

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 treatises 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 be seen 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 tons. 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 tons 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 tons, 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, bending 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.