THE
Scientific American.

MUNN & COMPANY, Editors & Proprietors.

PUBLISH D W EKLY AT
NO. 37 PARK ROW (PARK BUILDING), NEW YORK.

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

VOL. X. NO. 7...[NEW SERIES.].....*Twentieth Year.*

NEW YORK, SATURDAY, FEBRUARY 13, 1864.

Contents:

(Illustrations are indicated by an Asterisk.)

INVENTION, THE ALLY OF CIVILIZATION.

It is a little singular, when we reflect upon the subject, that the physical construction of the globe is essentially the same to-day as it was 3,000 years ago. It is true that rivers have diverged from their courses, that the sea encroaches upon the land, and that lands are reclaimed from the sea; that volcanic mountains vomit forth their contents and lay waste the fairest and most fertile countries; that mines cease to give up their treasures, and that new ones are being discovered in their places; yet one might suppose, in view of the never-ending supply of new and useful tools, machines, apparatuses, processes and labor-saving appliances, that a new world had been discovered, teeming with boundless wealth, and also with suggestions ready made for the benefit of inventors and the elevation of the best interests of mankind.

No! it is not so. All the world is the "old world" as it came forth from the hand of God; as it started in its orbit to move forever, until checked by the same power that imparted the first movement to it. This assertion does not relate to the labors of man in drawing forth from the natural productions of the globe all that is useful and beautiful; and we merely call our readers' attention to the fact that, while the physical construction of the earth remains the same, the ingenuity of man is continually changing its social and political aspects. Where once the wild savage stalked and screamed his fierce war-whoop through the forest, a mightier than he now whirls upon its way; not indeed a foe to the advancement of mankind, but an ally, an aid to it. The roar of the railroad train, the shriek of the steam whistle, the clatter and jar of the factory-loom, the quick, sharp twitter of the sewing-machine, the incessant rustle of the reaping-machine through the grain, the splash of paddles, the miles on miles of telegraph wire, the hoarse booming of the rifled guns crashing their shot against impenetrably-mailed ships, the far-ranging rifles and small-arms—all these are the types and exponents of civilization as much as the savage is a symbolization of the rudest, wildest, and most uncultivated stage of the world's existence.

Behold how invention has shortened the labor of men! and how each year seems to bring us nearer to that social millennium when the fullest and most perfect development of the world's resources would seem to have been attained! In times of peace, when the arts are undisturbed by other causes, then indeed civilization makes long strides toward reducing the world to a state of cultivation and prosperity. Even when the nervous arm and the iron heel of War overruns the land, it is only by strenuous effort and arduous application that invention is able to repair the mischief, by bringiug forth still better machines, more effective processes and methods than existed before. Therefore in one sense war is a benefit because it stimulates men to greater efforts. In any case, invention is the true ally of civilization. The ax, the hammer and the saw are good in their place; likewise the plow, the loom, and the anvil; but if the world were to wait on the capabilities of these simple instruments to supply its wants, the age would be backward indeed. The progress of the period is gratifying in the extreme, and he is indeed a far-sighted individual who can predict where or when it will cease. Invention succeeds invention; no sooner are the public wants manifested than they are satisfied; and the tendency of them is to make the world wiser and better. Even warfare itself will soon be made so destructive to life that none can be found to engage in it, and nations will learn that the arts of peace are those which advance their interests more swiftly than force, fraud, or diplomacy.

"MACFIE" ON PATENTS.

Our foreign cotemporaries are just now excited over the conduct of an individual named "Macfie." This ingenuous personage has raised a storm of honest indignation about his ears for simply writing what is called a "tract," comprising only 100 pages. The title of this publication is "The Patent Question," and in it Mr. Macfie proposes to show that the granting of patents do great harm to traders, but especially to those who do traffic abroad. This grievance (says Macfie in effect) should be suppressed; and to this end he suggests that patents should only be granted for three years, and after that time publicly appraised; and the value, not exceeding $5,000 in any one case, to be paid over to the patentee. If this person does not happen to be the real inventor (as is often the case in Great Britain and some other foreign countries), the injustice of such a proceeding is manifest at once. But there are other awards to be given to men of genius; medals are to be struck off—possibly electro-plated ones—and ribbons are to be presented as incentives to still further research; and the modern inventor who has perhaps spent years of toil in bringing forward his machine or process—the man who has lightened the labor of the world, and made plenty where famine once reigned—these benefactors are to be stuck over with brass and streamers till they resemble New Zealand savages or a ship newly launched.

