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THE FRERE FOUNTAIN, BOMBAY, INDIA.

Our first page illustration, this week, is a view of one of those rare works which captivate the artistic eye, and serve to cultivate a taste for art in the masses. The engraving itself is a work of art that will well repay study. One almost hears the music of the cooling waters, and on these sultry days longs to lave himself in their transparent depths.

The engraving is an excellent representation of the Frere Fountain in Bombay, the largest work of its kind in India, lately erected by the municipality of Bombay as a testimonial of the esteem in which their late Governor, Sir Bartle Frere, is regarded by that presidency. The idea was originated by a native gentleman, Mr. Cursetjee Furdanjee, who gave a liberal donation towards its erection. The hight of the fountain, measured from the water line, is about 35 feet, and it stands in a large basin, 100 feet in diameter, surrounded by an ornamental iron railing, having lamps at intervals. The material is Portland stone, excepting the columns at the base, which are red and gray granites.

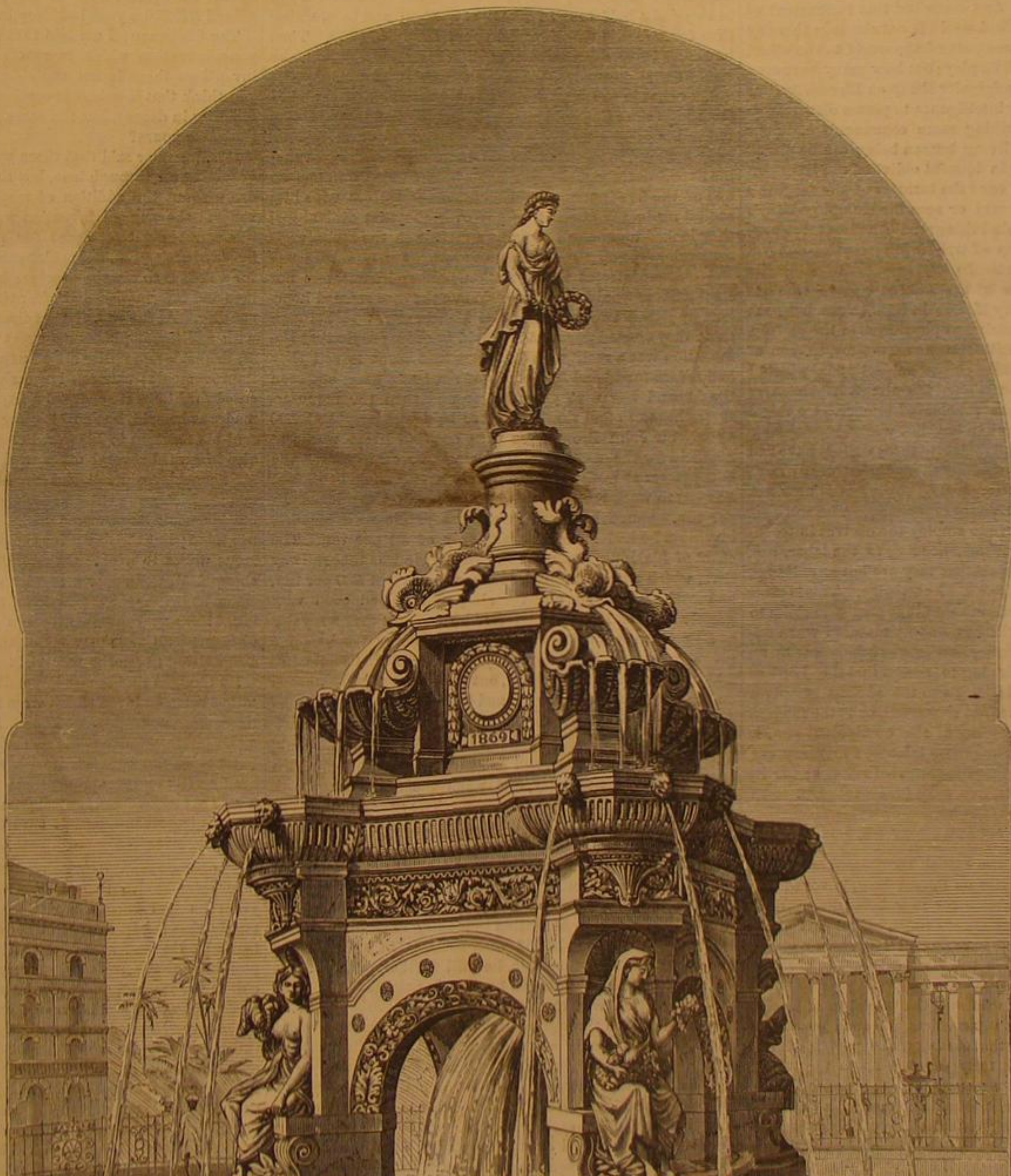
The four sitting figures are considerably over life size, and are representations of four of the leading products of India, while that on the top is a representation of Flora. In addition to these there is also a series of four dolphins, from which are discharged fan-like jets of water into shells; the waste water then escapes through the serrations of the shells into basins below, and is further utilized for the supply of jets lower down. In addition to the figures and ornamental sculpture, the fountain is further enriched by bronze heads of lions and panthers. From these heads are discharged jets of water, which fall into the large outer basin. All these jets, however, are subordinate to that in the center; this wells up like a natural spring, the sound of which must be refreshing in a hot climate like that of Bombay.

The execution of this fountain, which has cost about £4,000, exclusive of foundations, large outer basin, waterworks, lamps, ornamental railing, freight, and fixing, was intrusted to Mr. Forsyth, of London, who was already known for his works in this department of art, and who, with the friendly co-operation of Mr. R. Norman Shaw, architect, has carried it out in a successful manner. The site chosen for its erection is the Esplanade, the most salient and central position of the European quarter of the city.

WRITERS ON SCIENCE.

At the recent dinner of the Royal Literary Fund, Sir Henry Anderson proposed the toast of "Writers on Science." We make the following extracts, from the reply by Dr. Richardson, from the report of the Society:

Who are the writers on science? Are they as well known as other great writers? They are not. They are less fortunate, and, therefore, the more worthy of the exceptional honor you would bestow on them. Excuse me a moment or two while I indicate the peculiarities of the position of the writer on science. He is a man communicating to the world that which is, by comparison, new to the world. The poet can cast back for his models to a time when the Greeks had not so much as the figment of an alphabet. The theologian may go back for his lesson to the earliest manifestations of the life of intellect on the planet. The historian finds subject and matter ready for his hand from the oldest and remotest, as well as the newest, writings and traditions of races and peoples. The story teller is embarrassed with the richness of the past, and troubled by the greed of his admirers for more of his work. These all, indeed, are but the continuing interpreters of things, events, thoughts, which every man who claims to read, claims also to understand. The writer on science has none of these advantages; he is but newly born into an old world of thought, and is not simply telling of new wonders, but is often himself learning, at the same time as he is instructing an audience unlearned in his knowledge. Thus he comes slowly into the recognized brotherhood of men of letters; at the best he speaks to but a small audience, amuses rarely, excites sometimes, without intention, hopes that are delusive, and requires always, in order that he may be fairly understood, a degree of patience it is vain to expect from the multitude. To these difficulties others are added belonging to the work he accomplishes. The most original writers on science are destroyed constantly by the magnitude and overpowering character of the work they have written, and by the practical results that spring from the work. In other literature the book produced lives as the book, and the learner from it, age after age, must go back to the fountain head to drink and drink; in science literature the book sinks into the fact it proclaims, and the fact remains the exclusive master of the field. A striking example of this flashes across my mind at the present moment. Every reading



THE FRERE FOUNTAIN BOMBAY, INDIA

man and woman knows that in the reign of Queen Elizabeth the book of Shakspeare's had its origin, and nearly every one who has read the book (and who has not?) remembers the curious saying in it, "I'll put a girdle round the world in forty minutes." But how many are there who have read another great book of that same reign, entitled "*De Magnete*;" or are aware that at the time when Shakespeare was writing his now familiar phrases, the author of the book on the magnet, the Queen's physician, one William Gilbert, when his daily toils of waiting upon the sick were over, was working with his smith in the laboratory at his furnace, needle, and compass, was writing up for the first time the word "Electricity," and was actually forging the beginnings of the very instruments that now, in less than forty seconds, put the girdle round the globe? Again, writers on science are lost sometimes in the blaze of their own success. They raise wonder by what they do, and fall beneath it. All knowledge newly born is miracle, but by and by, as the knowledge becomes familiar, the miracle ceases. In this way advances in science become part of our lives, while the men who write them down cease to us.

When the Leyden jar was first described, Europe was mentally as well as physically convulsed with the thing; now a Leyden jar is a common object—we all know it; but how few know of Mr. Cuneus, who first described this instrument of science? The whole civilized world is cognizant in this day that communication from one part of the world to the other, by telegraph, is almost child's play; but how many have seen or heard of Mr. Cavallo's original "Essay on Electricity" as a means of communicating intelligence to places distant from each other? There is nothing more commonplace, in our day, than to know that a living human being can be placed in gentle sleep, and, while in blissful oblivion, can have performed on him what were once the tortures of the surgeon's art; but how few have heard or seen Sir Humphry Davy's paper announcing to mankind this grand beneficence! These are some of the difficulties of writers on science; and yet there is another I must name, be it ever so lightly. I refer to the desperate struggles of the man of science who has nothing but science to carry him on in life. None but such as are placed as I am, practising as physicians in the metropolis of the world, and admitted at the same time, as men of science, into some knowledge of the subject upon which I now speak, can form a conception of the almost hopelessness of the position of the pure scholar of science. On this I say no more. I would awaken but not weary your sympathy . . . . much of the difficulty these writers have had to bear I recognize with admiration, as their truest glory; and I see that hope for better worldly prospects is near. A profession of science is no doubt organizing. The world is at last asking men of science to employ themselves in teaching the world: and the teachers, bending to the labor, are, in their turn, willing to suspect that they are but as children, or at best youths, in the race after knowledge. This is most hopeful; and it is hopeful also to find that men who claim to be conservators of a knowledge that was matured when science was unborn, are listening now to our scholars with an attentive ear, and are beginning to accept that the Lord of Nature, whether He reveal Himself to the ancient law-giver in the burning bush that was not consumed, or to the modern astronomer in the burning glory of the omnipotent sun, is one and the same Lord. Thus there is hope, I may say certainty, in the future for the literature of science; for its poetry, its parables, its facts, nay, even for its religion.

UTILITY OF PATENT LAWS.

Mr. Macfie, a member of the British Parliament and of the House of Commons Committee on Patent Law, is very much opposed to the grant of patents for new inventions. He is reported to have said among other things, in support of his proposition to repeal the British Patent Law, that a strong movement was being made in the United States to abrogate our patent laws.

We beg to inform Mr. Macfie and the members of Parliament that this statement is not correct. No such movement is being made here. On the contrary, the people of this country were never more fully satisfied as to the advantages of the patent laws than at present.

Our patent laws have contributed in so marked a degree to the prosperity of the country, that the idea of their abandonment finds no place except in the minds of a few erratic, unbalanced individuals, who make it a point to disagree with everything that other people approve.

The House of Commons Committee has been taking the testimony of experts in reference to the general value and results of the British Patent Laws, and among the recent witnesses was Mr. Henry Bessemer, who gave the following interesting evidence, in which a history of his famous improvements in iron and steel manufacture is given.

He said that about seventeen years ago his attention was drawn to the desirability of making improvements in the manufacture of iron; for eighteen months he worked unsuccessfully in the endeavor to make improvements, and then the idea struck him that it might be possible to make cast iron malleable by introducing air into the fluid metal. He accordingly made experiments which proved to him that the highest temperature ever known in the arts could be obtained by the introduction of air into molten cast iron; these additional experiments occupied five months more of his time. In carrying out all these experiments his attention was diverted from his own pursuits for two or two and a half years, and his expenses over the work amounted to six or seven thousand pounds. Mr. George Rennie came to see his experimental works in London, and was so struck by what he saw that he recommended him to bring the invention before the public immediately. He said that whatever the deficiencies of the invention might be in detail, directly the practical ironmaster saw the plan he would fill in the details. He (Mr. Bessemer) accordingly read his paper on the subject at the British Association four days later, the result being that great interest was excited, and several ironmasters visited him in London. He then acted upon the following plan:—He divided England into five districts, and he said he wished one ironmaster in each district to work with him, and not against him. On condition that the ironmaster agreed to do so, the said ironmaster was to pay him a royalty during the first year, but no other royalty during the fourteen years of the protection by patent. Hence each of these five would be very strongly interested in the maintenance of his patent.

His proposition was accepted, and within a very few weeks after the reading of his paper, licenses were taken out amounting to £30,000. The writers in the press did not believe that he could melt malleable iron rapidly, and as several of the ironmasters who carried out his plans faithfully were unsuccessful in their attempts to manufacture, everybody began to run him down. He found that there was a difficulty, so set to work with the capital he had acquired to overcome the difficulty. His experiments were not small ones on the laboratory scale, for he worked from half a tun to two and a half tuns of metal at a time; and in working thus for two and a half years, spent about £16,000. Then he succeeded in overcoming the difficulty, also how to make steel as well as malleable iron; the steel was of so good a quality that in the workshops it could not be distinguished from high class Sheffield metal. He announced these results, but in the press everybody ran the invention down, and nobody believed in it. Had he not been supported by capital his experiments would never have been carried out, and no one of the five ironmasters who allied themselves with him at first made any attempt to get over the first difficulties; they looked upon him simply as a meteor in the metallurgical world.

After he perfected the invention neither ironmasters nor steel makers would take it up. When the case seemed hopeless, he joined two gentlemen at Manchester, and between them they erected works at Sheffield to show people that the invention was a reality. When they first began to sell they had orders for 28 and 56 pounds of steel at a time, but soon the demand began to grow larger, and then the manufacturers began to find that they were being undersold at £20 a ton. Sir John Brown was then erecting great works at Sheffield for the manufacture of steel; he came to see the new process at work, then altered all his plans, and took out licenses to work the process on payment of a royalty of £2 per tun. When he came before the public with his first invention he had asked a royalty only of £2 per tun. The effect of his invention upon the iron trade was that railway tires, which once cost £90 per tun, now cost but £20 per tun, and steel of all kinds and for all purposes had been very greatly reduced in price, therefore he thought that a royalty of £2 per tun was not too much. In this way the business progressed, and he had not only introduced this method of making steel into this country, but it was extensively worked on the Continent, in America, and in India.

HOW PATENT LAWS DEVELOPE IMPROVEMENTS.

If there had been no patent law to fall back upon, he could not have given the time and work to the invention which was found to be necessary, and when the first failure took place all the world was against him. The general results of the invention were that steel had been reduced from £50 or £60 per tun to £20.

Without the patent law, he, as an engineer, should not have gone into the iron trade, with which trade he was originally in no way connected, but with the protection of the patent law he felt no hesitation in making experiments; and when he recouped himself with £30,000, in spite of the adverse opinions of the trade, he still further perfected the invention. He had taken out twenty-six patents in all. The great invention was the forcing of atmospheric air in an upward direction through molten iron; that invention would have been practically valueless, without the after patents relating to improvements in machinery. If somebody else had patented the invention, both inventors would very properly have retained their rights to the special parts of the invention made by each. In cases where good processes result from the union of two inventors, arrangements are sure to be made between the patentees or with the licensees; the self interest of manufacturers and patentees guarantees this.

If a man takes out a patent for an invention which he believes to be of great public utility, one of the public ought to be made to show that it is not so before the right of the patentee should be allowed to cease. Many inventions cannot be introduced at once, as they require the expenditure of large sums of money to try them. Perhaps those who patent trivial inventions might be bound down to introduce them within a given time, but this should not be done when a man patents a machine the construction of which will cost some thousands of pounds. If an inventor did not put his invention in practice within a given time, others might be permitted to do it; a manufacturer might set it going if he had the power of using the invention for nothing; he should then be allowed to use it, because he showed its practicability; but the inventor should have his claim upon anybody who might intend to use it afterwards.

So far as his own invention was concerned he thought that no profit was made out of it till five or six years after the date of the patent. If the law had given him only two years to carry out his plans the world would never have had the benefit of his inventions, and he himself would have lost all his capital. He thought that patents should be granted for improvements in small articles, because in the production of the smallest article, a man having protection will erect valuable machinery to make small things in great quantity at the lowest possible cost, whereby the public gain an advantage which they never had before. Manufacturers, as a rule, are slow in making or taking up inventions.

He had proposed many things to manufacturers which he was convinced would prove useful if worked out, yet he didn't know of one case in which his suggestions had been tried; if he had given time himself to work out the ideas, he should then have to force the invention on the manufacturers, the public would get the benefit, and then other manufacturers would be obliged to follow, just like sheep when one leads the way. A manufacturer may make improvements which effect great changes in the ordinary system. He says: "I have expended much capital on my machinery, my patterns are very valuable, and I do not want to introduce anything new." The difficulty is always to get the first man to try the practical value of an invention. After he completed his invention he paid the five ironmasters, with whom he made his first agreements, to cancel them; to one of them he paid £10,000, and to the Dowlais Company he paid £20,000; by these means he swept the market of all special privileges; some of these manufacturers could have gained £40,000 a year had they kept the original privileges.

The Chairman: I am told that there is an originality about your invention which is rarely found, and that in many inventions there is not the character of individuality. Do you think that in minor inventions there is an individuality differing in degree, but the same in kind, as in great inventions like yours?

Mr. Bessemer said that there was an originality in the idea of forcing air through iron, but that would have been of no use without the addition of many little engineering contrivances; the original invention would have been valueless to the world without means for practically carrying it out. Seven years ago M. Schneider came over from France to him for a license to use the process; he furnished him with drawings and information, but after the lapse of two years he did nothing. At the end of that time he asked to be supplied with additional plans on a great scale; accordingly he sent M. Schneider an entire set of new plans with all the recent improvements; thirteen large sheets of drawings were executed for him. He charged a fixed price per tun on all iron made, as he said, but nothing for plans. M. Schneider then sent his foreman to his (Mr. Bessemer's) works; the foreman also inspected several other works. Time passed away, still M. Schneider did not put up his works. About fourteen months before the chief French patent expired, M. Schneider finished some large works made from his plans, and did not use them; but the day after the patent expired he set enormous works to work. On another patent for machinery he charged M. Schneider a royalty of 2s. 6d. per tun, and an action at law about the payment of that royalty is now pending. He had consequently not received a farthing from France, as all the other manufacturers were following suit, and waiting to see the result of the suit.

He thought that it was impossible to draw a line of demarcation between ideas which were really new and those which result in modifications of known inventions. Manufacturers make small improvements in their machinery and processes, but people not connected with a particular business make nearly all the great inventions of the age, because their minds are so free and untrammelled by custom. If he had been an ironmaster, he felt sure that he should never have made his invention.

SECRET MANUFACTURES HINDER IMPROVEMENTS.

In reference to the question of secret manufacture, for years he had been a secret manufacturer. He had been taught that patent law was so insecure that it could not be trusted. He had also made an invention whereby bronze powder could be produced at very considerably less than its cost in the market, and when he proved many years ago that he could do this, a gentleman gave him £10,000 to float the invention. He made out drawings of the different parts of the machinery he wanted, and had these parts made by manufacturers residing in different parts of the country; he set the process to work, and paid his managers several hundreds of pounds a year to do work worth not more than a payment of £100 a year, but on condition that they should keep the secret. The secret had been kept to that day, and he was nearly the only person who knew it. He had carried on this secret manufacture for twenty-eight years, and was then making three hundred per cent profit by it; when he first began he made a profit of a thousand per cent. But because it had been kept secret it was a manufacture in which no improvement had been made for twenty-eight years, which would not have been the case, he thought, had it been patented, and its details thereby made known. Five machines were required in the operations, and three of these were applicable to other purposes. Once he thought of making a part of the invention public, for use in the color manufacture, in which they would prove valuable; thus by secret processes stagnation is produced. Bronze powder is much used in japanning and gold printing.

His father had also been the worker of a secret process. His father discovered that the "color-water" used by jewelers contained much gold. This color-water was a solution of alum, salt, and saltpetre, which dissolves copper, and some gold. The gold of commerce is always alloyed with copper, and colored gold is a purely gold surface. His father bought up the color-water, and obtained from it a very large quantity of gold, so that in this matter he proved himself a veritable alchemist. The process died with his father, and he had but a hazy recollection of its nature, but his father used to deposit the gold on the large surface presented by shavings of another metal, then he melted the metal to obtain the gold. He believed that it was essentially an electrogilding process, and if it had not been kept secret very likely Elkington's beautiful process of depositing gold would have been brought before the world thirty years sooner than was actually the case. His father also had a secret method of making printing types.

ON THE WORKING OF PATENTS.

If an inventor failed to carry out any invention he had patented, he thought that a manufacturer, after giving due notice, should have power to start it, but not that any other manufacturer should afterwards have the power to use the same thing without the consent of the patentee. Mr. Bessemer, (in answer to questions put by Mr. Macfie), continued that, although he had acted equitably in charging the same royalty to different manufacturers, it was probable that all patentees might not do the same; in fact, to act fairly to all of them, he had bought up the old licenses at 10s. per ton, when he raised the royalty to £2 per tun. He did not approve of compulsory licenses, because he thought that it was a purely commercial question between the owner of property and the man who desires to purchase. If the owner asks absurd terms he will simply find no customer; he must make it to the interest of a manufacturer to take up his invention rather than to go on on the old plan. He thought that it was very rarely that licenses were refused, and when they were refused, the grounds were probably such that everybody would agree that they ought to have been refused under the circumstances. Once he had refused a license unless a certain condition were complied with. A firm of ironmongers employed an agent to search through his patents, with a view to upset his patent rights; this agent had since very candidly told him that he had told his employers that they had not a leg to stand upon. The company then applied for a license, but he refused it unless one of their people wrote him an apology, not necessarily a humiliating one, for all the abuse and scurrilous misrepresentations which one of them had showered upon him in print. He had a gentlemanly apology at once and the company took out a license, but never used it.

Mr. Macfie: Didn't Mr. Mushet make an invention very like yours?

Mr. Bessemer said that none of Mr. Mushet's inventions were in any degree analagous to his own. Mr. Mushet thought that as manganese much improved Sheffield steel, it might also perhaps much improve the Bessemer steel; in fact, it was analogous to the question whether or no salt improved roast beef, after the beef was prepared and cooked. Mr. Mushet took out no less than twenty-seven patents upon this subject, but never attempted to enter into litigation with him on the subject of the manufacture of steel. Mr. Mushet gave up his patents; they are a nullity to the present day, and he never paid the three years' royalty on them. He (Mr. Bessemer) charged the same royalty in foreign countries to those who worked his foreign patents, and he had taken out patents in France, Belgium, Sweden, Austria, and the United States, in all of which countries he charged a royalty of £2 per tun. He did not take out one in Prussia.

OPERATIONS OF THE PRUSSIAN PATENT OFFICE.

He sent his papers to Prussia in the care of Mr. Krupp, who paid him £5,000 for the use of his patents. He applied in due course for a patent, and was informed by the Prussian Patent Office that the invention was not new. The Prussian Patent Office grants occasional patents; they take the fees and the drawings from British inventors in any case, and afterwards publish them for the benefit of Prussia. The office said that Mr. Nasmyth was the inventor of the process; Mr. Nasmyth said that he was not. They next said that they would give the name of the real man in a few days. Six weeks passed, and they said, "if we don't find the name of the real man to-morrow we will give you the patent." A week of these "to-morrows" passed, after which they showed an English blue-book with his own invention published in it, and they said, "your invention is published, so according to the law of Prussia we cannot grant you a patent." All the time they had been promising to grant it. The process is now worked very largely in Prussia. He thought that it was a custom at Berlin to hold out the prospect of granting a patent to get all the information they can from the English inventor, and then they tell him that his invention is not new. Mr. Krupp has taken out an immense number of patents.

He (Mr. Bessemer), believed that he received the full amount of his royalties from continental manufacturers; he had one agent there only, and he lived in Paris; he had never kept more than two clerks, and these, with himself and partner, did all the work of attending to his business in connection with the manufacture of steel and iron. The patentee has the power by the English law of stopping the importation of articles made without his consent by persons using his invention in foreign countries. Large as the royalty of £2 might seem to be, it does not interfere with the manufacture or with commercial arrangements at all. The steel which he sold at £15 per tun was the same, so far as he could see, as that which Mr. Krupp sold at £130 per tun; he had tested the two by bending, specific gravity, and everything else, and could find no difference between them. Mr. Krupp was one of the greatest manufacturers of Bessemer steel. He did not think that any commission would have awarded him £5 for his original idea, or would have given him half a million of money as a reward for his invention.

Unsuccessful inventors are an unfortunate class, unfitted to struggle with the world in any business whatever, and they ought to have been born with money, instead of talent only. He did not think that, as a whole, the losses of inventors were greater than their profits. In England also we get a great many foreign patents we should hear nothing about for several years, were it not for the security given by the patent law to inventors. Competition in business does not foster invention much, more especially when the expenditure of large sums of money is involved in experiments.

DISCUSSION ON MR. HARDING'S PAPER, ENTITLED "THE APPLICATION OF STEAM TO CANALS," CONCLUDED IN OUR ISSUE OF JULY 15.---NO. 2.

Mr. Dipnall inquired of what material the boat referred to was constructed. He supposed plate iron would be the best, as giving the greatest capacity and the least amount of friction.

Mr. Harding said the boat he had described was simply an old wooden boat adapted to the experiment, but the new boats which were now being built upon this plan were entirely constructed of iron.

Mr. Dipnall said he had no practical knowledge of this subject, but it appeared to him that a self contained motor must be infinitely superior to any of those schemes of ropes or chains, which might get out of order, to say nothing of the various entanglements which might happen with them. If a vessel, with so small a force as had been described, could carry 200 tuns as the speed mentioned, he thought it would be not only a mechanical but a great commercial success. With regard to the mode of getting rid of the wave wash, he was struck with the vertical sides which the front of the vessel presented. It seemed to him that this was so blunt, and presented such a large surface, that there must be a considerable amount of lateral wash. He was not quite satisfied either whether the propeller was sufficiently protected against any such contingency as a sunken anchor, or anything of that kind, which might throw the whole affair out of gear.

Mr. Hancock inquired whether there was any guide for the discharged water along the whole length of the boat.

Mr. Harding said there was not. The sloping channel was only continued a short distance, as shown in the drawing.

Mr. Hancock said he could scarcely agree with Mr. Towle as to the advantages derived from Mr. Main's propeller, with regard to sustaining a greater weight in the barge, unless the laws of liquids had suddenly undergone a change, because the flotation of such a vessel must depend upon her specific gravity; and if there were a small quantity of water brought underneath the bottom of the boat, it must immediately find its way to the surface. Some time ago, he had seen a plan tried of propulsion by means of air, which was exceedingly ingenious, and, at the same time, very simple. There was a false sloping stern to the boat, and the air was forced against this sloping stern, and so sent the boat along with very little disturbance, the pressure required being very slight. The only objection that occurred to him in the one he saw arose from attempting to get too much pressure. The experiment was tried in a very clumsy way, but still a very respectable speed was obtained, and he thought that further experiments would be proved successful.

