

Scientific American.

MUNN & COMPANY, Editors & Proprietors.

PUBLISHED WEEKLY AT

NO. 37 PARK ROW (PARK BUILDING), NEW YORK.

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

Messrs. Sampson Low, Son & Co., Booksellers, 47 Ludgate Hill, London, England, are the Agents to receive European subscriptions for advertisements for the SCIENTIFIC AMERICAN. Orders sent on them will be promptly attended to.

"The American News Company," Agents, 121 Nassau street, New York.

American and Mexican News Company, Mexico, are Agents for the SCIENTIFIC AMERICAN.

Messrs. Trübner & Co., 60 Paternoster Row, London, are also Agents for the SCIENTIFIC AMERICAN.

VOL. XIV., No. 24. [NEW SERIES.] Twenty-first Year.

NEW YORK, SATURDAY, JUNE 9, 1866.

Contents:

(Illustrations are indicated by an asterisk.)

*Hearn's Hay-raking and Loading Device.....	391	Sawing Lumber.....	396
Healthful Effect of the Tomato.....	391	New Publications.....	396
Recent Photographic Improvements.....	391	Report on the Cattle Plague.....	396
Scientific Steel Pens.....	392	Storage of Gun Cotton.....	396
Our Special Correspondence.....	393	New Invention.....	397
Weights and Measure.....	393	Notes and Queries.....	397
Education of Workmen.....	393	*Allison & Bannan's Portable Boring Machine.....	398
Monitors in England.....	394	Special Notices.....	398
Salt and Soda.....	394	A Royal Blacksmith.....	398
*Hickman's Improved Washer.....	394	Bottled "Aloric".....	398
How American Velvet is Made.....	394	Humors of Business.....	398
An Extensive Salt Mine.....	394	Coal and a Substitute.....	399
Estimates about the Cotton Crop.....	394	Breech-loading Rifles for Sportsmen.....	399
Ancient War Implements.....	395	Educating other Nations.....	399
*Cryptography.....	395	Changes in Forms of Letters Patent.....	399
The European Naval Excursion.....	395	Patent Claims.....	400, 401, 402, 403
		*Gonner's Screw Wrench.....	404
		*Evans's Weather Strip.....	404
		*Ryerson's Churn.....	404

COAL AND A SUBSTITUTE.

In our last issue we referred to the subject of the anticipated exhaustion of the coal beds of Great Britain as having engaged the attention of Parliament, through the agency of such eminently practical men as John Stuart Mill and Mr. Gladstone. That there is some reason for the anxiety manifested by these gentlemen, at least so far as coal is concerned, there can be no doubt, but we do not subscribe to the opinion that, with the last tun of coal, goes the welfare of the toiling millions of England. Coal, either bituminous or anthracite, is not a condensed form of carbon. It is bulky, and in combustion leaves a large residuum of no value at all as a fuel. Already, even in this country, where the supply is apparently inexhaustible, invention is busy to provide a substitute for coal, or rather to procure a better and less bulky article of fuel. Of course the growth of our forests cannot be depended upon, as wood is more valuable for other purposes, and its bulky nature, even if it could outlast a hundred generations, would prevent it from ever superseding the fossil fuel now so generally used.

But there is another substance more generally diffused in all countries than either wood or coal, and one which is being continually formed. This is peat, which in some respects has qualities as a fuel far in advance of coal. It is now being manufactured by disintegration and compression, and put in use for stationary and locomotive engines. For many years it has been used in its crude state for domestic purposes in this country, and in Ireland it is the common fuel. The "bogs of Ireland" are immense receptacles or reservoirs of this substance—the debris of dead vegetation—and in Wales and many portions of England it abounds. It is not less common in this country, and since coal has ruled so high, attention has been turned to this substantial in plentiful and so easily obtained. It is said to give weight for weight, a much greater heat than coal, and for foundry and smelting purposes, is superior, as being entirely free from sulphur.

The bogs, or meadows containing peat, are in many localities continually encroaching upon the firmer land. The movement of the immense masses of decayed vegetation in morasses between hills or on the slopes of mountain ranges, is analogous to that of the glacier—imperceptible but sure and certain. There are cases in England, in Scotland, and even in this country, where the bogs have pushed their boundaries, year by year, until large tracts of valuable

arm lands have been overwhelmed and ruined. Here, then, are inexhaustible mines equal to those of coal, and having the advantage of being on the surface and easily wrought.

But the experiments in working petroleum as a fuel have not yet proved failures. There is but little doubt but this substance will be made to occupy an important position in the economy of domestic and manufacturing enterprise, so soon as its production in quantity sufficient will reduce its cost to a figure which will authorize its employment as a fuel.

Common pitch, from which the spirit of turpentine is distilled, has been tried in a pulverized state by a Russian naturalist, and is now being tested by the Russian Admiralty as a fuel for generating steam in the boilers of steam frigates. The result thus far, has been, report says, eminently satisfactory.

A French chemist claims to have realized the fable of bottling up sunlight by means of acetate of soda. He claims that by evaporation, after being confined, this substance will give out a strong heat. If he is successful our English friends of this generation may be able to carry in their pockets portable stoves for warming the outer man as many now carry stomach warmers.

Seriously, however, we cannot suppose that a diminution of the fuel now used can occur to such an extent as to threaten the prosperity of a great manufacturing nation without bringing with it a discovery which shall at least make good the loss.

BREECH-LOADING RIFLES FOR SPORTSMEN.

