

Scientific American.

MUNN & COMPANY, Editors and Proprietors.

PUBLISHED WEEKLY

At No. 37 Park-row (Park Building), New York.

O. D. MUNN, S. H. WALES, A. E. BEACH.

TERMS—Two Dollars per annum.—One Dollar in advance, and the remainder in six months.

Single copies of the paper are on sale at the office of publication, and at all the periodical stores in the United States and Canada. Sampson Low, Son & Co., the American Bookellers, No. 47 Ludgate Hill, London, England, are the British Agents to receive subscriptions for the SCIENTIFIC AMERICAN. See Prospectus on last page. No Traveling Agents employed.

VOL. III., No. 1.....[NEW SERIES.]....Fifteenth Year.

NEW YORK, MONDAY, JULY 2, 1860.

PROGRESS OF SCIENCE—THE PRESS AND PATENT LAWS.



N mental grasp and acuteness of intellect, in architecture, sculpture and great works of civil engineering, the ancients were not our inferiors. To whatever subject the Greeks and Romans devoted themselves intently, they arrived at great perfection; and, perhaps, if their minds had been directed to the necessity of inventing some great motive agent, the improved steam engine would have been the work of Archimedes instead of James Watt. But, although the human intellect has been the same in nature and power in all ages, yet it is accumulative in knowledge, and this leads to progress in invention. This is the reason why there are many arts and sciences in our day that were never heard or thought of by our ancient progenitors. It is an old and true saying that "Necessity is the mother of Invention," for, whenever a want is felt, the deep aspirations of nature are moved to supply it—and usually with success; hence, invention is truly the offspring of necessity.

Very great improvements have been made in science and art in our day, but the subject of greatest wonder connected with them is their rapidity of development. As much progress has sometimes been made in a few months in the present century, as in hundreds of years in the "olden times." We have no difficulty in arriving at the cause of this; it is the combined influence of the press and patent laws. These are the grand agencies for stimulating and encouraging invention, and thus impelling the car of Progress "onward with impetuous speed." Watt did not invent an engine for his own special use; Fulton a steamboat, Whitney a cotton gin, or Morse a telegraph; these were invented to supply public wants, and the press is the great agent for making these wants known. The scientific press, as a speciality, is the handmaid of progress in the useful arts. Of this, there can be no doubt—it is a fact founded on reason, and exemplified by the experience of everyday life. The SCIENTIFIC AMERICAN, as a personality, can testify to the truthfulness of these statements being corroborated by its experience of the past fifteen years. During that period, more valuable inventions in mechanism have been made than in thousands of years before the art of printing was known. The art of printing, by accumulating knowledge, permits every new generation to move forward from a higher elevation, because men of genius and inventors are now furnished with a knowledge of the discoveries made by others before them, and they are thus saved from wasting efforts in a wrong direction. It is thus that the scientific press is an economizer of public labor, as well as a teacher and friend of science and art.

One of our great specialties is the encouragement of inventors by patent laws as a just national institution for their protection. It requires no argument, because it is a self-evident fact, that the rapid advancement which our country has made in science and all the arts is due, in a paramount measure, to our patent laws. In a recent article in the London *Mechanics' Magazine*, on the manufactures of Switzerland, it says:—"It has been truthfully remarked that Switzerland has produced no eminent inventors. In accounting for this, Mr. Barnby—the British Secretary of Legation in that country—thinks we must look for the cause of this in the fact of there being no patent laws." We believe

that no other fact can be adduced for this, and from it we derive a most important lesson. Switzerland is distinguished for the skill of her artists and mechanics in a great variety of manufactures; and, for intense industry, her people surpass those of every other nation. But they have made no great inventions; they have derived their improvements mostly from France and Germany, where inventions have been encouraged by patent laws.

All the great inventions which have been evolved by our countrymen were protected by patents. It was under the encouragement of our protective laws that their authors labored on in hope and with unremitting toil in the accomplishment of their grand designs. We believe, we are warranted in making the assertion that our distinguished inventors could not, and would not, have produced those improvements which have given them wealth and fame, unless they had been encouraged and protected by patent laws. In commencing a new volume, we look forward with animated hope to still greater achievements in science and art than have yet blessed the earth, because the mighty agencies of the Scientific Press and patent laws exert a more extended influence for good than they ever did before.

ECONOMY OF STEAM.

