failure. The expenses have been much greater than in 1851—the receipts much less.



ISSUED FROM THE UNITED STATES PATENT OFFICE

FOR THE WEEK ENDING NOVEMBER 11, 1862.

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.

36,935.—Hugh Barr, of Independence, Iowa, for an Improvement in Churns:

I claim the rotary cream box, I, in combination with the stationary brakes, M M, provided at one side with V-shaped faces, e, and at the opposite side with flat faces, f, when said brakes are placed in an inclined position, as and for the purpose herein set forth.

[This invention relates to an improved churn of that class in which a revolving cream box or receptacle is employed, and consists of a revolving cream box in connection with a stationary brake, constructed in such a manner as to favor the rapid production of butter from the cream and the gathering of the former, when produced, with the greatest facility.]

36,936.—Alexander Beckers, of Hoboken, N. J., for an Improved Steering Apparatus:

I claim the barrels, 1 and 2, on the arms, c c, or tiller, in combination with the ropes or chains, h and i, and sheaves or blocks, f and g, substantially as and for the purposes set forth.

36,937.—Joseph Berthoud, of Paris, France, for an Improvement in Apparatus for Panoramic Advertising:

I claim the loom, l and m, the ratchet wheel, e', and the stop wheel, f, combined with the carrying rolls, d and i, when actuated substantially as described and for the purpose specified.

36,938.—Joseph Bradt, of La Porte, Ind., for an Improvement in Bee-hives:

I claim the construction of the hive or main box, b, with bars, f, flap, d, and inclined bottoms, g, arranged and operating with the entrance, D, box, A, honey boxes, a, and drawer, e, as set forth and described.

36,939.—Abel Brear, of Saugatuck, Conn, for an Improved Apparatus for Raising and Forcing Water:

I claim, the apparatus composed of the vessel, A, pipe or opening, B, pipes, G D, cock, H, or its equivalent, and the two self-acting check valves, C E, the whole combined to operate substantially as herein specified.

[This invention consists in a novel apparatus for raising and forcing water or other liquid, by the pressure of steam, compressed air or gas upon its surface in a suitable vessel, into which it runs by gravitation or is forced by the pressure of the atmosphere after a vacuum has been produced by the condensation of steam.]

36,940.—F. H. Brown, of Chicago, Ill., for an Improved Gas Regulator:

I claim, first, the bi-valve bellows, A, made, constructed, and operated as and for the purposes set forth.

Second, I claim tube, F, in combination with flange, a, and bellows, A, constructed and arranged as and for the purposes specified.

36,941.—Alexander Buchanan, of New York City, for an Improved Slide Valve for Steam Engines:

I claim combining an oscillating segment valve, A, with the pendulum or oscillating arm, I, which suspends it from fixed bearings by means of a flexible and elastic plate, C, or its equivalent, constituting a portion of the back of the valve, substantially as and for the purpose herein specified.

36,942.—E. J. Chapin, of Ottawa, Ill., for an Improvement in Watchmakers' Lathes:

I claim, first, The mode of attaching the bed-piece, I, to the table or bench, A, as shown and described, to wit, by means of the bell-shaped base, H, fitted on the annular way, G, and secured thereto by the screw, K, hook, J, and pin, L, all arranged as shown, to admit of the turning or adjusting of the bed-piece, I, on the table or bench.

Second, The gear-cutting frame, S, provided with the mandrel, T, cutter, U, and set screw, h, and connected to the sliding plate, f, by center points, g g, to admit of the rising and falling of said frame and its proper adjustment relatively with the wheel to be cut, as set forth.

Third, The combination of the mandrels, J O, with the bed-piece, I, rests, K N, chuck, M, and gear-cutting frame, S, all arranged as described, to form a new and useful lathe, for the purpose herein specified.

[The object of this invention is to combine a number of parts in such a manner that all the different lathes used by watchmakers may be obtained and used with a single bed-piece and with but one driving mechanism. The device, as a whole, being at the same time extremely simple and capable of being adjusted and operated with as great facility as the ordinary lathes in use.]

36,943.—C. B. Cotter, of Milford, Pa., for an Improvement in Molds for Casting Metals:

I claim the composition substantially as above described, whether the same be of ashes and lye alone, or the same, in combination with the hydraulic or plastic cement, as and for the purposes set forth.

36,944.—John P. Cowing, of Seneca Falls, N. Y., for an Improvement in Bell Yokes and Fastenings:

I claim making the yoke of the bell with a square hole to receive the bolt that holds the bell.

I also claim the bolt with four, more or less, flat sides to fit the corresponding hole in the yoke with the hole in the top of the bell sufficiently large to turn on the corners of said bolt for the purposes above specified.

36,945.—J. L. Ellis, of Concord, Ill., for an Improvement in Cultivators:

I claim the rock shafts, C C, uprights, D D, connected at their upper ends by the bar, E, and the lever, I, said parts being applied to the main frame, A, provided with curved transverse bars, B B', in combination with the supplemental frame, composed of the parallel bars, L L, and curved transverse bars, K K, with the driver's seat, J, attached, the supplemental frame being mounted on wheels connected to the main frame, and all arranged to operate as and for the purpose set forth.

[This invention consists in a novel and improved construction of a corn plow or cultivator, whereby the device may be drawn along and made to perform its work without breaking down or injuring the growing plants, and, at the same time be capable of having its shovels or shares operated or adjusted at the will of the driver so as to be elevated above the surface of the ground when necessary, as in turning the device at the ends of rows, and also capable of being moved while at work, toward and from the plants, as circumstances may require.]

36,946.—John Farrel, of New York City, for an Improvement in Locks:

I claim, as an improvement on Hall's lock (patented Aug. 1, 1848), mounting the lever tumblers on an axis at or about the middle of their lengths, substantially as described, in combination with the placing of the key-hole, so as to act on their back instead of their forward ends, substantially as and for the purpose described.