Mr. Towle said that whenever a heavily laden boat was propelled by steam power, by which the water was thrown from the stern, the vessel invariably sank at the stern from one to two feet; that was a fact which could not be rubbed out. This system remedied that evil, so that there was a clear gain of the depth of water to which the boat otherwise would sink. With regard to the atmospheric plan just mentioned, it occurred to him that if the water moved away so quietly, the boat would move forward also very quietly, and with much less velocity. Mr. Main's boats certainly possessed advantages which he had not seen in any other.

Mr. Harding, in replying to the remarks which had been made, said the propeller was protected by an iron grating across the front (somewhat indistinct on the diagram) which did not interfere with the passage of water, but which would intercept anything large enough to interfere with the working of the screw. With regard to the rope scheme, mentioned by Mr. Newton, he could only say that he had alluded to similar systems several times in the course of the paper, but time did not allow of entering into details with respect to them. It must be remembered that all these methods were open to several objections; they retained the full effect of the bow wave, which, if any degree of speed were attained, would be considerable; and, in addition to the power required for moving the boat, there was the friction and weight of the rope itself, which had to be pulled through the water. Then, again, there was a great difficulty with the locks. If they were to be roped through, there was a great difficulty with the sill, and it had always been found that you not only damaged the sill, but also soon cut the rope or chain. It would be extremely difficult to arrange any system of that kind which should prevent leakage, and not injure the chain or rope. The great advantage of a boat with self contained power was that it could leave the canal at any time and travel on a river or anywhere else without being towed, and at the same speed. Any self contained motor would always possess superiority in this respect over a system of rope or chain traction. Again, if the machinery of a self propelled vessel was defective, that particular boat was alone detained, whereas, let one portion of the rope plan get out of order, and the entire system from one end of the canal to the other is disarranged. The advantage mentioned by Mr. Towle—that of preventing settling at the stern—was of great importance, since in shallow water every inch of draft was of consequence, and one foot settling at the stern meant six inches less draft available for cargo, thus causing a loss of carrying capacity with greater expenditure of motive power. This settling or "squatting" at the stern interfered also with the steering qualities, while the bow propeller in Main's patent did away with all these objectionable features, kept an even keel, and was easily steered. The very thorough papers already mentioned as read a few years ago before the Institute of Civil Engineers, while advocating steam propulsion against horse towage, and propellers in preference to paddle wheels, particularly specified the disadvantages of propellers in respect to these points. On the table was a model of a rotary steam engine, invented by Mr. J. C. Wilson, which he thought would be very well adapted, from the space it would occupy, to canal boats, and he had arranged with the inventor to give it a trial. They also economized the use of the steam, by expanding it into a second cylinder. He reckoned that an engine about three times the diameter of the model on the table would drive a boat carrying 200 tuns of cargo. He had just received a copy of the SCIENTIFIC AMERICAN, the most able paper of its class in America, which, speaking of various modes of propulsion for canal boats which had been tried on the Erie Canal, said this method of Mr. Main's was of all methods the most simple, and seemed most likely to be popular. With regard to the bow section appearing very blunt, it was the ordinary shape of a canal boat, and would, of course, cause a certain wave if propelled through the water by any usual means at a rate of three miles an hour, but the water drawn into the propeller was really collected from a much larger area than that represented by the size of the channel, which had the effect of greatly reducing the resistance, and prevented bow waves. With regard to the lateral action of fluids, there might be something of the sort if the boat were stationary, but being in motion, there was no time for any perceptible lateral wave until the boat had passed, and then the water did not have the action on the banks as questioned. This was proved by the fact he had before referred to, that when the boat was heeled over by the wind, the bubbles could be seen rising; but as this did not occur when she was on an even keel, it supported the statement.

Mr. Botly moved a vote of thanks to Mr. Harding for his interesting and instructive paper. He remembered some years ago one of the railway "kings" remarking to him that if railways could get rid of a part of the heavy traffic, they would pay much better dividends.

Mr. Varley seconded the motion, and said he had always been favorably impressed with the idea of propelling boats by taking water in at the bow and expelling it at the stern, from having noticed that this was the method of propulsion employed by the larva of the dragon fly, which, though very bulky, moved with great rapidity through the water by an exactly similar means of propulsion.

The chairman said Mr. Harding had hardly stated the full extent to which traveling by canal and steam power had attained. Mr. Hyde Clarke had referred to the Netherlands, and he would add that even at the present day the large steamers leaving the Thames were accustomed, when the state of the tide was convenient, to enter and go along the canals, and you might see steamers there daily going in each direction at full speed. The method adopted there to prevent injury to the banks by waves, was to plant on each side of the canal rushes and willows, which broke the force of the water. The English canals were in a much better condition now than formerly, for there having been a great increase of traffic, these banks had been put into a better state, and they were now, therefore, well adapted for steam navigation. The form of propeller used by Mr. Main reminded him very much of the first model of the propeller which he ever saw, which was patented by a Mr. Smith, and exhibited in a large room opposite Garraway's, as long ago as 1824 or 1825. The inventor had a model boat moved by clockwork, and a pair of paddle wheels, but at the end of a certain time the wheels were unshipped, and the screw brought into play, when the boat made something like twice the speed. That, he believed, was the first public trial of a screw propeller as compared with wheels, and the form of the screw blades was very similar to the one in the drawing. With regard to the form of bow, there was no doubt that a square bowed boat was the most convenient shape for stowage, and it occasioned less dead weight. It had been found in the Navy that very handsome, sharp pointed bows gave a large amount of dead weight with no flotation power, and, therefore, that build had been discontinued.

The vote of thanks having been passed, the meeting adjourned.

A Chinese Puzzle.

The *Galaxy*, for August, contains, among many other good things, the following ingenious puzzle:

A Chinaman died, leaving his property by will to his three sons, as follows: To Fum-Hum, the eldest, one half thereof; to Nu-Pin, his second son, one third thereof; and to Ding-Bat, his youngest, one ninth thereof. When the property was inventoried, it was found to consist of nothing more or less than seventeen elephants; and it puzzled these three heirs how to divide the property according to the terms of the will without chopping up the seventeen elephants, and thereby seriously impairing their value. Finally they applied to a wise neighbor, Sum-Punk, for advice. Sum Punk had an elephant of his own. He drove it into the yard with the seventeen and said: "Now we will suppose that your father left these eighteen elephants. Fum-Hum, take your half and depart." So Fum-Hum took nine elephants and went his way. "Now, Nu-Pin," said the wise man, "take your third and git." So Nu-Pin took six elephants and traveled. "Now, Ding-Bat," said the wise man, "take your ninth and be gone." So Ding-Bat took two elephants and absquatulated. Then Sum-Punk took his own elephant and drove home again. Query: Was the property divided according to the terms of the will?

Myths.

In an able and humorous review of Edward B. Tylor's book, entitled "Primitive Culture," *Nature*, speaking of myths, says:

Civilized knowledge, as a whole, may be likened to an old canoe, of which no plank nor nail is the same as when she started on her first voyage, and myth to the old timbers and metal which once formed a part of her, but have now been some lost, some metamorphosed into wholly different shapes, some utilized again in the construction of other vessels. We can thus understand how every department of thought has absorbed and assimilated more or less of myth—how myth has absorbed and assimilated more or less of every product of the human intellect. It is, in fact, the non-appreciation of the true place of myth in human knowledge, which has led so many earlier students of mythology astray. One school looked on all mythology as crystallized poetry; another as indurated chronicle; a third as frozen philosophy; a fourth as petrified religion, and so forth—each school doing something towards really making mythology what it believed mythology to be, and all, as a net result, extracting from one of the most vitally interesting investigations a mere *caput mortuum* of doubly distilled platitude, and quintessential commonplace. So long as "mythology" meant simply an acquaintance from without with the Greek and Roman Pantheon, such a result was, perhaps, inevitable. Unfortunately the doctrines of these schools are not even yet by any means universally recognized as being themselves mythic; and many of them are still to be found reproduced in contemporary works of no inconsiderable learning, to supply future students with illustrations of Mr. Tylor's theory of survival. It must be admitted, too, that even the late brilliant achievements of more scientific inquirers still leave a vast field untouched for classification and comparison. Nor is this task an easy one. A myth is always the statement or explanation of a phenomenon, and myths may thus be classified according to the phenomena to which they refer; but first of all "to catch your myth," and then to determine the phenomenon to which it refers, are feats, for the most part, beyond the skill of ordinary students.

An amusing instance of these difficulties is afforded by Mr. Tylor himself. "No legend," he observes, "no allegory, no nursery rhyme, is safe from the hermeneutics of a thorough-going mythologic theorist. Should he, for instance, demand as his property the nursery 'Song of Sixpence," his claim would be easily established; obviously the four-and-twenty blackbirds are the four-and-twenty hours, and the pie that holds them is the underlying earth, covered with the overarching sky; how true a touch of nature it is that when the pie is opened—that is, when day breaks, the birds begin to sing; the King is the sun, and his counting out his money is pouring out the sunshine, the golden shower of Danae; the Queen is the moon, and her transparent honey the moonlight; the Maid is the 'rosy-fingered' Dawn, who rises before the sun, her master, and hangs out the clouds, his clothes, across the sky; the particular blackbird, who so tragically ends the tale by snipping off her nose, is the hour of sunrise. The time-honored rhyme really wants but one thing to prove it a sun myth, that one thing being a proof by some argument more valid than analogy."

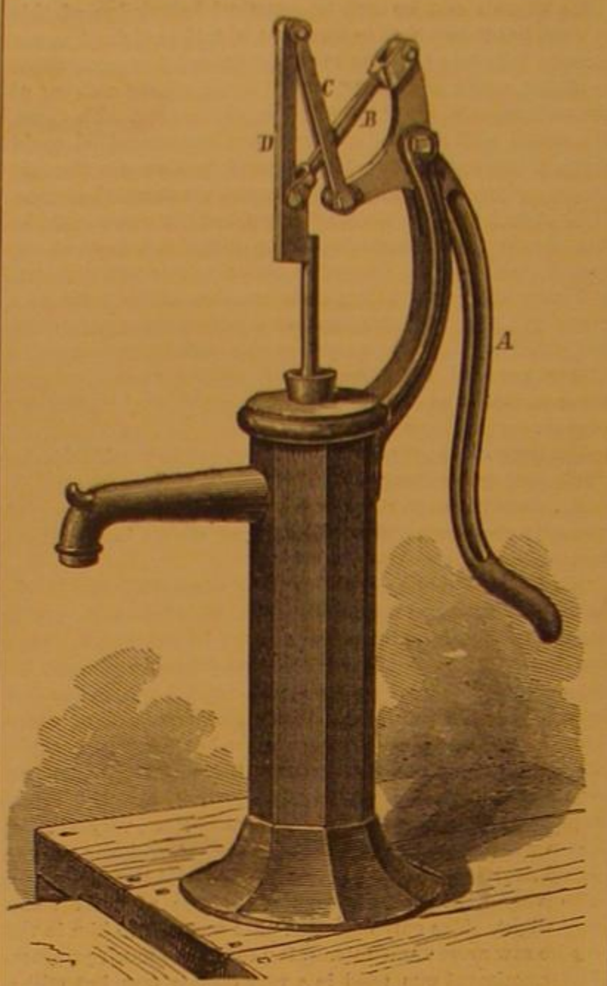
This is exquisitely ingenious; but what if the rhyme should turn out to be, after all, only a quite genuine nursery riddle, of the type which Mr. Tylor has so admirably illustrated elsewhere? An archetypal clock, presented as a *haute nouveauté* to some Edward III. or Richard II., would satisfy all the conditions of the enigma. The large circular face would represent the pie; the four-and-twenty hours duly figured thereon, in accordance with the liberal notions of archaic horology, would correspond to the four-and-twenty blackbirds; the striking, possibly with chimes, to the song of the birds; the king in his counting house, counting out his money, would felicitously symbolize the hour hand counting out the time, which is money, in majestic solitude, unaccompanied as yet by any fussy revolutionary minute hand; the queen in the pantry, eating bread and honey, would typify the stealthy activity of the fine wheel teeth of steel and brass; the maid in the garden, hanging out the clothes, would appropriately allegorize the wooden drum on which the weights were suspended by lines, at a distance from the works; while the magpie, which seems a preferable heading to "blackbird," who snaps off the maid's nose, would probably be none other than the ingenious machinist who wound up the instrument, and, having done so, removed the key from the nozzle of the drum. Whatever may be thought of this interpretation, it seems exceedingly probable that the rhyme is really a riddle, and, indeed, many other unintelligible jingles are most likely referable to the same category. One of them, if a riddle, does also unquestionably enunciate a sun myth. In the immortal "Jack and Jill went up the hill to fetch a pail of water," we may clearly recognize the sun and moon under an enigmatic, not to say riddle-iculous exterior, and after satisfying ourselves as to their identity, we may further admire the curious felicity with which the difference of sex between Hêlios and Selênê—etymologically identical with the difference between *leôs*, a lion, and *leaina*, a lioness—is indicated in the English ditty. To return, however, from the precincts of the nursery, Prof. Max Müller, with a natural bias in the direction of his own brilliant researches, seems to ascribe the origin of myth somewhat too exclusively to the influence of language, just as in his interpretation of myth he appears to pay a rather too marked attention to the Dawn-Goddess to do full justice to the claims of other less seductive divinities. The Professor himself, however, will probably be among the first to recognize the value of Mr. Tylor's distinction between material and verbal myth, and to acquiesce in the classification which considers the former as primary, the latter as secondary in the order of evolution.

NEW MECHANICAL MOVEMENT.

Our engraving illustrates a mechanical movement invented by E. G. Russell, of Ravenna, Ohio, patented through the Scientific American Patent Agency, March 7, 1871.

It converts a circular movement through a limited arc into a rectilinear one, by means of crossed links. The movement is shown as applied to a pump, in which application the inventor assures us it has worked very satisfactorily, but the same principle may be adapted to other machines.

The crossed links, B and C, are shown pivoted to the pump rod, D, and to the arms of the pump handle, A. The same arrangement of crossed links can be duplicated or triplicated if desired, to secure greater strength.



There are probably many other applications of this movement that can be made, such as the actuation of blacksmiths' bellows, organ bellows, and other machines where such a motion is desirable, which will readily suggest themselves to mechanics.

For further particulars, address E. G. RUSSELL, Ravenna, O.

The London "Builder" on Patents.

A patent, says the above named journal, is often a perilous thing, charged with all the plagues of Egypt to its unhappy owner. He has claimed too much, or he has not disclaimed sufficiently; consequently, he may have unwittingly infringed the patent of some other person, of whose existence—patent as well as patentee—he has not the slightest knowledge. As most inventors are sanguine beings, they often fall into this miserable error, nor will the best professional advice at all times enable them to steer clear of this difficulty.

Still, the inventor must be protected; for, if there is any utility in his invention, his property will be stolen from him with impunity; his principle, whatever it may be, will be at once seized upon and applied to daily use by people of whom he has never heard; so that, without something in the form of a patent, protection or privilege, he cannot defend his property, although it is as much his property as an acre of land would be if had bought the freehold.

Before and up to the times of James Watt, the growing depth of the mines had outrun the power of the "fire-engines" then in use to keep them clear from flooding, and had got beyond their power of lifting,—a dead-lock was approaching. Watt hit upon his great invention,—the separate condenser,—that was all, but it was the very soul of the engine, every engine owner in the country could readily add a distinct condenser to his wheezy engine; reap all the advantage of the improvement, pocket all the benefit,—no small one,—and leave Watt without a single penny to reward his ingenuity or the means of recovering a single iota from those who impudently appropriated his improvements.

What benefit could Watt have received for his simple, but nevertheless splendid invention,—none whatever,—without the protection of the law, in the shape of a patent,—no matter in what form,—so long as it secured his rights? Had Watt's patents not been granted, what condition would our mines have been in now? And what would have become of the splendid industry they created?

We have plodded at various times through the dry and dusty papers which have been read before the assembled wisdom of learned societies on this much vexed subject. We have heard lectures on patents and patent laws, and listened eagerly to all sorts and kinds of projected improvements, and we generally left as wise as when we entered. Little or nothing seems to come of all these palavers and speeches; they die a prompt and natural death; and Parliamentary recommendations share the same disastrous fate; and jurors reports from great exhibitions are no exception to the general rule.

Inventors themselves disagree: some advocate the total abrogation of all patents and patent laws,—they stand up for free trade in inventions; others fight manfully in their defence and appear pretty unanimous in the wish to cheapen and make them more easily accessible to the working classes.

Who can decide when doctors disagree? This fierce conflict of opinion,—a healthy sign in itself,—is a tolerably strong proof that some change is required, a remedy for admitted evils; but no inventor has yet invented the happy medium that shall satisfy all parties, or at least the majority for it is hopeless to attempt to satisfy all.

Shad in the Hudson.

The propagation of shad, says the *Rochester Union*, in the Hudson River has been prosecuted under the Commissioners of Fisheries this year with energy and success. The number of young shad brought forth and turned into the river may be counted by millions. The season has now closed. The temperature of the water has risen above eighty, and put an end to the hatching operations. The place selected for operations was Mull's Fishery, some ten miles below Albany. To that place the agents employed with the requisite apparatus repaired and encamped about the middle of May and remained till the 6th of July. Owing to the increase of shad by the work of former years, there was less difficulty in obtaining the parent fish for propagation. The catching of the shad and the manipulation is all done in the night—generally between the hours of nine and two. A large proportion of the shad taken were unripe or unfit for production.

M. A. Green, who has given his personal attention to the operations at Mull's, reports that on the night of May 15 he caught forty shad, of which only three were ripe, and from these he took 60,000 spawn. The temperature of the water ranged from 60° to 68°. On the 20th he took seven ripe shad which produced 140,000 spawn. On several occasions over 300,000 spawn were taken in a single night. On the 5th of July, the water was above 80°, and no shad were taken. Above 240,000 young shad were turned loose, and this closed operations on the Hudson for the season. The total of spawn taken was 8,335,000, from which 7,823,000 shad were produced and turned into the river. Three years from this Spring these shad will be large enough for market, and at that time the catch in the Hudson will be so large that shad will be sold at very low figures. Enough has been done in the way of shad culture on the Hudson in the past two seasons to make a marked difference in the yield in the two succeeding seasons. The practical results of fish culture may now be realized.

Petroleum in New Zealand.

A correspondent forwards us a document from which we extract the following facts concerning petroleum deposits in New Plymouth, New Zealand.

The first observation of coal oil was in the earliest days of the settlement, when a viscous fluid was seen floating on water, left in pools by the retreating tides, on the causeway between the island of Mikotaki and the main land. The appearance was disregarded as unimportant, and it was not till the year 1865 that operations were commenced. Messrs. Carter & Co., a well known firm in New Zealand, began operations at the Alpha well, and, through difficulties from water and gas, and from inefficient appliances, the shaft was sunk to a depth of about 60 feet and then abandoned, as the water became unmanageable. Further attempts were made by boring, and oil was struck at 85 feet from the surface. The well was sold to the Taranaki Petroleum Company, who erected an engine to pump the well. The oil soon began to flow at an increasing rate, but afterwards gave out, and, after an attempt to bore in a better manner, the Alpha well was abandoned. Other and further researches for oil were prosecuted without any encouraging amount of success.

The failure of these proceedings is to be accounted for by the fact that none of the parties engaged had ever seen an oil well, or had witnessed boring operations conducted with proper tools. The presence of oil in quantities has been demonstrated, and if skilled labor can be had, capital will soon be found by the enterprising inhabitants of the thriving colony of New Zealand.

In the neighborhood mentioned by our correspondent, is the far famed Taranaki iron sand, an enormous deposit of granulated iron of the highest purity. In appearance, it resembles fine, glazed gunpowder. We were shown, in London, a few years since, a knife of which the steel was said to be made from this iron; and the edge of the blade withstood the most violent treatment without being turned.

The Oil Business.

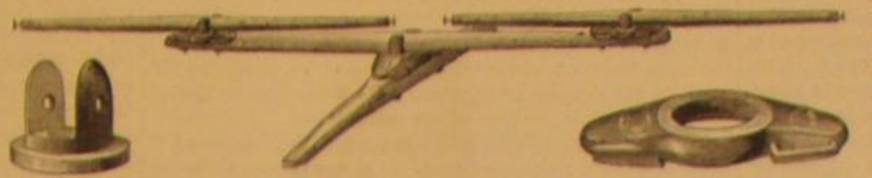
Speaking of the progress of Petrolia and the oil interest, the local paper says: At no time for years has there been more activity in oil development in this vicinity than at present. About thirty new wells are now under way, giving employment to one hundred and eighty men, besides the business furnished to teamsters, machinists, and so forth; and we hear reports of other wells soon to be begun. The work spoken of, added to that furnished by the running of pumping wells, accounts for the consumption that supports so many trading establishments as our rising village presents. Besides, the refinery interest here is one of great importance, and adds largely to the weekly circulation of money—a fact distinctly visible on pay night. Altogether the aspect is cheerful, and the prospects improve daily.

CROCKER'S WHIFFLETREE COUPLING.

The annexed engraving illustrates a whiffletree coupling patented through the Scientific American Patent Agency, May 2, 1871, by Hyde Crocker, Jr., of Montrose, Pa.

The evener may be coupled in the same way as the whiffletrees if desired, and is so shown in the engraving.

The coupling is formed of two parts shown in detail at the right and left of the engraving, the one at the right being the part attached to the evener, and the one at the left that attached to the whiffletrees. The part at the left is placed so that its ears extend up through the hole in the part at the right, the latter having a recess to receive the flange in the former. The part shown at the right is then securely bolted to the evener. The whiffletree is then placed between the ears of the part at the left, and secured by riveting. A very firm attachment is thus made.



The inventor does not confine his claim to the use of the ears shown, but forms them so as to embrace the upper surface of the whiffletree, or in any other manner deemed desirable. The parts of this coupling can be made of malleable cast iron, and are therefore cheap as well as efficient. Address the patentee as above for further information.

Iron Paper.

In the Great Exhibition of 1851, an American specimen of iron paper was first exhibited. A lively competition in iron rolling ensued among British iron manufacturers, excited by the above challenge from America, as to the thinness to which steel could be rolled cold. Mr. Gillott rolled sheets the average thickness of which was the 1,800th part of an inch. In other words, 1,800 sheets piled upon each other would collectively measure an inch in thickness, while the thinnest tissue paper to be purchased in the stationers' shops measured the 1,200th part of an inch.

These very thin iron sheets are perfectly smooth and easy to write on, although porous when held up to a good light. It may not be out of place, considering the great interest that is taken by those connected with that great branch of industry, the iron trade, to give a few curious particulars as to what extent iron can be welded, and the thin sheets that can be rolled out. Brother Jonathan little thought what a hubbub would be created in the old country, when from Pittsburgh he sent that wonderful letter, written on a sheet made from iron, which took no less than 1,000 sheets to make one inch in thickness, the dimensions being eight inches by five and a half inches, or a surface of forty-four inches, and weighing sixty-nine grains. This fact had no sooner made its appearance in print than Britain's sons began to work, and soon we heard of that sheet containing the same number of surface inches, but weighing only forty-six grains, had been made at the Marshfield Iron Works, Llanelly, Carmarthenshire, being exactly one third less in weight. But soon the Welsh leek had to give way to the rose of England, for Staffordshire was anxious to take its wonted lead. The Hope Ironworks succeeded in making a sheet of 11 surface inches, weighing but 89 grains, which, reduced to the American and Welsh standard of 44 in., gives about 33 grains; Messrs. R. Williams & Co., 69 in., 49 grains; reduced to the same standard, about 31 grains. For a time, Staffordshire wears the belt, but Wales becomes very restless, and is anxious for the honor of St. David; so further attempts must be made. Marshfield comes again into the field. They succeed in making one sheet, 8 in. by 5½ in., or a surface of 44 in., of the astounding weight of 23½ grains only, which required no less than 2,583 sheets to make one inch in thickness; another sheet, 8 in by 6 in., or 48 surface inches, weighed 25 grains, but brought to the standard of 44 inches, gives but 23 grains, and requires 2,950 sheets to make one inch in thickness. The Pontardawe Tinworks next come into the field with a sheet 14¾ by $7\frac{5}{16}$, or a surface of 115·17 in., weighing 60 grains; but being reduced to 44 in., is 24½ grains—a trifle heavier than the Marshfield, but Pontardawe claims 3,799 sheets to make one inch in thickness.

We now come to the climax. The mill manager of Messrs. W. Hallam & Co., of the Upper Forest Tin Works, near Swansea, has succeeded in making a sheet of the finest appearance and thinness that has ever yet been seen by mortal eye. The iron from which the sheet was rolled was made on the premises. It was worked in a finery with charcoal and the usual blast; afterwards taken to the hammer, to be formed into a regular flat bottom; from thence conveyed to the balling furnace, and when sufficiently heated, taken up to the rolls, lengthened, and cut by shears into the proper lengths, piled up, and transferred to the balling furnace again; when heated, it was passed through the rolls, back again into the balling furnace, and when duly brought to the proper pitch, was taken to the rolls, and made into a thorough good bar. Such is the history in connection with the forge department. It was then taken to the tin mills, and rolled till it was supposed to be thinner than 23 grains, afterward passed through the cold rolls to give it the necessary polish, and now it stands on record as the thinnest sheet of iron ever rolled. The sheet in question is 10 in. by 5½ in., or 55 in. in surface, and weighs but 20 grains, which, being brought to the standard of 8 in. by 5½ in., or 44 surface inches, is but 16 grains, or 30 per cent less than any previous effort, and requires at least 4,800 to make one inch in thickness.—*Ironmonger.*

THE Government of the island of Jamaica has passed laws authorizing aliens to hold real estate, and a large quantity of Government lands is soon to be put on the market at about one dollar an acre. So writes to us, from Kingston, an esteemed correspondent, who holds an official position.

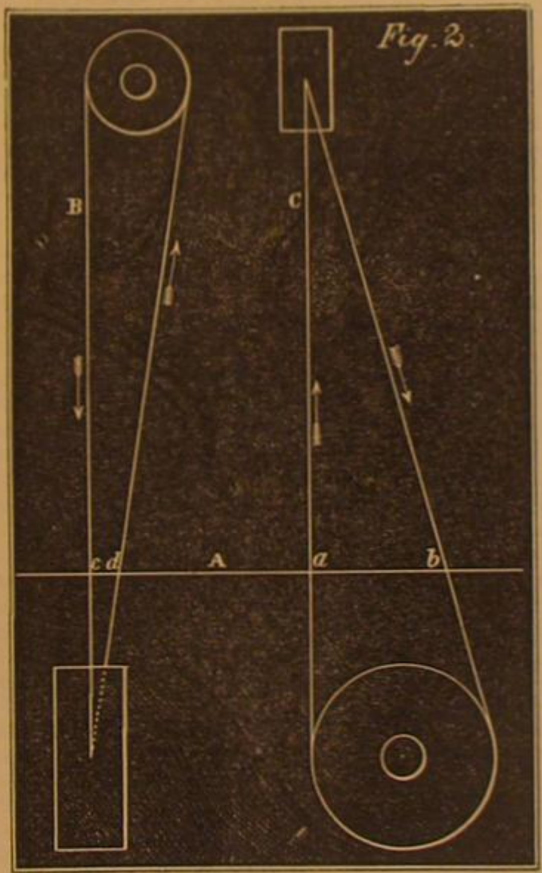
Obituary.