Everything that relates to this subject is of general importance, because the steam engine is so universally and diversely employed to subserve the purposes of commerce and the arts. It would naturally be expected that, with the advancement of knowledge and discovery, the opinions of scientific and practical men as to the best methods of applying steam would be more correct and uniform than heretofore. This, however, is not the case; the opinions of engineers and others who have devoted attention to this subject never were so various as at the present moment. Some believe that there is no gain in working steam expansively; while others as strongly contend that a saving of 50 per cent of fuel may be secured by expansive working. One believes that high-pressure steam is of vast advantage; while another asserts that low-pressure steam is equally economical, and much safer. Some believe that superheating the steam effects a great saving; while others contend that combined superheated and common steam surpasses all other conditions and arrangements for economy. A majority of those who are held to be high authority in engineering matters have, of late years, also advanced the theory that steam, when expanding in a cylinder, condenses into water in proportion to its rate of expansion, while there are a few who deny that such condensation takes place. These opinions are both various and contradictory; yet, among those who entertain them, a uniform sentiment prevails as to the small amount of power obtained in proportion to the fuel consumed for engines, thus admitting that there is great room for improvements.

As it regards the working of steam expansively, a paper was recently read before the Polytechnic Association, in which it was stated that experiments conducted at the Metropolitan Mills afforded evidence unfavorable to the advantages which are held to be gained by expansion, and we know that several engineers entertain similar views. That there is a decided gain to be obtained by working steam expansively is very easy of calculation. Thus: supposing we use steam of 80 lbs. pressure in a cylinder, and cut off at one-fourth of the stroke, we obtain an average pressure of 41.65 lbs. Unless there is a great loss sustained by condensation during expansion, it is evident, therefore, that there must be a saving of about 50 per cent of the steam.

The conclusion appears inevitable that, in every case where steam has been employed expansively without any apparent benefit, there has been some defect in the engine—such as unprotected cylinder and pipes or leaks by the valves. The new engines of the vessels belonging to the Pacific Mail Steamship Company (British), in which the system of expansion is carried out in a very superior manner, do the same work as the old engines, with about one-half the coal. We have been informed that one of the chief-engineers of the United States Navy has made trips in one of these steamers, for the purpose of acquiring information regarding their steam economy, and that he has presented a most able and favorable report on the subject to the Naval Board at Washington.

With regard to the employment of high-pressure steam, there is great economy when worked expansively. If steam, at 50 lbs. pressure, is cut off at half-stroke, it will exert an average pressure of 37.5 lbs.; while the same weight of steam at 25 lbs. pressure, without being cut off, will operate with a pressure of 12½ lbs. less. In the former case, the steam is expanded in the cylinder; in the latter, it may be said to have been expanded in the boiler. If it absorbed power to generate steam in proportion to the pressure in the boiler, no saving could be effected in using it at a high pressure. In practice, it requires a little more fuel to raise steam under high than low pressures; but the gain of power is greater than the increase of fuel. The boiler is the source of power, and it is evident that, with high pressure and expansive working, there must be great economy, unless condensation takes place in the cylinder independent of pressure and temperature, which does not seem possible.

The liquefaction of steam by simple expansion is a new theory, claimed to have been discovered about the same time by Professor Rankine, of Scotland, and Clausius, of France. The former gives formulæ for calculating the amount of condensation in proportion to the expansion; and yet there has not been a single fact adduced in proof of such liquefaction of the steam. Steam does not liquify in any boiler until its temperature is lowered below 212°, a result which does not take place by expansion while the pressure is maintained above that of the temperature.

Various ideas are afloat regarding the meaning of superheated steam; but it will simplify the subject to adopt the definition of Mr. J. Frost, who, above all other men, deserves to be called its inventor. According to his description, it consists of "common steam subjected to a higher temperature than itself out of contact with water." By allowing steam to flow from a boiler through tubes exposed to a high temperature in the smoke-stack or in the furnace, it becomes superheated. The employment of such steam in cylinders in place of common or saturated steam effects quite a saving of fuel, and it is becoming quite common in England on board of steamers.