36,947.—J. W. Foust, of Hammondsburgh, Pa., for an Improvement in Hay-loading Machines:

I claim the revolving rakes formed of the teeth, b, attached to wheels, A, and provided with the arms, D, in combination with the pendent bars, h, pins, i, or their equivalents, and the endless carrier formed of the chains, f f, the crossbars or slats, q, and the cords, j, all arranged as shown, with the frame, D', to operate as and for the purpose herein set forth.

[The object of this invention is to obtain a device which may be attached to a wagon, and so arranged as to rake and carry off the hay from the windrow and deposit it on the wagon as it is drawn along, thereby greatly facilitating the loading of the wagon and dispensing with considerable labor.]

36,948.—B. and C. Furnas, of Ononwa, Iowa, for an Improvement in Cultivators:

We claim, first, The bars, H H', connected at their front ends to the pendents, F F, and provided at their back ends with the driver's seat, I, in combination with the bars, M M, connected at their back ends with the cross-piece, N, and attached to the plow beams, G G, by the cords or chains, k k, all arranged substantially as and for the purpose herein set forth.

Second, The treddles, K K, when attached to the plow beams, G G, and connected to the cords or bar, L, by the cords or chains, l, as and for the purpose herein set forth.

Third, The uprights, O O, attached to the plow beams, G G, fitted in the guides, m m, of the bar, L, and connected by the bar, P, substantially as and for the purpose specified.

[This invention relates to an improvement in that class of cultivators in which a lateral as well as an up-and-down adjusting movement is allowed the shovels or plows. The invention consists in a novel means which is employed for operating the shovels or plows, whereby the latter are placed under the complete control of the driver or operator and made to follow the sinuosities of the rows of plants and also rendered capable of being raised and lowered with the greatest facility, so as to plow the required depth; the several parts being also so arranged that they may be adjusted to suit the driver to favor the most convenient operation of them.]

36,949.—P. W. Gates, of Chicago, Ill., for an Improvement in Apparatus for Evaporating Saccharine Liquids:

I claim, first, The combination of the fire arch, damper, evaporating pan and defecating and finishing chambers, arranged in the manner and for the purposes herein set forth.

Second, The combination with the fire arch and damper of steam coils, G G', and evaporating pan, C C', substantially as and for the purposes herein described.

Third, the construction of the steam coils with long and short bends substantially as and for the purpose described.

36,950.—Wm. Hailes, of Albany, N. Y., for an Improvement in Grates for Coal Stoves and Furnaces:

I claim the projections, d d, on the outer periphery of the grate in combination with the inner projections, a b, and with the looped bar in operating the grate, substantially as above described.

36,951.—Henry Harper, of Berlin, Wis., for an Improvement in Gages for Carriage Axles:

I claim, first, The method herein described of giving the proper pitch to carriage wheels by means of the bevel, Fig. 1, and the scale, Fig. 2, substantially as set forth.

Second, I claim the use of the bevel, constructed as set forth, for the purpose of giving the proper pitch to carriage wheels, substantially in the manner above set forth.

Third, I claim scale, Fig. 2, when used in the manner above set forth, for the purpose of giving the proper pitch to a carriage wheel.

36,952.—Ebenezer Harrington, of Boston, Mass., for an Improvement in Stove Grates:

I claim my improved grate, B, and sifter or sliding frame, C, as not only having their series of pokers, i i i, arranged with respect to the guide bars, as described, but as having the supporting trunnions, d e, extended from the frame, C, and applied to the fire-place, A, in manner and so as to operate the said frame, C, and the grate relatively to each other, as well as with respect to the fire-place, substantially as specified.

36,953.—Wm. Harris, of Jersey City, N. J., for an Improvement in Machines for Rolling Tires:

I claim the combination and arrangement of the rollers, G E and F, in the adjustable carriage, e, substantially as and for the purpose herein described.

36,954.—James Jenkins, of Elizabeth, N. J., and Henry Weissenborn, of Newark, N. J., for an Improved Furnace for Roasting Ores and for other Purposes:

We claim a furnace constructed substantially as herein specified, for the purposes herein named, or for any other, where, from it properties it may be used.

36,955.—W. W. Huse, of Brooklyn, N. Y., for an Improved Method of Preparing Chewing Tobacco:

I claim in the manufacture of plug chewing tobacco, arranging the filling tobacco between two layers of filling, in long troughs of the width of the intended plugs, and in that condition compacting and pressing it into a long strip of uniform thickness, substantially in the manner described.

I also claim, finally compressing the plugs in the cells of the long trough, provided with sliding partitions, separating the several cells so that the partitions shall yield to the pressure as the plugs are compressed, substantially as described.

36,956.—W. W. Huse, of Brooklyn, N. Y., for an Improvement in the Process of Stripping Tobacco Leaves:

I claim the process of stripping tobacco leaves while under the influence of steam, substantially as and for the purpose described.

36,957.—James Hopkins, of New York City, for an Improvement in Metal Screens:

I claim the screen formed of square wires woven up or laid together, as specified with the sides of the said wire at right angles to the plane of the screen, for the purposes and as specified.

36,958.—Thomas Joyce, of Brooklyn, N. Y., for an Improvement in Coffee-Roasters:

I claim the combined coffee-roaster and revolving griddle, herein described, consisting of the two flat shallow vessels, B C, in combination with the trunnions and frame, A, so arranged as to admit of being opened and of rotating, substantially in the manner and for the purpose above set forth.

36,959.—H. K. Kenyon, of Steubensville, Ohio, for an Improvement in giving Rotation to Ordnance Projectiles:

I claim, first, The specified relative arrangement of the corners of the respective sections of the punch point of the projectile, for the purpose set forth.

Second, Constructing that part of the projectile in rear of the compound punch point with crossed or other similar shaped oblique recesses, g m, when the parts, m, of said recesses rise on an incline, in combination with sliding, rising and descending rollers, f, substantially as and for the purpose set forth.