MR. ALEXANDER KEITH JOHNSTON, a well known eminent geographer, died recently in London. His knowledge of the science of geography was universal and complete, and his great learning has been communicated to the world by his published maps and atlases, which have long been renowned for their extraordinary accuracy as well as for beautiful execution. The latter excellence is due to Mr. Johnston's practical acquaintance with the engraver's art, to which he was in early youth apprenticed, and which first drew his attention to geography as a study. His *Physical Atlas of Natural Phenomena*, published in 1848, is the most important and valuable work of its class yet produced. His labors were widely appreciated, he having been elected a corresponding member of all the principal geographical societies of Europe, America, and Asia, and he was a well known and valued Fellow of the Royal Society of England, besides receiving many honors in other branches of science. He was a native of Kirkhill, near Edinburgh, and died in his sixty-seventh year.

BELT HOLES—QUARTER TURNED BELTS.

There has been considerable inquiry upon this subject from new subscribers, and for their benefit we republish the following direction from page 85, Vol. XVIII of the SCIENTIFIC AMERICAN:

The only proper method is by diagrams. Sweep a clean place on a smooth floor and set out with chalk line and "tram" two views of the pulleys and the floor, getting the distances as accurately as possible, or lay them down on paper to a suitable scale. Notice that a belt to work at quarter twist must run *on* to both pulleys in a line parallel with the plane of rotation, as B, in the diagram, running on the lower pulley, or C, running in an opposite direction on the upper one. Therefore drop the perpendiculars, B and C, as shown, and draw the diagonals, giving the distances, *a b* and *c d*, on the floor line, A. Now drop a plumb line from each side of the upper pulley at the center of the face to the floor, and from one point so found, *c*, in the diagram, lay off the distance, *a b*, in a line parallel with the upper shaft, and from the other point, *a*, in the diagram, the distance, *c d*, parallel with the lower shaft; the points so found will be the centers of the belt holes. The twist to be given to the holes, if such a refinement is necessary, may be made a matter of judgment.



The Gas Wells of Pennsylvania.

Honorable Neal Dow Communicates to the Boston *Congregationalist* gives the following account of natural gas wells:

In many parts of the Key Stone State, wells, bored for the purpose, yield an abundant flow of illuminating gas—identical in its character with that manufactured in our cities from bituminous coal. These wells are from two hundred to seven hundred or eight hundred feet deep, and from three inches to five or six inches in diameter. They are "bored" through the various strata of earth and stone, and are lined, like oil wells, with wrought iron pipe made for the purpose. In many places these wells are of great value, affording sufficient fuel for driving the machinery of large manufacturing establishments. In some cases the supply of gas is sufficient to repay the entire cost of the well and fixtures in a single year or less.

At Erie, I saw several of these gas wells employed in this way. Directly on the shore of the lake are located the works for the supply of the city with water. The water is forced into a stand pipe, two hundred and thirty feet high, by which it is distributed with sufficient pressure over the entire city. Two enormous engines do this work, being driven by steam generated by gas flowing from a well sunk upon the premises. We were permitted to look into the furnaces, which were all aglow with a brilliant flame, issuing from a series of small pipes connected with the gas well. There was no dust nor smoke, and no fireman was required. The only attention necessary was to turn on or off a little gas according to the indications of the steam gage. The works were about to be enlarged, and another well was in progress, to furnish gas for the additional boilers.

These gas wells are found also in operation for domestic purposes; I saw it employed in a gentleman's house. In the library was an open fireplace, and a wood fire—or what seemed to be such,—for the terra cotta upon the andirons was in admirable imitation of hickory wood. A low fire was burning, for the morning was not cold; the lady of the house turned a small tap near the fireplace, and the flame instantly increased in volume, and continued to increase, as the gas was turned on, until the fireplace was full of flame, issuing from the terra cotta, and we had what seemed to be a roaring hickory wood fire.

The gas was then slowly turned of, and the fire gradually diminished and finally expired. The lady then with a match lighted a piece of paper and threw it upon the wood, turning on the gas at the same moment, and we had instantly the low fire which we found at the beginning. In every room in the house, except the kitchen, was a similar apparatus, and fires could at any moment be lighted with as much facility as the chandeliers in the same apartments, supplied with gas from the same well.

In the kitchen was a large and complete range, sufficient for a family of thirty persons. When we entered, a low fire was burning, and sundry vessels were simmering over the flame. The cook turned a tap, and instantly the range was filled with a fire sufficient for all culinary operations up to the full capacity of the apparatus. Nothing is employed in that house for heating and illumination, except this gas.

The well is in the back yard, sufficiently removed from the mansion, and is covered by a small house. The bore is five hundred and twenty feet deep, lined with iron pipe, and furnished with a safety valve, like that of a steam boiler, and the gas is brought into the house and conducted over it, in the same mode employed in the case of ordinary street gas or water. The entire cost of this well and the fixtures, ready for use, was twenty-five hundred dollars, and the supply of gas was sufficient, I thought, for two or three other first class houses. Nothing can possibly be more perfect than this arrangement; the fuel supply being as convenient and abundant as that of water and illuminating gas from the public works.

REMINISCENCES OF INVENTORS.

Inventors have been occasionally the recipients of Government bounty,—always inadequate. This kind of reward is not only precarious, but apparently doled out on no fixed principle as to the merits of the case or the amount to be granted.

Henry Cort, whose great invention for the manufacture of iron is a well-known case, it is true, received the sum of £20,000, but too late in life for him to reap any enjoyment from it. It has been estimated by competent authority that the application of his discovery has created wealth to the amount of between £600,000,000 and £700,000,000, not a long way removed from equaling the National Debt, and gives at the present time employment to upwards of 600,000 work-people.

Perhaps one of the most unfortunate inventors was Henry Fourdrinier, who, after the labor of a long life, the ruin of his prospects, and the expenditure of £60,000, brought to perfection his machine for making paper,—one of the most useful machines ever invented for aiding in the spread of knowledge, after the printing press itself. So great was the improvement effected by this beautiful machine that the paper duty was soon increased by upwards of £500,000 per annum, and effected a saving to the country of £8,000,000. From the great improvement of the paper, it assisted powerfully in the progress of lithography and engraving. Even where least expected, it brought improvement in its train, for the fine tissue paper manufactured by it had a marked effect in improving the printing of patterns and devices on pottery, which was felt and freely admitted in Staffordshire. When in extreme old age, after many weary years of application, he received the small and utterly inadequate Government grant of £7,000, after his claims had been carefully investigated by a Parliamentary Committee. He lived to see the triumph of his machines, and died at the patriarchal age of eighty-nine.

Could this noble old man have stood by my side but a few weeks ago, how his eyes would have glistened with pleasure, to look upon some fine brass wove wire of 28,000 meshes to the square inch, and a copper wire 3,000 yards long, drawn from a single penny-piece,—one of Boulton & Watt's old contract pieces, long since withdrawn from circulation. What painful trouble, labor, and anxiety, these fine specimens of wire weaving would have saved to Henry Fourdriner, could he but have had the like when he began his experiments at his once paper mills,—the Two Waters,—at the juncture of the little river Gade and Bulbourne brook, in pleasant Hertfordshire?

Accidentally looking over an old-fashioned description of Derbyshire, "adorned with copper cuts," I stumbled upon a quaint account of Sir Thomas Lombe's once renowned silk-twisting mill, built on the banks of the pretty Derwent at Derby.

The somewhat mystified history of this piece of machinery is well known,—how Lombe went to Italy, got introduced to a famous silk mill there as a workman, studied the details, copied out all its parts, then fled for dear life to England, where he put up his mill,—the first in the kingdom,—for making argazine or thrown silk. So began the silk twist trade. We are treated to a little detail, and told how,—"This engine has 26,586 wheels and 97,746 movements, which are all worked by one water-wheel turned by the Derwent three times round a minute. By every turn of the water wheel the machine twists 73,726 yards of silk; so that in twenty-four hours it will twist 318,496,320 yards. And it gives employment to between 300 and 400 workpeople. This machine was considered of so much importance by the Legislature that, on the expiration of the patent the Parliament granted him £14,000 as a further recompense for the great hazard he ran;" for he is said to have been dogged by Italian assassins.

The condition of the recompense was that a perfect mode of the machine should be sent to the Record Office in the Tower of London, there to be kept to perpetuate the invention. The sole existing fragment of this machine is now preserved in a small glass case in the Patent Museum, Brompton; it is of wood, and seems have been well made, as far as one can judge from so small a fragment.

Harrison, the famous chronometer maker, and inventor of many useful appliances in horology, received a Government grant of £20,000 for improvements effected by him in chronometers and other time-keepers; he well deserved it, for he was a great friend to astronomers and navigators. A curious old fashioned eight-day clock, with wooden wheels, the production of his hands, is preserved in the Patent Museum, Brompton; it still "go's tic-tac," and is well worth inspection.—*London Builder.*

Correspondence.

The Editors are not responsible for the opinions expressed by their Correspondents.

Paine's Motor.

"A man's useful inventions subject him to insult, robbery, and abuse."—Franklin.

To the Editor of the Scientific American:

I was never more favorably impressed with the truth of the old philosopher's remark than with an article in your journal on Paine's motor, over the signature of "Rowland, C. E." Will you permit me, not in defense of Paine, but in the name of common justice, to state that I have constructed a motor (surreptitiously) after the description and drawings of Mr. Paine's English patent, and it fully verifies all his claims. I had previously been familiarly conversant with all the details of his experiments and found my task an easy one.

As no one not essentially an expert in electrical dynamics can explain why success has not heretofore crowned the efforts of the multitude of experimentalists, so no one but such an expert can realize the obstacles overcome, and the value of the results. A technical description of Mr. Paine's engine would possess little interest for the general reader; therefore the general statement that it occupies one tenth the room of a steam engine and boiler of equal power—involves no risk of fire or explosion—can be operated in a drawing room, as regards cleanliness, and at less cost than any steam motor—expresses all that is required by the economist. But to the mind of the physicist—to such men as Doremus, Tyndall, and Henry—an investigation of Mr. Paine's treatment of the electric currents opens up a field of thought second to none in the annals of science.

While witnessing the operation of the motor we cannot fail to be impressed with the perfect unity of mechanical engineering and profound science evinced in its construction.

Take for instance the first element of the machine, the magnet. Oersted had given, to our constructor in common with others, a bar of iron traversed by electrical currents. Ampère's and Henry's observations and manipulations thereof were deemed exhaustive; and later and more practical experimentors, Page and Farmer, certified the impossibility of successful results to be obtained from electro-magnetism as regarded motive power; the former by costly experiments, and the latter by both experiment and scientific deduction.

Mr. Paine, therefore, with any hopes of success, must start from a source as original as Oersted's, and a glance at the construction of the magnet is sufficient to satisfy the expert not only of original thought but of successful application.

As the normal condition of each molecule, in the mass of iron to be magnetized, must be disturbed, it follows that if any portion of the molecules can be removed without detriment to the required polar surface, or action, that a corresponding reduction of battery, and consequently of cost, will ensue.

Imagine a parallelogram bar, twelve inches long, three inches and one half thick, with four inches of its poles wound with insulated wire, and we have the common bar electro-magnet.

Now, Mr. Paine's researches revealed the important fact that more than one third of the molecules in the parallelogram were absorbents of electrical force under conditions adverse to any dynamical value. These battery wasting elements were found resident in the sides of the parallelogram (outside of the curved line starting from one pole and touching the axes of the parallelogram), at its center while being continued to the opposite pole. Remove this mass and we have the ordinary bar electro-magnet converted into Paine's sector magnet.

This improvement relates entirely to the economizing of battery force, and considered alone adds but little to the attainment of a practical electro-motor. For however sensitive the limbs of a magnet may be to the action of a traversing current, so long as the currents are reactionary, one on the other, all hopes of obtaining valuable results from such currents are as futile as to expect value from a wheel whose back water nearly equals its head.

Electricians are aware that like currents are repellent of each other. Now, if the coil of a helix be to the right and the current moving to the right, it follows that each successive layer must be moving in the same direction, and if there be twenty layers there will be eighteen currents moving in the same direction, and reacting on each other, producing the effect on the primary current that back water does on that of the head water in the case of the water wheel.

This destructive induced action is the rock that has wrecked many a hopeful experimentalist. It is one of two obstacles of which electrical scientists have predicated the impossible in electro-motors. But to the patient investigation and persistent efforts of twenty years even this impossibility has given way, the induced currents are neutralized, leaving the primary current free to expend its full value on the limbs of the magnet.

This desirable result is obtained by the interposition, between the layers, of metal foils, the theory being that the damaging induced currents expend themselves on the foil instead of re-acting on the primary current. However correct or otherwise this theory may be, the results as compared with magnets not treated with the foil are most astounding.

The great magnet in the New York College was made by the Messrs. Chester, who, it is needless to remark, have, in its construction, satisfied every requirement know to scientific record. This magnet weighs seven hundred pounds, and when actuated by a battery of three hundred one-gallon cells, disturbs a weight of fifty pounds at a distance of one inch from its poles. Now a Paine magnet weighing fifty pounds, and working under a battery of nine Bunsen's cells of one quart each, has an attractive power of one hundred and four pounds at a distance of one inch and five eighths, a difference in its favor over the college magnet, as regards battery power, of a hundred to one, and of dynamical value of almost eighty to one.

It would seem that possessing magnets of such immense power, at a mere nominal cost, that they only require the skill of the machinist to realize the wildest hopes of the enthusiast.

But just at this point—the application of the magnets to the production of continuous motion—the other insurmountable object intervenes, namely, the reflex action of the currents. Experimenters have found that magnets do not develope the same power when arranged to produce motion, as when tested in an isolated condition.

Magnets that have a dynamic value of ten when isolated, will develope less than two and one half when arranged one with the other, so as to produce rotary or reciprocating motion. All electric engines are operated by one common principle of cutting off the current from the magnet when its duty has been performed, and passing it to the next magnet in advance on the line of motion. Now, at the instant of breaking the current in the first magnet, the whole coil is charged with a current flowing, one will suppose, to the right. At the moment this current is interrupted, the current in the coil reacts to the left, giving the magnet a dynamic value equal to seventy-five per cent of the primary current, and this seventy-five per cent is reacting against the primary current on the magnet in advance.

Many attempts have been made to neutralize this reflex action, but to utilize it, to convert this three fourths of retarding force into assistant power, seems to have been left to the genius of Mr. Paine to accomplish.

It is difficult to explain, without drawings for reference, the details by which this desirable result is obtained. In general terms, the magnets are so arranged with reference to each other, that when one half the stroke is accomplished, the battery current is cut off and the reflex current expends itself in the rest of the stroke; and while the engine is being thus operated by the reflex action, the primary current is on the leading magnet, whose position is the most advantageous to utilize the primary current, and thus the full battery power is economized.

In the construction of the present engine, the immense direct strain of the magnets (a strain equal to twenty tuns) has necessitated the construction of a framework of peculiar and novel character. The fulcrum or stationary magnets have concave poles, and the wheel or rotating magnets are correspondingly convex.

The theoretic value of this arrangement is realized when these surfaces of the poles are worked so nearly in contact as to require lubrication. But the direct strain is so great that no massiveness of structure will secure the magnets from absolute contact, when thus attempted to be operated, and therefore a certain value of the magnetic attraction must be sacrificed to practical requirements.

The magnets in the present motor are adjusted to work at one sixtieth of an inch, and should the frame spring that amount, the engine must stop, as the fulcrum magnets would act as a break on the wheel magnets. Mechanical engineers will understand how difficult a task it has been to devise a frame of the weight, and in the compass, of the one under consideration, that would withstand the impact of twenty tuns without yielding the one sixtieth of an inch, and yet this is most successfully accomplished in the engine under consideration.

Reflecting on the small battery cost required to develope these great forces, it would seem that all that is now required to give the world a costless power, is the discovery of some mechanical process of generating quantity currents of electricity. We have magneto-electric machines that require less than one horse-power to generate an intensity current equal to thirty Bunsen's cells, and, as Mr. Paine's engine develops over three horse-power under three such cells, there would be a large surplus of power after operating the generating battery. But unfortunately, all machine electricity has high intensity with low quantity, and it is the latter quality that is required to give dynamic value to the magnet.

Whether Mr. Paine will overcome this difficulty is yet a question of experiment, but I may add, in view of what he has accomplished, there are strong probabilities of his success. With all these results Mr. Paine's labors are far from complete; there exist certain phenomena which have as yet baffled his powers of investigation. I refer to spasmodic action, irregularity of motion, and the uncertain life of the magnet.

Mr, Paine is now devoting his energies to the investigation of these adverse causes, and it is to be regretted that the spleen of some men and malice of others should, by theis outrageous innuendoes, disturb the quiet so much required in researches of this kind.

WINFIELD S. SIMS.

Newark, N. J.

The Depths of the Sea---No. 2.

To the Editor of the Scientific American:

The ocean has, like the firm land, its beautiful meadows, its vast forests. Its mountains and valleys are covered by a multitude of various plants, each species requiring its own particular climate, but the contrary one of that which it would choose on the surface of the earth. In ascending a mountain, we see how vegetation decreases gradually as we ascend higher and higher; how it, by and by, gets a sickly appearance, and at last disappears entirely to give way to everlasting snow.

An entirely contrary phenomenon would be observed in the waters of the ocean. The further we descend into the deep dales of the sea, the more does vegetation diminish; and from a depth of 3,000 meters, the plumb line never brought up any particle or trace of any plants; we are therefore entitled to argue that the deepest submarine abysses are totally deprived of vegetation. Land plants do not grow beyond the boundary of snow; so sea plants cannot exist in considerable depths. Some of the sea plants prefer a quiet place, where they are not touched by currents; others attach themselves firmly to rocks or other solid masses, around which a constant whirlpool is roaring and raging. These latter seem to thrive best in the stormiest roaring of the surges. Cane, reed grass, sedge, rush, salt herbs, etc., which require air and light, grow close to the shore or the level of the water; and while their roots are nourished from the shallow bottom of the sea, their branches and blossoms form charming little islands, on which water fowls are building their nests.

In the transparent waters of the Pacific, the vegetation of the sea displays its greatest splendor and richness. Various kinds of moss, of the greatest tenderness and the most splendid blending of colors, forming the richest Oriental carpets that fancy's witchcraft is able to produce, are spread out in enormous dimensions. In the seasons of calms, we can admire the wonderful *nuances* of their colors, in a depth of more than 100 meters. On the slopes of the elevations at the bottom of the sea, is the silky *Anferina*, its ribbed branches resembling trimmings of silk; and small, purple-red *algæ*, which, when standing together, give a red luster to the sea. Seaweed, or *fucus*, forming extensive meadow grounds in the Atlantic Ocean, is growing here also. These plants, when by some accident torn off from their native standing place, swim for years, on the surface of the water, without fading; and we see them floating, thousands of miles distant from their original place. A collection of floating berry seaweed (*Sargassum bacciferum*), extending from the Azores near Cape de Verde, and covering a space of 60,000 square miles, gives to this part of the Atlantic the name of the Sargasso sea.

In the waters surrounding the equator, there are plants belonging to the delicate *Florideæ*, having a bright red and yellow color; these plants cast their seed vessels far away, which then burst open, leaving the contents exposed to the pleasure of wind and waves; thus grain is spouting far away from its mother plant. The *Laminariæ*, resembling reptiles, when soaked and decayed sufficiently, are converted into a transparent gelatin, or jelly, which is regarded as a delicate dish in Chili, from Lima to La Concepcion. *Ulvæ* are found in great multitude in the waters of the oceans; some of them, by the name of sea lettuce, are eaten. But the most remarkable of all the sea plants is *fucus giganteus*, a species of seaweed. The cedar tree is called the giant of the mountains, but this fucus may justly be called the king of the sea. It rises out of a depth of 300 feet up to the water's surface; vast masses of this gigantic plant are swimming along on the waves, forming really floating islands, which seals and other sea animals and sea birds choose as their abode, to bask in and to sleep in comfortably. Navigators avoid these fucus isles like dangerous cliffs, or other perilous obstacles on their voyages. Around the equator, where calms are prevailing, ships sometimes get so entangled, in the vast networks of this seaweed, that they have to remain on the same spot for months until a violent breeze sets them free.

Among the sea plants growing close to the shore, there are many, which furnish palatable food to men; others serve for industrial purposes, and form a profitable article of commerce. The *Borax* species supply us with iodine, which finds frequent application as a medicament, especially for scrofula; besides, it has been a great medium for art purposes, since the invention of dagurreotypes and photographs. By washing in lye the ashes of certain prickly *algæ*, growing on all the sea shores of Europe in vast multitude, soda is produced, which is a main ingredient of soap and is used in many other ways. Remains of plants, torn from the rocks by the ever toiling surges, and thrown up to the ocean's surface, during a storm, are spread over the soil, an excellent manure for it, and serve therefore to increase the prosperity and wealth of the inhabitants of the coast.

The submarine vegetable kingdom has by no means unvailed all its wonders to us; and the constant investigations of those men, who apply themselves exclusively to this branch of science, will reveal the greater discoveries in that department, in that it was formerly neglected by navigators and investigators.

The more we advance in the study and investigation of Nature, the more we see, with admiration and astonishment, what grand phenomena Nature produces by means insignificant, at least to our eye! Nature, unbounded in time and space, nevertheless uses all her powers with such wonderful economy, as if they were not inexhaustible.

From invisible evaporations caused to rise from the bottom of moist valleys, by the rays of the sun and condensed, at the hight of mountains, by the cold, Nature forms grand cataracts and large rivers. The insignificant, hardly visible *larvæ* of insects were sufficient to make the strongest, loftiest trees of our forest decay and fall into dust. A petty grain of seed, carried off by the winds or fallen down from a bird's bill, sprouts in a few days on a huge piece of rock, on which human power would in vain try its rage to destroy; but the feeble roots of this little plant force their twigs into the fissures of the most solid stones, and will gradually burst them open. A simple *polypus*, standing at the lowest point in the scale, among the lowest orders in the classification of animals, is Nature's medium at the bottom of the sea, by which new continents are created. One of the *polypus* species, the *Madreporæ*, belonging to the *Phytocorallia*, or plant coals, piling up silently, but incessantly and assiduously, layers upon layers of stones, are an example of what the most insignificant feeble creatures can do, when united. To the incessant work of the *Madreporæ*, future generations will be indebted for extensive fertile tracts of land, on which they can build their spacious and comfortable homes. The rocks of the *Madreporæ* and other *polypus* species may display themselves ever so grandly and so vast in extent to our eye, yet they are produced in a very simple, comprehensible way; for remains of rocks, stones and other earthy matters, united with the calcareous stone crust which these petty animals exude, form the only building material for the construction of new continents. Wood torrents, in their rapid fall, are tearing off, from our mountains, pieces of rocks, which the ever toiling surges, by and by, destroy and convert into pebbles and gravel. In this state, they are carried to the larger streams, and, by constant friction, the little stones are decomposed gradually till they reach the ocean in the form of sand. Earthy substances, melted by rain, roll down the mountain slopes, are carried along by the rivers, and now form valleys, originally plowed out by streams. The skilled eye of the geologist measures easily how much a river carries along of its own sandy shore, how much deeper it is digging its own bed, and how the latter is contracted in the course of time. Geologists compute the mass of earth that a river washes off yearly in its course through extensive valleys to raise, at its mouth, the bottom of the sea. The eye of the geologist sees everywhere primitive rock decomposed into sand, by the union of air and moisture, and following the rapid course of the mountain waters into the rivers which distribute it in the oceans. To the superficial eye of man, Nature only forms an inconsolable picture of disharmony and destruction; but a "thinker" admires, at every step, the grandeur and Harmony as well in Nature's designs as in her way of executing them. Ebb and flood make rocks tremble, the force and power of the surges convert pebbles into the finest sand powder; but, at the same time, the sea is the reservoir in which all the rubbish and remains of the soil, on which we live, are gathered and consumed, and here Nature forms a new world out of the remains of an old one. These fragments of earth are not committed to casualty or to an arbitrary new compound. On the contrary, they separate or unite with wonderful regularity, according to their specific weight or the greater or smaller degree of their solubility, into various affinities in order to enter into new conditions and relations. A part of these remains, carried down into the depth slowly and gradually, accumulates there in vast masses, which, in the course of time, are hardened into solid rock, forming huge blocks, similar to those we find in our present stone pits. Another part of said remains is used by molluscs for the building material of their tender and delicate shells; some parts penetrate into the texture of certain plants, from which human industry extracts them in another form by the process of combustion; whereas not a small number of those remains serves the *polypi* for their wonderful works. The *polypus* is a diminutive gelatinous animal, furnished with feelers, by which it holds its food. A large number of these animals is attached in common to a little membrane, and every one of them is bound to its stone cell, which it cannot leave. Only a very few of them live singly; most species build a house in common, in which each one has its own petty apartment, like the larvæ in the cells of a beehive. Yet they form such a strict community, that the little particle of food one takes is sufficient for the whole family, and if a single one of them is hurt or wounded the whole family will die. They do not extend further down than a few fathoms, and die as soon as they are brought into connection with our atmospheric air. But we do not know much about the life and habits of these diminutive creatures; not long ago they were ranked among the vegetable kingdom. There is a great variety of them, all remarkable on account of the neatness and simplicity of their habitations. The longest known species is that which furnishes coral, and there is certainly no museum without a fragment of the works of this *polypus*, which is distinguished by its purple color and leafless form.

The coral is found in great abundance in the Red sea, whose not very deep bottom is converted into a miraculous garden by the numberless branches and ramifications of the *phytocorallia*; in the Mediterranean sea also, a vast multitude of them live. The coral fishery is to the inhabitants of the coast a rich source of commerce, business, and prosperity, and the city of Marseilles owes its flourishing state mostly to the coral trade.

AMALIE PFUND, *née* JANSSEN.

The Threaded Envelope Patents.

To the Editor of the Scientific American:

The article on the envelope openers, published by you a short time since (June 24), seems to have created considerable amusement among your readers.

More than this, you would evidently have people understand that there was no patentable or valuable difference between the two plans there presented. I beg leave to differ with you in this sentiment, premising that I have no interest in either of the patents named, and no connection or even acquaintance with the patentees or assignees of either.

I think it will be readily perceived that if a plain bit of thread be attached to an envelope of heavy material in the manner described in the patent of '58, and allowed to project ¼ or ½ of an inch, as indicated in your article, in nine cases out of ten the thread would slip through the fingers before the paper would give way, rendering the plan practically of little value, being equally if not more troublesome than cutting or tearing in the usual manner.