Another condition or method of employing steam, lately introduced, is the "Wethered system." It consists in using superheated and common steam in combination in the cylinders of engines. Mr. J. Wethered, of Baltimore, recently read a paper on the application and advantages of his system before the Institution of Civil Engineers (England), and on the 3d of April last an entire evening was devoted to its discussion by the members. As applied to the British screw frigate *Dee*, it was stated that the result of 20 experimental voyages gave, with combined steam, 500 H.P. in the engine; with superheated steam alone, 409 H.P.; and with common steam, but 404 H.P. It was also stated that the combined steam had also been applied to a non-expansive engine, when the consumption of fuel fell from 35 to 24 cwt. per week. It was admitted by the members of the institution that the "Wethered system" effected a great saving of fuel in the steamer *Dee*, but it was held that the steam should not be superheated more than 100°, and that all the extra caloric it required was just a sufficient amount to permit common steam remaining dry to the end of its required expansion. In closing the discussion, it was stated, as the general opinion of the members, that the practical introduction of the system of superheating steam in England was greatly owing to the exertions of Mr. Wethered. He had succeeded in moving the British Admiralty when an English engineer could not have been so successful. This was also a subject of congratulation to them, as it was desirable, at all times, to give the greatest encouragement to foreigners, so as to attract the best talent.

Viewing the question of steam economics from various points, it appears evident that a great saving is effected by using high-pressure steam, superheating it, and then working it expansively in the cylinder. Boilers can be made to withstand a pressure of 100 lbs. per inch as easily as 20 lbs.; therefore, safety depends altogether on the construction of the boiler. A few years ago, it required about 6 lbs. of coal to a horse-power in steamships, but the *Persia* steamer consumes from 3.92 lbs. to 4.2 lbs. per horse-power now; while some steamers, built within three years, in which high-pressure and expansive-working are carried out, do not consume over

one-half of this quantity per horse-power. We believe that the day is not far distant when 1 lb. of coal per horse-power will be all that is required, and engineers should labor to effect this result, for, theoretically, it is attainable. Such an achievement would effect a complete revolution in ocean navigation. The *Persia* consumes from 110 to 164 tons of coal per day. When this amount (as it may be) is reduced to one-fourth, she would only consume 350 tons for a voyage, instead of 1,402 tons—the quantity which she has actually consumed in 10 days.

NEW ARRANGEMENTS AT THE PATENT OFFICE.

The Commissioner of Patents has established a special bureau to hear and determine Interference cases and applications for Extensions; thus relieving the Examiners and tending to render the decisions of the Patent Office in those cases more uniform than they have heretofore been. This arrangement is an excellent one, and has long been needed. Up to the present time it has been the practice to require the Examiners to take charge of and decide all Interference cases arising in their respective classes, subject to the approval of the Commissioner. But so greatly has the general business of the Office and the number of new applications made for patents increased, that the Examiners find themselves unable to give proper attention to Interferences and Extensions without neglecting or postponing other cases of importance. The bureau just established will therefore greatly relieve them.

The Bureau of Interferences and Extensions has been placed under the charge of Examiner Henry Baldwin, who is more particularly known at the Patent Office as Judge Baldwin. We regard this appointment as an excellent one. Judge Baldwin is one of the oldest and most experienced officers in the department, and he is fully qualified to discharge the important duties of the newly-created bureau with success.

Mr. John Van Santvoord succeeds Mr. Baldwin as Examiner-in-chief of that class which is composed of fibrous and textile inventions, which includes sewing, spinning, weaving and knitting machines. Mr. Van Santvoord has had much experience in this division, and the appointment is most judicious.

Mr. Adams takes the chief charge of the classes which embrace vapor lamps, medicines, hay rakes, winnowers and some other divisions. Mr. Adams is a careful and experienced officer.

Mr. Howell has been appointed an Assistant-examiner in the class embracing steam engines, &c.

Mr. Scheft is transferred to the division which comprises presses, railroads, &c.

The Patent Office—take it altogether—is, at the present time, in a highly flourishing condition; and its officers, with few exceptions, exhibit in their official views and actions a uniform and commendable liberality of disposition toward inventors. In these respects a very marked change has been observable within the last three years, which alteration we attribute, in a great degree, to the wisdom and firmness which has characterized the labors of the Board of Appeals. There has been no change in this board; the members are Messrs. Lawrence, Little and Rhodes.

No institution of the kind in the world presents a better organization or administration than that of the United States Patent Office as now constituted.

KNITTING MACHINERY.