36,960.—J. A. McCreary, of Brooklyn, N. Y., for an Improvement in Devices for Holding Blind Slats:

I claim the arrangement of the swivel rod, f, in combination with the spring slide, c, frame, A, and slat bar, C, all constructed and operating substantially as and for the purpose shown and described.

[This invention consists in the arrangement of a hinged swivel rod, in combination with a friction slide and with the slat bar and frame of a blind, in such a manner that said friction slide is permitted to accommodate itself fully to the position of the slat bar, and the slats are retained in any position in which they may be brought, and at the same time the slats can be set to any desired angle by moving the slat bar in the ordinary manner.]

36,961.—B. Mellinger, S. Mellinger, Jr., and J. Mellinger, of Mount Pleasant, Pa., for an Improvement in Horse Rakes:

I claim the arrangement of the double armed lever, E, and connecting rods, f h, in combination with the axle, A, rake teeth, G, and clearer, F, all constructed and operating as and for the purpose shown and described.

36,962.—W. H. Miles, Jr., of Brooklyn, N. Y., for an Improved Paint Brush:

I claim the employment of a shoulder, o, in the handles of paint brushes to prevent the handle from slipping back into the brush after the same has been driven into the brush, as specified.

36,963.—W. A. Palmer, of San Francisco, Cal., for an Improvement in Amalgamators for Gold and Silver:

I claim in combination with an amalgamating pan, A, a steam-chest or chamber, E, formed of a removable plate or false bottom, B, provided with one or more flanches at its under side, substantially as and for the purpose herein set forth.

36,964.—J. R. Peters, of New York City, for an Improvement in Air Engines:

First, I claim the operation of the plungers of the heating vessels, in connection with the working cylinder, substantially in the manner herein shown and described, so that the plungers will alternately remain at rest at the top of the heating vessels, while the other plunger makes a downward and an upward stroke, as set forth.

Second, The construction of the stuffing box gland with an oil cup, l, and flexible collar, n, combined substantially as herein described for the purpose set forth.

36,965.—Pascal Plant, of Washington, D. C., for an Improved Apparatus for Discharging Torpedoes under Water:

I claim the tube placed above the water line, with its ball and socket joint and otherwise substantially as and for the purpose described.

36,966.—D. J. Powers, of Madison, Wis., for an Improvement in Grain Drills:

I claim the suspended adjustable foot-board, F, arranged substantially as and for the purpose herein specified.

I also claim the combined application of a spring and friction surface to sustain the drill-teeth, M M, upon their bars, H H, firmly and rigidly, while in operation, but so as to yield with sufficient readiness when they meet obstructions, substantially as herein specified.

I also claim the roller, G, arranged in combination with the operating gearing of the machine, so that the drill-teeth may be raised together by the automatic action of the machine itself in its forward movement, without stopping or halting, substantially as herein specified.

I also claim the continuous zig-zag seeding apertures, y y, adjustable in width, substantially as and for the purpose herein set forth.

36,937.—Edward Precht and Victor Toepken, of New York City, for an Improvement in the Manufacture and Packing of Friction Matches. Ante-dated May 18, 1862:

We claim making the match splints of thin strips of wood, in double sets or combs, those of each comb adhearing together at the upper ends, substantially as and for the purposes herein specified.

We also claim packing the tips of the matches in a band of paper, which is prepared with a composition or substance on its upper edge, whereby the match tips (correspondingly prepared), are ignited on coming in contact therewith, in the act of drawing out of the package, substantially as herein specified.

36,968.—Reuben Shaler, of Madison, Conn., for a Centrifugal Spring Gun:

I claim the combination in the manner described of the stock, 1, spring, 6, barrel, 8, and trigger, 3, by which the bullet is discharged by centrifugal force, as above set forth.

36,969.—Jonathan Smith, of Tiffin, Ohio, for an Improvement in Grain Drills:

I claim, first, Suspending the frame or bars that support the driver's seat from the under side of the main frame of the machine, substantially as and for the purposes described.

Second, The treadles or levers arranged as described, when combined with the separate lever drums for elevating a part or all of the teeth, substantially as set forth.

Third, In combination with the treadles or levers and lever drums, I claim the ratchet wheels and spring pawls, as and for the purposes specified.

Fourth, I claim the slide when constructed with the rectangular projections, and the means described for transverse adjustment, for the purposes and substantially as set forth.

36,970.—G. S. G. Spence, of Salem, Mass., for an Improvement in Preserving Jars and Cans:

I claim making the cover of fruit jars with a bottom projecting downward into the neck of the jar, so as entirely to exclude the air therefrom, substantially in the manner and for the purpose set forth.

I also claim the sealing iron, constructed and used substantially as set forth to aid in expelling the air as described.

36,971.—John Taylor and R. W. Brown, of Westerly, R. I., for an Improvement in the Dobereiner Hydrogen Lighter:

We claim, first, The arrangement of the two openings, e1 and e2, and the surrounding lip, e3, or its equivalent, with the elastic valve, G, as and for the purpose herein set forth.

Second, The employment of the adjustable spring, H, in combination with the above, for the purpose described.

Third, The valve herein described, composed of india-rubber and coated with fine bronze powder or its equivalent, for the purpose set forth.

36,972.—W. H. Towers, of New York City, for an Improvement in Pen-holders:

I claim forming said tube, B, of blotting paper, felt, or other absorbent material, so as to enable it to act in the double capacity of a pen-holder and preventive to the soiling of the fingers of the person using it, substantially as herein set forth.

36,973.—F. A. Trant, of New Britain, Conn. for an Improved Carpenter's Bench Gage:

I claim, as an improved article of manufacture, a carpenter's bench gage, viz., the two or more bars, e e, held in uniform position by means of tongue and groove, a a', or their equivalents, in combination with a single head, c, and set screws, d d, substantially in the manner as described.

36,974.—W. B. Treadwell, of Albany, N. Y., for an Improvement in Stoves:

I claim, first, The bed piece, F, constructed as described, and operating in the manner set forth.