But our inventor of 1871 steps in with his knot on the thread, by which the user may seize and retain the latter between two finger nails, and thus easily tear out the material of the envelope. He, in fact, has done just what many another has done for more important inventions, rendered perfectly practical what before was experimental and unsatisfactory. It is not enough to argue that knots on threads are old, and that envelopes with threads are old, and other like fogyism, much of which is rampant in certain rooms of the Patent Office. I contend that the knot in this connection is novel, by performing a new function (not identical with that on the thread in the lady's work box) and by producing a more advantageous result than was possible with the old construction.

Furthermore, in the patent of 1871, the inventor claims a "knot on one or both ends of the thread," the latter plan doubly facilitating the operation of opening the envelope, as well as cheapening the construction; for the thread may be simply laid in the crease without any fastening whatever, except the knot at each end. If I were a lawyer, I would not hesitate to defend the "improvement" patent, as to novelty and utility (not as to infringement) in any competent court.

From knowledge of the characteristics of some of the present incumbents of the position of examiner, I judge that the latter patent was obtained from the more liberal Board of Appeals, whose opinion in the case is at least entitled to consideration. There is a difference (sometimes) betwixt tweedledee and tweedledum, and that difference is or ought to be patentable.

F. H. CLEMENT.

Rochester, N. Y.

Steam Plows.

To the Editor of the Scientific American:

Permit me to occupy a short space in your valuable paper, to show, in my opinion, where "Speed the Plow" is in error as regards the practical working of steam plows in America on what is termed the cable principle, or in other words, where the engine is stationed at the side of the field and draws the gang of plows back and forth, by means of a cable.

First, what, I think, as a general thing, the American people would accept as a practical steam plow, is a machine that is driven back and forth, across the field, and drawing its gang of plows after it. The working expense of such a machine would be far less than to do the same work by the English system of stationary engines and wire cables, as the traction engine with its gang of plows can be worked very easily by two men, while, the English plan (if I am correctly informed), requires four or five men to operate one of their machines. I quote the substance of Mr. John Fowler's words, when I say he considered it more economical to use two engines, one at each side of the field, than to use a single engine at one side of the field, and an anchor at the other side. If the using of two engines is more economical than a single engine with anchor, how economical it must be to plow by steam on that plan!

I do not believe the American people can be made to believe that it is a very economical way of plowing, where one engine is standing still and burning fuel while the other engine is at work, as it is necessary to have steam up in the one that is standing still, so as to be in readiness to go to work when its turn comes.

This plan puts me in mind of what I have frequently seen, where there would be employed a gang of men of double the number which were necessary to do a certain piece of work half of the number would be at work, while the other half would be standing up with their hands in their pockets, their pay going on at the same time.

Secondly, in plowing by the English system, there is, of course, a limit to the distance through which the gang of plows can be drawn. In large fields, such as are frequently met with in the Western States, it would be necessary to plow the fields in portions to correspond with the length of the cable. This would be another objection, as there would be too many headlands to be plowed or finished up by horses, an objection, which, if it was the only one, would, in my opinion, prevent said system of plowing from coming into general use in America.

Lastly, the price would be a serious objection to its introduction, as the engines and appliances necessary for working order, cost a sum which place them beyond the reach of men of ordinary means.

"Speed The Plow" seems to think that it is impossible to get up a traction engine that would be capable of drawing two plows, each cutting a furrow sixteen inches wide by twenty-six inches deep.

Permit me to say, from what I have ascertained by experimenting with different kinds of plows: The resistance offered to the draft by two of the most improved kinds of plows, cutting furrows of the above depth and width, was about 3,000 pounds to 3,500 pounds, a resistance which I have not the least doubt can be overcome by a traction engine, which would also propel itself. Furthermore, the traction engine with its gang of plows, can be built in America at a price which would not place it above the means of any but capitalists, although the prices of labor and material range higher in this country than in England.

Chestnut Hill, Philadelphia. W. H. H. HEYDRICK.

Boilers at High Levels.

To the Editor of the Scientific American:

The facts concerning the working of boilers at high levels are, I think, as follows:

That if a boiler, whose safety valve is arranged to work at 50 pounds under an atmospheric pressure of 15, be carried to an elevation where the atmospheric pressure is only 9 pounds, it will do the same service, when the safety valve lever or balance indicates an internal pressure of 50 pounds; because, although the actual internal pressure is only 44, the back pressure of the engine is reduced 6 pounds per inch.

You say that safety valves and pressure gages indicate the difference between the internal and external pressure under all circumstances.

Now please think again, and I believe that you will find that pressure gages are made to indicate an excess of internal pressure over the atmospheric pressure of 15 pounds per inch, so that if an ordinary pressure gage indicates an internal pressure of 50 pounds under an atmospheric pressure of 9 pounds, the actual internal strain on the boiler is 56 pounds per inch, which shows an increased strain of 6 pounds per square inch, when working according to the ordinary pressure gage.

Therefore, a boiler whose safety valve and pressure gage are arranged to work at 50 pounds per square inch under the atmospheric pressure of 15 pounds per square inch, will do the same service at an elevation where the atmospheric pressure is only 9 pounds per square inch, when the safety valve lever or balance indicates 50 and the pressure gage 44 pounds per square inch, on account of the reduction, of 6 pounds per square inch, of the back pressure on the engine.

JAMES GARLAND.

Providence, R. I.

Saccharate of Mercury.

To the Editor of the Scientific American:

Mr. Tunbridge, of Newark, takes exception to an article which you did me the honor of publishing in your issue of July 1, and states that "the only intelligible result of triturating mercury with sugar is to oxidise the former." I give an entirely different interpetration to the process.

The difficulty in getting mercury thoroughly incorporated with clay ore, or washings from crushing machines, renders it advisable, if possible, to combine the mercury with some substance soluble in water. If this can be effected, a very small quantity of mercury will do for the purpose, as it will be brought into contact with every particle of gold in the mass. I have rubbed mercury and sugar together in a mortar, and find that the sugar immediately acquires a pale gray color, the granules being coated with the mercury in the finest possible degree of comminution. If this powder be thoroughly mixed with pulverized ore, and the whole then washed with water, there will be no grain of earth, and consequently of gold, that is not in contact with metallic mercury. This is the theory, and it seems eminently practical. "Chalk, molasses, and many other substances" have no kind of fitness for the purpose.

D. B.

COMPENSATING FOR LEGAL SERVICES.—In Sir Walter Scott's Life there is an amusing account of his professional emoluments at Jedburgh. In one case Scott's client was convicted of housebreaking. After the trial the prisoner sent for him, thanked him for his exertions, and said he was sorry he could not give him a fee, but he would give him two bits of advice: First, that a yelping terrier, inside of a house, was a better protection than a big dog outside; and secondly, that no lock so bothered a housebreaker as an old, rusty one.

MILDEWED LINEN may be restored by soaping the spots, and, while wet, covering them with fine chalk scraped to powder, and well rubbed in.

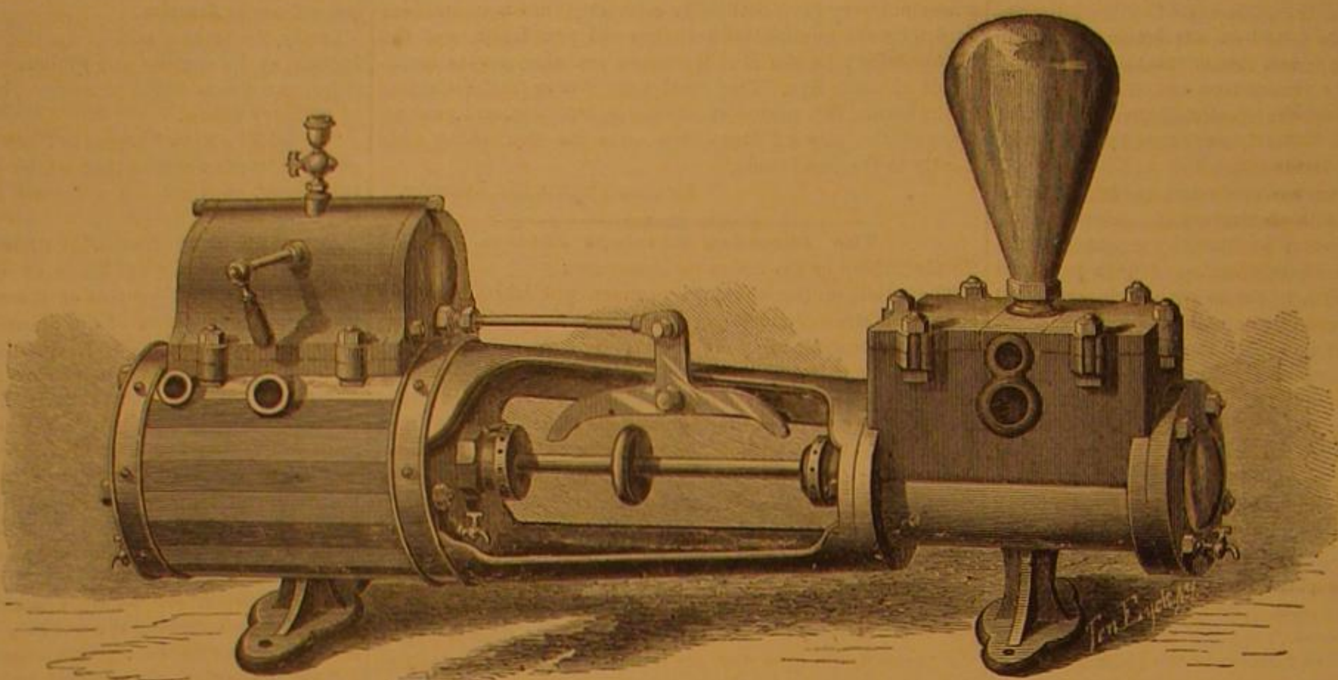
The Selden Steam Pump.

We have been very much pleased with the working of this pump. The arrangement of its valves is peculiar and causes it to work with great steadiness. It seems well adapted to boiler feeding, as well as all the purposes to which such pumps are generally applied.

The steam piston and the pump piston are attached to a common rod, as shown in Fig. 1. On the middle of this rod is fixed a button, which operates a curved rocker with an upright oscillating arm which actuates the valve rod attached to the auxiliary valve, A, Figs. 2 and 3.

This valve is a three-ported valve, as is also the main valve, B. The auxiliary valve works directly under the main valve, as shown in Fig. 2. The two valves are fitted simultaneously, by placing the auxiliary valve in the recess, C, of the main valve, and facing them down together. Placing the auxiliary valve under the main valve obviates the jumping from its seat of the former, a difficulty experienced in some other pumps employing an auxiliary valve.

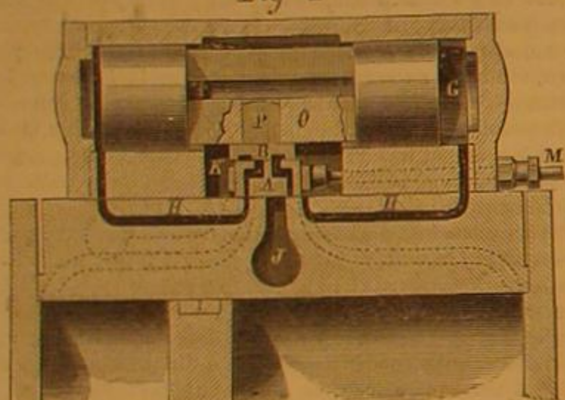
The purpose of the auxiliary valve is to obviate the necessity of an eccentric and fly wheel to actuate the principal valve, as the latter arrangement is liable during a slow motion of the pump (such as is needed in boiler feeding) to stop in the center.



THE SELDEN STEAM PUMP.

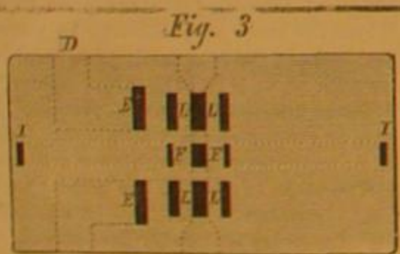
In the Selden pump, as in many other steam pumps now in market, the auxiliary valve admits steam to a cylinder containing a piston which actuates the principal valve, but it does this in a peculiar manner, claimed to possess important advantages over that employed in other pumps.

Fig 2



In Fig. 2—a vertical and longitudinal section through the main cylinder and auxiliary cylinder—the steam passages are shown; and in connection with Fig. 3, which is a plan of the valve seat, the course of the steam through the passages, and the action of the valves, may be easily traced. Steam is

Fig. 3



admitted to the steam chest, K, through the pipe connections, D, Fig. 3, extending, as shown in dotted outline, to the ports, E. Only one of these admissions is employed, but we hardly need to say that the supplying of one on each side is a convenience in setting these pumps in the variety of situations in which they are required to work.

This connection of steam pipes to the cylinder, of instead the top of the steam chest, is also a great convenience in another respect, as thereby the valves may be reached without disconnecting the pipes.

The middle series, F, of ports, are those covered and opened by the auxiliary valve, A. The outer ones of the series are the induction ports of the auxiliary cylinder, G, which cylinder is placed on the top of the principal cylinder, as shown in Figs. 1 and 2. The dotted outlines extending from the two induction ports of the series, F, show the course of the passages, H, Fig. 2; the ports, I, Fig. 3, being the openings of the passages, H, into the auxiliary cylinder. The middle port of the series is the exhaust port (shown in dotted outlines in Fig. 2), which opens into an exhaust passage, J, Fig. 2, this being the common exhaust passage for both valves.

The two exterior series, L, of ports, Fig. 3, are those covered and uncovered by the main valve, B, the outside ones being induction ports of the main cylinder, and the middle ones, the exhaust ports.

The piston in the main cylinder having made its stroke, causes the button on the piston rod to tilt the rock bar. This, through the rod, M, Fig. 2, opens the proper induction port of the auxiliary cylinder, and, admitting steam thereto, causes the duplex piston to make its stroke. In so doing, the rod, O, which connects the two piston heads, and which is also connected with the principal valve by the lug, P, moves the latter, and allows the principal cylinder to exhaust on one side of its piston, and fill on the other, thus rendering the action of the pump continuous, no matter how slowly it may move, and rendering the closure of the throttle valve the only means by which it can be stopped.

The auxiliary valve is caused to cushion by cutting off the exhaust in a very ingenious manner, not shown in the engraving, so that there is total absence of any shock in its working.

The piston in the auxiliary cylinder is fitted loosely, and consequently not liable to be fixed by corrosion of the metal.

The wearing surfaces being flat are easy of adjustment, and the compactness, simplicity, and small number of parts are conspicuous features. There is employed no construction unfamiliar to engineers, and hence repairs can be made or parts substituted in any machine shop most convenient.

The water cylinder or pump proper is double-acting, fitted with composition heads, and rings adjustable by screws or with leather rings or patent wood packing. The water valves are placed above and as near as possible to the cylinder so as to displace nearly all the water at each stroke of the piston, thus insuring uniformity of action throughout the stroke, and preventing the jar or concussion in the valve motion so common in this class of pumps.

The valve rods are composition, and the valves either rubbar or composition. The latter are easily accessible and can be removed by taking off two nuts, only a few minutes being required to clear out the valve chest and replace them.

Patented Dec. 20, 1970, by Wm. C. Selden, and assigned to Adam Carr, whom address, for further information, 43 Cortlandt street, New York.

Ammonia as a Motor.

Several months ago we described the operation, at New Orleans, La., of a street car, propelled by ammonia. The mechanism, we believe, was found on trial to require rearrangement, and, the necessary changes having been made, now operates, it is said, to better advantage than before.

Liquified ammonia, when subjected to a heat of sixty degrees Fahrenheit, turns to a vapor which produces a pressure of sixty pounds to the square inch. This pressure is applied like steam and is subject to the same controlling influences. When intended to be used for the purpose of propulsion, the ammonia is poured into a system of tubes deposited in a tank of water in such a way that the gas which passes through the cylinder, instead of escaping into the open air may be carried through the exhaust pipe, and be absorbed by the water. In this manner the ammoniated water is preserved, and being redistilled, is capable of being used over again several thousand times, wearing out only at the rate of twenty-five per cent per annum. The gas is so readily absorbed by the water that it prevents any disagreeable smell or noise of concussion with the air. At the end of each trip the tubes are refilled from a stationary reservoir of liquid ammonia, and during the journey the heat lost by the tubes is acquired by the water in the tank, which re-imparts it, and prevents the ammonia from falling below the boiling temperature. The report of the Examining Committee, headed by General Beauregard, approves of the invention in terms which are too indefinite to be conclusive.

BAER'S DOOR FASTENER.

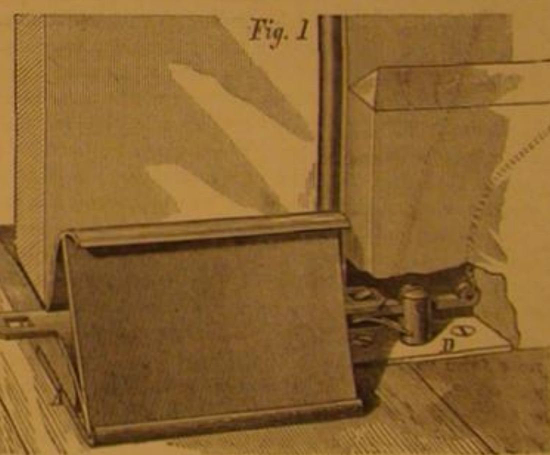
A great many devices, calculated to supply the deficiencies of ordinary door locks, have been invented, many of which have enjoyed a fair share of popularity, and met with satisfactory sale. Our engravings, this week, illustrate another claimant for popular favor in this field, which is so simple as not to require an extended description, and which, from its great strength, must fasten a door very securely.

This fastener is intended as a permanent fixture for doors, and not to be carried about in the pocket, as many inventions of this kind are. The construction of its parts is shown in Fig. 2, and its use in Fig 1. A, Figs. 1 and 2, is a flat plate with its edge recurved, which is screwed to the floor as shown in Fig. 1, its straight edge being inserted under the door sill, as shown, and its recurved edge projecting a little way from the edge of the sill.

B is a wedge piece, formed of a metallic plate, shaped as delineated. Projecting laterally from the base of this wedge piece are ears, C, with holes formed therein, as shown. D is a plate bearing a stud, in which is pivoted the spring catch, E. This catch is concealed in the wood, at the bottom of the door casing, as shown in Fig. 1.

The plate, A, having been previously screwed down to the floor, the wedge piece is, when it is desired to fasten the door, slipped in between the recurved edge of A, and the bottom of the door, as shown in Fig. 1. One or the other of the ears, D, is then caught and locked by the spring catch, E, as shown. When so locked, it is impossible for the wedge piece to be slid out of its engagement with the plate, A, by the insertion of a knife blade, or other thin instrument, beneath the door

Fig. 1

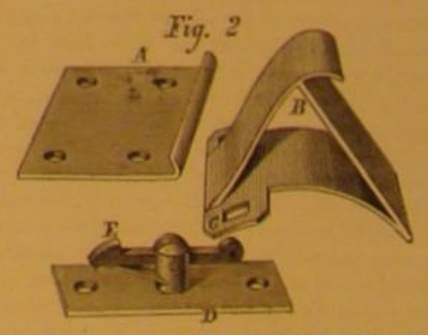


Two ears, C, are formed on the wedge piece to adapt it to use on either right or left hand doors.

To release the wedge piece from the spring catch, a cord or wire, indicated by the dotted lines in Fig. 1, is employed, which cord is passed through the wash board, or behind it, to any distance required, or to a place of concealment.

The inventor, however, claims that the wedge piece is of itself sufficiently secure without the bolt, so that the latter need only be employed by those who wish to make assurance doubly sure.

Fig. 2



This invention was patented May 23, 1871. The whole of the right for the United States will be sold, or rights to manufacture on royalty granted. Address B. F. Baer, patentee, 131 East Lemon street, Lancaster, Pa.

An interesting application of electricity, in connection with a tank for supplying locomotives with water, is now in operation at Buda Station, on the Chicago, Burlington and Quincy Railroad. The steam pump which supplies the tank is on the bank of a small stream half a mile distant, and entirely out of sight. A float is arranged so that if the water be drawn off to a level more than two or three inches below the top of the tank a circuit, connecting by wires with the pump house, is closed. This sets an alarm bell ringing within hearing of the engineer, who then starts his pump, and runs it till the tank is full, of which due notice is given by the cessation of the alarm.

Scientific American.

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NEW YORK, SATURDAY, JULY 29, 1871.

Contents:

(Illustrated articles are marked with an asterisk.)

THE SPECTROSCOPE AND ITS APPLICATIONS.

If our readers will turn to their files of the SCIENTIFIC AMERICAN, they will find the first mention of the spectroscope in July, 1861, on the occasion of the narration of the wonderful discoveries of Bunsen and Kirchhoff. The discovery was like the return to the sky of a forgotten meteor, vastly more brilliant than on its previous visit, and this time in such splendor as to dazzle all eyes, and at once to command and fix the attention of observers. The principles involved in Bunsen's application of the spectroscope were not new. Newton, Wollaston, Frauenhofer, Herschel, and Draper had previously discovered and explained them, but the philosophic way in which he and his colleagues turned to practical use the discoveries of his predecessors was what astonished the world, and opened up a new field of investigation. We have never seen a history of the course of reasoning that must have led Bunsen into the path which ultimately conducted him to such brilliant results, but we have our own theories on the subject, and propose to give them in this connection. In the summer of 1859 we spent some weeks in Heidelberg, and were frequently the guests of Bunsen and constant visitors to his laboratory. He was at that time engaged upon two researches in which light played the principal part.

His pupil Roscoe, now well known as the distinguished professor at Manchester, and the author of the best treatise on the spectroscope that we possess, was intrusted with one branch of investigation, namely the study, in some measure, of the actinic force of light, while the other branch, namely, flame reactions, seemed to chiefly occupy Bunsen's own attention. Roscoe has since published the results of his experiments in several important papers. Bunsen's flame reactions have been also given to the world, but being less startling than the spectroscope, have attracted less attention, although entitled to the highest consideration on the part of chemists. During our visits to the laboratory, Bunsen was full of this subject of the detection of various substances by the color of their light when viewed through different media, by the absorption of their rays in wedge shaped bottles, and by a great variety of ingenious contrivances, enabling him to analyze many minerals in a few minutes. It is well known that Bunsen always had a fondness for physics and an unusual knowledge of this branch of science. The chair occupied by him, however, was chemistry, and his special attention was confined to the students in the laboratory. At the university was a young professor of physics, a great favorite and the constant companion of Bunsen. This was Kirchhoff. These two men were every day to be seen in each other's society, taking long walks or discussing some knotty points of science, and nothing would have been more natural than for Bunsen to speak of his attempt to detect substances by the color of their flames, and than that the use of the prism should have been suggested in the course of the conversation. It requires no stretch of the imagination to picture to ourselves Kirchhoff examining substances by prismatic analysis at Bunsen's instigation. And once entered upon this line of research, the young professor was sure to attain the results that have since made him so celebrated. Bunsen, in his capacity of director of the mineral springs of Darmstadt, had occasion to examine various waters, and, as he was subjecting everything he could lay his hands upon to the new test, he fortunately took up some of the residues of the Durkheim spring, and thus it was that he found the new lines and hit upon the discovery of the new elements cæsium and rubidium.

Our business called us again to Heidelberg in 1862; and in the meantime the discovery, the dawn of which we unconsciously saw in 1859, had been made and published to the world. Kirchhoff had left terrestrial matters to his great master Bunsen, and had pointed the tubes of the instrument to the sun, and had given us the chart of the solar spectrum, and had established a new line of research in celestial chemistry. Bunsen took us at once into his dark room to exhibit the instrument called the spectroscope, and there pointed out the lines produced by the old and new elements when the flame of his burner was lighted by them. Kirchhoff showed us the coincidence of the lines in the sun with those produced by burning metals, and the grand discovery was complete.

Ten years have elapsed since the publication of the first paper in Poggendorff's *Annalen*, and since that time every year—we might say almost every month—has witnessed some new and unexpected application of the spectroscope to astronomical research or to the arts. On the occasion of the last total eclipse of the sun, the instrument mostly in demand and from which the chief service was expected, was the spectroscope. It revealed to the observers the nature of the corona, of the photosphere, of the sun flames, and was of the utmost importance in determining many hidden mysteries connected with this phenomenon. Having in a measure determined the nature of the atmosphere of the sun, of the moon, and of many planets, and helped us on the way to a clear understanding of the true character of the *aurora borealis*, we are startled by the announcement that the spectroscope can be used to measure the velocity of approach or recession in luminous bodies moving with great rapidity. We can detect and measure the movement of the stars commonly called fixed, by this delicate instrument.

It has been observed that if a luminous object approach with great velocity, the position of the image of the slit will be removed towards the violet end of the spectrum; if the body recede, the change of position is towards the red. If, therefore, we know the direction and rate of movement of the object, in order to establish a ratio between its rate and the amount of displacement observed in the image of the slit, we shall be able to measure or estimate the velocity of the moving body, by knowing what position the line or lines of its spectrum occupy when the body is at rest, and observing the position they occupy when in motion. This requires considerable knowledge of the heavenly bodies; and such knowledge is already possessed of the sun, and upon this orb the first experiments can be made.

The further applications of the spectroscope, to the detection of adulterations, to the study of physiology, to the manufacture of steel, to chemical analysis, to determine the intensity of aniline colors, have been noted in our journal.

They are a small part of what appears destined to grow out of this line of research, and it is safe to predict for the spectroscope, uses as great as has been made of the telescope and microscope.

THE ERIE CANAL NAVIGATION PROBLEM.

As might be expected, our table is deluged weekly with correspondence upon this topic. Most of these seek information, some contain suggestions of more or less value, others indulge in general remarks of little value or pertinence.

One correspondent makes the suggestion that the Commissioners should delay as little as possible in their action, as the conditions of the law entail necessarily considerable expense upon competitors, and this expense would, in many cases, result in serious embarrassment to inventors obliged to incur indebtedness in order to meet it.

Another suggestion is, that boats should not be made to suit propellers, but that propellers be made to suit the thousands of boats already in use. We have already shown that no propeller, no matter how powerful, could propel boats of the present model three miles per hour, without damage to the canal banks; and that, if this speed is to be secured, either the construction of boats, or the canal, or both, must be modified.

Boats are now made as large as they can be got through the locks. They draw water to within one foot of the bottom of the canal; and we are well informed that many of them are, or have been, allowed to be loaded to within six inches of the bottom. The new law requires that the boats shall carry loads requiring six feet draft, and that the speed of at least three miles shall be obtained. We have the opinion of an experimental boat builder, that the terms of the law are incompatible with each other. The arguments in support of this view have certainly much force. They may be summarized as follows:

The boats, to carry the loads required, must necessarily, as above stated, run very near the bottom. If the water be displaced, in order to avoid side swells, through under the bottom of the boat—which some devices are intended by their inventors to do, and which it is maintained is the only way to obviate side washing with blunt prowed boats—the water would be necessarily forced through this narrow space at a minimum speed of eighteen miles per hour, and when boats are loaded to within six inches of the bottom, the velocity of underflow would reach thirty-six miles per hour. These velocities are regarded as practically unattainable. The law in fixing the load at two hundred tuns, has virtually precluded a sharp prow and light draft.

