The 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—Three Dollars per annum—One Dollar in advance, for four months.
Single copies of the paper are on sale at the office of publication, and at all periodical stores in the United States and Canada.
Sampson Low, Son & Co., the American Booksellers, 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. VIII, NO. 20...[NEW SERIES.]....*Nineteenth Year*

NEW YORK, SATURDAY, MAY 16, 1863.

REFORM THESE ABUSES!

It sometimes occurs in the operations of a machine-shop that the ordinary chucks fitted to lathes will not take in the work to be done, and resort is then had to wooden blocks bolted to the face-plate and turned out to any desired form. Sometimes these blocks are screwed on to the spindle itself, but in either case they cost time and money to make. It would seem from the want of care and attention paid to these necessary appurtenances of a machine-shop that they were considered useless except for temporary purposes, and that the only disposition to be made of them is to leave them around on the floor, under the vice bench or in any hole or corner that is unoccupied by any thing else. Some men find them useful to batter mandrels or arbors into work they are about to turn, to sit upon at noon-time, to build a fire with in the mornings, they find them convenient to punch sheet iron upon; in short, wooden chucks are abused in an infinite variety of ways which seem to us altogether wrong. Put them away in a safe place like any other tool. Assuming that the block will not run true after being shifted from the lathe it can still be re-turned and employed again for work approximating in shape to the first job it received. The block out of which the chuck is made is always the best piece of wood to be had, and it is poor economy to cut up lumber to use, or rather abuse, in the manner set forth above. And in this connection it will not be amiss for us to protest against battering up the centers of shafts or mandrels by carelessness. No good workman needs to have any remonstrance addressed to him on this score; but bad ones are continually guilty of the practice referred to. If a workman wishes to damage his reputation in the eyes of all intelligent artisans he will take a heavy hammer and blunderingly whack away on the delicate center that should be as carefully protected as the pupil of the human eye. Such a course only results in mischief; in a well-regulated shop it is soon found out, and the individual committing this outrage on common sense should be immediately dismissed from the shop. It also looks very knowing, when erecting new work, to use the naked face of the hammer upon finely-polished gibs, keys and straps. If the brass does not go back to its seat, why not examine it to find out the source of the difficulty? Do not smash away on the bright flanges of it with a rough hammer. By so doing the careless artisan will have the mortification of spoiling his employer's property and of creating a reputation for himself which ought to prevent him from obtaining employment until he has changed his method of working. Carelessness and laziness are the parents of such folly as this, and no person but one utterly lost to a sense of mechanical decency would be guilty of it. We are confident that these requests will be met in the right spirit and that good results will be manifest if they are followed.

ROCKETS IN WARFARE.

All persons are familiar with the sky-rocket as used for signalling and pyrotechnic display. It mounts upwards with the velocity of an arrow in a pathway marked with its own fire. The application of rockets as destructive missiles of warfare is plausible in theory, and on some occasions they have been used with advantage, but on the whole, not with perfect satisfaction. There are many persons, however, who believe that rockets may be so improved as to become nearly as effective as artillery. The common sky-rocket is made with a paper case, and is furnished with a stick-tail, the object of which is to keep the mouth of the case (from which the fire escapes) downwards, and the rocket is thus projected by the charge contained within itself. It is said that such missiles were used in India and China, for war purposes, before artillery was known in Europe. These were common sky-rockets, each of which was furnished with a barbed arrow head. Sir William Congreve made a great improvement on the rocket as a war projectile by using a sheet iron, instead of a paper conical case, and supplying it with a central instead of a lateral stick-tail. Rockets have advantages in carrying within themselves their own propulsive power, and they neither require guns nor mortars to project them, consequently they may be carried to situations where it would be difficult or impossible to use artillery. They may also be made quite large, and an infantry soldier might carry one or two and discharge them in commencing an engagement, after which he would not be cumbered with more than his usual arms.