The proverb says "Republics are ungrateful;" but if Macfie's little proposition is acted upon, what shall be said of Principalities and Powers? Supposing after all the time and toil which Wilson bestowed upon his sewing machine, that our Government appraised its value at $5,000 and, handing over that sum, together with a red ribbon and a brass medal, set him adrift! With what justice then might we not repeat that "republics are ungrateful." We might bring Morse into consideration, Colt upon the stand, Manny, McCormick and others, as evidence in point that such an absurd proposition as Macfie's shows little knowledge of trade, the first principles of the value of a patent, or even expresses sentiments of common justice. And yet this gentleman is chairman of the Liverpool "Chamber of Commerce!" Herein we find the key to the whole matter; this fact, connected with the assertion that "patent laws are an injury to trade" (the silliest and the baldest nonsense ever uttered), shows convincingly the animus of the writer. Says Macfie, substantially:—"Here is a greasy inventor; he has no education, he has neither money nor friends; but by his ingenuity he has constructed a machine that accomplishes ten times as much as was formerly done, and he is in a fair way to make money—to 'get on' in life. In the meanwhile, however, what are the distanced competitors in trade to do? This machine will revolutionize the trade; it is in this respect an injury to it, we can't compete! What must be done?"

Why what, of course, but to abolish the patent laws! Take away the legal protection afforded to talent and ingenuity, rob the inventor of his discovery, and what is the result? Simply a return to the old time processes, the slow methods in vogue ages ago; that is one way to benefit trade. And this is just what Macfie proposes to do. He has not honored us with one of his pamphlets, but we gather our facts from the London *Engineer*, and we are pleased to see the vigor with which our contemporary repels this attack upon the rights of inventors—a common brotherhood of genius all over the world.

TUNGSTEN AND ITS ALLOYS.

Some important and interesting experiments have lately been made in France, by order of the Minister of War, to determine the influence produced by *tungsten* upon gun-metal, steel and cast-iron, when combined with them and forming alloys. Tungsten is one of the rare metals, which the great majority of persons have never seen. Its name signifies "heavy stone," and it is also called *wolfram*. In its native state it is found as an ore associated with iron, manganese, sulphur and arsenic. It is reduced from the ore by fusion with carbon, and with a current of hydrogen gas. In the metallic state it is difficult of fusion, hard, brittle and gray in color. There is only one mine of tungsten ore in France. When roasted the sulphur and arsenic are driven off, leaving iron and manganese combined with the tungsten. The experiments, which were conducted by M. Caron, satisfactorily proved that when one per cent of tungsten was added to cast-iron, the grain of the latter became more regular, and there was greater homogeneity exhibited. The addition of one per cent of tungsten to steel increased its hardness and tenacity. A steel rifle barrel, containing that amount of tungsten, was subjected to severe tests, and it withstood larger charges of powder and heavier shot than any other steel barrel of the same dimensions tested. M. Caron recommends the employment of tungsten in all French steel to improve its quality. On the other hand it was found that tungsten was incapable of forming true alloys with copper, tin and gun-metal; it mixed with gun-metal, but rendered it less homogeneous and tenacious.

AMERICAN FLAX-COTTON AND MACHINERY.

We have repeatedly called the attention of our readers to the importance of developing flax culture throughout the Northern States. This valuable fiber may now be extensively cultivated and employed in various manufactures, and a favorable opening exists for the invention and introduction of improved machines to clean and prepare it for spinning. The subject is already receiving considerable attention, and we anticipate that the time is not far distant when this branch will become one of the great manufacturing industries of the country. We have recently received from Joseph Taylor an excellent sample of flax-cotton such as is now being made at Lockport, N. Y., by the Lockport Flax-cotton Company. The fiber is white and strong, much resembling coarse wool, and it is made up in battings, which find a ready market. Considerable quantities are sold to woolen cloth manufacturers who mix it with wool as a substitute for cotton. The Company has appliances for producing about 2,000 lbs. per day; but our correspondent states that an improved machine for cleaning the flax so as to free it completely from shives, also a good carding machine, are much needed. This Flax-cotton Company has been in operation but little over a year, and during that time several valuable improvements have been made, yet there is an ample field for many more.