Others, again, maintain that a boat may be towed from the bank at even higher speed than that required by law, without injury to the banks. A Brooklyn correspondent calls attention to the fact that the large bluff bowed lighters, when towed by the sharp prowed steam tugs that ply on our rivers, make scarcely any side swells in comparison to those caused by the tugs. He argues from this that although the swells of a propeller or side-wheel steamer seem to proceed from the bow of the vessel, they are in some way connected with the screw or paddle wheel, since the same speed attained by towing will not generate such swells. He attributes the swells to the generation of an undertow by the wheel or screw, the swell proceeding in reality from some point far in advance of the boat.

It is to be regretted that the Commissioners remain so long inactive, or at least silent, upon this subject. Judging from the tone of our correspondence, there will, or might, be a very lively competition for the large prize offered, were the course the Commissioners are likely to pursue fully announced and satisfactory to inventors at large.

Since writing the above we are informed that the Commissioners have had a meeting and organized, but adjourned without fixing upon any course of procedure upon the part of applicants. As soon as this is publicly announced, we shall publish it.

The Chairman of the Commission is Gen. Geo. B. McClellan, Dock Department, 348 Broadway, New York.

OUR CORRESPONDENCE.

We are grateful to our correspondents for their many favors. Their contributions upon practical subjects form one of the most valuable features of our paper. Our answers to queries, which are in large measure furnished by them, contain much useful information, and are doubtless perused with as much interest as any other department. Longer and more important papers published under the heading "Correspondence" appear also each week, and serve an important purpose in arousing thought and eliciting discussion. Never have these two departments been in a more prosperous condition than at present, yet we assure all who have anything practical or useful to communicate that there is still room for them. Whoever addresses the readers of the SCIENTIFIC AMERICAN speaks to a large and appreciative audience.

With the increase of correspondence, however, there is an increase of editorial labor, and it is with a view to save ourselves unnecessary addition to our already arduous duties that we have sat down to have a plain familiar talk with our correspondents.

It is not necessarily an indication that we regard a contribution inferior when we decline to publish it. There are many reasons why we may not wish to print a manuscript in itself interesting and well written. All communications addressed to this office, of whatever character, are carefully read and considered. If intended for publication, they may be rejected for one or other of the following reasons, namely: The subjects treated have been so fully discussed as to exclude them from further immediate attention. The topics treated may be foreign to the scope of our paper. The tone of articles may be offensive and vituperative. Articles may be so long as not to find available space, and yet of a kind which does not permit condensation. Other already accepted articles upon the same subject may preclude the acceptance of some excellent manuscripts. Articles containing nothing but speculative discussions will in general be excluded, as will also articles purporting to give practical information of a character too familiar to render its publication profitable. Articles the aim of which is to advertise the business of the writer, or the business of some person known to the writer, will be rejected, or, if accepted, will be pruned of objectionable features; and, in general, all articles treating of subjects which we think would, if discussed, be unacceptable to our readers at large, will be refused.

There may be other reasons for the refusal of manuscripts not enumerated, though we have named the chief. We have also a word to say as to the manner of writing.

There are many inconveniences to printers arising from writing on both sides of the paper. Communications intended for printing should therefore be written on one side of the paper only, and a wide margin should be left for typographical corrections.

Names of persons and places should be much more plainly written than ordinary words, as the context gives no clue to their orthography.

No anonymous communications should be sent. If correspondents do not wish their names to appear, a note to that effect should accompany the manuscript over their own signature, and the name or initials they wish appended should be stated.

Any remarks not intended for publication should be written on a slip by themselves, not on the manuscript.

If our correspondents will observe these simple rules, they will save us much inconvenience.

If it be desired to have manuscript returned if not accepted, stamps to prepay postage should be enclosed.

We publish in another column a list of manuscripts rejected within a reasonable time after their receipt.

We would suggest to querists that as some of their inquiries call out a certain class of advertising, they will often find information sought in our advertising columns; and we would respectfully suggest to those who seek to make use of our column of replies to advertise their business, that the proper place for them to do so is in that part of the paper devoted to advertising.

Architectural Engravings.

We commence, this week, the publication of a series of architectural engravings, obtained from the publisher of the London *Builder*, a periodical devoted to architecture and art, and which, in size and character of its illustrations, stands unrivaled by any other publication of its class printed in the English language. Of the high artistic merit of the illustrations to follow, the one presented this week is a fair sample. We believe that this series of illustrations will be studied with much interest and profit by architects and persons of artistic tastes.

TO DRAIN LAND in level places, sink a well down to the first porous stratum. The water from the upper soil will flow readily into the well, especially if drain pipes or tiles be laid in its direction.

SCIENTIFIC INTELLIGENCE.

APPLICATION OF AIR BLASTS IN THE ARTS.

The necessity of oxygen for combustion has been known for nearly a hundred years, and all iron furnaces are provided with a powerful blast, but the application of the same principle to other operations, not being so obvious, has hitherto escaped attention. In recent times, however, we note the adaptation of air blasts to several important processes, particularly in wine making and bleaching paper pulp. If wine be left to itself, it requires months and sometimes years for the nitrogenous constituents of the must, the albumen, gluten, etc., to be removed by the slow process of oxidation. M. d'Heureuse has found that this waste of time can be avoided by blowing rapid currents of air through the must, and thus accomplishing in a few hours what under the old system required as many months. If the operation be carried too far, there may be some danger of carrying the grape juice through the first fermentation into the formation of vinegar, and it is quite worth investigating whether, in this way, acetic acid could not be rapidly and economically manufactured. Another ingenious application of the air blast was mentioned on page 25, current volume, where we gave an account of an invention made by John Campbell, of Chatham, N. Y., for bleaching paper stock by aid of a blower or powerful current of air. It seems to be pretty thoroughly established that it is the liberated oxygen of the chloride of lime that accomplishes the bleaching, and not the chlorine, and hence, if an extraordinary supply of oxygen be forced into the bleaching vat, it stands to reason that the operation will be greatly facilitated. Whether ozone is actually generated in this way remains to be proved, but without the necessity of calling in the theory of ozone to explain the reaction, the practical result is certainly to bleach any stock in much less time, and with one third the amount of chloride of lime. We incline to the belief that powerful blasts of air could be advantageously employed in the precipitation of water for drinking purposes, in the refining of sugar and sirup, in bleaching all kinds of goods as well as paper stock, in the treatment of wine to promote fermentation, and in general, for all purposes where an extraordinary supply of oxygen gas is deemed to be necessary. We throw out these hints for the benefit of inventors, and may give the subject a more thorough examination in a future article.

THE HEAVENS FROM A SOUTHERN POINT OF VIEW.

Our readers are probably aware that some time since Dr. B. A. Gould was appointed director of the Cordoba Observatory. We now learn, from a letter to the editor of the *American Journal of Science and Arts*, that this distinguished astronomer has reached his destination, and has already commenced the labor of mapping the stars of the Southern hemisphere, that is, the preparation of a catalogue of all stars between the South Pole and 10° north declination. The sky of Cordoba possesses a wonderful transparency, and exhibits to the trained eyes of Dr. Gould and his assistants, an almost incredible number of faint stars, probably at least twice as many as can be seen in the most favorable nights at the north. For example, they find in *Orion* twice as many stars as are given by Argelander in his chart, and in *Canis Major*, they define 200 stars, while Argelander saw but 39. Our knowledge of Southern constellations is limited, and much of the Southern sky is utterly unknown to us, so that Dr. Gould has a field of research comprehensive enough to satisfy the most devoted astronomer. After so long a period of inaction, a new day seems dawning for stellar astronomy in the Southern hemisphere.

THE *Gardener's Chronicle* (England) publishes more recent intelligence of Dr. Hooker and his party under date "Camp, Atlas Mountains, May 19th." They had succeeded in reaching the top of the crest of the Atlas, nearly due south of Morocco, at an altitude of about 11,500 feet, the upper 3,000 feet of which were very steep indeed, very rocky and stony, with a good deal of snow, and the temperature 24° Fah. The flora of this upper region appears to be excessively poor: they did not find a single really Alpine plant, "and few plants of any kind; no gentians, primroses, anemones, ranunculi, or other types of an Alpine flora. The rocks were chiefly a very hard porphyry, red, black and gray, with granite here and there, and beds of limestone, all hard and obnoxious to plants. Moreover, these steep upper cliffs of the Atlas are alternately roasted by a blazing sun, or parched by a Sahara sirocco, or swept by moist northwest Atlantic gales, which bring heavy snow storms such as we experienced, probably throughout the year. The flora, up to 7,000 feet, on the contrary, is exceedingly rich, varied, and beautiful;" and Dr. Hooker thinks that their collections will prove of very great interest and considerable extent. Many English plants find their southern limits here, and there is an abundance of roses, bramble, elder, honeysuckle, ivy, ash, poplar, etc.

CINCINNATI INDUSTRIAL EXPOSITION.—The exposition for this year will open on September 6, and continue to October 7, inclusive. Preparations are being made for an exhibition of inventions, products, manufactures and works of art of every class and of the most varied attractions; and the show will doubtless draw thousands of visitors to Cincinnati, a city which, as a manufacturing and commercial center, stands high among the cities of the world. A. T. Goshorn, of the Cincinnati Board of Trade, is the President, and H. McCollum, of the Ohio Mechanics' Institute, the Secretary; and these gentlemen have, united with them, other prominent and well known members of both these bodies, and of the Cincinnati Chamber of Commerce. Thus the venture starts well, and under the most favorable auspices, and we wish it every success.

ALABAMA AGRICULTURAL AND MECHANICAL FAIR.—The Alabama Agricultural and Mechanical Association has forwarded us the list of premiums to be awarded to exhibitors at the fair to be held at Montgomery on October 16, 17, 18, 19 and 20 of the present year. The premiums amount to $20,000, and are to be awarded for growing crops, samples of field crops, samples of sugar, cotton, and other produce; agricultural implements, machinery, works of art, domestic utensils, needle work, fruits, flowers, vegetables, cattle, horses, minerals and metals. The Secretary of the Association is Mr. Hal. T. Walker, Montgomery, Ala.

BLACKBERRY WINE.—Our numerous lady readers may find the following recipe acceptable: Crush the berries with a wooden pestle in a wooden tub or bucket; draw off all the juice, and add to it an equal quantity of water, and two pounds of refined sugar for each gallon of the mixture. Keep it in jars till the fermentation is complete, and then bottle and cork it up. A second fermentation will take place in the ensuing spring, during which another pound of sugar should be added to each gallon. The wine thus prepared will keep well, and improve by age.

Examples for the Ladies.

Delia A. Eply, Buren Springs, Mich., has used her Wheeler & Wilson Machine 7 years without repairs; earned, making cloth garments, in 1869, $785; in 1870, $587·65, besides doing the family sewing for four persons; has used one needle over a year on heavy work.

"Geo. P. Rowell & Co., 40 Park Row, New York, Advertising Agents, is a model business house. They give more for the money than any other house in the world."—*City Item, Phila.*

"Whitcomb's Remedy for Asthma enabled my wife to sleep quietly."—*Kimball Hadley, Wardsboro', Vt.*

Business and Personal.

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

Manufacturers of Furniture—I want to buy full stock. Send price lists to T. T. Edmunds, Columbus, Georgia.

The paper that meets the eye of manufacturers throughout the United States—Boston Bulletin, $4 00 a year. Advertisements 17c. a line.

For best Lubricating Oil, Chard & Howe, 134 Maiden Lane, N.Y.

Copper and Brass Seamless Tubes (from 3-8 to 5 in. outside diameter. Merchant & Co., 507 Market st., Philadelphia.

Wanted to purchase, an established business, or an interest in a business. Chemical or manufacturing preferred. Address, by letter, F. C. Beach, 260 Broadway, cor. Warren st., New York city.

The Eccentric Elliptic Geared Power Presses are the best in the world. For Circulars, address Ivens & Brooke, Trenton, N. J.

$50,000 can be made from Abbe's Patent Bolt Forging Machine in a short time. Best designed in United States. Investigate. Patent for sale. Address John R. Abbe, 110 John st., Providence, R. I.

Wanted.—A first class Mechanical Draftsman; one experienced in wood-working machinery preferred. Address E. Lyon, 70 Grand st., New York.

Two 80 H. Engines, with Boilers, Esler & Co.'s make; good order; ½ cost new. Andrews & Bro., 414 Water st., New York.

The Baxter Steam Engine will not explode.

To Cotton Pressers, Storage Men, and Freighters.—35-horse Engine and Boiler, with two Hydraulic Cotton Presses, each capable of pressing 35 bales an hour. Machinery first class. Price extremely low. Wm. D. Andrews & Bro., 414 Water st. New York.

Mining, Wrecking, Pumping, Drainage, or Irrigating Machinery, for sale or rent. See advertisement, Andrew's Patent, inside page.

Bliss & Williams, successors to Mays & Bliss, 118 to 122 Plymouth st., Brooklyn, manufacture Presses and Dies. Send for Catalogue.

The Bucket-Plunger Steam Pump discharges at both strokes, with only two water valves. Valley Machine Co., Easthampton, Mass.

Lord's Boiler Powder is only 15 cts. per pound by the bbl., and guaranteed to remove any scale that forms in steam boilers. Our Circular with terms and references, will satisfy all. Geo. W. Lord, 107 W. Girard ave., Philadelphia, Pa.

Improved mode of Graining Wood, pat. July 5,'70, by J. J. Callow, Cleveland, O. See illustrated S. A., Dec. 17,'70. Send stamp for circular.

The Baxter Steam Engine pays no extra insurance.

Steam Watch Case Manufactory, J. C. Dueber, Cincinnati, Ohio. Every style of case on hand, and made to special order.

L. & J. W. Feuchtwanger, Chemists, 55 Cedar st., New York, manufacturers of Silicates of Soda and Potash, and Soluble Glass.

For Hydraulic Jacks, Punches, or Presses, write for circular to E. Lyon, 470 Grand st., New York.

Belting that is Belting.—Always send for the Best Philadelphia Oak-Tanned, to C. W. Arny, Manufacturer, 301 Cherry st., Phil'a.

Copper and Brass Seamless Tubes (from 3-8 to 5 in. outside diameter). Merchant & Co., 507 Market st., Philadelphia.

Send your address to Howard & Co., No. 865 Broadway, New York, and by return mail you will receive their Descriptive Price List of Waltham Watches. All prices reduced since February 1st.

The best engine and hand lathes for foot or power. Also, punching and stamping presses, small machinery, models, etc., built by J. Dane, Jr., 61 and 63 Hamilton street, Newark, N. J. Small steam engines and machinists tools for sale, new and second hand.

Dealers in mill machinery, please send address to S. H. Soule, Binghamton, N. Y.

A first class pattern maker wanted, one capable of designing preferred. Moderate wages, but steady employment. Address Exeter Machine Works, Exeter, N. H.

Railway Turn Tables—Greenleaf's Patent. Drawings sent on application. Greenleaf Machine Works, Indianapolis, Ind.

Fitts' "Patent Chronometer Governor Valves" are manufactured by the Union Water Meter Co., Worcester, Mass.

Wanted—A thoroughly competent and practical draftsman None others need apply. American preferred. The Watson Manufacturing Co., Paterson N. J. opposite Depot.

d'Heureuse's Patent Air Treatment in the quick, cheap, and perfect manufacture of wine, cider, spirits, sugar, oils, etc. Rights for sale. For particulars, apply to R. d'Heureuse, P. O. Box 6,844 New York.

Notice to Inventors.—J. R. Gilchrist, Mt. Pleasant, Iowa, has facilities for casting, finishing, and plating copper, brass, zinc, etc., and would buy a good invention or manufacture for others. Samples of his celebrated Lightning Rod Points sent to the trade free.

Sell your patents for the Pacific coast through Wiester & Co., 17 New Montgomery street, San Francisco, Cal.

A comprehensive catalogue of choice seeds, fancy fowls, pigs, etc. Address Geo. A. Dietz, Chambersburg, Pa.

The Baxter Steam Engine Co., 18 Park Place, New York, have the most economical engine. Sizes 2 to 10 H. P. Send for Circular.

Having invented a practical Gunpowder Engine, I desire the coöperation of some person with capital to inaugurate successful aerial navigation. Address Joseph S. Foster, Salem, Mass.

A water power, 25 feet fall, with job shop and saw mill. Also a 4½x12 stationary engine, with flue boiler. For sale cheap. Address G. B. Keeler, Port Chester, N. Y.

The Baxter Steam Engine is made like the Waltham Watch, each part duplicated.

Brown's Coalyard Quarry & Contractors' Apparatus for hoisting and conveying material by iron cable. W. D. Andrews & Bro, 414 Water st., N. Y.

Improved Foot Lathes, Hand Planers, etc. Many a reader of this paper has one of them. Selling in all parts of the country, Canada Europe, etc. Catalogue free. N. H. Baldwin, Laconia, N. H.

Presses, Dies, and Tinners' Tools. Conor & Mays, late Mays & Bliss, 4 to 8 Water st., opposite Fulton Ferry, Brooklyn, N. Y.

Cold Rolled-Shafting, piston rods, pump rods, Collins pat. double compression couplings, manufactured by Jones & Laughlins, Pittsburgh, Pa.

The Baxter Steam Engine is "the perfection of motive power."

For Solid Wrought-iron Beams, etc., see advertisement. Address Union Iron Mills, Pittsburgh, Pa., for lithograph, etc.

Peck's Patent Drop Press. For circulars address the sole manufacturers, Milo, Peck & Co., New Haven, Ct.

Dickinson's Patent Shaped Diamond Carbon Points and Adjustable Holder for dressing emery wheels, grindstones, etc. See Scientific American, July 24 and Nov. 20, 1869. 64 Nassau st., New York.

The Baxter Steam Engine is manufactured by Colt's Arms Co., Hartford, Ct., and sold by the B. S. E. Co., 18 Park Place, New York.

To Ascertain where there will be a demand for new machinery or manufacturers' supplies read Boston Commercial Bulletin's Manufacturing News of the United States. Terms $1 00 a year.

Answers to Correspondents.

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

ALL reference to back numbers must be by volume and page.

CHEAP BATTERY.—The cheapest and most efficient battery I can recommend to T. G. B. may be constructed as follows: For a cell use a large glass tumbler. Get a sheet of zinc (a thick plate if possible) almost as wide as the tumbler, and long enough to reach to within an inch of its its bottom, and a strip of sheet copper, somewhat narrower than the zinc plate, but twice as long. Take a strip of hard, well dried wood, about ½ inch wide, and long enough to extend across the top of the tumbler, and having made a sufficiently large mortise through its center, into it fasten the zinc plate, by wooden wedges. Next, bend a copper strip into the form of a U, having the legs ½ inch apart, and fasten this upon the wooden strips so as to enclose the zinc without touching it. The whole system thus formed will sit firmly in the tumbler. To charge the battery, fill the cell nearly full of a saturated solution of bichromate of potash, and then add dilute sulphuric acid until a slight effervescence takes place. The zinc plate should be amalgamated. This battery works with remarkable vigor, being superior to Smee's or Daniell's, although not so constant as the latter. For further security the wooden strips should be varnished, and of course, terminal wires must be soldered, one to the copper plate, and the other to the zinc. For the telegraphing apparatus an electromagnet and a key are required. An electromagnet is but a bar of soft iron wound with insulated copper wire, the winding being at all parts in the same direction. This may best be understood by taking a straight bar, and commencing at one end and winding it throughout the whole length and back again; but as it is not convenient to bend the bar after being wound, it is first bent into the form of the letter U, and wound afterwards. A small bar of soft iron is to be fixed by a spring at a little distance from the free ends of the electromagnet, and capable of motion such that when the magnet is excited, the bar may be brought into contact with its ends, and thus make a "click," while the spring may carry it back when the magnet loses its charge. The key may consist of a metallic spring, having one end fastened upon a board in such a manner that when at rest the other end may be elevated about ½ inch. Under the free end is a metal button, or merely a piece of wire so placed that the spring may be brought into contact with it by pressing its free end down. These things being arranged, the connections are made as follows: By a copper wire, connect the zinc plate with the fixed end of the spring in the key; connect the button with one extremity of the electromagnetic coil; and connect the other extremity of the coil with the copper plate. Then, whenever the spring in the key is pressed down, connection is complete between the coil and the battery, the magnet becomes charged, and the armature or small iron bar is drawn into contact, making a sharp "click;" when the spring is suffered to rise, contact and hence metallic connection is broken, the magnet loses its power, and the armature is carried back by its spring attachment. It will not require the exercise of much ingenuity for J. G. B. to arrange these several portions of the apparatus, in a way best suited for his purpose.—NEMO.

RECOVERING MERCURY FROM OLD BATTERY PLATES.—G. E. will probably find it most easily effected by distillation. Break the plates into pieces, and put them into an iron retort, furnished with a delivery tube. Heat to a temperature of about 1000° Fah., and, upon continuing this heat for some time, the mercury will distil over, and may be collected. If the delivery tube be of considerable length, no other condenser will be needed.—NEMO.

BENZOLE can be separated from the light oil of distilled coal tar by a second distillation. Benzole distils over at a temperature varying from 176° to 190°; below the lesser limit, the lighter oils (rhigoline, chymogen, etc.) pass over; above the higher one, kerosene and others volatilize.—W. E. S. F.

MERCURY.—G. E. can recover his mercury from old battery plates by dissolving them in dilute oil of vitriol (H_2SO_4) and heating the finely divided mercury under water until it unites.—W. E. S. F.

COATING GLASS.—Let C. E. G. wash the demijohn thoroughly, then fill with a dilute solution of nitrate of silver, to which add a strong solution of sugar and let the demijohn stand for 48 hours.—W. E. S. F.

LOCAL LICENSES AND PATENTS.—I wish to inquire if the patentee of any article, or his agent, is obliged to pay town or city license to canvass or introduce the article. If so, how do letters patent relate to town or village ordinances? In this case the license is from $2·00 to $5·00 per day for canvassing, which is rather a heavy addition to expenses for a person of moderate means.—J. Y. D. ANSWER.—Town and county licenses have nothing to do with patents. Hackers, and persons who go about to sell vegetables, household goods, and other articles must procure a local license. The grant of a patent does not exempt any one from the operation of local laws. If you become a vender of any article, whether patented or not, you must obtain a license.

ROACHES.—About twenty-five years ago I occupied a house in Brooklyn, N. Y., that was much infested with roaches. So numerous were they that having a door cut through the partition between the kitchen and dining room, the workman said that he took a peck of roaches from between the base boards in the space thus opened. A short time afterwards, the roaches entirely disappeared, and never returned during the time we occupied the premises (nine years), but mice made their appearance before we had missed the roaches. I thought at the time that the mice drove them out, and had determined to try the experiment, but no opportunity has ever offered since, so I send you this that others may try it if they see fit.—H. W.

CRUDE TARTAR.—The chief impurity in crude tartar is the tartrate of lime. The process for purifying the tartar is founded upon its greater solubility in hot than in cold water. Pulverize the tartar, and boil it with water in a large boiler, until the solution is saturated. Cool it, when the tartar will deposit, in an almost colorless crystalline layer. Remove this layer and repeat the operation, when a tolerably good article will result. To remove all color, add in the second boiling about eight per cent pipe clay, and evaporate almost to dryness.—W. E. S. F.

TURBINES.—In answer to J. C. W.'s query about turbines, I would say: if a draft tube is to be used, his is the best way, as a larger tube can be employed (thus reducing the friction) without danger of the air not being washed out. Likewise, if there be any deficiency in the tube, it will show itself, and the reaction will be more complete, as no squirting of the water can take place. The subject is a difficult one. I propose to give a few thoughts, first on theory, and then on practice. Suppose you take a piece of chalk, draw a square inch on one side of your hand; it is hard to make you believe that there is a pressure of 15 pounds upon it. But draw another square inch on the side exactly opposite to it; the one pressure balances the other, and they are to you insensible. But put one of the squares on the mouth of a tube and exhaust the air, and you will very soon feel the pressure. Now, suppose you build a penstock 30 feet deep from bottom to top of fall, and put a turbine wheel, 15 feet from each end, on a water and air tight floor; the air pressure on the top water will be 15 pounds on the square inch. Now, suppose you keep the water out, and exhaust the air column on top of wheel; the tail water column of air will force the water up through the wheel, driving it backwards till the water column reaches the top, when it will balance the air column, and motion will cease. Again, suppose you exhaust the air below the wheel; the air column on tail water will force up a column of water to wheel, weighing 7 pounds per square inch, and pressing against the wheel with a pressure of 8 pounds per square inch. This is met by the descending water, pressing 7 pounds to the inch, and upper air column of 15 pounds, making 22 pounds of pressure above the wheel, and 8 pounds below, leaving an effective pressure of 14 pounds per inch, which, after all, is the weight of a water column 30 feet high. It will be seen from this that nothing is gained or lost, either by suspending or immersing the wheel, if the penstock be built from bottom to top of fall (and the penstock ought to be, in its horizontal area, 100 times greater than all the discharging areas of the wheel added together, thus reducing lost motion in the penstock to 1 per cent.) But if, on the other hand, the penstock be built only from the wheel up, and a small rough, cast iron pipe for draft tube to tail water be used, the theoretical 7 pound pressure of the lower water column will be reduced to perhaps 5 pounds of effective pressure against its ever present active and frictionless enemy, the 15 pound air column on the tail water, and the effective power of fall will be reduced from 30 to 26 feet.—J. W. H., of Del.

BELTS.—One of your correspondents wants to know how it is that his belt runs to the high side of the pulley; another answers, because it is tighter. Allow me to state that a belt no more than anything or anybody else wants to get in a tight place, but is forced there by circumstances over which it has no control. When a pulley has a high side, the angle of its face is always greater or less than 90° to the plane of rotation, while the line of direction of the belt is always in the plane of rotation, or at right angles to the shaft on which it and the pulley is fixed. Suppose you take a pulley 24 inches diameter, 6 inches face, and bore and turn it; cut the edges true. Set your lathe so that it will turn one end of the pulley 23¾ inch, and the other 23½ inch. Put the pulley on the shaft, take a straight edge or line across the edges of pulleys; set it in line with the pulley with which it is to work. Now take a square, and apply it to the face of the tapered pulley. You will see that the lines of the straight edge and square are not exactly parallel. The belt runs in the direction of the straight edge till it strikes the pulley, then it runs in the direction of the square, and becomes bent, and in its efforts to straighten itself runs up or over a little, as the case may be. We were first led to question the orthodox saying that belts always run to the high side, when putting up some cones about 6 feet long, 22 inches diameter at the one end and 11 inches at the other; they were straight cones, placed about 12 feet apart from center to center, broad end of the one turned to the narrow end of the other; when the belts were put on, to our surprise, they tended to run to the high end of the one, and the low end of the other.—J. W. H., of Del.