Rockets have also great defects, and these have operated against their general use. Their flight is irregular; they cannot be discharged with advantage against the wind, or across a rapid current of air, hence they are not so reliable as shot and shell fired from guns. The long wooden stick of a rocket acts as a lever for the wind to deflect the iron case, and to such an extent has this deflection occurred in several instances that, like boomerangs, they have returned to the place whence they were started. The Duke of Wellington entertained a strong prejudice against them on this account, yet he had always a rocket brigade attached to his army.

The original ideas of Sir William Congreve—the inventor—with respect to the use of rockets in warfare, have never been carried out fully in practice. He suggested three methods of firing them; and infantry, cavalry and artillery were to be furnished with supplies. One method of firing was by a tube singly; second, in a volley from several tubes mounted on a carriage; and thirdly, by a volley from the ground. The rocket tube is a cylinder of brass or iron, corresponding in size with the diameter of the rocket intended to pass through it. Its object is chiefly to give a correct line of flight. (No tubes were used with the earlier Congreve rockets.) This tube can be placed at any angle of elevation, and pointed like a gun. When the proper line of aim is secured, the rocket is thrust into the tube and ignited, when out it rushes on its destructive course. In the English army, the rockets have been fired in volleys from the ground with their heads towards the enemy. For the first hundred yards, they ordinarily pursue a regular course, at an elevation of about five feet eight inches, then they become very irregular in their motions and dart about in all directions. Sometimes they have proved as dangerous to those who discharged them as those they were intended to destroy. In full motion the power of rockets is tremendous, and could they be so improved as to secure certain flight, they would perhaps be as effective in the field, and for bombarding fortified places, as shells. Of course, they cannot penetrate iron plates, or smash down the solid stone walls of forts, but they scatter destruction among the ranks of soldiers, and carry flames into all combustible materials.

THE GALVANIC ACTION BETWEEN IRON AND COPPER IN VESSELS.

When two metals of different degrees of oxidation are connected together in salt water, they form a galvanic battery, and the most oxidizable metal is soon decomposed. Thus copper and iron form a galvanic battery in salt water, and the iron rusts with astonishing rapidity. Copper sheathing cannot therefore be safely employed on iron-plated ships, unless the two metals are completely isolated. Thus far no satisfactory method has been adopted for attaining such a result. Several of the wooden-framed iron-plated ships in the French navy, which have been sheathed on their bottoms with copper, have been found defective. The frigate *La Gloire* is an illustration of this. Her iron armor-plates, extending below the water line, formed an electro-galvanic couple with the copper sheathing through the medium of the salt water. After having been over a year in service, forty tuns of barnacles were scraped from her bottom when she was docked, and much of her iron work was permanently injured. This galvanic action sometimes takes place also in wooden steamers sheathed with copper. A correspondent of *Mitchell's Steam Shipping Journal* states that paddle-wheel steamers frequently foul opposite the arms and rims of the wheels. He had seen the copper sheathing of wooden steamers, both in the navy and merchant service, thickly coated to the extent of one-third the diameter of the wheels, after a voyage to the West Indies, with oysters, barnacles, coralline, worm-shells and weed—the copper becoming negative by the proximity of the iron wheels, which require to be turned frequently, lying in harbor, to prevent the inner arms from being destroyed by galvanic action. The inner arms and rims of the steam-sloop *Cormorant* were reduced to the thickness of a dollar on a single voyage, between Tahiti and Valparaiso, in 1844, and were obliged to be renewed, the copper-sheathing being unusually foul. Iron should not be allowed to come in contact in salt water with either copper or brass in steamers or sailing vessels. Copper and brass feed-pipes for boilers are objectionable on this account. For the same reason care should also be exercised that cables be not allowed to lie in contact with the copper sheathing of sailing vessels.

SEWING MACHINES IN EUROPE.

A paper was read before the Society of Arts, London, on the 8th of April, by Edwin P. Alexander, on the "History and Progress of the Sewing Machine." The credit is given to Mr. Elias Howe, of Cambridge, Mass., as being the inventor of the first practical sewing machine using two threads; and an account of the sewing-machine business in America occupies the greatest portion of that interesting paper. Most of the information relating to American sewing machines has been published in the columns of the SCIENTIFIC AMERICAN. Full credit is given to American inventors, and their improvements are highly praised.