AMERICAN STEEL AND MACHINE-CUT FILES.

New branches of industry, embracing many improvements over old modes of manufacturing, are being continually developed, and especially has this been true since the beginning of the war, which has taxed the productive resources of the country to their utmost. Among the many new industries which have sprung up, as if by magic, is that of manufacturing files by machinery. At Bridgeport, Conn., a few days since, we witnessed the operation of file-cutting by a very simple yet beautiful mechanical contrivance. The steel was operated upon by a hammer-chisel, which produced the same effect as if the blow had been struck by hand, but of course much more rapidly. The files also appeared to be quite equal to those made by hand, and the manufacturers assured us that they gave equal satisfaction.

We learn (from the *Commercial Bulletin*) that the Whipple File Manufacturing Company at Ballardvale, Mass., is also doing a very large business in manufacturing files by machinery, and that no less than one hundred and forty machines are now in operation and forty more are being built. The *Bulletin* states that this Company manufactures their own steel, which is of a superior quality. Several tuns of it are now turned out daily. We believe that this is the

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only file establishment in the country where the steel for the files is manufactured on the premises. Hitherto all the steel that had been used for American-made files was imported from England. It therefore affords us pleasure to make a record of the enterprise of the Whipple File Manufacturing Company.

On page 22, Vol. XIV. (old series) of the SCIENTIFIC AMERICAN, we gave a very full description of the processes and operations involved in the manufacture of files by hand; and we said:—"It seems reasonable that machinery might be constructed to cut files as well, in every respect, as can be done by hand." This opinion has now been confirmed, although at the time it was penned, many practical file-makers with whom we had conversed, believed that a machine could not be made to put the same burr edge upon files, as a skillful hand-cutter. We also said in that article, with respect to the steel:—"Our steel comes from England, while the Sheffield file-makers manufacture their own steel, and are thus enabled to meet rivals in every market in the world. Until we make our own steel (and we do not see why we should not do it), our toolmakers must labor at a great disadvantage in competing with those tools which come from abroad." This suggestion has met with consideration, and the results are indeed gratifying.

THE PRESSURE PRODUCED BY GUNPOWDER.

Professor Barnard, of Washington, has communicated to *Silliman's Journal* an article on the pressure produced by burning gunpowder in a cannon, in which he shows that the several experimenters differ very widely in their results; some stating the pressure at 7,000 or 8,000 lbs. to the inch, and others at more than 200,000. Professor Barnard objects to all of the methods pursued by the different experimenters, and then remarks that we finally have an investigation which leaves nothing to desire—the investigation made by Messrs. Bunsen and Schischkoff. These eminent chemists analysed all of the substances resulting from the combustion of gunpowder, and calculcated the pressure which they would exert if confined in the space occupied by the powder before it was burned; taking into account the specific heat of the several substances. Professor Barnard remarks that the powder was burned under the pressure of the atmosphere only, and expresses the opinion that the result would not be materially varied by that circumstance.

The best chemists in this city assert, on the other hand, that the burning of gunpowder under the pressure of the atmosphere only, affords no criterion whatever of the effects which would be produced by burning it behind a heavy shot in a cannon. By confining the powder, the heat would be far more intense, and this intense heat would cause an entirely different class of compounds to result from the combustion; thus destroying the foundation of the calculations.

We will also suggest another objection to this investigation. The specific heat of the several products varies with the temperature, and at the high temperature in question has not been ascertained.

