

The Bureau of Ordnance.

BUREAU OF ORDNANCE,
NAVY DEPARTMENT, Oct. 30, 1874.

Hon. George M. Robeson, Secretary of the Navy:

SIR: I have the honor to submit the annual report of this bureau with accompanying estimates for the fiscal year ending June 30, 1875.

Besides the ordinary duties of preparing our ships for service, and preserving the public property placed under its charge, the bureau has continued its examination into the various important questions enumerated in its last annual report, and which are briefly discussed in the succeeding paragraphs, each under its respective heading. Additional to these are mentioned the experiments of Mr. Norman Wiard, at Nut Island, resumed during this summer, but not yet completed. At their conclusion, a separate and detailed report will be made to the department.

The most important operations of the bureau occurred during November and December of last year, on the occasion of the seizure of the *Virginia* by a vessel of war of the Spanish navy.

It was deemed advisable to immediately arm and equip every available ship of the Navy, then in the ports of the United States.

The complete and rapid armament of so many ships, including ironclads and the largest frigates, although a heavy task, was nevertheless successfully performed without the omission of a single important detail. The exertions made were commensurate with the exigencies of the occasion, and involved a large accumulation of stores, nearly all of which, however, are still available for future operations.

RIFLED CANNON.

The organization of our ordnance dates from 1845, and from that period it has been fully recognized in the Navy that our ships should compensate for inferiority of numbers by superior armament of individual ships; and so long as the smooth bore formed the batteries, that superiority was maintained by a limited number of powerful guns.

With the introduction of ironclads, and the universal adoption of rifled cannon by other powers, we are forced to adopt the same armament, otherwise, we shall, if engaged in war with even a second rate power, find ourselves overmatched, not only in numbers, but power of individual ship. There is, however, no reason why our ships, heretofore superior to all others in armament, shall not be restored to equality.

The bureau therefore recommends the entire re-armament of the Navy, with breech-loading rifled cannon, which can be done at a very small cost, in the present reduced state of number of ships and guns required.

With wooden ships the mere lodgment of a shell in the side before the explosion might inflict a fatal injury; but against armored, or even wooden cased double bottomed ships, complete perforation and explosion of a large charge within is essential.

The present types of foreign armored cruising ships carry from 4½ to 6 inches of armor, and at present we have no guns except the XV. inch in the monitors, which will seriously injure the lightest of these armored vessels. Substitute a 7 inch of 8 inch for the XI. inch smooth bore, which even our smallest ships carry, and few of them would come off without great damage.

The sphere of offence of the monitors does not extend beyond 500 yards, which might be increased to 3,000 yards, by the substitu-

tion of an efficient rifle of the same weight of 10 inch or 11 inch calibre, for the XV. inch smooth bore.

WIARD'S EXPERIMENTS.

The experiments of Mr. Norman Wiard on the conversion of smooth bores to rifled cannon on his system commenced last autumn, and since continued under the nominal supervision of this bureau, have not developed any new or unexpected results. A single shot was fired from each of two XV. inch guns of the shot of 450 pounds weight, and a charge of 140 pounds of powder, the other rifled on Mr. Wiard's plan, with a pointed shot of the same weight, and same charge of powder at similar targets composed of five 3 inch plates set up at a distance of 160 feet. The first broke up the plates; the second penetrated them. A few fires for comparative ranges were then made, and the experiments suspended. The recoil, as was to be expected with a charge nearly treble that for which the gun was designed, was such, (twenty four feet), as to be entirely uncontrollable in the turret of a monitor, or indeed anywhere in service. This element, it is essential to consider, for, notwithstanding the improvements in powder, which are equivalent to an increased strength in the gun, the weight of the gun is designed for a fifty pound charge.

It would appear to those unacquainted with artillery practice, that a great result had been obtained, but a comparison with other experiments will show that nothing new has been developed. Whitworth has fired a IX. inch shell of 404 pounds, propelled by fifty pounds of powder through three 5 inch layers of iron concrete, (made of iron turnings and lead), the whole forming a mass 25 inches thick. An equal result has been produced by the English 10 inch gun, firing a 400 pound shell with seventy pounds of powder, at a distance of 1,000 yards; and by the Krupp, twenty six centimetre, firing fifty seven pounds of powder and 415 pounds shot. Thus showing that with well proportioned guns, projectiles and charges, the disproportionate and dangerous charges of Mr. Wiard are useless.

