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AMERICAN GUNS.

There are two classes of guns now made for, and used almost exclusively in, the American army and navy. These consist of cast-iron smooth-bores for round shot and shell; and rifled "built-up" guns for elongated shot and shell. The smooth-bore cast-iron guns vary in size from 12-pounders up to 425-pounders—the 15-inch guns, and the "built-up" rifled ordnance, range from 10-pounders to 300-pounders. The 15-inch guns are the largest modern ordnance in the world. The first made of this caliber was the Rodman gun, now mounted at Fortress Monroe. It was cast at the Fort Pitt Works about four years ago, weighs 49,100 pounds, and was illustrated and described on page 305, Vol. IV. (new series) of the SCIENTIFIC AMERICAN. It has been used only experimentally with shells and moderate charges of powder. Its range, however, has been ascertained, and is stated by Captain Benton to be 1,973 yards, with a 320-pound shell, a charge of 35 pounds grain powder and elevation of 6°. With a charge of 40 ponnds of powder, elevation 28° 35′, the range is 5,435 yards. Great results were expected from guns of such caliber, and it was proposed to construct several of 20 inches bore; but before such suggestions were acted upon it was wisely resolved to complete several 15-inch guns for the navy, and use them in the turrets of the monitors. After having been tried at Charleston, it is now publicly reported that they have not fulfilled the expectations entertained respecting their destructive powers, that they have been condemned, and are to be replaced with 13-inch guns. On this subject the Pittsburgh *Chronicle* says:—

"These 15-inch guns were all cast in Pittsburgh, and we should be sorry to know that they are failures; yet we confess that opinion is beginning to be entertained. We would like to hear their founders or advocates on this subject, and to know from them whether the efficiency of these big guns would not be increased by rifling."

Their efficiency would certainly not be increased by rifling them; they do not possess sufficient strength to stand the pressure to which a rifled gun is subjected; but the denunciations which have lately been vented against them in several of our daily papers, may be wrong in many particulars. These statements will show that the gun question is in a very unsatisfactory condition; for there are no good grounds to conclude that a cast-iron 13-inch gun will be more effective than the 15-inch one. The largest modern cannon in Europe is the "Horsfall gun," composed of a single forging of wrought iron, at the Mersey Steel Works, Liverpool. It is about 16 feet in length, 13 inches bore, weighs 22 tuns, and has been fired with charges of powder varying from 40 to 80 pounds, behind solid round shot of 283 pounds. At an elevation of 12° its range was 3,883 yards, and at 800 yards distance, its shot smashed through the *Warrior* target, made of 4½-inch iron plates, backed with 18 inches of teak and an iron skin-plate of ⅝-inch. It has not, however, been adopted for the British navy, and its 12-inch companion in the Brooklyn navy yard meets with the same neglect.

The other class, called "Parrott guns," have come into use since our unhappy war commenced. They are rifled, and, in construction, each consists of a cast-iron tubular body, a wrought-iron band shrunk for the reinforce, and a solid breech screw plug secured in the rear. They are manufactured according to two patents granted to Capt. R. Parrott, Oct. 5, 1861, and May 6, 1862. The cast-iron body is bored through the rear, and the band is shrunk for the reinforce, while the body is being rotated and cooled in the interior with a stream of water. This mode of shrinking the coiled hoop on the tube produces a most perfectly banded gun. Such ordnance has acquired a high reputation at Charleston and other places, for strength, accuracy and range. A 10-pounder of 2.9 inches bore has a range of 600 yards, at an elevation of 1°; and, at an elevation of 20°, a range of 5,000 yards. A 100-pounder, of 6.2 inches bore, has a range of 1,450 yards at an elevation of 3¼°, and a range of 8,463 yards at an elevation of 35°; the charge being 16 pounds of powder, with an 80-pound shell. The 200-pounder is an 8-inch bore; the 300-pounder a 10-inch bore, and their respective ranges exceed 5 miles. At Charleston, the 300-pounder was burst by a shell exploding before it reached the muzzle—no fault of the gun.

It is known that American smooth-bore cast-iron guns surpass those made in Europe for strength; but it has been supposed that the Armstrong and the Whitworth rifled guns excelled those of all other nations. Those who have devoted attention to such subjects entertain a different opinion. After expending $12,500,000 on Armstrong guns, we learn that they have lost their high reputation; and Sir William Armstrong has ceased to be the Government gun-maker. The Whitworth gun, which has been so much lauded, obtained its fame from the character of its rifling, and not on account of its superior construction; and no better evidence could be furnished respecting the superiority of American guns, than to state that Mr. Whitworth has lately taken out a patent in England for making guns upon the Parrott principle, except in using a forged soft steel barrel for a cast-iron one. He has the body made of a tube, over which is a wrought-iron shrunk band, for the reinforce, and the breech is closed with a solid screw plug. Upon this principle Mr. Whitworth will now be able to manufacture much stronger guns than he has hitherto done.