Captain Rodman's plan of measuring the pressure of the gases resulting from the combustion of gunpowder in a cannon would seem, at first thought, to be unobjectionable. This plan has been illustrated in the SCIENTIFIC AMERICAN. It consists in boring a hole through the wall of the gun and screwing into this hole a hollow cylinder fitted with a solid piston, the outer end of the piston being of diamond form. When the gun is fired, the pressure of the gas drives the end of the piston into a sheet of pure copper to a depth varying with the pressure. The piston is afterward forced into another piece of pure copper to the same depth by means of a press, the force of which may be measured, and the pressure of the gas is taken to be the same. It has been objected to Rodman's method that the inner end of the piston not being in contact with the powder, the gases would acquire a very high velocity in passing outward through the hole in the wall of the gun, and would strike the piston with a force far exceeding their pressure. It seems to us that there is force in this objection.

Captain Rodman found a pressure, in one instance, as high as 180,000 lbs. to the square inch, and it has been objected by Mr. Fisher, of this city, that such pressure would crumble the cannon to dust—the power of cast-iron to resist a crushing strain seldom if ever exceeding 120,000 lbs. to the square inch. The reply to this is, that the pressure does probably crush the iron within the scope of its influence; but, as the pressure is only momentary, it is exerted only upon the surface—causing an enlargement of the bore. Captain Rodman says that the pressure ordinarily produced in a cannon would blow the gun to pieces if it were not instantly relieved.

As the objection raised by Professor Seely and Professor Everett to the investigation by Bunsen must be as familiar to that eminent chemist as his A B C's, we cannot help suspecting that there may be some error in our account of his inquiry. It will be seen, however, by an extract in another column, that the President and many Fellows of the Royal Society are of opinion that the subject has never yet been properly and thoroughly investigated. Bunsen's calculation gave a pressure of 65,000 lbs. to the inch, and there is no reason to suppose that his method would make the pressure any less than it really is. We invite the attention of our men of science to this interesting subject.

OUR SUBSCRIBERS.

At the commencement of this volume of the SCIENTIFIC AMERICAN we made an appeal to our friends to aid us in extending its circulation. The response to the appeal has been most noble and gratifying; and to all those valued friends we return for their kindness our warmest thanks. Our paper is not large enough to publish the names of all, as we would like to do; we therefore select only those who have taken the trouble to get up large clubs:—

AMERICAN WATCH COMPANY	Waltham, Mass.
BASSETT, C.	Massillon, Ohio.
BELL, J. W.	St. Louis, Mo.
BLANDY, H. F.	Zanesville, Ohio.
BRADISH, A.	Decorah, Iowa.
COOPER, C. & J.	Mount Vernon, Ohio.
CROSS, C. H.	Pulaski, N. Y.
DUNNELL, J.	Pawtucket, R. I.
DUVINAGE, L.	Owego, N. Y.
FLUKER, F. F.	Provincetown, Mass.
FOSDICK, S. W.	Clinton, Mass.
GARST, JOHN	Dayton, Ohio.
GOODELL, DeB.	Elmira, N. Y.
HALTEMAN, A. K.	St. Louis, Mo.
HAGERMEY G.	Big River, Cal.
HEMINGWAY, H. N.	Des Moines, Iowa.
HILL, C. F.	Hamilton, Ohio.
HOLMES, JONAS	Clayville, N. Y.
HUBBARD, C. S.	Whitneyville, Conn.
JONES, WILLIS	Bridgeport, Conn.
LATHROP, G. W.	Weedsport, N. Y.
LYMAN, T.	Sandusky, Ohio.
McCONNELL, J.	IowaCity, Iowa.
MARSTON, F. J.	Houghton, Mass.
MILLER, E.	Meriden, Conn.
MOSES, W.	Buffalo, N. Y.
NEWCOMER, G.	Meadville, Pa.
NIXON, W.	Adrian, Mich.
ORAHOOD, H. M.	Black Hawk, Col. Ter.
REED & CO., G. W.	Montreal, C. E.
ROBINSON, H. C.	Monmouth, Ill.
SAGER, M. S.	Washington C. H., Ohio.
SHORT, W. A.	Malone, N. Y.
STRUNK, D.	Janesville, Wis.
THOMPSON, C. B.	St. Catherines, C. W.
VAN FRIES, H. S.	Hollidaysburg, Pa.
WARFIELD, G. W.	F to ville, Mass.
WICK, JR., C. B.	Sharon, Pa.

