

THE
Scientific American.

MUNN & COMPANY, Editors & Proprietors.

PUBLISHED WEEKLY AT

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

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

VOL. XI. NO. 12....[NEW SERIES.]...*Twentieth Year.*

NEW YORK, SATURDAY, SEPTEMBER 17, 1864.

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THE ENGLISH GOING AHEAD OF US IN ARMS.

It is stated in some of the papers that orders have been issued for arming the whole of the British infantry with breech-loading rifles. Experience in our war has shown that this would be equivalent to increasing their numbers at least five fold. We have been accustomed to consider the English Government as very conservative of old methods, and slow in adopting improvements, but if the above statement is correct, it would seem that they are more prompt to profit by our experience than we are ourselves.

In heavy ordnance too, the British Government is making gigantic strides. The strange favoritism shown to the absurd breech-loading system of Sir William Armstrong, so fondly supported by the leading daily press, has been shaken by the intelligent criticisms of the *Mechanics' Magazine*, and *Engineer*, and is now being overthrown by the results of extensive trials. The English are not following our practice at all in heavy cast-iron ordnance, their heaviest guns of this material being of 8-inch caliber, while we have them in use of 9, 10, 11, 13, 15 and 20-inch caliber. In England the attention of the Government and manufacturers seems to be directed wholly to the use of wrought iron or steel, or to combinations of these two materials for the construction of heavy ordnance. The largest gun yet made of wrought iron is 13½ inches caliber, and weighs 22 tons. This is the gun that Sir William Armstrong chooses to call the 600-pounder, we suppose on the ground that a bolt might be put into it of sufficient length to weigh 600 pounds. It is rifled but with a turn of only 1 in 56, and it is found that this is not sufficient to prevent an elongated bolt from tumbling over. Its most destructive effects have been produced by a shell nearly spherical, weighing 303 pounds, and discharged by 40 pounds of powder.

But the delusions in regard to Sir William's humougs, though supported by the most powerful of the daily press, are being rapidly brushed away by the costly lessons of experience, and the enlightened discussions of the mechanical journals. The best form and material for heavy ordnance will doubtless be arrived at, and then the enormous appliances of the English workshops will enable them to turn out cannon equal in quality to any that can be made in the world.

The strange supremacy which this country has so long enjoyed in ordnance, was doubtless owing to the contempt in which our naval and military establishments were held by the fighting monarchies of Europe. This contempt is now in a measure removed, and our advance will be watched with jealousy by all military powers. England, France, Prussia and other nations are constructing heavy ordnance of wrought iron and steel, and we shall need all of our skill and ener-

gy to keep pace with them. England is even taking a stride far in advance of us in infantry arms, an advance that will render 50,000 of her troops equal to 200,000 of ours in any engagement. We trust that our Government will allow no other nation to get the advantage of us in the all important matter of arms.

THE MISSION OF MACHINERY.

When Charles Dickens wrote "Bleak House" he created a prominent character—Mrs. Jellaby. This lady had a mission. She was obliged to look after the heathen, and she looked after them so fast and so far that her own children were in rags and tatters; her house was a scene of disorder, her daughter ignorant and stupid, her husband a nonentity, prone to sit by the kitchen stove, and the whole domestic machinery was disordered and deranged. This was simply the natural result of neglecting her duty; but if the same distinguished author should revisit this country and write about ladies with missions, he would find a very different state of things to chronicle.

Look at what the simple machinery of the household has done for society. Years ago the housewife sat of an evening and plied her needle when the heavier labors of the day were done. The garments that rose before her aching sight threatened to overwhelm her, and as for the stockings—there were dozens of them. It is not so now; and we may thank inventors that in their tireless perseverance they have provided the machines to do the drudgery of the needle. In an hour a machine can do more than the hand in a day, and the matron rests instead of working. It is not in the sewing machine alone that we find great social changes, but also in the kitchen, laundry, and even in the nursery. With wringing and washing machines the laundress can do her work in half the time formerly required, with mangling machines the labor of ironing is greatly reduced. The nurse's task is lightened by many ingenious toys. The walking dolls, self-acting locomotives, velocipedes, cantering horses, baby-jumpers, and wooden dancing negroes, have all been originated from the fertile fancies of inventors, and it is hard to think of any condition of society, high or low, which has not been almost revolutionized by the introduction of machinery either directly or indirectly.

This is always the mission of machinery—to lessen the labor of mankind, to make it better, for where drudgery is dispensed with, man rises elastic, as grass does after the feet have passed over it. Every useful machine invented is another step forward in the progress of civilization, and the thrift, energy, and affluence of any community is directly in proportion to its labor-saving machinery.

GAS ENGINES.