Second, The combination and arrangement of the bed piece, F, with the fire pot, C, illuminating chamber, D, and supply chamber, G H, substantially as herein set forth.

Third, The supply cylinder, G H, constructed and operating substantially as herein set forth.

36,975.—G. W. Wilson, of Galesburg, Ill., for an Improvement in the Mode of Tightening Followers to Mill Spindles:

I claim the re-curved spring, A, constructed as described, in combination with an adjusting nut, E, and follower, B, when arranged and operated as and for the purposes set forth.

36,976.—Abram Acker, of Ramapo, N. Y., assignor to J. S. Wanamaker & Co., of Hohokas, N. J., for an Improvement in Spring Butt Hinges:

I claim the device for adjusting the spring, c, consisting of the enlarged cap, a2, reduced toothed or perforated portion, g, pin, i, and shoulder, p, arranged as and for the purpose herein set forth.

36,977.—T. W. Wisner, of Osceola, Mich., for an Improvement in Trying Squares:

I claim the adjustable face plate, C, applied to the stock, B, of the square, substantially as shown, and operated by the screw, D, or its equivalent, for the purpose specified.

[This invention relates to a new and useful improvement in trying squares, such as are used by joiners and other workers in wood, for testing surfaces which are designed to be at right angles with each other. The object of the invention is to obtain a simple means for keeping the square perfectly true, so that the blade of the square will always be at right angles with the face-plate of the stock.]

36,978.—Benjamin Horn (assignor to himself and J. P. Rittenhouse), of Flemington, N. J., for an Improved Washing Machine:

I claim, first, The combination and arrangement of the rods, K, and weight box, L, with the shaft, C, arms, E, rocking pieces, F, and fluted rollers, G, substantially as and for the purpose herein set forth.

Second, I also claim the arrangement of inclines, o and b, brake, I, shaft, C, rollers, G, and treadle, M, substantially as and for the purpose herein described.

36,979.—C. S. Hutchinson, of Burlington, N. J., assignor to W. T. Hopkins for an Improvement in Hooped Skirts:

I claim the pad, H, and straps, G and G', or the equivalents to the same, when connected to the waist belt and front tapes, B and B', and arranged for application to the wearer's person, substantially as set forth.

36,980.—T. W. Irvin, of Indianapolis, Ind., assignor to W. C. Holmes and Edward Dunn, both of Marion county, Ind., for an Improvement in Grain Separators:

I claim the combination of the corrugated hopper, K, with the angular tube, F E D, and valve, H H O a and b, all arranged and operating substantially as and for the purpose shown and described.

36,981.—John McKinnell, of London, England, assignor to John Hyslop, of 10 St. Judes' Square, Bradford, for an Improvement in Ventilating Apparatuses:

I claim, first, A ventilator for apartments or other enclosed spaces, composed of two concentric tubes or passages opening below in the ceiling or top of the apartment or inclosed space, and communicating with the external atmosphere at different levels, when used in connection with a deflecting flange, I, (adjustable or otherwise), to distribute the pure air within the apartment, substantially as set forth.

Second, The employment or use, in the ventilator described, of an adjustable flange or annular plate, which serves to close the passage either wholly or partially, when required, and which when open acts as a deflector to deflect and spread out the current in a horizontal direction, as hereinbefore described.

Third, A ventilator for apartments, composed of two concentric tubes or passages, opening below in the ceiling or top of the apartment or inclosed space, and communicating with the external air at different levels, when used in combination with a horizontal tube or tubes, Q, for the ingress of pure air, substantially as and for the purposes set forth.

36,982.—Daniel Sherwood (assignor to himself and E. P. Woods), of Lowell, Mass., for an Improved Wire-gauze Strainer:

I claim, as an improved article of manufacture, a strainer for liquids made of corrugated or twilled wire cloth, substantially as described.

36,983.—Sidney Squires (assignor to C. B. Boyce & Co.), of Boston, Mass., for an Improved Clothes-Wringing Machine:

I claim the combination of the levers, L and H, constructed in the manner substantially as described, for the purpose specified.

36,984.—S. W. Wood, of Cornwall, N. Y., for an Improvement in Revolving Fire-arms:

I claim, first, Hollowing or cupping the stationary or fixed breech secured to or forming part of the frame or stock of a revolving pistol, and receiving and incasing the end of the cylinder and heads of the cartridges, having a fixed or stationary inclined plane, the whole arranged and constructed as herein described.

Second, In a self-cocking and discharging pistol, I claim revolving the cylinder and operating the hammer by means of a forked spring pawl in one piece, arranged as set forth.

RE-ISSUES.

1,354.—J. L. Booth, of Rochester, N. Y., for an Improvement in Grain Separators. Patented April 8, 1851:

First, I claim the combination of a vertical upward blast, with a shaking or chaffing sieve which receives a portion of the blast, substantially as and for the purposes herein specified.

Second, I also claim the combination of the double bend (or bends), G, in the blast tube, and the open spout (or spouts), H, for the purpose specified.

Third, I also claim a valve, J, or its equivalent, in combination with a vertical, upward, separating blast and chaffing sieve, which receives a divided portion of the blast, for the purpose specified.

1,355.—John Magee, of Chelsea, and W. J. Towne, of Newton, Mass., assignees of said John Magee, for an Improvement in Ventilating Dampers for Stoves. Patented May 20, 1856:

We claim the new combination of the damper, d, (Fig. 3), smoke pipe, F, and air inlet, c, so that the movement of the damper which diminishes the air inlet will increase the opening of the smoke passage, and that which increases the opening for the smoke will diminish the inlet for air, substantially in the manner and for the purposes above specified.

1,356.—John Magee, of Chelsea, and W. J. Towne, of Newton, Mass., for an Improvement in Stoves. Patented August 14, 1860:

We claim the new arrangements of the smoke pipes and air valve, and mouth of the furnace, or their equivalents, so that they are brought into proximity on the same side of the furnace, substantially in the manner and for the purpose hereinbefore described.

