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TWENTY INCH SMOOTH BORE GUN FOR THE RUSSIAN GOVERNMENT.

The weight of this weapon in a finished state is $44\frac{3}{4}$ tons. The weight of the projectile to be employed—a cast iron spherical one—is 900 lbs. In trying the gun, in all 313 rounds were fired, the normal charge of prismatic gunpowder being about 117 lbs. The experiments of firing were conducted on the river Rama, the high bank across the stream serving as a butt, which was at a distance of about 1,400 yards from the gun. The weapon was placed under an iron plated covering of a peculiar construction. On the discharge of the piece the concussion of the air was so great that in the village of Matoriloro, situated at a distance of one third of a mile, the chimney stacks fell in when the wind was blowing in that direction. The sound itself, although loud, was not deafening, and persons standing even under the iron-plated covering were able to support both the noise and concussion of the air. The iron gun carriage weighs $6\frac{1}{2}$ tons. The breech of the gun is elevated and depressed by means of a screw ratchet key. For facilitating the running forward of the gun a system of cogwheels is introduced, and for the diminution of the recoil, and the hoisting of the charge and projectiles, special appliances are provided. The moving of this enormous mass of iron can be effected easily by three men.

After the introduction into the military art of rifled cannon, the conviction became established of their unconditional superiority over the smooth bores. As regards guns of small caliber this opinion may very likely be correct; but with respect to naval guns of the largest calibers, it would be difficult to give the preference either to the one or the other system. Without going into particulars of the merits or demerits of the one or the other description of weapon, we will point to one important difference in the effect of the spherical projectiles of the smooth bores and the oblong ones of the rifled guns; the latter will hit an iron-plated target at a greater distance than the former, and, so to say, pierce it through; on the other hand, the former will produce a far greater amount of concussion, shaking loose the rivets of the

plates and bolts of the target, and bounding on the plates and cracking them. Besides the difference in the destructive action of these weapons, there is an enormous difference in the cost of production. Thus, for instance, according to a statement of Mr. Grasshof, the price of a 20 inch smooth bore gun will cost, when produced in quantities, about \$8,000, whereas an 11 inch steel rifled piece corresponding to the same could not be produced under \$30,000.

MARINE CASUALTIES.

The report of Supervising Inspector General Nimmo, recently made public, furnishes the following interesting details relative to late casualties in river and ocean steamers. Full statistics are given for the year 1871, from which we find that sixty-five disasters by fire, explosion and wreck took place during that period, involving a loss of \$3,600,661 and 363 lives. The average number of casualties above given is thirty-one per cent less than the average for the preceding three years; the average loss of property is nineteen per cent and of life four per cent less. Various modifications are suggested to the present laws, and more specific provisions are asked for regarding methods of investigation. The different catastrophes which have happened during the past year are recapitulated. The first case is that of the steamer Oceanus, which exploded on the Missouri river, killing forty-one persons. Then follows the Bristol casualty in Newport harbor; the burning of the Bienville and loss of forty-one lives; the sinking of the Metis, twenty-three lives lost; the bursting of the flue on the Dean Richmond, the fault in this case being ascribed to the failure of the manager of the line to have the boiler inspected after the steamer had been laid up for several months; lastly, the burning of the Missouri and the sacrifice of eighty persons closes the list.

Strict discipline and repeated drilling of the officers and crews of sea-going vessels is earnestly recommended. A uniform system of tests for boiler plates is suggested, and the principal manufacturers have been called upon to present plans of testing machines. A series of general experiments