As it respects the sewing machine in Europe, it seems that several single-thread and embroidering machines had been invented in England prior to the arrival of Mr. Howe in that country—(after having secured his patent in America in 1846)—but they were all defective. It is stated that Mr. Howe sold his patent in England to William Thomas for a trifling amount, and it has proved very unfortunate for the English people and American manufacturers of sewing machines that Howe's foreign patent should have fallen under the control of such a person. On this head Mr. Alexander says:—"Although the sewing machine was in practical operation in this country before it had been thoroughly recognized in America, it has received no radical improvement at our hands; all the most important improvements being due to American inventors. Its general introduction here was greatly impeded by the refusal of one of our first patentees to grant licenses to make or sell American machines, which by many are preferred to those of English manufacture. Had a more liberal policy been pursued, and licenses granted to all comers at a reasonable rate, the sale of machines would have been quadrupled, endless law proceedings avoided, and the profits to the patentee greatly enhanced. In 1860 the patent in question expired, and the public has since then enjoyed the privilege of selecting those machines best adapted to their special requirements, the majority of which are of American manufacture. The real trade in sewing machines has only existed in England since 1860, but the sewing machine is now beginning to make its way in various departments of manufacture in this country, and a steady demand for family sewing machines is showing itself."

At first there was a strong opposition manifested against them by English operative shoemakers, who struck generally against their employment. These very operatives have since found that their conduct was positively against their own interests. They now consider the machine to have greatly benefited them, especially in the manufacture of the lighter kinds of

work. At present the number of sewing machines in use in Great Britain and Ireland is estimated at 60,000, while the number in America is estimated at 300,000, about 75,000 of which are used in families for domestic sewing.

THE NEW CANADIAN PATENT BILL.

There is now pending before the Canadian Parliament a very well digested patent bill, which, if it becomes a law, will enable American citizens, and all other foreigners to secure Letters Patents for their inventions in those Provinces. The bill passed its second reading on April 10th, and official and private advices assure us that it will become a law.

Under the present Canadian patent system, patents are granted only to resident subjects, who must also be inventors of the improvements for which Letters Patent are sought; thus effectually shutting out all except *bona-fide* Canadians. We rejoice in the present hope that a system so ill-advised is likely to be swept from the statute-book, and that full reciprocity in this matter is to be introduced. The bill before us contains sixty-nine sections, wherein liberal provisions are made for the protection of new inventions, designs and trade-marks; and in many respects it resembles our own laws—indeed, some of the provisions seem to have been copied from them, almost word for word.

We will present a brief digest of such features of the bill as are most likely to interest our readers. Patents are to be granted to original inventors for a term of fourteen years, and can be extended upon the proper proofs being adduced before the Commissioner of Patents, that the inventor has failed to secure, without fault, a reasonable profit from his invention. New and useful designs will be protected for terms of three and five years according to their character. Trade-marks will be protected without specified limit, to those who originate and adopt them in their business. In the case of all mechanical inventions a suitable model will be required at the time of application; in the case of designs and trade-marks, models will not be required. The twenty-ninth section provides that all Letters Patent for inventions granted under the provisions of the bill shall cease at the end of one year, unless the patentee shall have, within that period, commenced and carried on the manufacture of, or caused to be manufactured, within the Province, the articles so patented; but the time may be extended six additional months on sufficient reasons being shown to the Commissioner. This feature of the bill is designed to promote the industry of the Provinces, and is copied from the French law of 1844. We do not like this clause, and should be glad to see it stricken out; but if this cannot be done, let the time for introduction be extended to three years at least. We cannot complain of this feature with a very good grace, so long as it exists in respect to foreigners in our own statutes; the bill before us makes this application to all patentees without distinction. Patentees and assignees of patents are required to stamp the patentee's name and the date of the patent on all articles sold under the patent; but this section of the bill is defective, inasmuch as it provides no penalty for the omission—a law without some penalty for its violation is quite innocent and harmless.