When a person in any town or city makes a successful invention the minds of his fellow citizens are naturally turned in the same direction, and they are very apt to produce a series of inventions in the same department of the arts. The success of Lenoir's gas engine has fired the imaginations of the Parisians, and they are patenting a number of gas *moteurs*. The London *Mining Gazette* gives the following description of one of these inventions:—

"An improved 'gazomoteur,' the invention of Mr. Belon, has been successfully introduced at the paper factory of Mr. Anzin, near Paris, and has been favorably reported upon by the Academy of Sciences. It is stated that the machine possesses an economy equal to 60 or 70 per cent; it consists of three principal parts—an air-pump, a smoke-consuming furnace, and a motive cylinder. The furnace, when the engine is at work, remains closed, except at the orifice by which the air-pump opens on it, and the one by which the heated air sets the cylinder in motion. It is so arranged that a quantity of combustible matter, equal to that which it consumes, falls constantly into it. A state of combustion is kept up by the air-pump: part of the air passing from this rushes into the furnace; the rest combines with the coal gas, forming thus a gaseous mixture, the volume of which is far greater than that of the air previous to its introduction to the furnace. This mixed air acts on the piston of the *cylindre moteur* with a force proportionate to the increased volume produced by the elevation of the temperature."

If any of our readers ask what is meant by "an economy equal to 60 or 70 per cent," we can only say

that the phrase is as unintelligible to us as to them. It will be seen that this *moteur* is simply the steam engine worked by gas. The gas and air are forced into a tight chamber corresponding to a boiler, where they are burned, and the products of combustion are then worked through a cylinder. It is what Mr. Fairbairn would call a gas engine of constant pressure.

This engine is the same in principle as Roper's air engine, but must be far more expensive both to construct and to operate. Roper uses for fuel anthracite coal, a day's supply of which is placed in the chamber in the morning; while in the case of the gas engine a pump must be constructed to force the gas into the chamber as it is consumed. Anthracite coal costs now about half a cent per pound, and illuminating gas about 5½ cents, ten times as much.

CONCUSSION OF HEAVY GUNS.

Every country boy who has ever been to a "general training," as the annual muster of village militia is called, has remarked how the grass is blown down by the discharge of the 6-pounder gun usually fired on such occasions. Similar effects take place every time a gun is fired, but they are not always so apparent. The discharge puts a column of air in motion from the muzzle outward, which sweeps forward with terrible force. The original *Monitor*, when she engaged the *Merrimac* in Hampton Roads, was universally condemned for not following the repulsed vessel to its lair, and the correct reason for her failure to do so has never been given until the publication of this article.

The *Monitor* did not follow the *Merrimac* because she was not in a condition to do so, for this reason:—The pilot-house, it will be remembered, was immediately forward, and when the guns were fired in line with the keel the shot passed over it.

The top of the pilot-house was a solid, wrought-iron plate, 3 feet 6 inches wide, by 5 feet long, and 3 inches thick. This top was lifted bodily up and displaced by the discharge of the 11-inch guns fired from the *Monitor's* turrets, so that in sheering off to repair this damage the *Monitor* reluctantly allowed the rebel vessel to escape.

The guns could not afterwards be fired except at an angle of 30° with the keel, so great was the effect of the discharge upon the vessel itself, and upon the inmates of the pilot-house through the sight holes. For this reason, and some others, the pilot-houses on the new monitors are placed over the turrets, and the hatches which cover the openings in the deck are all strongly fastened with heavy bolts.

FIRST FALL MEETING OF THE POLYTECHNIC.

The Polytechnic Association of the American Institute held its first regular meeting after the summer vacation at its room at the Cooper Institute, on Thursday evening, Sept. 8th, the President, D. S. Tillman, in the chair.

The President read an address, giving an account of the progress of internal improvements in the country from their commencement, and the remainder of the evening was devoted to miscellaneous matters. Petroleum was selected as the subject for the next evening, it being understood that Mr. Overton, who has been spending some time in the oil region, will open the discussion.

Agricultural Department of the Patent Office.

The examination of the class of cases in the Agricultural Department of the Patent Office has been much behind along back, owing to the resignation some time ago of the Acting Examiner-in-Chief, Mr. Dodge. We are happy to learn that the examining force in this room has been re-enforced by the appointment of Prof. A. G. Wilkinson, an energetic, talented gentleman, who will be sure to give this important department of the Patent Office renewed vitality.

BRITISH RAILROADS.—There are now in the British Islands three hundred and seventy-five district railway companies, who own eleven thousand five hundred miles of road. They carry above eighty million passengers yearly, and above thirty million tons of merchandise and minerals. They give employment to probably not less than two hundred thousand persons.