It has long been a desirable object to obtain a machine which could knit a stocking "from top to toe" without a seam, and which would fit the foot as neatly and sit as easily as one knit by hand. This has at last been accomplished. On the 5th ult., we examined four unique knitting machines in the shop of Messrs. Raymond & Richards, in First-street, Williamsburgh, which knit at the rate of two pairs of entire stockings in nine minutes, as timed by our watch. One girl can attend four machines, and produce over ten dozen pairs of stockings per diem. Three threads are fed simultaneously on one machine to the needles, which are placed around a circular "former" or cylinder that is actuated to execute the difficult operations of forming the legs and feet alternately. The devices for accomplishing these results are ingenious and peculiar. The stockings are knit in a continuous web; the toe of one is finished when the top of the other begins, and by

drawing out a thread, the one is separated from the other. Nominally, there is no waste of yarn, and the mechanism is strong and durable; and as the needles have no latches, they are not liable to break.

The American and European patents for these machines belong to the McNary Knitting Machine Company, of this city, and will not be sold at any price. The object is to license only fifteen factories in the United States, each making its own particular class of stockings, and all will be protected in the full and peaceful enjoyment of their rights.

Since the above article was written, we are informed that the machines referred to have been removed to Oldham (near Paterson), N. J., to the hosiery factory of Charles & William Hodges, who have contracted for machinery sufficient to make 500 dozen pairs of stockings per day through the whole term of the patent.

RECENT AMERICAN INVENTIONS.

The following inventions are among the most useful improvements patented this week. For the claims to these inventions the reader is referred to the official list on another page:—

PEN-HOLDER.

The object of this invention is produce a cheap pen-holder, which will allow of carrying the pen in the pocket without damaging the same, and which accommodates itself to any pencil, whether round or polygonal, and the invention consists in the use of an elastic tube with its noses, which form the socket for the pen, turned up or otherwise arranged in such a manner that a pencil or another cylindrical or polygonal stick can be put clean through said tube whether the pen is in the socket or not, so that when it is desired to use the pen, said tube can be pushed out to the end of the stick, and if it is desired to put the pen in the pocket, said tube together with the pen can be slid back, or the stick or pencil to such a position that the pen is protected. The inventor is A. F. Warren, of Brooklyn, N. Y., who obtained a patent for the same through the Scientific American Patent Agency.

DRAY.

This invention is an improvement in two wheel vehicles, particularly in that class known as the street dray, and used for transportation of boxes of goods, bales, barrels and like articles of a heavy and unwieldy character. It consists in attaching the shaft to the floor of the vehicle, by a king-bolt and a peculiar lock, so that when the dray is backed up in a narrow street to receive, or be discharged of its load, the horse may be turned round at right angles to the dray, out of the way of passing vehicles. The credit of this contrivance is due to H. M. Walker, of Watertown, Conn.

SHINGLE AND BOX MACHINE.

The object of this invention is to obtain a machine which will be automatic in its operations, for sawing up bolts into shingles, or slabs for boxes. The invention consists in clamping the bolts in a reciprocating carriage, that moves over a horizontal circular saw, which, at each movement of the carriage, saws off from the bolts a slab gaged to the proper thickness, by alternately releasing and confining the bolts previously to presenting them to the saw, adjustable gage tables being placed at each end of the machine. For shingles, the beds of the gage tables are set obliquely, and alternately change their obliquity from one side to the other, so as to give the shingles their proper tapering or wedge form. This invention was patented by E. T. Wheeler, of Cannelton, Ind.

SKATE.

The object of this invention is to remedy a serious objection attending the heel attachment of the skate patented December 20, 1859, wherein no provision was made to secure the skate against a longitudinal thrust of the foot. This improvement consists in forming an attachment by a vertical dovetail groove and tenon which will prevent the skate from casually getting detached from the boot, either by a lateral, forward or backward movement. This improvement was secured by additional Letters Patent to Thomas S. Whitman, of this city.

PORTFOLIO.

This invention consists simply in attaching to the inside of one leaf, of the portfolio two or three elastic cords which have flat needles on their ends, and affixing to the other leaf, inside, loops to receive the needles. The papers, letters, music, &c. &c., are secured in the portfolio by passing the needle through the marginal backs

and through the loops, when the back scores of the leaves will be drawn close together by the elastic cords, and hold the paper smoothly in place making a self-holding, self-adjusting book-shaped portfolio. This device has been patented to J. N. Jacobs, of Worcester, Mass.

FENDER FOR DOCKS.