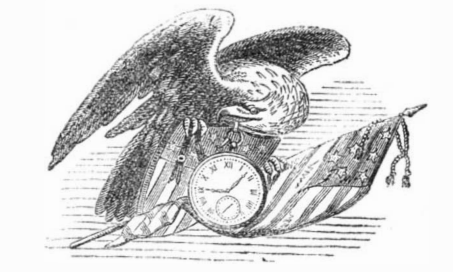
EXTENSION.

C. B. Turner, of Buffalo, N. Y., for an Improvement in Brakes for Railroad Cars. Patented November 14, 1848:

I claim, first, Constructing the brake so as to act simultaneously on all the wheels of the car or cars of the train, on opposite sides, by the momentum and resistance of the several cars, and the consequent contact of the bumpers, which actuate the rubbers, and by which the motion of the cars is arrested; that is to say, I claim the combination of the rubbers, K, levers, D, shafts, C G, bars, I, and rods, O E, arranged and operated in the manner and for the purpose above set forth, or other modes, substantially the same, or operated by manual power applied through the agency of the windlasses, e, chains, f, levers, b, rods, d, or other similar contrivances.

Second, I claim the manner of constructing the sliding spring bumper for operating the brake by the momentum and resistance of the cars, as described; that is to say, I claim the combination of the slide, P, with the bumper, X, and spring, S, constructed, arranged and operating in the manner described, or other mode which may be substantially the same.

PATENTS FOR SEVENTEEN YEARS.



The new Patent Laws enacted by Congress on the 2d of March, 1861, are now in full force, and prove to be of great benefit to all parties who are concerned in new inventions.

The duration of patents granted under the new act is prolonged to SEVENTEEN years, and the government fee required on filing an application for a patent is reduced from $30 down to $15. Other changes in the fees are also made as follows :—

On filing each Caveat	$10
On filing each application for a Patent, except for a design	$15
On issuing each original Patent	$20
On appeal to Commissioner of Patents	$20
On application for Re-issue	$30
On application for Extension of Patent	$50
On granting the Extension	$50
On filing Disclaimer	$10
On filing application for Design, three and a half years	$10
On filing application for Design, seven years	$15
On filing application for Design, fourteen years	$30

The law abolishes discrimination in fees required of foreigners, excepting reference to such countries as discriminate against citizens of the United States—thus allowing Austrian, French, Belgian, English, Russian, Spanish and all other foreigners except the Canadians, to enjoy all the privileges of our patent system (exceptin cases of designs) on the above terms.

During the last sixteen years, the business of procuring Patents for new inventions in the United States and all foreign countries has been conducted by Messrs. MUNN & CO., in connection with the publication of the SCIENTIFIC AMERICAN ; and as an evidence of the confidence reposed in ou Agency by the Inventors throughout the country, we would state that we have acted as agents for more than FIFTEEN THOUSAND Inventors! In fact, the publishers of this paper have become identified with the whole brotherhood of Inventors and Patentees at home and abroad. Thousands of Inventors for whom we have taken out Patents have addressed to us most flattering testimonials for the services we have rendered them, and the wealth which has inured to the Inventors whose Patents were secured through this Office, and afterward illustrated in the SCIENTIFIC AMERICAN, would amount to many millions of dollars! We would state that we never had a more efficient corps of Draughtsmen and Specification Writers than are employed at present in our extensive Offices, and we are prepared to attend to Patent business of all kinds in the quickest time and on the most liberal terms.

The Examination of Inventions.

Persons having conceived an idea which they think may be patentable, are advised to make a sketch or model of their invention, and submit it to us, with a full description, for advice. The points of novelty are carefully examined, and a reply written corresponding with the facts, free of charge. Address MUNN & CO., No. 37 Park-row, New York.

Preliminary Examinations at the Patent Office.

The service we render gratuitously upon examining an invention does not extend to a search at the Patent Office, to see if a like invention has been presented there, but is an opinion based upon what knowledge we may acquire of a similar invention from the records in our Home Office. But for a fee of $5, accompanied with a model or drawing and description, we have a special search made at the United States Patent Office, and a report setting forth the prospects of obtaining a Patent &c., made up and mailed to the Inventor, with a pamphlet, giving instructions for further proceedings. These preliminary examinations are made through our Branch Office, corner of F and Seventh-streets, Washington, by experienced and competent persons. More than 5,000 such examinations have been made through this office during the past three years. Address MUNN & CO., No. 37 Park-row, N. Y.

How to Make an Application for a Patent.

Every applicant for a Patent must furnish a model of his invention if susceptible of one; or if the invention is a chemical production, he must furnish samples of the ingredients of which his composition consists, for the Patent Office. These should be securely packed, the inventor's name marked on them, and sent, with the government fees by express. The express charge should be prepaid. Small models from a distance can often be sent cheaper by mail. The safest way to remit money is by draft on New York, payable to the order of Munn & Co. Persons who live in remote parts of the country can usually purchase drafts from their merchants on their New York correspondents; but, if not convenient to do so, there is but little risk in sending bank bills by mail, having the letter registered by the postmaster. Address MUNN & Co., No. 37 Park-row, New York.

Foreign Patents.

We are very extensively engaged in the preparation and securing of Patents in the various European countries. For the transaction of this business, we have offices at Nos. 66 Chancery-lane, London; 29 Boulevard St. Martin, Paris; and 26 Rue des Eperonniers, Brussels. We think we can safely say that THREE-FOURTHS of all the European Patents secured to American citizens are procured through our Agency.

Inventors will do well to bear in mind that the English law does not limit the issue of Patents to Inventors. Any one can take out a Patent there.

Circulars of information concerning the proper course to be pursued in obtaining Patents in foreign countries through our Agency, the requirements of different Patent Offices, &c., may be had gratis upon application at our principal office, No. 37 Park-row, New York, or either of our Branch Offices.

Rejected Applications.