The experiments were resumed in September of this year, and at the thirteenth fire with heavy charges and at the distant target the rifled gun burst, the target not having been hit. This result I anticipated, and do not hesitate to declare that it is impossible to convert a cast iron smooth bore into an efficient rifle by any system of rifling.

Since this draft was prepared, the bureau has received a report of the burst, at the first fire, of a second XV. inch gun, Navy pattern, rifled on Mr. Wiard's plan, firing a charge of 180 pounds, and a sub calibered shot of 492 pounds, aimed at a 30 inch target.

No person in the least acquainted with ordnance, could hope to fire half a dozen such charges; therefore, even if successful in a single fire, no useful result was to be expected from the experiment.

The principal advantage of rifled projectiles consists in the greater penetration due to the concentration of effect on a smaller and better form of surface—next in greater content of explosive for some calibre, than range, and lastly accuracy.

Since the weight of the gun is fixed by the construction of the vessel, and the recoil cannot exceed certain well defined limits, the conditions of calibre of gun, length of bore, weight of projectile and charge of powder, are also fixed within close limits, and cannot be departed from without a loss of effect.

For these reasons, neither the XV. inch nor XI. inch Navy guns can be converted into efficient rifles, on any plan, even by reducing and lining the bore. They are too short to properly utilize a proportionate charge of suitable powder, nor can they be converted to breech loaders, which the bureau considers the essential feature of any rifled system.

POWDER.

The experiments on the improvement of powder have been prosecuted as far as limited means will permit, and the general questions of manufacture settled.

Our stock of gunpowder had been allowed to fall quite low during the prosecution of these experiments, at last autumn a quantity was ordered necessarily at a most unfavorable season. Fortunately, circumstances did not require immediate delivery, as the difficulties of manufacturing uniform powder in winter are very great. The bureau submits the propriety of an appropriation for gradual increase of our stock.

BREECH LOADING HOWITZERS.

The subject of increased efficiency of our boat and field artillery has attracted the earnest attention of the bureau which has prepared model guns of two classes, a light howitzer of 350 pounds adapted to all boats, even the smallest, and a heavier one of 500 pounds, firing the same projectile with different charges.

They are on two systems, one a wedge breech on the plan of Mr. B. B. Hotchkiss, the other a slotted screw. Both use metallic cartridges which, in the opinion of the bureau, is the best plan, and overcomes several objections to breech loaders. The latter, can, however, use the common cartridge bag. They are mounted on carriages which give 40 deg elevation, 45 deg depression, the latter condition being very useful as a defence against torpedo boats. The model guns are completed in bronze, but the construction is stopped for want of funds, and because suitable steel block cannot be supplied by any of our steel manufacturers.

GATLING GUNS.

Fifty of the small Gatling guns have been purchased, a suitable carriage devised, and they are now ready for issue to the service. This gun, too, has been arranged to fire down at great depression, a very important condition for a gun designed to be used in the tops, and for firing into boats close alongside. Some difficulties relative to feeding in this position, remain to be overcome.

TORPEDO STATION.

The general character of the instruction at this station is given in the accompanying report of the board detailed to witness the examination of officers under instruction:

During the past year it has supplied complete outfits of torpedoes and electrical apparatus to all our cruising ships, and the mechanical facilities of the station are sufficient for any probable future exigency. The assembly of ships at Key West afforded opportunity for extensive practice, developing defects of our system, and causing remedies to be applied. Frequent report are made to the bureau from cruising ships of the efficiency of the apparatus now supplied.

The course of instruction was interrupted last autumn by the detachment for sea service of most of the class before the completion of the course. In ordering a new class it was deemed advisable to utilize more of the favorable season for experimental practice. This has resulted in marked benefit. The principal defect observed is, that the majority of the officers ordered for instruction