The object of this invention is to obtain a simple and efficient device for preventing vessels of navigation from being injured by coming in contact with docks, piers and the like, and one which may be readily applied, and readily adjusted when applied, to suit vessels of various heights, as well as to suit the depth of the water so that a proper protection may always be interposed between the vessel and the dock or pier, or other structure to which this invention is applied. The invention consists in the use of a frame, provided with rollers and suspended to the dock, pier, or other structure by means of chains and a windlass, the frame having elastic rollers attached to its inner side, and also connected to the dock, pier, or other structure. The patentee of this invention is Jacob Moomey, of Clinton, Iowa.

HEATING APPARATUS.

This invention consists in the combination with a stove or furnace having suitable provision for the admission of air, to support combustion, and for the escape of the gaseous products thereof, of a chamber having a perforated top, and a reservoir for giving a properly regulated supply of oil or other inflammable or combustible liquid to the said chamber, to be burned as fuel above the perforated top thereof. The credit of this contrivance is due to Lyman Bridges, of Chicago, Ill.

BAGASSE FURNACE.

The object of this invention is to overcome the difficulty of stirring the fuel at the sides of the hearth and clearing the outlet, which exists in bagasse furnaces having their fire-chambers of circular form; and to this end it consists in the construction of the fire-chamber of the furnace of square or other polygonal form in its horizontal section, with its outlet at one angle, and with doors arranged at its other angles, for the introduction of rakes or pokers in such a manner as to provide for the clearing of the outlet, and the prevention of the choking of the draft, and for the stirring of the fuel on all parts of the hearth. The inventor of this improvement is Charles A. Desobry, of Plaquemine, La.

BACK PAY ALLOWED.—Several of the Examiners at the Patent Office, though nominally appointed as assistants, have, in fact, for some months past, discharged the duties of Chief-examiners. Congress has lately passed a bill giving them back pay as Chief-examiners from the day of commencing such service. Good

The broom business is active in Hadley, Mass., and the adjoining broom corn towns. The brush is now all in the hands of the manufacturers, who paid eight to nine cents per pound for it, and find a ready sale for their manufactured results.

NEW BOOKS AND PERIODICALS RECEIVED. ST. PAUL'S TO ST. SOPHIA, OR SKETCHINGS IN EUROPE; by Richard C. McCormick, author of "The Camp before Sevastopol," "The Italian War of 1859," &c. Sheldon & Co., publishers, No. 115 Nassau-street, this city.

There was a time when books of European travel were not only valuable but eagerly sought for. Then, comparatively few Americans went to Europe, and almost every one who did so seemed to think it a duty to write a book of travels. The facility of semi-weekly steam ocean navigation, bringing us within nine days of Europe, has quickened the spirit of travel so much that direction that an European voyage now surprises no one. Books of travel have, of course, largely multiplied, and, for the most part, are not of much interest or account; in fact, we seldom think it worth our while to look at these ephemeral publications, much less to undertake to read them. The book in hand is an exception to the general rule. It is an entertaining and lively production, and will well repay a perusal. The author is an observing gentleman, and has the right sort of elements to produce an interesting and unobjectionable work.

DICKENS' GHOST STORIES; T. B. Peterson & Bros., publishers, Philadelphia.

These stories, numbering 31, have never before been published in this country. They relate to a great variety of topics, and even the inventor has his experience in obtaining a patent humorously told. We gave an excellent extract from this story on page 373 of our last volume. All the sketches are entertaining, and are told in Dickens' best vein. The above publishers have issued several different editions of Dickens' works.

NORTH BRITISH REVIEW; Leonard Scott & Co., publishers, No. 54 Gold-street, this city.

The present number of this able quarterly contains nine original essays, besides its usual minor reviews of current literature. It contains one scientific article, by Sir David Brewster, on "Scottish Lighthouses," which is the fruit of a little controversy between him and the Stevensons, engineers of the lighthouses. To this subject we shall revert at some future time.

BLACKWOOD'S MAGAZINE (by the same publishers) for this month is a splendid number. It contains articles on the "War in China," the "Life of Wellington," "Captain Speke's Adventures in Africa," and several others—all evincing marked ability.

HOE'S ILLUSTRATED CATALOGUE; the most beautiful illustrated catalogue of machinery that we have ever examined has just been issued by Messrs. R. Hoe & Co. It contains illustrations of the printing presses manufactured by them in their establishments at Boston and in this city. Messrs. Hoe & Co. are the most extensive manufacturers of printing presses in the world, and they now own the entire right of the Adams patent printing press, which they make principally in Boston.