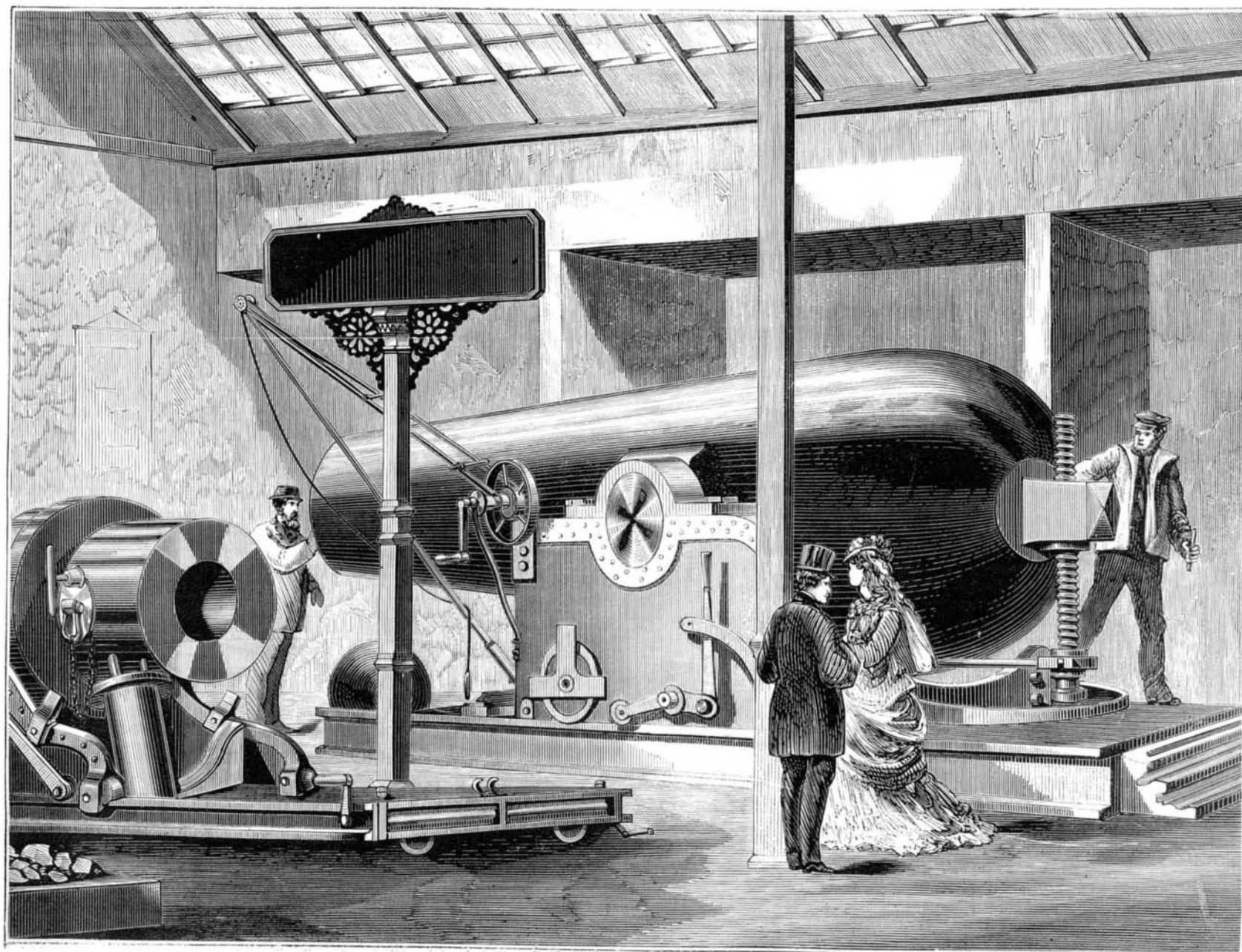
upon safety valves is also recommended, which shall be of the most exhaustive character. Further tests of steam boilers, similar to those made at Sandy Hook, are called for, and especially upon boilers of the various forms used on vessels of the seaboard, of the lakes, and of the Western rivers. It is suggested that passenger steamers be allowed to carry petroleum which, in the opinion of experts, shall be perfectly safe, and amendments to the law are recommended which will authorize the immediate seizure of explosive or dangerous articles shipped contrary to the law.

The steamboat inspectors' service consists of a supervising inspector general, 10 supervising inspectors, 36 inspectors of hulls, 36 inspectors of boilers, 3 assistant inspectors of hulls, 3 assistant inspectors of boilers and 8 clerks of inspectors.

The report concludes with the expression of the hope that in the future there may be a free and friendly interchange of views between this service and all the interests of the country affected by our laws for the preservation of life and property on steam vessels, and that such intercourse may result in the best attainable security for human life and the highest degree of prosperity for our commercial interests.

A PLANET BETWEEN MERCURY AND THE SUN.—Mr. J. R. Hind, the astronomer, shows that there is a high probability that a planet circulates between Mercury and the sun, having a period of revolution of about nineteen days. Mr. Hind suggests that, on March 24 next, the sun's disk should be watched, as a conjunction of this hypothetical planet with the sun will occur about 10 A. M. on that day.

A CORRESPONDENT writes us that, while visiting the Library of the British Patent Office, in London, he noticed that the SCIENTIFIC AMERICAN attracted a larger number of readers than any other scientific publication there taken. This is an interesting fact, and holds good wherever our paper is taken. The regular weekly edition of the SCIENTIFIC AMERICAN is nearly equal to the combined number of all other scientific papers in the world.



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