FIXING PENCIL MARKS.—I have tried various methods for fixing pencil and crayon drawings. The recipe which I send you, I have found the cheapest and least objectionable. It is copied from "Chapman's Drawing Book," page 251. To a saturated solution of alum in pure water, add as much fish glue (isinglass) as may form a size of the proper consistency (which can only be regulated by the character of the drawing for which it is intended). Let the solution stand for about thirty-six hours, after which it should be boiled, and when cold, passed through a linen cloth. Add about an equal quantity of some colorless spirits or diluted alcohol. Put the solution in a dish or wooden tray, and, holding the drawing horizontally, face downward, gently immerse it therein, and almost immediately lift it out, without changing its horizontal position, in which it must remain till dry.—LIZZIE.

CHEAP LAUNDRY.—You will please let me add a few suggestions in reference to a cheap laundry. It seems to me that the principle of spreading clothes on the grass to bleach might be taken advantage of. Every country washerwoman knows that if clothes be thoroughly wet in strong suds, and spread on the grass when it is raining, if it continues to rain for ten or twelve hours, they will be washed almost clean. The clothes, however, are very apt to get stained from the grass. This could be remedied by spreading the clothes on galvanized wire frames, which might, by some simple contrivance, be made to pass under a sprinkling spout.—LIZZIE.

CRACKING OF CASTINGS.—L. A. P. must regulate the cooling of his castings. The trouble is that the rim of his wheel cools long before the hub; then when the hub cools, it shrinks, producing tension on the arms, and proportionate strain on the rim of the wheel. Let him take away the sand above and below the hub, and knock out the core, allowing air all around it, keeping the rim covered in the sand. I have seen pulleys taken out of the sand sound, and upon centering in the lathe, using a wooden block, they would part, usually in the arms. The blow being light and the pulley loose on the face plate, showed that the casting was on a strain.—G. S. K.

ELECTRIC MACHINE.—H. L. C. does not want an electrical machine to be turned by hand to give power to propel his electrical engine. He should use electromagnets in his engine, which will derive their power from a galvanic battery.—M. L. B.

QUARTER TWIST BELT OPENINGS.—Let J. E. D. lay out the centers of his belt holes, as directed in the article with diagrams, on page 85, Vol. XVIII (Feb. 8, 1868), SCIENTIFIC AMERICAN. Since the belt twists 90° in passing from one pulley to the other, it is plain that if the floor were just half way between the centers of two pulleys of equal diameter, the angle of the plane of the belt with the shafts at that point would be 45°, and this would also be very nearly true for pulleys of unequal diameter. It is obvious, also, that the nearer the floor is to one pulley, the nearer parallel with the shaft of that pulley will the belt opening be. Thus, suppose the floor to be 3 feet from the lower pulley, and 9 feet from the upper one; 90° divided by 12 feet (distance between shafts) = 7½° twist to one foot; and 7½ x 3 = 22½° twist. Draw lines through the centers first found, parallel with the shaft nearest the floor, set off the angles thus calculated, and draw the diagonals, which will be the center lines of the belt holes. In wide belts running on a quarter twist, there is, of course, a slight curvature from side to side, but it is hardly necessary to take that condition into the problem. Moreover, J. C. D. will find it economical to run a very wide belt in that manner.—F. H. C. [The diagram referred to will be found in another column.—EDS.

CLOTHING STEAM PIPE.—If B. L. C. will cover his long steam pipe with hair or wool felting, 1½ or 2 inches thick, he will have no trouble with water. The felting is made for the purpose, and sold at supply stores.—P. B.

SETTING BOILER.—If I were A. M., I would not set my boiler as he proposes. I would set it in the usual way, having the grate surface as large as possible, the space under the boiler, behind the bridge wall, 3 feet deep for a combustion chamber (if I used coal), and at the hind end contract the flue, immediately on leaving the boiler, to as small as the stack, and smaller if the stack be over 18 inches square.—P. B.

TO KEEP FLIES FROM HORSES.—I have employed a remedy for the last fifteen years, both for horses and cattle, which I wish could be known to everybody. Procure a bunch of smartweed, and bruise it to cause the juice to exude. Rub the animal thoroughly with the bunch of bruised weed, especially on the legs, neck, and ears. Neither flies or other insects will trouble him for twenty-four hours. The process should be repeated every day. A very convenient way of using it, is to make a strong infusion by boiling the weed in water a few minutes. When cold it can be conveniently applied with a sponge or brush. Smartweed is found growing in every section of the country, usually on wet ground near highways.—E. H. G.

TO KEEP GLUE FROM SOURING.—If a little muriatic acid be put into glue when it is dissolved, ready for use, it will retain the glue in the same condition for a long time. It will neither dry up, nor ferment. Liquid glue is made in this way, and sold in bottles. The use of a small portion of sugar of lead will also prevent fermentation.—E. H. G.

COATING GLASS DEMIJOHN.—I would suggest to C. E. G. the possibility of coating the inside of his demijohn with collodion, afterwards blackleading this, and then, by filling it with solution of sulphate of copper, deposit a lining of metallic copper by the battery. Perhaps a solution of beeswax in spirits of turpentine would be preferable to the collodion.—M. L. B.

SPEEDING PULLEYS.—Proceed as in vulgar fractions, placing the number of revolutions of the prime mover as a numerator of a compound fraction, and the diameter of each of the driving wheels in inches also as numerators, and the diameters of each of the pulleys in inches as denominators (or divisors), and proceed by cancellation.—O. L. L.

RELATIVE POWER USED IN TURNING INSIDE AND OUTSIDE OF CYLINDER.—G. S. R., of Mass., will, I think, see, on reflection, that the difference arises from the impossibility of holding the tool against the inside at the same angle as against the outside. This is owing to the difference between a concave and a convex surface. Moreover, the centrifugal force of the revolving cylinder is in favor of cutting on the outside, and against cutting on the inside.—D. B., of N. Y.

CIRCULAR SAW.—I think if B. L. C. will use flat rings of paper, which will fit the arbor, he can correct the dish of his saw. He should first put them on, then slip on the loose collar, and continue to close until the collar will not come quite up to the saw, (for the collars are turned out hollow, or "dishing"). Turn up the nut tight, and try with a straight edge; if not right yet, use others until the saw is flat. If the saw have bumps or sprung places by overheating, send it immediately to a saw maker for repairs. This fault can be easily detected by a bright place on one side, and a corresponding black one on the other.—W. W. W., of N. Y.

CIRCULAR SAW.—E. A. M. will find by experiment that a thin saw will run easier than a thick one, regardless of the number of teeth, but either will run easier with thirty than sixty teeth.—A. G., of Me.

DISHED CIRCULAR SAW.—If B. L. C. will take his saw from the arbor to a smooth faced anvil, and with the sharp end of a smith's forge hammer, hammer in straight lines, from or near the center to the outer edge, increasing the force of the blows gradually from the center to outside, by taking care not to hammer too much he will have no trouble in trueing his saw.—A. G., of Me.

SPEED OF CIRCULAR SAW.—If T. W. B. will run the cutting edge of his saws 9,000 feet per minute, he will find that a very good rule.—A. G., of Me.

TO KEEP FLIES FROM HORSES.—If your correspondent, F. N. P., will take a sponge saturated with fish oil, and sponge his horse with the same, he will not be bothered with flies. A very simple and effective remedy.—C. D.

BOILER PIT.—E. H. H. could not prevent the water running into his pit by "plastering or pointing" on the inside, for the reason that the adhesion of plaster or point to the walls would not be sufficient to resist the pressure from without. His pit being 6 feet deep, and the earth on the outside being fully saturated, the pressure to be resisted is the same as if his pit walls were but a coffer dam in a simple body of water. And since a column of water 1 inch square and 28 inches high, weighs 1 pound, the pressure at the bottom of his pit is 2·21 pounds to the square inch, or 318·24 pounds to the square foot. The only way in which he can make his pit tight, is to plaster carefully, with good cement, the vertical walls on the outside, and put in a concave bottom, or one of sufficient thickness to resist by its weight the pressure from beneath, which pressure is equal to that upon the sides at the same depth.—S. C., of N. Y.

BITUMINOUS AND ANTHRACITE COAL.—Noticing in your issue of July 8, a query, relative to bituminous and anthracite coals, from G. H. W. (No. 13), as to which was the most economical and best to use, and which injured the boiler most, I will state that after 25 years practical experience as an engineer, and after testing the various kinds of coal in all kinds of boilers, I have come to the conclusion that bituminous coal is the most economical, is less injurious to boilers, and makes steam better than any other coal.—F. H. S., of Conn.

T. G. B. does not need a battery or electromagnet to learn telegraphy; he wants simply a train of gearing (like a clock) to carry two rollers, between and by which his paper is drawn, and a pen lever, whose pen or point will, when brought in contact with the under side of the paper, press it into an annular groove in the upper roller. This pen lever, hung in its middle, may be worked by grasping its outer end in the same manner as a telegraph "key." If H. L. C. or T. G. B. will address me—"Lock Drawer 185, Aurora, Ill.,"—I will be pleased to give him gratis, full information, drawings, etc., which would take too much space in your paper.—M. L. B.

A. H., of Wis.—The mineral you send is iron pyrites—contains no lead or silver. Is of no great value.

J. E. W., of Ark.—There is no known substance through which magnetic attraction will not act.

J. W., of Ind.—If the cooling effect of air blown upon the surface of the body were confined simply to the imparting of heat through radiation to the air, fanning, with the air at 102 degrees, would be of no use. But the larger part of the heat carried off from the body is conveyed away by evaporation from its surface, and this is greatly facilitated by a constant change of air. The body will therefore be cooled by air currents at temperatures above "blood heat."

J. W., of Ont., wants to know whether the pressure of wind blowing into a funnel-shaped vessel, having the small end truncated and closed, will be that due to area of small end, or that due to the area of the large end. We answer: That due to the area of the large end.

J. H. M., of N. Y.—Living so near as you do to the great public libraries of New York city, we cannot advise you better than to search them for the early history of the steam engine you are seeking. These libraries contain a great many books relative to this subject, from which you may gather nearly every fact of importance, calculated to shed light upon the part taken by early inventors, from Hero down to the present day.

C. S., of Ohio.—We can not give you the address desired.

L. B. G.—There is no rule for locating fixed pulleys on shafts placed in the same plane, but inclined to each other. A belt will not run on pulleys so placed.

W. P. S., of Pa.—The rotation of a body on its own axis does not in any way interfere with or influence the action of gravity upon it.

LUBRICATING OIL.—If S. R. will send to Chard & Howe, 134 Maiden Lane, he will receive sample of oil that will answer his purpose.

Queries.

[We present herewith a series of inquiries embracing a variety o topics of greater or less general interest. The questions are simple, it is true, but we prefer to elicit practical answers from our readers.]

1.—**TABLE CUTLERY.**—I have been put to much annoyance and expense by loss of "temper" on the part of my table cutlery, especially of carvers; and I would like to inquire through your valuable columns whether it is possible for the steel to lose its temper by being in scalding water for any length of time. I have purchased every variety of carvers, and for a short time they keep an edge, but soon they become utterly worthless. Will some one give me a hint on this subject?—R. S. S. H.

2.—**HULLING STONES FOR RICE.**—We use in the preparation of rice a millstone for hulling, soft, free, and therefore self sharpening. It often occurs that there are hard spots which cause unequal wear, and consequently split and injure the grain. Can some one suggest a remedy? The stones are worked open upon a fixed frog or rind, and therefore differ from those used for ordinary grinding.—R. R. L.

3.—**GLUE OR CEMENT FOR OILED WORK.**—Do any of my brother wood working mechanics know how to prepare glue or a cement to be used on wood that has been coated with linseed oil, so that it will make as strong a joint as on the raw wood, and with little or no more trouble than the common glue in use?—H. H. R.

4.—**DIMENSIONS OF BOILER.**—Will some of your numerous subscribers give me dimensions of a Watertown boiler, capable of running a 3 by 10 inch cylinder engine, of a pendulum oscillating construction? I think of having a hole under the grate bars for ashes to drop through, etc., similar to a fire door in an upright boiler. Is it a good idea?—J. P.

5.—**WATER PIPES.**—Would it not be possible to line an iron pipe with porcelain, in the manner of preserving kettles and other hollow ware, which would protect the iron and furnish a pipe cheaper than block tin, and bring us water free from all mineral contamination? If so, where can I obtain some of this pipe? In conclusion, allow me to advise all persons using water conveyed by lead pipe, to ascertain at once whether they are taking this insidious poison into their system. H S gas is easily prepared from Fe S and H Cl by any amateur, and after concentrating a gallon of the water to half a pint, the insoluble oxide and carbonate may be collected on a filter, when a solution of sulphureted hydrogen poured on the filter will at once prove its presence. To determine the exact quantity present requires more skill and delicate apparatus. The presence of even a trace of lead may in time result in paralysis and even death.—E. J. H.

6.—**STEEL AXLE TURNING.**—How can I turn steel axle journals so that I can have a smooth finish without filing the same?—D. D. D.

7.—**WASHING ETHER.**—Will some of your "chemical" readers inform me what is the process of "washing ether"?—E. H. M.

8.—**CASTING BRASS IN IRON MOLDS.**—Can some one of the many readers of the SCIENTIFIC AMERICAN tell me how a brass cylinder say six inches long, by one inch outside and three fourths of an inch inside diameter, can be cast in an iron mold? There are some irregularities outside, so that I cannot use tubing. Is there any coating that can be used to face the molds with, so that brass will run well, and produce good smooth castings in iron molds?—G. J. C.

9.—**SCHOOL OF ENGINEERING.**—I should be glad to find through the columns of the SCIENTIFIC AMERICAN, where a young man can most speedily acquire a knowledge of steam engineering; and if some of your numerous correspondents can point out some school in the Southern States where it is taught it will greatly oblige—A. T.

10.—**LINSEED OIL VARNISH.**—I find that linseed oil boiled properly with dryers makes an excellent varnish for either inside or outsid work. In fact, for durability and gloss I think it equal to the best coach varnish, but boiling does not change the smell. Is there anything that can be put into it that will give it the smell of varnish?—G. W. F.

11.—**ASPHALTING GARDEN WALKS AND STREET PAVEMENTS.**—Under this heading, in your journal of the 3d of June last, taken from the "Gardener's Chronicle," are some directions for asphalting, which I must conclude are fallacious. The instruction is to mix quicklime, powdered, with gas tar, which I did, making the mixture about the consistency of putty, which I put away under the cover of a roof to harden. In about four weeks I had a light feathery pile of air slaked lime, discolored, of course, by the coal tar. The pile was so light that a breath of air might have scattered the whole, being lighter than ordinary air slaked lime. Will some one either set me right in my process, or state whether my doubts of the value of lime are well founded?—Pa.

12.—**GIMLET POINTED SCREWS.**—How are gimlet pointed wood screws cut? Is the cut made in one operation? Is the point cut by separate dies? Is the end pointed by shaving before the thread is cut?—I. H. D.

13.—**STOVE FLUES FOR COTTON MILL.**—What is the best arrangement for heating a three story wooden cotton mill with stoves? Two on each floor are required, so as to have as few openings for the exit of smoke as possible, and the least danger from fire. If an inside central flue to receive the pipes would answer the purpose, how, and of what material should it be constructed?—J. L. M.

14.—**PUTTING UP FRUIT IN GLASS.**—What is the best method for exhausting atmospheric air from glass jars, in order to preserve fruits and vegetables in them? The plan should not be expensive, as it is for the use of private families.—S. H. P.

15.—**CEMENT.**—I have a clay pipe in joints, and I want to put them together. What kind of cement, that will stand heat, shall I use? I have tried hydraulic cement, but it will not answer my purpose, as it cracks when subject to heat.—B. H. D.

16.—Cone Pulleys.—I wish to find out, through "Answers to Correspondents," if it makes any difference how far apart two cone pulleys are placed, in order that the belt shall run equally tight on each pulley. I have been told that, if placed far apart, the belt would not run the same as it would if they (the pulleys) were placed close together, and that the sizes of the pulleys must be varied to suit their distance from each other.—G. A. B.

17.—Stained Marbles.—I have some furniture marbles stained by smoke from burning hay. I wish to know how to remove the stain without destroying the polish.—T. T. E.

18.—Blueing.—How is cake blueing made? Is indigo, or some cheaper material, used?—I. H. D.

19.—Wind Propeller.—I have experimented as follows: An ordinary wind wheel, with arms at an angle of 45° to the plane of revolution, 8 inches in diameter, speed 204 revolutions in the air, propelled a boat (16 inches long, 4 inches wide, 4 inches deep over all, with Babbitt metal enough run in the hold to weigh it down so that it was under water amidships), at the rate of four miles per hour up stream in the Mississippi. This is further than paddle wheels would propel it, if driven by similar power with a clockspring. So much for experiment. My theory is this: When the wind turns a wind wheel with sails at an angle of 45°, with a power equal to ten horse power, it also exerts a force of ten horse power against the framework of the mill. Now then, if there be no wind, and a ten horse power engine is attached to the shaft to revolve the wheel as before, it will still exert that ten horse power against the framework, will it not? It will if action and reaction are equal. Now, I propose to run two such wheels side by side by a belt running over both of their pulleys and the driving pulley of the engine; the pulleys on the wind wheel shafts to be cone pulleys, set the small end of one opposite the large end of the other, so that shifting the belt would act as a steering apparatus by varying the relative velocities of the fans. I would like to know what your correspondents think about this.—F. S.

Declined.

Communications upon the following subjects have been received and examined by the Editor, but their publication is respectfully declined:

Cocoa Nut Oil, by G. R. P.
Know Thyself, by ——.
Quarter Twist Belt, by N. F. D.
Quarter Twist Belt, by W. A. P.
Is the Nebular Hypothesis a Theory? by C. L. F.
Electricity and Galvanism, by ——.
Silver Mining, by H. C. A.

Recent American and Foreign Patents.

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

Wheat Cleaner.—Emanuel Chipman, Baltimore, Md.—This invention consists in a machine for cleaning wheat by means of two or more sets of burrs placed one above another in a frame, each set of burrs being surrounded by a perforated case, and all the sets being inclosed in a trunk in the top of which, above the uppermost set of burrs, is a fan blower, the action of which produces an upward flow of air through the trunk and among the burrs, by which flow the dirt that is rubbed from the wheat between the burrs, and also between the burrs and cases, is carried upwards and discharged from the top of the trunk, the wheat passing from one set of burrs to another.

Corn Planter and Fertilizer Distributor.—Charles W. Barrick, Walkersville, Md.—This invention relates to sundry improvements in a machine for planting corn, and at the same time, distributing fertilizer, said improvements enabling the operator to govern the depth of the furrow, the depth of covering, the number of grains, and the quantity of fertilizer delivered to each hill, and the width of the interval between the rows.

Shingle Machine.—Franklin Muzzy, Bangor, Me.—This invention relates principally to an apparatus whereby the reciprocating carriage, which carries the shingle block forward against the saw and backward from it, is made to work automatically by throwing the pinion that drives the carriage out of gear therewith at the moment the shingle is severed from the block, and thus subjecting the carriage to the action of the weight which draws it back, and by throwing the aforesaid pinion into gear with the carriage at the moment the latter reaches the end of its backward movement, and thus causing the carriage to move forward again.

Sawing Machine.—Dr. Homer Bean, Fredonia, Ohio.—This invention relates to a machine for sawing wood into lengths suitable for stoves, furnaces, etc. including both a circular and a reciprocating saw, a portable frame bearing the operating mechanism, a cross frame, for sustaining the wood, hinged to the front end of the portable frame, a mechanism for raising and lowering the reciprocating saw, and a mechanism for throwing into operation or out of it, the feed roller on the hinged frame.

Railway Conductor's Electric Telegraph Apparatus.—Hugh S. L. Bryan, Liberty, Mo.—This invention has for its object to enable a railway conductor ignorant of the science of telegraphy to make use of the telegraph for the purpose of apprising the authorities at a designated station of any accident that may have happened to his train. To this end each train should be supplied with an electromagnetic apparatus provided with facilities for connecting with the telegraph wires that are stretched by the roadside, with which apparatus is connected the conductor's mechanism.

Mode of Molding Cigars.—John Charter, Sterling, Ill.—This invention consists in a new combination of suitably grooved and sliding blocks with sundry attachments and appendages whereby cigars may be molded in a convenient, expeditious, and perfect manner.

Nail Machine.—A. W. Paull and John Morgan, Jr., Wheeling, West Va.—The peculiar feature of this invention consists in producing a straight sheer cut by causing alternate and reversely obliqued knives to move in a plane perpendicular to the plane of the nail plate.

Bag Holder.—T. J. Trapp, Williamsport, Pa.—This invention relates to a bag holder that can be adjusted to suit the openings of bags of different sizes, and that can be raised or lowered as may be necessary to accommodate bags of different lengths, and that is combined with a movable platform on which the bags rest while filling, which platform can be raised and lowered for the purpose of shaking down and consolidating the contents of the bags.

Harrow.—Benjamin Johnston, Sterling, Ill.—In this case the teeth of the harrow are all inclined backwards to prevent stalks, stubble, weeds, etc., from becoming impaled on them, but the invention particularly relates to the arrangement of parts by which, through the lateral movement of a lever, either half of the harrow may be raised from the ground, the two halves being hinged together.

Harvester.—William H. Harman, Westminster, Md.—This invention relates to a harvester wherein the axle of the transporting wheels transmits motion to the mechanism that operates the cutter bar whenever the first cog wheel of said mechanism is connected with the axle by means of a sliding clutch, said mechanism being rendered inoperative when the sliding clutch is thrown out of gear with the cog wheel and axle. The improvement relates particularly to the construction and arrangement of a draft or brace bar in reference to the finger bar, and to a swinging frame connecting it with the case inclosing the gearing and to the case itself.

Throttle Valve Lever.—In this improvement, invented by Charles E. Stewart, of Aspinwall, State of Panama, U.S., of Columbia, an eccentric acts upon the lever attached to the valve stem, the eccentric being actuated by a lever attached to the shaft of the same. The eccentric strap or band is made to bind upon the eccentric by a hand screw so as to lock the valve in any desired position. The object of the invention is to give greater control over the throttle valves of steam engines, by the increased power thus secured.

Deep Well Pump.—T. S. Trapp, Williamsport, Pa.—This invention consists in a funnel shaped bottom applied to a deep well pump for the purpose of giving room for an orifice at the lower end of the pump, large enough to admit such a column of water as will fill the same, and for a valve of corresponding size to be used in connection with said orifice.

Sewing Machine.—John P. Sherwood, Fort Edward, N. Y.—This invention consists in a thread holder so constructed as to prevent the needle from catching in the thread or passing through kinks in the same, prior to entering the cloth; also in an oscillating vertical arm that gives motion beneath the bed plate to the connecting rod which operates the shuttle carrier, such arm being provided with a slot, each of whose sides is double beveled from a vertical central line outward, in combination with a friction roller on the wrist pin that projects from the side of the balance wheel and traverses such slot, the said roller being also double beveled from a central circumferential line towards each end for the purpose of reducing friction and giving room in which the wrist pin may rise and fall in the slot as the arm oscillates.

Yarn Hook.—Thomas Stibbs, Wooster, Ohio.—This invention relates to a mechanism for twisting skeins of yarn, preparatory to tying them into hanks, said mechanism consisting of a hook fixed on the end of a shaft supported in a suitable frame, and of a pulley placed loosely on said shaft, and driven independently of it, and of a clutch fixed on the shaft, by means of which, when the clutch, by moving the shaft endwise, is thrown into gear with the pulley, the shaft is rotated and the hook also, so that when the bight of a skein of yarn is placed on said hook the skein becomes twisted thereby, such twisting ceasing when the operator stops pulling on the skein, the clutch being then thrown out of gear with the pulley by means of a spring.

Propeller.—Keyes P. Cool, Glen's Falls, N. Y.—This invention relates to a propelling mechanism employing two cylinders, and intended to be placed in a horizontal position on the floor of the after cabin of a canal boat or other vessel, and in which the piston rods are directly connected with floats hung to the rear ends of said rods, said floats working in bottomless chambers built at the vessel's stern and open to the water, so that the moving of the floats sternward propels the boat forward, and the moving of the floats forward propels the boat sternward.

Dredge.—Edwin Platt, Charleston, S. C.—This invention relates to a dredging apparatus, the lower end of which when at work rests always on the bottom of the body of water where it is employed, its upper end being connected with the boat, and the dredge having play enough to keep its lower end always on the bottom in all states of the tide; the apparatus being also provided with one wheel at the bow or stern of the boat for propelling her forward or backward, and with another wheel for turning the boat to either side.

Churn Power.—Benjamin F. Frampton, Punxsutawney, Pa.—This invention consists of an arrangement of parts whereby a churn dasher is operated by a descending weight, which latter, as it goes down, raises a lesser weight, that, when the first weight has completed its descent, goes down also, thus continuing the movements of the dasher till the second weight has completed its descent.

Apparatus for Operating Fans.—William M. Bruton, Baltimore, Md.—This invention consists in an apparatus to be connected with a table for supporting a fan in such a manner that it may be vibrated sufficiently to create a breeze for the comfort of a person sitting by it, by means of a cord connecting the fan with a treadle and a counterspring to operate in opposition to the treadle.

Door Stop and Holder.—Isaac J. Wells, Willmar, Minn.—This invention consists of a casting having a slanting upper surface, and secured to and resting upon springs that are to be fastened to a floor at a proper distance from the wall, said casting having a transverse notch in its upper side, in combination with a casting intended to be let into the bottom of a door crosswise of the same, and provided with a shoulder, which, when the door is swung open, glides up the incline of the floor casting until it enters the notch in the same, where it is held fast.

Padlock Key.—This key is constructed with one set of bits upon the ends and another set upon the sides of its wards, so that it will first throw back one set of tumblers, and hold them while throwing back another set. The inventor is Edward L. Gaylord, of Bridgeport, Conn.

Wheelbarrow.—Harry Lawrence, of New York city.—This wheelbarrow is made with folding legs, sides, and ends, these parts being hinged to the frame of the body, and being, when in use, held by a system of slotted braces. This construction allows the wheelbarrow to be packed in close compass for storage or transportation.

Stern Bearing for Propellers.—An enlargement of the bearing is made by means of a secondary bearing applied to an extension of the casting attached to the stern post for supporting the ordinary bearing, the said extension being let into a recess in the stern post surrounding the shaft. James Bolles, of New York city, is the inventor.

Ladies' Work Stand.—A stationary circular top has under it a revolving top, carrying radial sector shaped tills, which are brought under a sector shaped lid in the upper top or leaf, whenever the tills are revolved on the standard of the workstand. A series of separate compartments easily reached is thus supplied, whereby the various articles used by ladies in sewing may be kept assorted, while at the same time a stand of graceful and ornamental design may be furnished. The upper end of the standard rises through the upper leaf, and supports a spool stand and emery bag. C. S. Caple, of Frankfort, N. Y., is the inventor.

Wheelbarrow.—Harry Lawrence, of New York city.—Our readers will find in another place in this department of the paper a notice of a wheelbarrow, with folding legs, sides and ends. The present improvement by the same inventor makes the wheel detachable from the axle, so that it can be laid down flat upon the folded barrow, thus still more reducing the space necessary for storage or transportation.