We are prepared to undertake the investigation and prosecution of rejected cases, on reasonable terms. The close proximity of our Washington Agency to the Patent Office affords us rare opportunities for the examination and comparison of references, models, drawings, documents, &c. Our success in the prosecution of rejected cases has been very great. The principal portion of our charge is generally left dependent upon the final result.

All persons having rejected cases which they desire to have prosecuted are invited to correspond with us on the subject, giving a brief story of the case, inclosing the official letters, &c.

Assignments of Patents.

The assignment of Patents, and agreements between Patentees and manufacturers, carefully prepared and placed upon the records at the Patent Office. Address MUNN & CO., at the Scientific American Patent Agency, No. 37 Park-row, New York.

It would require many columns to detail all the ways in which the Inventor or Patentee may be served at our offices. We cordially invite all who have anything to do with Patent property or inventions to call at our extensive offices, No. 37 Park-row, New York, where any questions regarding the rights of Patentees, will be cheerfully answered.

Communications and remittances by mail, and models by express (prepaid), should be addressed to MUNN & CO., No. 37 Park-row, New York.

Caveats.

Persons desiring to file a Caveat can have the papers prepared in the shortest time by sending a sketch and description of the invention The government fee for a Caveat, under the new law, is $10. A pamphlet of advice regarding applications for Patents and Caveats, in English and German, furnished gratis on application by mail. Address MUNN & CO., No. 37 Park-row, New York

Notes and Queries

J. M. G., of Ohio.—You will find a notice of Alden's type-setting machine in the SCIENTIFIC AMERICAN of August 23d. It is undoubtedly a remarkable piece of mechanism, and the machine on exhibition works well.

R. L. S., of N. Y.—From the very small sample of powder you have sent us it seems to be kaolin or China clay. You had better have it examined by some experienced mineralogist if you consider the matter worth attention.

C. W., of Pa.—We do not know where you can obtain in this country copies of the excise, income and internal tax laws of Great Britain. Messrs. Willmer & Rogers, of this city, could probably obtain them for you.

W. L. D., of Pa.—We do not think the patent to which you refer has been extended. The SCIENTIFIC AMERICAN contains a report of all the extended patents.

A. T. M., of Conn.—We have no idea of the expense of burning glasses of the size and focus you specify ; we doubt if they can be obtained in the country. You might address your inquiry to Messrs. Benjamin Pike & Sons, of this city.

G. S., of Conn.—You desire to know how to temper large flat steel tools without springing them. All such tools that we have seen hardened and tempered required to be "trued" afterward on account of springing. Perhaps some of our readers may be in possession of a method of tempering flat tools without springing them. and may communicate their system to the public for the benefit of our mechanics generally.

J. H. L. F., of N. J.—We think there must be some mistake in the printing, or some error in the application of the term *ignus fatuus* vitality, or "vilatity" as you have written it. Liebig uses the term vital force, not as force *per se* such as electricity, but as a term embracing causes on which the vital properties of living organisms depend. It is thus employed in a similar manner to "chemical force," and the "force of affinity," but as connected with *ignus fatuus*, it has no proper meaning to us.

A. R., of N. Y.—A great many of the common clothes lines are made of jute, but they are weak and soon become rotten. The best material for making them is clean Italian, Russian, or American hemp. Such cords may be prepared with sumac or chloride of tin to resist the effects of rain, but any such preparation known to us will tend to stain white linen, we therefore do not advise its use. Cord for tieing up shrubbery, if prepared with unrefined paraffine, will resist the effects of rain in a superior manner. Paraffine may be obtained from dealers in petroleum and coal oil. It is melted by heat, and the cord dipped into it, then taken out and dried.

W. P., of Md.—When the wick of a candle or lamp is uniform in texture and kept clean in burning, the light does not flicker. Gas jets flicker because the pressure in the pipes is constantly varying.

C. R., of N. Y.—Perhaps the reason why the ticking of the watch of Mr. Glaisher was heard so distinctly, at such a great elevation, in his balloon ascent, was owing to the increased nervous sensibility of the aëronaut. Sounds are certainly much less audible in a rare than a dense atmosphere.

W. H. C., of Cal.—We are not acquainted with any parties who hatch chickens by steam heat. We do not think any such system is in vogue in this country.

J. W. Jr., of Pa.—We know of but one agricultural journal published on the Pacific coast, viz., the *California Farmer*, published in San Francisco by Col. Warren.

S. K., of Mass.—The only way to ascertain the true condition of your boiler is to have it thoroughly inspected by a boiler maker and tested by a hydraulic pump. The very object of a "governor" on a water wheel and steam engine is to regulate the speed of shafting subject to frequent changes.

J. R., of Ohio.—A very small quantity of catechu may be employed in steam boilers to prevent incrustations, but if it is used in excess, it will act upon the metal of the boiler.

W. G. L., of Brooklyn.—You will find a description of the process of making aniline colors on page 81, Vol. VI. (new series) SCIENTIFIC AMERICAN ; also on page 212, current volume. Such information cannot be obtained by you in any other American publication.

Money Received

At the Scientific American Office on account of Patent Office business, from Wednesday, November 19, to Wednesday, November 26, 1862 :—