The schedule of fees is somewhat lengthy, and, on the whole, higher than our own, though they are quite reasonable. We will omit their publication now, as, before the bill becomes a law, they are liable to modification. Ample provisions are also made for the prosecution of infringers, and for the punishment of frauds.

The language of the bill is quite clear and unequivocal; and, on the whole, we like its provisions. We hope, moreover, that it will be speedily adopted; but we fear on this point, as we call to mind the several futile attempts which have been made in that direction. We sincerely hope that all friends of patent-law reform in Canada will see to it that this bill is not allowed to die in Parliament for want of proper nursing.

STEAMBOAT-MEN at St. Louis say that the expenses of the Vicksburgh expedition, for the single item of chartering steamers, are $40,000 a day.

THE REBEL SHOT.

The press of the country are continually expatiating in one form or another upon the excellence of the English projectiles and the damage they did to our iron-clads in the late encounter off Fort Sumter. The theme is endless and seems to afford an unlimited amount of discussion. The inference from reading all the sensible treaties published on the matter in question, is that we have no missiles in this country capable of doing such execution as was done by the foreign shot. These foreign projectiles are spoken of as "highly polished," as "conical" as "possessing penetrative power in a high degree," in a word, endowed with every conceivable mechanical virtue which renders them extremely formidable and pre-eminent as destructive agents.

We listen with patience to these laudations, but we beg our readers to understand that as contributions to the stock of standard scientific knowledge they are not imperishable. The fact of the matter is, that the shot fired by the rebels on the occasion were partly of domestic and partly of foreign origin, and from illustrations published on page 276, current volume of the SCIENTIFIC AMERICAN, it will beseen that the rebel domestic shot are merely fac-similes of the celebrated Stafford projectile which has demonstrated its penetrative power most fully. The rebels in arms against the authority of the nation, have simply made use of the facilities afforded them by other traitors in the employ of the Government, and used them to our disadvantage. There is no particular mystery attending their possession of this formidable shot. We have fired thousands of Parrott shot and Stafford's shot and shell at the enemy. We have given them opportunities which they were not slow to improve, and they have merely picked up the missile sent them and pelted us in turn with fac-similes of their own manufacture. That the Whitworth shot and shell possess destructive properties we do not deny, but that we have equally as good, and as powerful ordnance, and as efficient shot and shell, we can prove to the utter dissatisfaction of our foes.

The Parrott 300-pounder shot is said to have pierced 9-inch iron plates heavily backed up, and the Stafford shot is known to have demolished targets composed of 7 inches of iron, with ease. There is now in the Brooklyn Navy-yard a huge wrought iron gun of 12-inch bore, unrifled, which has sent its shot through at least 6 inches of iron; the shot weighs 280 pounds and the gun weighs 21 tuns. It is the mate to the one called the "Peace-maker," which exploded on the U. S. Steamer *Princeton* many years ago, and was constructed by the builder of the celebrated Horsfall gun, over whose performance at Shoeburyness, England, the English papers have recently made such ado.

We have as fine artillery and naval ordnance in this country as the world can produce. The unofficial inventors of the North have constructed perfect armories wherein to manufacture their several weapons from all materials—wrought-iron, steel, semi-steel, and cast-iron; and quite recently the Bureau of Ordnance in Washington has advertised for proposals for wrought-iron guns, so that we may soon expect to see what our inventors can do toward substituting this variety of iron for that used by the Government heretofore. Let us have done with senseless laudation and exaggeration of our enemies' strength and prowess, and turn our eyes to objects within the legitimate scope and field of our observation. Let all the Jellybys fix their fine eyes on Borrio-boola-gha, if they choose; but let those gifted with common sense embrace the opportunity of diffusing some portion of it among their fellow-citizens.