Photographic Refrigerator.—This is designed to be a more convenient refrigerator for photographers' chemicals than those hitherto employed. The invention consists in a definite arrangement of compartments for the purpose specified. The inventor is Mrs. Mary A. Thornton, of Perrysburg, Ohio.

Fruit Can.—Leo C. Straub, of Pittsburgh, Pa.—This consists in the application of a moveable metallic collar to the neck of a fruit jar, the collar being so formed that it makes a channel for the reception of the wax used in sealing. The lower end of the cover enters into the channel, and the wax being poured in, the jar is thus sealed.

Fruit Drying Apparatus.—This is the invention of Judson Allen, of Everett, Mo., and consists in an arrangement of a heater, hot air conducting pipes, and fruit drawers, in a wooden case having an apparatus for generating heat, and another for distributing the same uniformly to the fruit.

Combined Cider Mill and Press.—Orville M. Brock, Monroeton, Pa.—This invention constitutes a portable cider mill. It consists of sectional toothed grinding cylinders, having an appropriate hopper, and discharging the ground apples into a hoop, provided with a follower which is forced down by a screw to compress out the juice from the ground or crushed fruit. The crushing cylinders are driven by a winch and suitable gearing.

Wagon Brake.—This is the invention of Washington Bryant, of Batesvill, Ark., and has for its object the application of the resistance of the team in holding back to force down the brakes, and yet to allow the wagon to be backed freely, when desired. The brake shoes are applied to the wheels in such a manner that the forward motion of the wheels causes them to tighten against the tires, while the backward motion releases them, the application of the shoes, when the team holds back, being made through a system of evers and links actuated by a chain connected with the breast yoke.

Inodorous Portable Water Closet.—William Chapman, Mount Vernon, N. Y.—The vessel or chamber is made with a double wall at the top of this wall extending downward about one half the entire length, or sufficient to give, when filled, a water column of sufficient weight to prevent the escape of gases, when the annular space has water placed therein. A cap passes down into this annular space, thus forming a water seal like that used in gasometers. A valve is provided in the top of the cap or cover to allow the escape of air when the cap is introduced into the annular space above described. Both cap and cover are provided with suitable handles. This is a good invention, and will supply a want long felt in sick chambers.

Window Curtain Roller.—William Gorton, New York city.—When the roller is of that class made of sheet metal—usually tin—it is so formed that the edges of the sheet lap each other snugly but are not connected, so that the hem on the upper end of the curtain may be slipped in between the lapped edges, or when the roller is made of wood, it is formed in halves, longitudinally, and a groove cut in one half for the reception of the hem.

Evener.—Martin Terrill, Star Prairie, Wis.—This consists of a fixed crossbar, with pulleys at the ends, over which chains pass from the whiffletrees, to a horizontally oscillating T lever, so adjusted that when the horse pulls ahead, the leverage is changed to favor the hindmost horse.

Steam Pumping Engine.—This is an improvement in the mode of connecting the valves and valve seats with the pump, and in the arrangement and combination of parts, by which a very simple automatic valve motion is secured, in a compact and easily constructed form, and which is, in its various details, accessible and easily adjusted and repaired. Patrick Doyle, of New Comerstown, Ohio, is the inventor.

Fly Wheel.—Charles Root, of Cleveland, Ohio.—This consists in the mode of attaching fly wheels to their shafts. A series of friction devices is employed, which hold the wheel firmly enough during any variation of power required in ordinary work, to act as an efficient regulator, but still admit the wheel to turn on the shaft, in case of sudden stoppage, thus relieving the machinery of the great strain to which it would otherwise be subjected in such cases.

Railroad Switch.—This is designed for horse railways. The switch is so constructed that it is actuated by a system of levers, controlled by a hinged plate, placed between the rails of the track upon which the horses step, their weight thus bringing the switch into the proper position. The inventor is T. Newman, of New Orleans, La.

Locomotive Head Light.—In this head light an external reflector is employed, having sides converging in straight lines to meet a concave surface at the back, which latter surface has in the center a depression or concave surface with a smaller radius than the first. Within this reflector is a smaller reflector, with an open end toward the concave surface of the first named outer one. The surfaces are so arranged with reference to each other that the light falling upon them from a lamp is reflected out in a beam of parallel rays, the larger portion of the rays suffering double reflection in order to bring them parallel to the others. The reflector is constructed on sound optical principles, as will be seen upon inspection. Invented by Charles S. Lee, and William M. Baldwin, of Troy, N. Y.

Apparatus for Removing and Replacing Wagon Bodies.—This consists of two rollers, one for the forward end, and one for the back end of the wagon body, one of them having a hand wheel, and both being adjusted in a suitable frame attached to the timbers on the roof or upper floors of wagon sheds. Ropes are attached to the wagon body at the ends, one passing down directly from the hand wheel roller, and the other passing back from the same over the rear roller, so that both are wound or unwound simultaneously and the wagon body is raised or lowered in a horizontal position.—T. R. Vestal, Santa Fe, Tenn., is the inventor.

Circular Saw Mill.—Samuel M. Palmer, of Glen's Falls, N. Y.—To each end of the mandrel is attached a pulley, one or both of which is detachably attached to the said mandrel, by means of a screw thread cut upon the said mandrel, and upon the inner surface of the said pulley, or in any other convenient manner, so that the said pulley or pulleys can be readily removed when required to enable the saws to be detached from said mandrel. By this arrangement, the saws are driven by power applied to both ends of the mandrel instead of by power applied to only one end, as is the usual construction. The lower feed rollers are grooved, and their journals revolve in bearings attached to the frame. Should the feed rollers encounter any obstruction, a friction disk slides upon a friction wheel until the machine can be stopped, thus guarding against breakage of the feed mechanism.

Electric Car Brake.—The lever system of the brakes is actuated by chains which are wound upon a shaft driven by a belt from a pulley on one of the car axles, which belt only operates when tightened through the agency of electromagnetism, which raises the winding shaft in slotted bearings, and thus puts the belt under tension. The inventor is Henry F. Daggett, of La Fayette, Ind.

Setting Steam Boilers.—The object is to facilitate the draft and the application of heat to the boilers. The invention consists in graduating the arch and the breeching from the fire door to the smoke stack. The inventor proposes to arrange the grate and the bottom of the arch behind it on a gradual and uniform ascending incline from the mouth to the rear, and to incline the wall towards the boilers in the same manner; also, to graduate the capacity of the breeching, beginning on the side of the most distant boiler from the smoke stack discharging into it towards the smoke stack, according to the volume discharging into it, or the sum of the areas of the flues discharging into it which arrangement, together with the smoke stack made considerably greater than the area of the boiler flues and the arch, has the effect of making the draft much more apid from the fire through the arch and flues, and thereby very greatly increases the steam generating capacity also the capacity to burn wet fuel, such as green tan bark and the like.—Orrin Ranney, of Corry, Pa., is the inventor.

Medical Compound.—Abram M. Loryea, East Portland, Oregon.—This is a new compound for the treatment of rheumatism, in which the essential ingredient is the unkweed, supposed to be *Thaspium cordatum*, of Oregon which the inventor styles "the unkweed remedy."

Corn Sheller.—Asahel Patch, of Hamilton, Mass.—This is a new combination of familiar devices, by which the inventor claims to have secured a more efficient machine than has hitherto been used for the purpose specified. The parts are extremely few and simple, and the machine is unusually compact. We judge it will find favor among practical men.

Folding Easel.—This is a construction of an easel whereby it folds together very compactly in a flat and limited space, a great convenience to painters while making sketching tours, as well as in schools, lecture rooms, etc.—The inventor is Rufus Wright, of Brooklyn, N. Y.

Washing Machine.—M. Van Auken, Utica, N. Y.—A swinging segmental ribbon moves in a semicylindrical case, having ribs upon the bottom, the rubber being also provided with ribs. The arms upon which the pendant rubber swings do not admit the ribs upon it to come in contact with the bottom ribs, but the surface of the rubber approaches the ribbed bottom more closely at the ends of its stroke than at the middle, so that the clothes are squeezed as well as rubbed.

Carving and Molding Machine.—M. F. Boult, Battle Creek, Mich.—This excellent machine was illustrated and described elaborately on page 351, Vol. XIII. of the Scientific American. The present patent is for improvement, in mechanism and cutters upon the machine, as there described, which add to its utility, but in no way affect the general character or principle of the machine.

Carbureters for Gas and Air.—Matthias P. Coons, of Brooklyn, assignor to himself, Philip Dater, of New York city, and Charles N. Ayres, of Brooklyn, N. Y.—This invention has for its object to provide a simple cheap, and efficient gas or air carbonizer or carbureter, which will be perfectly safe against explosion in cases of fire or ignition by careless treatment or design, except at the ignition point of the burner; also, to provide an efficient and reliable means of supplying air and maintaining the requisite pressure when air is used. The invention consists in certain improvements in the arrangement of the air and gas mixing apparatus; also, in improved absorbent material employed for taking up the hydrocarbon and exposing it to the air or gas; also, an improved safety filling apparatus; also, an improved jacket of fireproof and non-heat-conducting substance for the preservation of the carbureting chamber, and regulation of the temperature of the same; and also, an improved apparatus for injecting the air. The absorbing substance is preferably woolen cloth and hair prepared in balls for taking up the hydrocarbon or the gas and holding it for the more perfect combination with the air.

Cultivator Tooth.—Michael F. Lowth and Orlean H. Porter, Wabasha, Minn.—This invention relates to a cultivator tooth that is suspended at its upper end in the beam, the shank of the tooth being provided with a brace that extends backwards and upwards through the beam, the improvements having for their object to enable the teeth to yield to obstructions when drawn forward, and to prevent the teeth from swinging forward when the cultivator is drawn back.

Official List of Patents.

ISSUED BY THE U. S. PATENT OFFICE.

FOR THE WEEK ENDING JULY 11, 1871.

Reported Officially for the Scientific American.

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116,789.—Fruit Gatherer.—G. Aldridge, Henderson city, Ky
116,790.—Hub Center Machine.—K. P. Allen, Homer, Mich.
116,791.—Lawn Mower.—W. Allen, Worcester, Mass.
116,792.—Heater.—J. Argall, Mineral Point, Wis.
116,793.—Musical Ins.—T. Atkins, H. Drewer, Cincinnati, O.
116,794.—Brush.—B. F. Averill, Dunkirk, N. Y.
116,795.—Journal Box.—B. C. Baker, Toledo, Ohio.
116,796.—Steam Generator.—G. A. Barnard, New York city.
116,797.—Table, etc.—D. K. Barnhart, Gaines, Pa.
116,798.—Cider Mill.—W. Barr, Ypsilanti, Mich.
116,799.—Advertising Medium.—J. O. Belknap, N. Orleans, La.
116,800.—Door Spring.—A. T. Boon, L. Mills, Galesburg, Ill.
116,801.—Car Coupling.—J. H. Bull, Hereford, Md.
116,802.—Ice Run.—G. Burhans, Rondout, N. Y.
116,803.—Evaporator.—F. G. Butler, Bellows Falls, Vt.
116,804.—Stock Car.—J. B. Calkins, Pacific, Mo.
116,805.—Gage, etc.—F. C. Castle, Montana.
116,806.—Anchor.—C. A. Chamberlin, Pittsburgh, Pa.
116,807.—Cutlery Rest.—L. J. Cherrington, Boston, Mass.
116,808.—Oil Can.—P. Childs, Northampton, Mass.
116,809.—Sewing Machine.—J. C. Cochran, Ripley, Ohio.
116,810.—Vent Bung.—B. R. Cole, Buffalo, N. Y.
116,811.—Folding Chair.—N., C.O., A. Collignon, Closter, N.J.
116,812.—Grate Bar.—H. Collinson, Boston, Mass.
116,813.—Baby Walker, etc.—L. O. Colvin, Newark, N. J.
116,814.—Car Brake.—J. R. Crabill, La Crosse, Ill.
116,815.—Bed Bottom.—D. V. Crandall, Chicago, Ill.
116,816.—Watch Chain.—C. Croselmire, Newark, N. J.
116,817.—Mill Pick.—J. Cummings, West Charleston, Vt.
116,818.—Car Brake.—H. S. Daggett, La Fayette, Ind.
116,819.—Billiard Cushions.—M. Delaney, New York city.
116,820.—Valve.—T. Draper, Petrolia, Canada.
116,821.—Soap.—F. M. Ellis, Brooklyn, N. Y.
116,822.—Carpet Protector.—H. W. Eskildson, Boston, Mass.
116,823.—Tube Cleaner.—P. Farley, Philadelphia, Pa.
116,824.—Copying Press.—J. Fensom, Toronto, Canada.
116,825.—Treating Rubber, etc.—P. Finley, New York city.
116,826.—Telegraph.—D. Flanery, New Orleans, La.
116,827.—Corn Planter.—J. T. Foree, Henry county, Ky.
116,828.—Shoe.—C. C. Geller, Albany, N. Y.
116,829.—Furnace.—G. and B. J. Goodsell, and John Been, Jr., Pentwater, Mich.
116,830.—Sewing Machine.—J. W. W. Gordon, Newport, Ky.
116,831.—Railway Signal.—W. Green, Yonkers, N. Y.
116,832.—Cook Stove.—S. Gregory, South Norwalk, Conn.
116,833.—Carpet Sweeper.—D. C. Hall, Hannibal, Mo.
116,834.—Musical Instrument.—E. Hamlin, Winchester, Ms.
116,835.—Can for Roving.—E. Haskell, Dover, N. H.
116,836.—Boiler.—S. J. Hayes, E. T. Jeffery, Chicago, Ill.
116,837.—Boring Bit.—D. Kelly, Muskegon, Mich.
116,838.—Marker.—F. B. Kendall, Monmouth, Ill.
116,839.—Drain Pipe.—C. W. Kennedy, Brooklyn, N. Y.
116,840.—Feed Regulator.—R. Kitson, Lowell, Mass.
116,841.—Waste Picker.—R. Kitson, Lowell, Mass.
116,842.—Paper Bag Machine.—M. E. Knight, Boston, Mass.
116,843.—Horse Power.—F. M. C. Liles, Roanoke, Ala.
116,844.—Butter Kettle.—J. Liming, Philadelphia, Pa.
116,845.—Roofing Bracket.—J. H. Look, Jr., Rochester, Mass.
116,846.—Medical Com.—A. M. Loryea, East Portland, Ore.
116,847.—Ratchet Drill.—J. W. Mahlon, Brooklyn, N. Y.
116,848.—Ratlin.—J. P. Manton, Providence, R. I.
116,849.—House Implement.—R. A. McCauley, Baltimore, Md.
116,850.—Sofa.—J. W. McDonough, Chicago, Ill.
116,851.—Hinge, etc.—A. D. McMaster, Rochester, N. Y.
116,852.—Converting Residuum.—C. C. Mengel, Brooklyn, N. Y., and A. P. Von Pöhrnhoff, St. Catharine's, Canada.
116,853.—Steam Piston.—E. Merriman, Allegheny, Pa.
116,854.—Water Gate.—D. J. Moffit, Thorntown, Ind.
116,855.—Churn.—O. F. Monfort, Dearborn, Mich.
116,856.—Cradle.—T. W. Moore, New York city.
116,857.—Galley Rest.—J. M. Murphy, Olympia, Wash. Ter.
116,858.—Watch Chain.—D. F. Myers, New York city.
116,859.—Liquid Meter.—H. B. Nickerson, Boston, Mass.
116,860.—Tassel.—James Norman, Brooklyn, N.Y.
116,861.—Invalid Bedstead.—M. A. Ormsbee, Fair Haven, Vt.
116,862.—Bracket.—G. W. Pierce, Boston, Mass.
116,863.—Medical Compound.—M. E. Perrin, Montreal, Can.
116,864.—Chimney Cap.—W. J. Pettingell, Lowell, Mass.
116,865.—Amalgamating Gold.—I. M. Phelps, Chicago, Ill.
116,866.—Stock Car.—Amos Rank, Salem, Ohio.
116,867.—Trimming Machine.—T. K. Reed, E. Bridgewater, Ms.
116,868.—Shears, etc.—R. and A. Renz, Naugatuck, Conn.
116,869.—Hay Press.—W. H. Reynolds, New Orleans, La.
116,870.—Swivel Hook.—C. E. Richards, N. Attleboro', Mass.
116,871.—Churn.—J. L. Rust, Keithburg, Ill.
116,872.—Boot and Shoe.—F. Senn, Forestville, N.Y.
116,873.—Blast Protector.—J. H. Setchel, Cincinnati, O.
116,874.—Knapsack.—C. W. Schaefer, Philadelphia, Pa.
116,875.—Medical Compound.—A. F. Shannon, Quincy, Ill.
116,876.—Excavator.—G. F. Sheffield, Boston, Mass.
116,877.—Sawing Machine.—Ira Shepard, Dowagiac, Mich.
116,878.—Fastener.—H. Smiley, W. T. Loughead, Boston, Mass.
116,879.—Musical Instrument.—K. Smith, Lowell, Mass.g,
116,880.—Screw Machine.—L. Southworth, Jr., S. G. Cushin Stoughton, Mass.
116,881.—Flier for Spinning, etc.—T. Stibbs, Wooster, O.
116,882.—Elastic Supporter.—G. C. Stillson, Derby, Conn.
116,883.—Well Auger.—W. H. Stone, Pattonsburg, Mo.
116,884.—Memorandum Book.—I. N. Swasey, Yonkers, N.Y.
116,885.—Shearing Machine.—F. W. Tally, M. Ryan, Phila.
116,886.—Leather.—Z. A. Taylor, Haverhill, Mass.
116,887.—Chimney Cowl.—G. G. Thomas, St. Louis, Mo.
116,888.—Shovel, etc.—J. Thompson, Decatur, Mich.
116,889.—Safety Shaft.—J. S. Tibbets, Brazil, Ind.
116,890.—Pipe Cutter.—G. W. Tower, Cambridge, Mass.
116,891.—Car Basket Racks.—M. Tower, Boston, Mass.
116,892.—Inking Apparatus.—N. F. Turner, Williamsburg, N.Y.
116,893.—Sewing Machine.—S. S. Turner, Westborough, I. S. Craig, Boston, Mass.
116,894.—Potato Bug Destroyer.—J. B. Turney, Inkster, Mich.
116,895.—Bathing Apparatus.—C. B. Veronee, Athens, Ga.
116,896.—Pitching Barrels.—W. Vogt, Louisville, Ky.
116,897.—Soap.—D. H. Warren, Montreal, Canada.
116,898.—Thill Coupling.—Edward Warren, Ceresco, Mich.
116,899.—Umbrella.—Walter Watson, Fayetteville, N. C.
116,900.—Stovepipe Drum.—B. Webster, Kingfield, Me.
116,901.—Countersinks.—Asa Wheeler, Brattleborough, Vt.
116,902.—Steam Engine.—J. D. Whelpley, Boston, Mass.
116,903.—Ores.—J. D. Whelpley, J. J. Storer, Boston, Mass.
116,904.—Harness Trimming.—S. Wiener, Newark, N. J.
116,905.—Cooking Stove.—John Wilder, Detroit, Mich.
116,906.—Healing Plaster.—D. G. Williams, Boston, Mass.
116,907.—Lock.—J. T. Williams, Chicago, Ill.
116,908.—Hot Air Furnace.—C. Wood, Worcester, Mass.
116,909.—Steam Condenser.—W. Wright, New York city.
119,910.—Wagon Brake.—J. J. Adgate, Stevensville, N.Y.
116,911.—Twine Holder.—John Adt, New Haven, Conn.
116,912.—Fruit Jellies.—Charles Alden, Newburg, N.Y.
116,913.—Watch Key, etc.—J. P. Allen, H. Croft, Springfield, O.
116,914.—Car Heater.—J. G. Allen, Philadelphia, Pa.
116,915.—Sawing Machine.—G. F. Almy, Toledo, O.
116,916.—Hoist.—J. R. Anderson, P. C. Harlan, Freeport, Pa.
116,917.—Battery Liquid.—V. Barjon, New York city.
116,918.—Bronzing Machine.—E. F. Benton, Buffalo, N.Y.
116,919.—Fan Attachment for Tables.—T. S. Binkard and R. H. Boal, Urbana, Ohio.
116,920.—Pipe Machine.—H. Bissell, Hartford, Conn.
116,921—Boot Soles.—L. R. Blake, Fort Wayne, Ind.
116,922.—Screw Machine.—E. C. Blakeslee, Waterbury, Ct.
116,923.—Metal Cutter.—S. A. Bostwick, Waltham, Mass.
116,924.—Cotton Gin.—W. F. Bowen, Stark, Fla.
116,925.—Baling Hoops.—G. Brodie, Plumb Bayou, Ark.
116,926.—Glass Press.—A. P. Brooke, New York city.
116,927.—Stove.—L. A. Brooks, La Porte, Mich.
116,928.—Telegraph.—H. S. L. Bryan, Liberty, Mo.
116,929.—Curtain Fixture.—C. Buckley, Meriden, Conn.
116,930.—Molding Cigar.—John Charter, Sterling, Ill.
116,931.—Tin Box.—J. R. Cole, New York city.
116,932.—Vise.—A. Crease, Cleveland, Ohio.
116,933.—Paper Pulp.—C. M. Cresson, Philadelphia, Pa.
116,934.—Chair for Boats.—R. H. Cutter, Cleveland, Ohio.
116,935.—Skate.—C. T. Day, Newark, N. J.
116,936.—Shears, etc.—S. W. Eastren, Tremont, N. Y.
116,937.—Water Wheel.—D. Ehrhart, Bel Air, Md.
116,938.—Shoe.—L. Elliott, Jr., New Haven, Conn.
116,939.—Shaft Coupling.—J. F. Emmert, Waynesboro', Pa.
116,940.—Churn.—F. M. English, Evansville, Ind.
116,941.—Attaching Knobs.—W. A. Fenn, Rochester, N. Y.
116,942.—Brick Machine.—A. Ferguson, D. Ralston, George Hildreth, Troy, N.Y.
116,943.—Apple Parer, etc.—C. A. Foster, Fitchburg, Mass.
116,944.—Electric Apparatus.—S. Gardiner, Jr., New York.
116,945.—Bridle Bit.—A. Gilliam, Pittsburgh, Pa.
116,946.—Saddle.—A. Gilliam, Pittsburgh, Pa.
116,947.—Sewing Machine.—C. Goodyear, Jr., N. Rochelle, N.Y
116,948.—Paper Collar.—S. S. Gray, Boston, Mass.
116,949.—Water Pipe.—J. R. Griffin, Waterdown, Conn.
116,950.—Billiard Table.—L. A. Grill, New York city.
116,951.—Billiard Fabric.—L. A. Grill, New York city.
116,952.—Journal Box.—H. Grogan, Flatbush, N. Y.
116,953.—Lamp Reflector.—J. W. Haines, Cambridge, Mass.
116,954.—Safe.—E. K. Hall, Louisville, Ky.
116,955.—Ratchet Drill.—I. S. Hamilton, Hamilton, Ohio.
116,956.—Plow.—W. Hay, T. B. Freeman, Hillsborough, Ore.
116,957.—Wagon Brake.—D. Healy, South Danville, N. Y.
116,958.—Carpet Beater.—J. Hothersall, J. Banks, New York.
116,959.—Shoe.—G. C. How, Haverhill, Mass.
116,960.—Gate.—E. Howard, Milford, Mass.
116,961.—Car Wheel.—L. B. Hunt New York city.
116,932.—Draft Regulator.—A. L. Ide, Springfield, Ill.
116,963.—Thill Coupling.—J. H. Jennings, New Bedford, Ms.
116,964.—Bale Tie.—C. G. Johnsen, New Orleans, La.
116,965.—Hay Press.—D. Knowles, Philadelphia, Pa.
116,966.—Skid, etc.—J. M. Lane, South Norwalk, Conn.
116,967.—Stench Trap.—S. Lawrence, New York city.
116,968.—Governor.—B. S. Lawson, Brooklyn, N. Y.
116,969.—Preserving Wood, etc.—F. Lear, St. Louis, Mo.
116,970.—Salt.—R. G. Leckie, Acton Vale, Canada.
116,971.—Washing Machine.—W. Lewis, Webster, N. Y.
116,972.—Padlock.—O. D. Madge, Washington, D. C.
116,973.—Metallic Heel.—A. S. Mann, St. Louis, Mo.
116,974.—Plant Protector.—I. Mayfield, Mayfield, Ky.
116,975.—Railroad Rail.—A. McKenney, Maumee City, Ohio.
116,976.—Preserving Eggs.—J. T. McKinn, Remington, Ind.
116,977.—Padlock.—J. H. McWilliams, New York city.
116,978.—Pulp Engine.—H. B. Meech, Fort Edwards, N. Y.
116,979.—Paper Pulp.—H. B. Meech, Troy, N. Y.
116,980.—Paper Pulp.—H. B. Meech, Troy, N. Y.
116,981.—Bag Holder.—C. K. Mitchell, Greenville, Mich.
116,982.—Watch Key.—J. L. Moore, Bridgeport, Conn.
116,983.—Roofing Compound.—H. Morrie, Rockford, Ill.
116,984.—Lamp.—T. H. Mott, New York city.
116,985.—Shingle Machine.—F. Muzzy, Bangor, Me.
116,986.—Chain Link.—E. Meyers, Creagerstown, Md.
116,987.—Corn Sheller.—G. & H. O'Connor, Mishawaka, Ind.
116,988.—Shingle Machine.—O. A. Olmsted, Sebastopol, Cal.
116,989.—Fence.—P. C. Pearson, Louisville, Ky.
116,990.—Bolt Head.—J. Plunkett, New York city.
116,991.—Rotary Harrow.—R. Rakestraw, Wyoming, Ill.
116,992.—Cooking Stove.—A. J. Redway, Cincinnati, Ohio.
116,993.—Harness.—S. Reynolds, Pittsburgh, Pa.
116,994.—Hydrocarbon Gas.—F. A. Sabbaton, Troy, N. Y.
116,995.—Fish Nursery.—R. E. Sabin, W. Springfield, Mass
116,996.—Curtain Fixture. L. L. Sawyer, San Francisco, Cal.
116,997.—Coating Compound.—J. Schultz, New York city.
116,998.—Seed Tube.—L. Scofield, Watertown, Wis.
116,999.—Weighing Scales.—G. Scott, Montreal, Canada.
117,000.—Thimble Skein.—A. L. Shears, St. Louis, Mich.
117,001.—Window Blind.—S. M. Sherman, Fort Dodge, Iowa.
117,002.—Sewing Machine. J. P. Sherwood, Fort Edward, N.Y.
117,003.—Meat Cutter, etc.—A. R. Silver, Salem, Ohio.
117,004.—Wagon.—J. Skeen, Mound City, Ill.
117,005.—Animal Trap.—B. C. Smith, Pekin, Ill.
117,006.—Stove.—D. Smith, Albany, N. Y.
117,007.—Fire Escape.—G. C. Smith, F. M. Burrows, Baltimore, Md.
117,008.—Flue Cleaner.—C. H. Stebbins, Circleville, Ohio.
117,009.—Grate.—E. F. Steele, Wallingford, Conn.
117,010.—Friction Pulley.—J. Steger, New York city.
117,011.—Corn Husker.—J. Stengel, Croton, C. C. Davey Big Prairie, Mich.
117,012.—Chair.—V. Stockton, Williamsburg, Ohio.
117,013.—Ice Bag.—S. Stroock, New York city.
117,014.—End Gate.—J. L. Stropes, Bloomfield, Ind.
117,015.—Envelope.—M. Taylor, Buffalo, N. Y.
117,016.—Safe Door.—W. Terwilliger, New York city.
117,017.—Log Roller.—J. Torrent, Muskegon, Mich.
117,018.—Mattress, etc.—W. H. Towers, Boston, Mass.
117,019.—Deep Well Pump.—T. J. Trapp, Williamsport, Pa.
117,020.—Paneling Mach.—D. F. Walker, Minneapolis, Minn.
117,021.—Equalizer.—L. Warren, Dwight, Ill.
117,022.—Butter Worker.—W. Weaver, Phœnixville, Pa.
117,023.—Latch, etc.—S. H. Wheeler, Dowagiac, Mich.
117,024.—Plow.—E. Wiard, Louisville, Ky.
117,025.—Telegraph.—A. M. and M. A. Wier, London, Eng
117,026.—Table Bell.—H. C. Wilcox, West Meriden, Conn
117,027.—Cotton Press.—U. T. Wilson, Independence, Miss
117,028.—Adjustable Dam.—J. A. Wood, Pittsburgh, Pa.