"Yet," we say, "there is room for a few more." Our subscription list is not quite full; and we appeal again to our many thousands of readers to "follow in the footsteps of their illustrious predecessors."

PRESENT STRENGTH OF THE BRITISH NAVY.

The official annual return of the number, name, tunnage, station, and every particular regarding the steam and sailing ships composing the British Navy, together with the horse-power and armament of each, has been published under the authority of the Lords Commissioners of the Admiralty. The total strength of the effective ships of the navy on the 1st of January was 975 of all classes, not including a number doing duty in the various harbors both at home and abroad, the whole of which would be speedily converted into block ships for the defence of the coast, together with a numerous fleet of iron and wooden mortar-boats laid up at Chatham. Of this number there are 72 vessels ranking as line-of-battle ships, each mounting from 74 guns to 121 guns; 42 vessels of from 60 guns to 74 guns each; 94 steamers and other ships, carrying an armament of from 22 to 46 guns each, and the majority of which are of a size and tunnage equivalent to line-of-battle ships; 25 screw corvettes, each carrying 21 guns; and 500 vessels of all classes, including iron ships of great power and tunnage, carrying an armament of from four guns to 21 guns each. Exclusive of the above there is a squadron of 185 screw gunboats, each mounting two Armstrong guns, and nearly the whole of which are fitted with high pressure engines each of 60-horse power. The total number of ships of all classes in commission and serving in nearly every part of the world is upwards of 300, the remainder being attached to the reserved squadrons at the various naval ports, and partially equipped in readiness to proceed to sea whenever their services may be required.

RECENT AMERICAN PATENTS.

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

Machine for dressing Slate.—This machine consists of a rectangular frame which may, if necessary, be mounted on wheels for the convenience of transporting or removing the machine from one locality to another. This frame is provided with a fixed knife and also suitable bearings for a lever or sword arm which carries a movable knife. This sword arm is suspended by a spring or springs, so that when in a normal position the movable cutting edge is raised above the lower knife edge, and the two edges resemble a pair of open shears and act in the same manner. A treadle frame is attached by means of a link to a lever, which is upon the same spindle as the sword arm, and the knife edges are brought together by the pressure of the foot of the workman, or, if desired, the machinery may be worked by mechanical power, by applying power to the treadle lever, or the treadle lever may be dispensed with and the power may be applied direct to the sword arm. The spindle of the sword arm is made adjustable to compensate for wear in the cutting edge and other working parts and a gage plate with suitable marks or points, corresponding to the different recognized sizes of roofing slates, is placed on the frame-work, so that the rough slates may be laid in their proper places and adjusted with facility. If desired a double set of shears or cutting edges may be employed, so that two sides of the slate may be cut, trimmed or dressed at the same time, but this will not be found a convenient arrangement in practice. C. E. Amos, of Southwark, London, England, and John Francis, of Penrhyn, North Wales, are the inventors of this improvement.

Skate Fastening.—This invention consists in the employment of revolving cam buttons attached to the sides of the runners and acting upon the ends of the straps which serve to fasten the skate to the foot in such a manner that by turning the cam button after the strap has been drawn tight, the end is firmly clamped between the edge of the slot in the runner, through which it passes, and the point of each cam button and the ordinary buckles or other tedious fastenings can be dispensed with. Geo. P. Schifflin, of New York city, is the inventor of this improvement.

Punching Press.—This invention consists in the combination with the rod or pitman which connects the main shaft of the press with the slide carrying the punch or slide of an adjustable eccentric and clamp in such a manner that by rotating said eccentric the position of the punch or cutter in relation to the work, can be adjusted with the greatest facility and with perfect accuracy, It consists, further, in the arrangement of a slide with triangular guides operating in two jaws cast solid with the stock of the press and held in place by a triangular gib, in such a manner that all the bearing points or surfaces of the jaws and of the carriage can be planed off by one operation and without changing the position of the piece to be planed on the bed of the planing machine, and consequently all these surfaces must be perfectly parallel; and furthermore, the set screws used to adjust the gib

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