INGENUITY OF A MASSACHUSETTS SOLDIER.—There is a beautiful and finished specimen of the ingenuity of a Yankee soldier on exhibition in Boston. It is a four-bladed knife of exquisite polish, with every part complete, including a large blade, two smaller blades and a "nail-cleaner," manufactured by a soldier of the Massachusetts 39th Regiment, encamped in Virginia, during his leisure hours. It was made from a common beef-bone, and its appearance is highly creditable to the skill of the painstaking and ingenious soldier. The scabbard of a sword, made from the same material, can be seen in the window of the same store.

DEFECTIVELY-DESIGNED BOILERS.

We understand that Mr. L. E. Fletcher, Chief Engineer of the Manchester Association for the Prevention of Steam Boiler Explosions, has nearly 2,000 boilers under his charge, and he has had more opportunities of examining into the practical causes of explosions during the past few years than any other person living. In his report for the month of March last, as published in the London *Engineer*, it is stated that during the month he examined 60 boilers thoroughly and 409 externally. The opinions of such a professional and practical man are, therefore, of great value. In giving an account of a vertical boiler which had exploded on Feb. 23, 1863, by which thirteen persons were killed and fifteen injured, he states that the iron of the boiler was in good condition, and there was plenty of water in it at the time of the accident. But "a serious oversight," he says, "had been made in the design of the boiler—the top end being hemispherical and the bottom flat. The hemispherical end would, when the steam was up and blowing off freely, have an upward pressure of nearly 250 tuns acting upon it and tending to tear it away from the bottom. There would be an equal downward strain counteracting this, induced by the pressure of the strain upon the crown and tapering sides of the fire-box combined with that upon the flat plate forming the bottom of the annular water space. As long as the attachment between the bottom and the top of the boiler held good, the two forces would be in equilibrium and the boiler remain at rest upon its bed. But should the attachment fail, the upward force would instantly shoot the top of the boiler upward with a buoyancy of 250 tuns, which is equal to the weight of a long railway train including the engine and tender. This action is exactly what took place. The flat plate at the bottom gave way, rending completely around through the seam of rivets at the outside ring of angle iron which attached it to the shell, when the boiler flew up and was carried to a distance of 160 yards from its original seat. There is nothing surprising in this, when the force of pent-up steam within so large a boiler is considered (the boiler was 20 feet high and 9½ feet external diameter), and the due appreciation of which shows how unnecessary is the supposition of the existence of explosive gaseous compounds or any force greater than steam itself, while the propagation of such theories only tend to divert attention from the real cause of steam boiler explosions."

ACTION OF SULPHURIC ACID UPON LEAD.

The manufacture of sulphuric acid is one of the most important arts, because this acid is the active agent that is used in a large number of chemical processes. It is condensed and concentrated in chambers and vessels lined with lead, as it exerts a very feeble action upon this metal. It will dissolve tin, copper, and iron with wonderful rapidity, but lead resists its action. It has generally been held by men of science that metals are less acted upon by acids in proportion to their greater degree of purity, hence lead-smelters and chemists have endeavored to secure the purest lead possible for chemical establishments. It would seem that these notions are erroneous. It is also stated in works on chemistry that sulphuric acid only acts sensibly upon lead at a temperature of 383°. This also appears to be erroneous. Mr. T. Crace Calvert, F. R. S., has lately published a paper on this subject, detailing a series of experiments made by himself and R. Johnson, with three kinds of lead and sulphuric acid, and the results of those go to prove that the purest lead is most actively acted upon by the acid. The metal chosen was common commercial sheet lead of 98 per cent. purity, virgin lead of 99 per cent. purity, and chemically pure lead. Sulphuric acid of different densities were used, and in several experiments the temperature of the acid ranged from cold up to 120°; and the lead was submitted to the acid from ten up to fifteen days. In all cases it was found that the action of the acid was about three times as great upon the pure as the most impure lead; and although the action was greater according as the temperature was elevated, still a portion was dissolved at a temperature of 64°. Such results were unexpected; they are of much interest to chemists.