C. W. G., of N. J., $10; Van H. & R., of Mo., $10; G. P. C., of Mass., $20; S. N. L., of Mass., $20; J. B., of Ind., $20; W. C. S., of N. Y., $20; W. J. W., of N. Y., $20; J. P., of N. Y., $22; N. P. F., of N. Y., $20; W. P. B., of Mich., $20; J. P. R., of N. Y., $20; V. H., of N. Y., $20; J. K., of N. Y., $40; S. R. D., of Mass., $20; T. S., of Conn., $20; T. L., of Cal., $35; Z. G. H., of Iowa, $20; C. W. B., of Conn., $10; T. R. W., of Cal., $20; O. W. M., of N. Y., $45; A. R., of Iowa, $20; E. W. D., of Mass., $40; J. G., of N. Y., $20; J. A. De B., of N. Y., $20; T. & E., of Pa., $20; J. R., of N. J., $20; L. H. D., of Ind., $20; A. G. E., of Mass., $20; E. P. H., of Ind., $45; C. G. G., of N. Y., $22; C. F. P., of Mass, $45; D. C. B., of N. Y., $15; A. L. T., of Vt., $10; H. B., Jr., of Canada, $15; J. C., of Ind., $15; E. W. H., of Mich., $20; D. M. E., of N. Y., $15; J. T. M., of N. Y., $15; W. T. M., of Ill., $15; M. & G., of Ill., $25; N. J., of Iowa, $25; D. K., of Pa., $25; J. B. T., of Pa., $20, E. L., of Ohio, $15; P. & R., of N. Y., $15; J. U. M., of Mich., $25; T. V. C., of Tenn., $25; C. E. H., of Mass., $135; J. S., of Mo., $25; C. B., of Mich., $42; W. F. G., of Pa., $15; W. P., of N. Y., $25; J. A. R., of N. J., $10; J. H., of Ill., $35; A. A. M., of Ohio, $10; N. A., of Conn., $25; G. W. H., of Mass., $25; S. G., of N. Y., $15; S. A., of N. Y., $25; E. W. D., of Mass., $40; P. H., of N. Y., $25; M. N. F., of Md., $25; F. A. De M., of N. Y., $25.

Persons having remitted money to this office will please to examine the above list to see that their initials appear in it, and if they have not received an acknowledgment by mail, and their initials are not to be found in this list, they will please notify us immediately, and inform us the amount, and how it was sent, whether by mail or express

Specifications and drawings and models belonging to parties with the following initials have been forwarded to the Patent Office from November 19, to Wednesday, November 26, 1862:—

E. W. D., of Mass.; J. G., of N. Y.; C. G. G., of N. Y.; J. K., of N. Y.; P. H., of N. Y.; N. J., of Ind.; D. K., of Pa.; H. P., of Me.; J. H., of Ill. (2 cases) ; M. P., of N. Y.; F. A. De. M., of N. Y.; J. S. of Mo.; J. U. M., of Mich.; G. W. H., of Mass.; N. A., of Conn.

RATES OF ADVERTISING.

Twenty-five Cents per line for each and every insertion, payble in advance. To enable all to understand how to compute the amount they must send in when they wish advertisements inserted, we will explain that ten words average one line. Engravings will not be admitted into our advertising columns ; and, as heretofore, the publishers reserve to themselves the right to reject any advertisement they may deem objectionable.

Back Numbers and Volumes of the Scientific American.

VOLUMES I., II., III., IV., V., (NEW SERIES) COMplete (bound or unbound) may be had at this offi and from all periodical dealers. Price, bound, $2 25 per volume, by mail, $3—which include postage. Price, in sheets, $1 50. Every mechanic, inventor or artizan in the United States should have a complete set of this publication for reference. Subscribers should not fail to preserve their numbers for binding. Nearly all the numbers of VOL. VI. are out of print and cannot be supplied.

Binding the "Scientific American."

It is important that all works of reference should be well bound. The SCIENTIFIC AMERICAN being the only publication in the country which records the doings of the United States Patent Office, it is preserved by a large class of its patrons, lawyers and others, for reference. Some complaints have been made that our past mode of binding in cloth is not serviceable, and a wish has been expressed that we would adopt the style of binding used on the old series, *i. e.*, heavy board sides, covered with marble paper and morocco backs and corners.

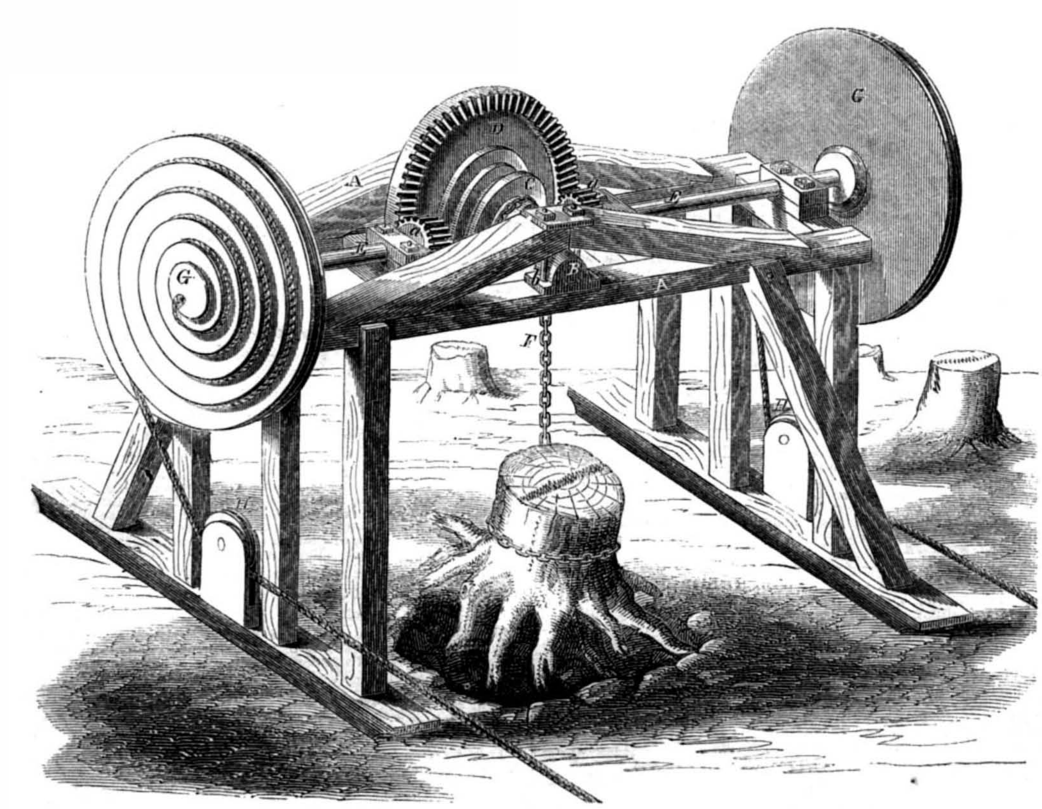
Believing that the latter style of binding will better please a large portion of our readers, we shall commence on the expiration of this present volume to bind the sheets sent to us for the purpose in heavy board sides, covered with marble paper and leather backs and corners.