Banded or "built-up" guns are old; but to Professor Daniel Tredwell, of Cambridge, Mass., belongs the credit of reviving and improving them. In 1840, he constructed three 4-pounders, and in 1844 four 23-pounders. They withstood the Government tests, and were intended for the navy; but the old Navy Board gave them no encouragement. In 1843, the first English patent was issued for a banded gun, to John Frith; in 1852, one was granted also to A. Krupp, of Prussia, for a banded steel gun, and in 1855 one to Captain Blakeley, who claimed hoops of steel, wrought-iron and coiled wire, shrunk over the cylinder, applicable to strengthen both new and old guns. Captain Blakeley makes the best banded guns in Europe, as a private manufacturer, and he has furnished some capable of carrying 400, 500 and 600-pound elongated shells. But after examining into the published statements of results attained by modern European guns, we confidently believe that those which are now manufactured in America surpass them for strength and range. Practical warfare has developed defects which could not have been ascertained by common experiments; and failures, faults and deficiencies, have led to such improvements in fabrication as have placed them in the front rank of modern ordnance.

A TRAP TO CATCH A SUNBEAM.

The comfort, convenience, and economy of social life depends very often upon a knowledge of the elementary principles of science. Thus acoustics, as exemplified in the speaking tubes; thermotics, or the laws relating to heat; pneumatics, or the exclusion of drafts and the introduction of a proper amount of fresh air to our dwellings; these and kindred branches of science are all laid under contribution to furnish forth our homes in luxury and refinement. The mere fact of the existence of fixed laws and principles confers no especial benefit upon humanity, and it is only when one's brain feels active through breathing fresh air, or the body is warmed by the radiation of heat from a comfortable stove, that we acknowledge the benefits science is capable of conferring, and realize them in a practical manner. Therefore, to be of service to man, the hints afforded by even the simplest ray of light should not be neglected. We speak of light, because that is the most inestimable of all gifts conferred upon man.

The first fiat of the Creator was "Let there be light;" and from that hour to this mankind struggle and pray for it, and pine away when deprived of its genial life-giving rays. In too many of the homes of the land sunbeams are as rigidly excluded as if they carried some death-dealing miasma or subtle poison, instead of bearing, as they do, balm and healing to every house. Dark corners and close little rooms abound, from which every beam is shut out; and human beings wilt in such places as surely as a plant will under similar conditions. A very simple way to obviate such trouble is to erect reflectors to throw in light obliquely where it cannot enter directly. If men will persist in so building their apartments that direct illumination cannot be made, the following simple arrangement will effect a thorough reform in this important particular:—

Procure a small iron rod, say half an inch in diameter and three feet long, and fasten it to the side of a window-frame by suitable brackets, so that it will turn easily like a blind: to this rod rivet flat bars of hoop-iron, 2 feet long, at right angles with it. Over this framework stretch a white cotton cloth, and the reflector is ready for use. It is easy to see that any side light striking upon this cloth will be reflected into the apartment where it is erected, with an intensity varying according to the angle it is fixed at. If tin be substituted for cloth, the improvement will be very great. If the apartment is more easily lighted from above, the reflector must be fastened over the top. Reflectors are used in many places in large cities, but they are differently made and have greater illuminating power. Such an apparatus as is here described will be found useful in places where others are unattainable.

THE PITCHES OF SCREW THREADS.

If there is any one thing in the transactions of the machine-shop more incomprehensible than another, it is the want of some settled size or number for screw threads. It would be just as sensible for every machine-shop to use its own standard of length, as it is for them to employ unusual and fractional pitches for common use. The Whitworth gage is generally allowed by most experienced persons to be well proportioned and a desirable one for adoption. If it is found by practical experience that this one does not meet all the requirements of every-day duty, it is very easy to modify it until correct. But whether the Whitworth standard or any other be fixed upon, it is vitally important for the interests of all trades that use bolts and nuts that some standard be agreed upon and religiously observed. As the case now stands, a wagon-maker, a miller, or a country machine-shop in small practice, may have a great many dollars worth of bolts and nuts kicking around under foot; but not one single bolt of the quantity will fit any nut. Some have twelve threads to the inch in ⅝th bolts, some eleven, others eleven and a half; in short, there is no end of division and sub-division. There is no use for a fractional thread under any circumstances, and it is always better to make an even number of them, unless indeed the work be special.

The stores are full of steel scales, in sub-divisions of a foot, all approximately accurate. Wire makers have a standard gage by which they regulate their manufacture; gas fitters and pipe makers cut their threads so that any nipple will fit any pipe, and they have a regular and specified number of spaces to the inch. It is left to the bolt and nut makers alone to pursue a totally independent course in this matter, and to make and vend their wares wholly uninfluenced by the public needs in this respect.

What is wanted to remedy this matter is simply an agreement between a few of the leading manufacturers to adhere faithfully to one standard; or, if this is found inoperative, to instruct members of the legislature to offer a bill bearing on the subject, to regulate the standard by law. Such measures are probably unnecessary, as those who are interested would doubtless come to some conclusion on the subject, if they met together for the purpose; in any event, economy and convenience alike demand that early attention be given to the regulation of the pitches of screw threads.