REISSUES.

4,464.—Harrow Teeth.—J. F. Chase, Westbrook, Me.—Patent No. 113,141, dated March 28, 1871.
4,465.—Division A.—Car Brake.—W. H. Dunham, Hokah, Minn., J. Widney, Allegheny, Pa.—Patent No. 71,591, dated Dec. 3, 1867.
4,466.—Division B.—Brake Shoe.—W. H. Dunham, Hokah, Minn., J. Widney, Allegheny, Pa.—Patent No. 71,591, dated Dec. 3, 1867.
4,467.—Boiler.—W. B. Scaife, Pittsburgh, Pa.—Patent No 107,817, dated Sept. 27, 1870.
4,468.—Drying Fruits, etc.—F. H. Smith, Baltimore, Md.—Patent No. 31,566, dated Feb. 26, 1861; reissue No. 3,017, dated June 30, 1868.
4,469.—Grape Trellis.—T. G. Yeomans, Walworth, N. Y Patent No. 84,154, dated Nov. 16, 1868.

DESIGNS.

5,096.—Yoke.—D. Appel, Cincinnati, Ohio.
5,097.—Center Piece.—C. Autenrieth, Philadelphia, Pa.—
5,098.—Boot, etc.—A. O. Bourn, Providence, R. I.
5,099 to 5,101.—Stocking Fabric. C. Button, Philadelphia, Pa.
5,102.—Table Cutlery.—F. R. Chapman, Greenfield, Mass.
5,103.—Picture Frame.—L. L. Dennick, Chicago, Ill.
5,104.—Muff.—W. Ettinger, New York city.
5,105.—Bracket.—W. D. Gridley, New Haven, Conn.
5,106 and 5,107. Shawl Fabric. J. Hodgson, Philadelphia, Pa
5,108.—Carpet Pattern.—H. S. Kerr, Philadelphia, Pa.
5,109.—Carpet Pattern.—J. Magee, New York city.
5,110 and 5,111.—Mat.—J. Magee, New York city.
5,112 to 5,116.—Oil Cloth.—C. T. Meyer, Lyon's Farm, N. J.
5,117.—Bell Tower.—T. W. H. Moseley, Hyde Park, Mass.
5,118.—Blacking Box.—D. O'Leary, Hubbard, Ohio.
5,119.—Carpet Pattern.—T. Pennell, Morrisania, N. Y.
5,120.—Vase.—M. L. Snow, West Sterling, Mass.
5,121 to 5,126.—Carpet Pattern.—G. C. Wright, New York

TRADE-MARKS.

370 and 371.—Whisky.—Capel & Roebuck, Cincinnati, Ohio.

FOR THE WEEK ENDING JULY 18, 1871.

117,029.—Fruit Dryer.—J. Allen, Everett, Mo.
117,030.—Evaporator.—A. J. Andrews, Linden, Mich.
117,031.—Locomotive.—W. D. Arnett, Denver, Colorado.
117,032.—Relishing Machine.—D. G. Arnold, Winona, Mich.
117,033.—Hay Loader.—H. Baker, Cortland, N. Y.
117,034.—Cultivator.—P. O. Baldwin, Spring Lake, Mich.
117,035.—Water Meter.—J. S. Barden, Providence, R. I.
117,036.—Spring Bed.—B. Barstow, Westfield, Mass.
117,037.—Curtain Fixture.—J. E. Baum, Philadelphia, Pa.
117,038.—Curtain Fixture.—J. E. Baum, Philadelphia, Pa.
117,039.—Stern Bearing.—James Boiles, New York city.
117,040.—Shaker.—W. H. and P. Bott, West Manchester, Pa.
117,041.—Cider Mill.—O. M. Brock, Monroeton, Pa.
117,042.—Truss Bridge.—J. Burke, Saginaw, Mich.
117,043.—Press.—John T. Burr, Brooklyn, N. Y.
117,044.—Work Stand.—C. S. Caple, Frankfort, N. Y.
117,045.—Water Closet.—W. Chapman, Mount Vernon, N.Y.
117,046.—Claw Bar.—David Christie, Chillicothe, Ohio.
117,047.—Iron Bridge.—T. C. Clarke, A. Bonzano, Phila., Pa.
117,048.—Iron Bridge.—T. C. Clarke, A. Bonzano, Phila., Pa.
117,049.—Iron Bridge.—T. C. Clarke, A. Bonzano, Phila., Pa.
117,050.—Iron Bridge.—T. C. Clarke, A. Bonzano, Phila., Pa.
117,051.—Propeller.—K. P. Cool, Glen's Falls, N. Y.
117,052.—Evaporating Brine.—L. R. Cornell, Syracuse, N.Y.
117,053.—Fireplace.—M. A. Cushing, Aurora, Ill.
117,054.—Plow.—D. C. Day, San Jose, Cal.
117,055.—Harvester.—G. E. Deardorff, Canal Dover, Ohio.
117,056.—Chair.—W. Donoghue, Philadelphia, Pa.
117,057.—Galvanic Battery.—L. Drescher, New York city
117,058.—Cotton Gin.—J. Du Bois, Greensborough, Ala.
117,059.—Car Stove.—J. T. Evens, St. Louis, Mo.
117,060.—Pasting Paper.—B. F. Field, Beloit, Wis.
117,061.—Packing Box.—John H. Foster, Chicago, Ill.
117,062.—Vault Light.—J. C. French, Chicago, Ill.
117,063.—Vault Light.—J. C. French, Chicago, Ill.
117,064.—Padlock.—E. Gaylord, Bridgeport, Conn.
117,065.—Medicine.—Margaret N. George, Evansville, Ind
117,066.—Table Stand.—John Gibson, Jr., Albany, N.Y.
117,067.—Car Coupling.—J. W. Gillam, Newton, N. J.
117,068.—Curtain Roller.—W. Gorton, New York city.
116,069.—Shirt Stud.—J. G. Griswold, Hartford, Conn.
117,070.—Churn.—G. Groom, Brockville, Canada.
117,071.—Piston Packing.—T. Hanson, New York city.
117,072.—Animal Trap.—E. Hause, L. Kelley, Tecumseh, Mich
117,073.—Windlass.—O. P. Hix, Rockland, Me.
117,074.—Feeder.—N. Hoggatt, Madison Parish, La.
117,075.—Cider Press.—J. Holbrook, Sherburne, Mass.
117,076.—Ventilator.—J. L. Howard, Hartford, Conn.
117,077.—Rim for Wheels.—L. Hubbard, Ottawa, Ohio.
117,078.—Gaiter Shoe.—F. H. A. Hussey, Lynn, Mass.
117,079.—Harrow, etc.—S. Hutchinson, Griggsville, Ill.
117,080.—Door.—W. C. James, Fishersville, N. H.
117,081.—Peg Sharpener.—A. Kehl, Indianapolis, Ind.
117,082.—Boring Tool.—J. J. Kraus, Menasha, Wis.
117,083.—Molding Machine.—I. L. Lamb, Darien, Wis.
117,084.—Pencil.—R. Lanstrom, Cincinnati, Ohio.
117,085.—Wheelbarrow.—H. Lawrence, New York city.
117,086.—Wheelbarrow.—H. Lawrence, New York city.
117,087.—Making Ice.—C. P. Leavitt, New York city.
117,088.—Printing Press.—T. Leavitt, Everett, Mass.
117,089.—Reflector.—C. S. Lee, W. M. Baldwin, Troy, N.Y.
117,090.—School Desk.—J. Long, E. Convers, Oswego, N. Y.
117,091.—Flanging Machine. S. Lowen, Temperanceville, Pa.
117,092.—Cultivator.—M. F. Lowth, H. Porter, Wabasha, Min.
117,093.—Strainer.—R. and S. Mason, Burgh Hill, Ohio.
117,094.—Liquid Meter.—J. Mead, Charlestown, Mass.

117,095.—Cutting Machine.—J. Meinig, Cincinnati, Ohio.
117,096.—Cooking Range.—E. Mingay, Boston, Mass.
117,097.—Brick Machine.—A. F. Mitchell, Valparaiso, Ind.
117,098.—Drawing Frame.—B. Moon, Coventry, R. I.
117,099.—Steam Trap.—G. R. Moore, Philadelphia, Pa.
117,100.—Button Hole Cutter.—W. A. Morse, Phila., Pa.
117,101.—Sewing Machine.—Carl Necker, Berlin, Prussia.
117,102.—Washing Machine.—P. Nichols, Troy, N. Y.
117,103.—Arm Revolving Shelf.—P. Nichols, Troy, N. Y.
117,104.—Roof.—N. G. Northup, Bloomington, Minn.
117,105.—Corn Sheller.—C. M. O'Hara, Cincinnati, Ohio.
117,106.—Camera.—C. W. Parker, Watkins, N. Y.
117,107.—Spool Case.—W. S. Phillips, Chicago, Ill.
117,108.—Steam Engine.—O. M. Pike, Chicopee, Mass.
117,109.—Dredging Machine.—E. Platt, Charleston, S. C.
117,110.—Key.—Titus Powers, New York city.
117,111.—Heater.—F. H. Pulsifer, Auburn, N. Y., and W. C. Wheeler, Baltimore, Md.
117,112.—Cock.—Joshua Regester, Baltimore, Md.
117,113.—Steam Plow.—Z. Rider, Painesville, Ohio.
117,114.—Jack.—H. L. Riouff, Pleasant Ridge, Ohio.
117,115.—Fly Wheel.—C. Root, Cleveland, Ohio.
117,116.—Cutting Tires, etc.—H. B. Seavey, Vienna, Me.
117,117.—Ladder.—E. O. Shepardson, St. Louis, Mo.
117,118.—Horse Cover.—S. Sibley, Chelsea, Mass.
117,119.—Mold.—I. Smith, New York city.
117,120.—Card Holder.—E. Stewart, Fort Madison, Iowa.
117,121.—Fruit Jar.—L. C. Straub, Pittsburgh, Pa.
117,122.—Pulp Machine.—J. Taylor, Luzerne, N. Y.
117,123.—Evener.—M. Terrill, Star Prairie, Wis.
117,124.—Refrigerator.—M. A. Thornton, Perrysburgh, O.
117,125.—Flax Puller.—S. W. Tyler, Troy, N. Y.
117,126.—Washing Machine.—M. Van Auken, Utica, N. Y.
117,127.—Steam Heater.—D. Vaughan, Cincinnati, Ohio.
117,128.—Spike Mach. O. A. Wadsworth, Allegheny City, Pa.
117,129.—Chimney Cowl.—J. Walker, Boston, Mass.
117,130.—Griddle Greaser.—L. Vard, Poughkeepsie, N. Y.
117,131.—Chandelier.—R. F. White, Hoboken, N. J.
117,132.—Chair.—G. C. Winchester, Ashburnham, Mass.
117,133.—Picture Frame.—R. Wright, Brooklyn, N. Y.
117,134.—Paper Stock.—W. Adamson, Philadelphia, Pa.
117,135.—Extracting Resin.—W. Adamson, Phila., Pa.
117,136.—Paper Stock.—W. Adamson, Philadelphia, Pa.
117,137.—Rivet Machine.—C. B. Allen, Philadelphia, Pa.
117,138.—Welt Trimmer.—J. H. Allen, Wadsworth, Nev.
117,139.—Iron Tray.—J. H. Armbruster, Philadelphia, Pa.
117,140.—Elevator.—L. Atwood, New York city.
117,141.—Valve Gear.—L. Atwood, New York city.
117,142.—Wheel.—J. R. Baird, Vincennes, Ind.
117,143.—Farm Gate.—M. Barthel, San Francisco, Cal.
117,144.—Composition.—O. F. Battey, Worcester, Mass.
117,145.—Tweer.—J. Bauer, Brooklyn, N. Y.
117,146.—Car Standard.—S. S. Beeman, St. Albans, Vt.
117,147.—Wagon Brake.—W. Bryant, Batesville, Ark.
117,148.—Nail.—A. H. Caryl, Groton, Mass.
117,149.—Harrow.—J. Chellew, Glassford, Ill.
117,150.—Button.—E. A. Cobb, Philadelphia, Pa.
117,151.—Collar Pad.—G. P. Cole, Hudson, Mich.
117,152.—Sewing Machine.—G. A. Colter, S. P. Babcock, Adrian, Mich.
117,153.—Engine.—J. M. Conkle, Beaver Falls, Pa.
117,154.—Wash Tub.—A. M. Cushing, Cambridge, Mass.
117,155.—Building Paper.—F. N. Davis, Beloit, Wis.
117,156.—Draining.—E. S. Dickinson, J. L. Peake, New York.
117,157.—Mold.—H. Dillaway, Sandwich, Mass.
117,158.—Nubia.—T. Dolan, Philadelphia, Pa.
117,159.—Boiler.—N. T. Edson, New Orleans, La.
117,160.—Millstone Curb. G. W. Eggleston, Monroe Co., N. Y.
117,161.—Decolorizing Sugar. L. H. G. Ehrhardt, New York
117,162.—Saving Gold, etc.—G. R. Evans, Virginia City, Nev.
117,163.—Tub, etc.—E. A. Firby, East Norwalk, Ohio.
117,164.—Elevator.—L. F. Fischer, Fennimore, Wis.
117,165.—Preparing Food.—R. B. Fitts, Philadelphia, Pa.
117,166.—Churn Power.—B. F. Frampton, Punxatawney, Pa.
117,167.—Brush.—S. A. Gibson, J. B. De Haas, Clearfield, Pa.
117,168.—Boot.—H. V. Gould, Dover, N. H.
117,169.—Adder.—E. M. Hamilton, New York city.
117,170.—Boring Machine.—J. C. Hendry, Manchester, N. Y.
117,171.—Buggy Spring.—H. H. Hill, Pontiac, Ill.
117,172.—Projectile.—T. Hill, Vallejo, Cal.
117,173.—Cartridge.—A. C. Hobbs, Bridgeport, Conn.
117,174.—Wheel.—O. Hyde, Oakland, Cal.
117,175.—Belt Fastener.—W. C. James, Fishersville, N. H.
117,176.—Heater.—G. W. Jones, Nashville, Tenn.
117,177.—Wood Pavement.—J. Judge, New York city.
117,178.—Harvester.—W. G. Kenyon, Wakefield, R. I.
117,179.—Body Loop.—W. W. Knowles, Plantsville, Conn.
117,180.—Earth Auger.—N. H. Lindley, Bridgeport, Conn.
117,181.—Windmill.—T. C. Little, Dixon, Ill.
117,182.—Car Truck.—W. H. and G. H. Little, Peabody, Ms.
117,183.—Shuttle.—J. Lofendahl, Woonsocket, R. I.
117,184.—Solar Compass.—B. S. Syman, Philadelphia, Pa.
117,185.—Cask.—J. Marshall, Brooklyn, N. Y.
117,186.—Ladder.—J. Maxwell, T. Gray, Philadelphia, Pa.
117,187.—Plow Clevis.—A. McCollam, New Orleans, La.
117,188.—Washing Machine.—W. McCord, Sing Sing, N. Y.
117,189.—Neck Tie.—J. McGee, Lancaster, N. H.
117,190.—Car Brake.—J. W. McGlashan, Montreal, Canada.
117,191.—Grain Drill.—D. E. McSherry, Dayton, Ohio.
117,192.—Broom.—W. A. Middleton, Harrisburgh, Pa.
117,193.—Water Wheel. C. M. Mooney, Scotch Plains, N. J.
117,194.—Grate.—G. R. Moore, Philadelphia, Pa.
117,195.—Fastener.—J. F. Morley, Lansing, Mich.
117,196.—Composition.—S. G. Morrison, Williamsport, Pa.
117,197.—Washing Machine.—T. B. Neill, Philadelphia, Pa.
117,198.—Switch.—T. Newman, New Orleans, La.
117,199.—Welding Steel.—B. W. Nichols, Coxsackie, N. Y.
117,200.—Mold. -A. Pearl, Brooklyn, N. Y.
117,201.—Hay Rake, etc.—T. W. Peirce, Minneapolis, Minn.
117,202.—Band Tie.—J. I. Peyton, Washington, D. C.
117,203.—Sewing Machine.—J. Pitt, J. Pitt, E. Pitt, and W. Pitt, Cleckheaton, Eng.
117,204.—Hay Rake, etc.—A. J. Preston, East Guilford, N. Y.
117,205.—Clamp.—C. R. Rand, Dubuque, Ohio.
117,206.—Blower Tube.—B. W. Reynolds, Evansville, Ind.
117,207.—Sewing Machine.—E. P. Richardson, Lawrence, Ms.
117,208.—Cutting Glass.—J. T. H. Richardson, Tutbury, Eng.
117,209.—Folding Chair, etc.—J. M. Rudiger, Brooklyn, N. Y.
117,210.—Coffee Pot.—F. I. Sage, Cromwell, Conn.
117,211.—Axle Box.—P. Seyl, P. Fischer, and P. Brenner, Chicago, Ill.
117,212.—Pavement.—W. E. Shaw, Portland, Me.
117,213.—Cart, etc.—I. Showalter, Chester county, Pa.
117,214.—Halter Buckle.—P. A. Snyder, Butlerville, Ohio.
117,215.—Cultivator.—J. W. Spangler, Jackson, Pa.
117,216.—Trunk.—W. C. Spellman, Hartford, Conn.
117,217.—Journal Box, etc.—S. T. F. Sterick, Georget'n, D. C.
117,218.—Twisting Machine.—T. Stibbs, Wooster, Ohio.
117,219.—Printing Press.—R. J. Stuart, Yonkers, N. Y.
117,220.—Shuttle.—E. A. Thissell, Lowell, Mass.
117,221.—Refrigerator.—J. R. Torres, New Orleans, La.
117,222.—Lime Kiln.—D. H. Turbett, New Bloomfield, Pa.
117,223.—Floating Dock.—H. Van Keuren, Jersey City, N. J.
117,224.—Hoist.—T. R. Vestal, Santa Fé, Tenn.
117,225.—Furnace.—J. J. Vogelgesang, Columbus, Ohio.
117,226.—Shutter.—L. H. Watson, Pittsburgh, Pa.
117,227.—Fastener.—G. A. Wilbur, Woonsocket, R. I.
117,228.—Tea Pot, etc.—L. H. Williams, Cromwell, Conn.
117,229.—Liquid Meter.—D. Williamson, New York city.
117,230.—Planing Machine.—S. A. Woods, Boston, and G. E. Woodbury, Cambridge, Mass.
117,231.—Mule.—E. Wright, Worcester, Mass.
117,232.—Buckle.—W. Yost, Butlerville, Ohio.
117,233.—Compression Bib.—W. Young, Easton, Pa.
117,234.—Friction Clutch.—G. Clisbee, Marlboro', Mass.
117,235.—Ditching Machine.—B. Rhett, Abbeyville, S. C.
117,236.—Jar Cap.—W. Taylor, C. Hodgetts, Brooklyn, N. Y.

REISSUES.

4,470.—Trip Hammer.—J. C. Butterfield and J. Hay, Chicago, Ill.—Patent No. 108,326, dated October 18, 1870.
4,471.—Division A.—Gun Carriage.—J. B. Eads, St. Louis, Mo.—Patent No. 93,691, dated August 17, 1869.
4,472.—Division B.—Gun Carriage.—J. B. Eads, St. Louis, Mo., Patent No. 93,691, dated August 17, 1869.
4,473.—Wringer Roller, etc.—J. F. Holt, Providence, R. I.—Patent No. 49,030, dated July 25, 1865; reissue No. 3,930, dated April 19, 1870.
4,474.—Cultivator.—L. Packard, Galesburg, Ill.—Patent No. 25,087, dated August 9, 1857.
4,475.—Hydrant.—W. Race, Lockport, N. Y., and S. R. C. Matthews, Philadelphia, Pa.—Patent No. 19,306, dated January 26, 1858.
4,476.—Carbureter.—B. Sloper, St. Louis, Mo.—Patent No. 115,988, dated June 13, 1871.
4,477.—Silvering Glass.—W. A. Walker, New York city.—Patent No. 97,838, dated Dec. 14, 1869.
4,478.—Steam Pump.—N. W. Wheeler, Morristown, N. J.—Patent No. 115,670, dated June 6, 1871.

DESIGNS.

5,127.—Group of Statues.—H. C. Brix, Copenhagen, Denmark.
5,128.—Show Case.—W. H. Core, New York city.
5,129.—Clock Front.—W. H. Griffiths, Boston, Mass.
5,130.—Jelly Glass.—T. R. Hartell, Philadelphia, Pa.
5,131.—Table Caster.—C. H. Latham, Lowell, Mass.
5,132.—Cake Pan.—A. Reid, Buffalo, N. Y.

TRADE MARKS.

372.—Salt.—F. Baker, Boston, Mass.
373, 374.—Caster Oil.—H. J. Baker & Bro., New York city.
375.—Sugar Corn.—J. Baxter, Portland, Me.
376.—Illuminating Oil.—Bostwick & Tilford, New York city.
377.—Illuminating Oil.—Bostwick & Tilford, New York city.
378.—Composition Bearing. -Jackson & Wiley, Detroit, Mich.
379.—Paint.—O. Johnson & Co., Providence, R. I.
380.—Medicine.—S. H. Kennedy, Johnstown, N. Y.
381.—Wood Working.—McBeth, Bentel & Margedant, Hamilton, Ohio.
382.—Crackers.—W. N. Monies, L. Pughe, Scranton, Pa.
383.—Chemical and other Preparations.—E. F. Suire & Co., Cincinnati, Ohio.
384.—Paint.—The Averill Chemical Paint Company, New York city, and Cleveland, Ohio.
385, 386.—Paint.—G. T. Young & Co., Plainfield, N. J.

EXTENSIONS.

Harvester.—J. P. Manny, of Rockford, Ill.—Letters Patent No. 17,798, dated July 14, 1857; reissue No. 3,580, dated August 3, 1869.—Division A.
Harvester.—J. P. Manny, of Rockford, Ill.—Letters Patent No. 17,798, dated July 14, 1857; reissue No. 3,581, dated August 3, 1869.—Division B.
Harvester.—J. P. Manny, of Rockford, Ill.—Letters Patent No. 17,779, dated July 14, 1857; reissue No. 3,524, dated June 29, 1869.—Division A.
Harvester.—J. P. Manny, of Rockford, Ill.—Letters Patent No. 17,779, dated July 14, 1857; reissue No. 3,525, dated June 29, 1869.—Division B.
Harvester.—J. P. Manny, of Rockford, Ill.—Letters Patent No. 17,779, dated July 14, 1857; reissue No. 3,526, dated June 29, 1869.—Division C.
Lock.—L. F. Munger, of Rochester, N. Y.—Letters Patent No. 17,804, dated July 14, 1857; reissue No. 62, dated April 2, 1861.
Cotton Gin.—D. Pratt, of Prattville, Alabama.—Letters Patent No. 17,806, dated July 14, 1857.
Centering Machine.—E. F. Whiton, of Stafford Springs, Conn.—Letters Patent No. 17,814, dated July 14, 1857.
Steam Tight Joint.—M. J. Kelsey, of Brooklyn, N. Y.—Letters Patent No. 17,835, dated July 21, 1857.
Passenger Fare Box.—J. B. Slawson, of New York city.—Letters Patent No. 17,899, dated July 28, 1857; reissue No. 550, dated May 4, 1858; reissue No. 4,240, dated January 24, 1871.

APPLICATIONS FOR EXTENSION OF PATENTS.

Manufacture of Seamless Felt Garments.—Delos W. Gitchell, Newburgh, N. Y., and Luther W. Badger, Elizabeth, N. J., have petitioned for an extension of the above patent. Day of hearing, October 4, 1871.

Cotton Seed Planter.—T. W. White, Milledgeville, Ga., has petitioned for an extension of the above patent. Day of hearing, October 4, 1871.

Harvester.—Hosea Willard and Robert Ross, Vergennes, Vt., have petitioned for an extension of the above patent. Day of hearing, October 18, 1871.

Melodeon.—Stanley A. Jewett, Cleveland, Ohio, has petitioned for an extension of the above patent. Day of hearing, September 27, 1871.

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Cartridge Case.—G. H. Berdan (of New York), St. Petersburgh, Russia.
Double Crank.—E. Quinn, Brooklyn, N. Y.
Lubricating Compound.—W. Salamon, New York city.
Mixer.—J. Dixon, New York city.
Paper File.—A. A. Schlesinger, New York city.
Postal Envelope.—E. J. Smith, Washington, D. C.
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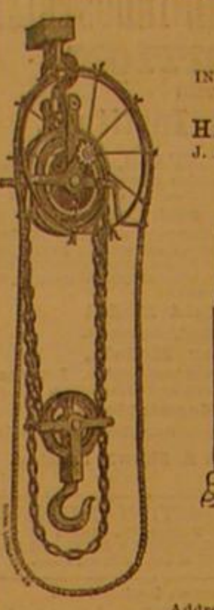

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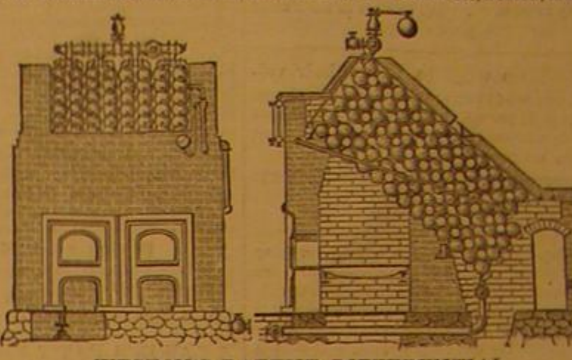

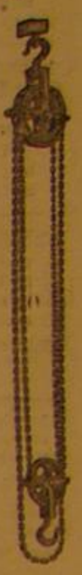

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