The price of binding in the above style will be 75 cents. We shall be unable hereafter to furnish covers to the trade, but will be happy to receive orders for binding at the publication office, 37 Park Row, New York.

Improved Stump Extractor.

In all countries, both new and old, much inconvenience is felt from the stumps of trees which remain after land has been cleared. Not only are they unsightly, but they are also cumberers of the ground, occupying room that might otherwise be made available for cultivation. To remove these by hand is a work of much labor. Sometimes they are blasted, or else burned down. These methods, however, are all slow and laborious, by no means comparing with mechanical ones. A new machine for drawing these stubborn old roots has been devised by Mr. F. Godfrey, an engraving of which we herewith present to our readers.

It consists of a stout wooden frame, A, on which the machinery is placed. B is a shaft on which is secured a spirally-grooved cone, C. Upon the end of this shaft a large beveled gear, D, is keyed. The shaft, B, runs in the bearings, *b*. At right angles with it two shorter shafts, E E, are disposed, having pinions, *a a*, on each end, these mesh into the wheel, D, as shown in the engraving. The large, scroll-grooved pulleys, G G, are also permanently fixed upon the shafts, E E, and have ropes fastened at their centers, carried around their several circumferences, and leading from thence through stationary roller blocks, H, to the prime movers, whether cattle or other power ; the grooves on the pulleys run in contrary directions to each other, so that by drawing out the ropes together both pinions will act on the large beveled wheel conjointly. It will be apparent, by examining the engraving, that when the power is applied to the chain, F, which is fastened to the stump, it will be on the smallest diameter of the cone, C, at the time when the greatest strain is required to be exerted ; and also that the position of the ropes about the pulleys favors the best disposition of the exerted force. As the stump is loosened from the earth it comes up more easily ; the chain then rises on the larger portion of the cone as the rope runs down the grooved pulley ; the motions of the machine are thus accelerated while its efficiency remains unimpaired.



GODFREY'S PATENT STUMP EXTRACTOR.

The patent for this invention was procured through the Scientific American Patent Agency, October 14, 1862, and further information in relation to it may be obtained by addressing the inventor, Mr. Freeman Godfrey, of Grand Rapids, Mich.

Digestion Assisted.

No branch of chemistry has of late years made greater progress than that relating to the functions of the human body. By the analysis of the blood we learn that it contains iron and soda ; the brain yields phosphorus ; the hair contains sulphur. It is obvious, therefore, that these materials play a certain part in our well-being, and that if they are not supplied to the frame by our daily food, the result will be a derangement of our organization, which will exhibit itself in the shape of a disease of some kind or other. Imperfect digestion is one of the commonest diseases of a sedentary life. Now it has been shown by Mr. W. Bastick that the stomach of a man in good health, who "earns his meal before he eats it," always contains lactic acid. Reasoning by a happy analogy Mr. Bastick conceived that lactic acid would assist digestion in those persons who suffer from dyspepsia ; and experiments have confirmed the truth of his theory. No sooner was lactic acid administered to a patient troubled with dyspepsia (indigestion) than the stomach resumed its labor. Further to illustrate this fact, the process of digestion can be exhibited out of the stomach. Pieces of butcher's meat, fowl, fish, &c., being put into a solution of lactic acid and maintained at the temperature of the body, completely dissolve and become fluid, forming an artificial chyme ready for the absorbent vessels. Lactic acid takes its name from *lacte*, milk, because it is the acid found in sour milk. No wonder then that the highlanders of Scotland and North Wales, who drink buttermilk, are a hardy race of people and never troubled with indigestion, for buttermilk is little else than a weak solution of lactic acid (sour milk).—*Septimus Piesse.*

What a Volcano can Do.

Cotopaxi, in 1738, threw its fiery rockets 3,000 feet above its crater ; while, in 1754, the blazing mass, struggling for an outlet, roared so that its awful voice was heard a distance of more than 600 miles ! In 1797, the crater of Tunguragua, one of the great peaks of the Andes, flung out torrents of mud, which dammed up rivers, opened new lakes and in valleys of 1,000 feet wide made deposits of 600 feet deep. The stream from Vesuvius which in 1837 passed through Torre del Greco, contained 33,600,000 cubic feet of solid matter ; and in 1793, when Torre del Greco was destroyed a second time, the mass of lava amounted to 45,000,000 cubic feet. In 1769, Etna poured forth a flood which covered 84 square miles of surface, and measured nearly 100,000,000 cubic feet. On this occasion the sand and scoria formed the Monte Rosini, near Nicholosa, a cone two miles in circumference and 4,000 feet high. The stream thrown out by Etna, in 1810, was in motion at the rate of a yard a day, for nine months after the eruption ; and it is on record that the lava of the same mountain, after a terrible eruption, was not thoroughly cool and consolidated ten years after the event. In the eruption of Vesuvius, A.D. 79, the scoria and ashes vomitted forth far exceeded the entire bulk of the mountain ; while in 1660, Etna disgorged more than twenty times its own mass. Vesuvius has sent its ashes as far as Constantinople, Syria and Egypt ; it hurled stones, 8 pounds in weight, to Pompeii, a distance of six miles, while similar masses were tossed up 2,000 feet above its summit. Cotopaxi has projected a block of 109 cubic yards in volume, a distance of nine miles ; and Sumbawa, in 1815, during the most terrible eruption on record, sent its ashes as far as Java, a distance of 300 miles of surface ; and out of a population of 12,000 souls only twenty escaped !

FROM THE STEAM PRESS OF JOHN A. GRAY