By reference to our Washington correspondence, it will be seen that at least one man is ready to bet that, with his breech-loading rifle, he can surpass in accuracy any muzzle-loader that can be produced—proving pretty conclusively that in the one thing needful—accuracy—breech-loading rifles have at last reached a point of excellence equal to that of muzzle-loaders. As they are greatly superior to muzzle-loading guns in convenience, ease, and rapidity of loading, and as they obviate the necessity of carrying into the woods a variety of apparatus—ramrod, powder horn, charger, percussion caps, and in the case of false-muzzle guns, mallet and driver—they will now, no doubt, be generally adopted for sporting purposes.

A very general defect in breech-loading rifles, made up to the present time, has been a want of sufficient weight in the barrel. For army purposes it is manifestly extremely desirable to have the arms of infantry soldiers made just as light as possible, the man being required to carry on foot a load of other things; but for any considerable range this lightness can be obtained only at the expense of accuracy. There is no use in offering to sportsmen a gun, however excellent in all other qualities, that is not absolutely perfect in accuracy. If there is anything which he regards with intolerable abhorrence it is a rifle that will not carry the bullet where it is pointed.

A very light rifle is peculiarly objectionable for those long ranges which are now in universal vogue. For those ranges it is necessary to have heavy elongated bullets and large charges of powder, producing a recoil which throws a light rifle out of position, and utterly destroys all accuracy of fire. The extent of the range is also diminished by lightness of the barrel. It was formerly supposed that one-half of the force of the charge was expended on the shot and the other half upon the gun, but Professor Treadwell has demonstrated that the portion of the force expended on each is in proportion to the distance which each is moved while the force is acting upon it—that is, during the passage of the shot along the barrel. This proposition was overlooked by a writer so well informed as Professor Silliman, and so recently as 1858. In his "First Principles of Philosophy," page 22, he says, "By the principle that action and reaction are equal (27), we know that when a musket is discharged the force of the explosion reacts upon the musket with the same intensity as it projects the ball. According to the principles of momentum, the weight of the gun, multiplied by the velocity of the recoil, must be equal to the weight of the ball, multiplied by the velocity of its projection, yet the recoil of the gun is received by the sportsman with perfect impunity, while the moving ball deals death or destruction to opposing objects."

Professor Treadwell's proposition results from the

first principles of mechanics. Work is measured by the amount of the force and the distance through which it acts, regardless of time. It is somewhat surprising, therefore, that the proposition has been so generally overlooked.

The fatal want of accuracy, and the diminished range of very light guns, may be well worthy of consideration by our ordnance officers in determining the weight of our army rifles.

EDUCATING OTHER NATIONS.

Quite enough has been done, we think, in the improvement of other nations by our example alone, in originating, experimenting, and carrying to completion radical and valuable improvements in every department of mechanics, without carrying our schools to their doors and furnishing them with instructors gratuitously. Of course it cannot be expected that any national improvement, the operation of which must be open to the inspection of foreigners as well as our own people, can be kept a secret, but it is not necessary for the government to spend hundreds of thousands for the purpose of combating foreign prejudice and compelling a recognition of our superiority, when, if successful, the result will be merely to enable other nations to equal us, and thus relatively reduce our position.

The proposition of sending the *Miantonomoh* to Europe, in charge of Assistant Secretary Fox, ostensibly on a visit of ceremony to the Czar Alexander, but really to exhibit our progress in naval affairs to Europe, we do not really approve. It is unnecessary for us to go cruising about the world with a traveling show, in order to gain the respect of other nations. The game is not worth the powder. We know that we are the peer of any nation that boasts a navy, and if we desire to prove it we have only to refer to the achievements of our monitors during the past four years.

The resolutions of respect, sympathy, and congratulation, of which Mr. Fox will be the bearer, could as well be forwarded through our Minister at St. Petersburg, as sent in one of our largest monitors at an expense of at least one hundred thousand dollars.

Changes in Forms of Letters Patent.

We understand that Commissioner Theaker proposes some changes in the forms of patents issued to inventors. It is intended to reduce the size of the instrument from fifteen by twenty inches to ten by fifteen inches, thus rendering it of a more convenient size for mailing. The present large vignette of the Patent Office will be replaced by a much smaller view of the Patent Office, surrounded by small medallion engravings, representing the advancement made in machinery in the present century—all to be engraved in the highest style of the art, and printed on parchment paper. The seal of the Patent Office, instead of the words, "Seal of the Patent Office," will hereafter contain "United States Patent Office," and the sentence below it, "Countersigned and sealed with the seal of the Patent Office," will be omitted.

The specification for the patentee and the bound record in the Office will be printed instead of written as now. Another important improvement is in the manner of inserting the drawing, which is required to be ten by fifteen inches in dimensions. In the present form of patent the drawing cannot be newly inserted, but in the form proposed it can be adjusted with newness and precision. These changes can be made, the Commissioner thinks, without additional expense to the Government, and will render the patent a credit to the Office and to this Government, when sent abroad.

STEAM omnibuses are to be established in Paris to run from the Champ de Mars, the spot where the great exhibition is to be held, to the Place Bastille—making six halts. The distance is now traversed by horse omnibuses in one hour and twenty minutes. The steam company undertake to accomplish it in forty-five minutes including stoppages.

The *Evening Post* of the 25th ult., informs us that a Western gentleman has discovered the lost art of hardening copper. Will some one kindly inform us who lost it, how valuable it was, and if the finder got any reward?