

arranged on the following plan:—Upper deck.—Two 12 ton 9-inch revolving guns, mounted one under the fore-castle and one under the dromi-poop. These guns throw 250lb. shot and shell, with a charge of 50lb. of pebble powder. The projectiles have "chilled heads," are of course armour piercing, and have an initial velocity of 1425ft. The energy of the shot per inch on its circumference in foot tons is 124 tons at the muzzle of the gun, and ninety four at a distance of 1000 yards; bursting charge of shells, 18-5lb. The *Raleigh* also carries four converted 71cwt. 64-pounder guns, two side guns, and two as chasos. The shells for these guns are, as the designation of the gun implies, of 64lb. weight. Each of the powder charges is only 8lb. of rifle large-grain powder as full charge, and 6lb. as the reduced or ordinary charge. The shells have a bursting charge of 7lb., and the highest initial velocity obtainable is 1170ft. These 64 pounders are built up from the carcass of an 8-inch cast iron gun bored out and fitted with a steel tube. They are useful weapons for light shell work mounted on a ship's upper deck, as supplementing heavy guns, but for no other purpose. Colonel Fisher, R.E., recently described at Shoeburyness the 64-pounder as being a good shell gun for land service with shell up to 2000 yards, but as being useless as a shot gun. Main deck.—Two 64 pounders as chasos-guns, and fourteen of the n-w pattern—115 pounder 7-inch 4½-ton shell guns. The 64-pounders we have already described as part armament of the upper deck. The 90cwt. 115 pounder shell gun is a copy, reduced 2 tons in weight, of the smallest of our navy armour piercing guns, the 6½ ton 7-inch gun, which fires chilled shot and shell with a 30lb charge of pebble powder at an initial velocity of 1525ft. The *Raleigh's* 7-inch guns fire common shell only with a full charge of 14lb. of rifle large grain powder, and a reduced or ordinary charge of 10lb. The greatest initial velocity is calculated at 1216ft., but it is doubtful whether the shells in their flight reach even this comparatively low figure. The total weight of the guns, with their carriages and slides, carried by the *Raleigh* is—guns, 108 tons 16cwt. 1qr. The change in the maindeck armament from fourteen 71cwt. 64 pounders to fourteen 90cwt. 7 inch 115 pounders has given an increased weight of nearly 39 tons. The *Raleigh*, like the other frigates of the group to which she belongs—the *Inconstant* and the *Shah*—is a perfectly built iron ship, divided internally into water tight compartments, and with an outer casing of double wood planking, the inner skin of wood planking being lapped on to the iron hull with iron screws, and the outer skin on to the inner wood skin with joints broken. On this outer wood skin is nailed the copper sheathing of the hull below the lead line. The consumption of coal averaged 10 2/3 tons per hour. The *Raleigh* is fitted with three coal ports on each side—an idea imported from America—opening into shoots on the lower deck which lead direct into the bunkers below—a very excellent arrangement for several reasons. She, however, has no steam capstan or steam steering apparatus. It was nearly 8 p.m., before the *Raleigh* anchored at Spithead, on her return from the trial.

MILITARY BALLOON EXPERIMENTS.

The experimental balloon ascent from Woolwich Arsenal took place on Saturday afternoon under very favorable circumstances. The strong westerly winds which had prevailed for a week previously, and rendered an ascent out of the question, especially for the purpose in view, had quite abated, and there was almost a dead calm, the best possible conditions under which a trial could have been made. The apparatus to be tested was, as already briefly explained, the invention of Mr. C.A. Bowdler, who hoped by its means to accomplish that which had long been a desideratum with scientific aeronauts, to steer the balloon in the air at an angle by deviation more or less deflecting from the direction of the wind. Major Beaumont, the president of the Army Balloon Committee, was authorized to represent the War office in the ascent. Major Beaumont is an officer of the Royal Engineers, and one of the members of Parliament for Durham. For many years he has applied himself to the science of ballooning, and has made numerous ascents, several of which has been made with Mr. Coxwell, while he has even extended his experience to the use of ballooning in actual warfare, and witnessed from the skies a battle before Richmond during the civil war in America. He may, therefore, be safely pronounced the most competent individual to have conducted the experiment. The balloon employed was a nearly new one, in which Mr. Coxwell has made three previous ascents, and it has been christened the "City of York" by the lady mayoress of that city. Its height, independent of the car, is eighty feet, and it contained, when inflated, 60,000 cubic feet of gas, so that it is a large balloon—too large, the inventor thought, for a fair trial of his steering apparatus. As, however, it was necessary to accommodate four persons and same machinery in the car, it was necessary to have a large balloon, and Mr. Bowdler, sanguine of success, simply stipulated that any results he might obtain should be reckoned slightly above their value in consequence of his being at this disadvantage. At three o'clock, the hour fixed for the experiments, the balloon was fully inflated, and there were assembled a large number of spectators, among whom were General D'Aguilar, commandant of Woolwich Garrison, General Sir J. Lintorn Simmons, governor of the Royal Military Academy; Sir John Mayron Wilson, Bart., General Philpotts, R.A., General Benn, R.A., the Hon. Colonel Gage, R.H.A.; Colonel Wolsey, R.A., Colonel Field, superintendent of the Royal Carriage Department; Major Markham, R.H.A.; Captain J.O. Browne, R.A.; Captains Noble and Jones, of the Ordnance Select Committee, Captain Owens, Royal Gun Factories, and many other Gentlemen connected with the scientific branches of the army or the manufacturing departments. The four passengers in the balloon were Major Beaumont, Mr. Coxwell, Mr. Bowdler, and a sapper, Sergeant T. Murray, to assist in working the steering machinery. This was fixed to the car in a few minutes. A tall frame of wood was lashed inside, containing a few small cog wheels and a common crank handle, while outside and above the car were fixed in connection with it two fans or screw propellers, precisely like the screw of a ship, and made apparently of tin or zinc. The simple nature of the contrivance and its immense disproportion to the balloon, which towered above it, suggests a very general doubt whether it could have

any influence or control over the course which the balloon must take, if left free to sail before the wind; and opinions were expressed by those who have studied the question that the object aimed at can never be attained until some agency more potent than manual power can be carried with the balloon—some engine capable of driving an arrangement of fans a high speed, but weighing only a few pounds. Mr. Bowdler's apparatus was but 3ft in diameter, and its rate of motion was but twelve or fourteen revolutions per second. Delome's apparatus, designed by the French naval architect, is to have a screw 16 feet high, and a much more rapid speed is calculated upon, but it is difficult to see how it can be obtained, except by largely augmenting the motive power. The second screw in Mr. Bowdler's machine was fixed vertically just below the other, and with this he proposed to raise and depress the balloon, and it was decided to try this first. Major Beaumont, mounted in the rigging, took command, and Mr. Coxwell, by a careful expenditure of ballast, got his balloon, which was held captive by a guy rope, to a nice balance about 20 feet from the ground. The major gave the order, and the inventor and his soldier assistant worked vigorously at the crank, while the vertical fan spun round, but no other effect was produced, the balloon neither rising nor falling, to all appearance, a single inch. Mr. Bowdler, somewhat disconcerted, confessed that his contrivance had not shown the power he expected, but Major Beaumont suggested that perhaps he had turned the handle the wrong way, and proposed another trial. The balloon was brought to a balance again, this time close to the ground, and when the machinery was set going it slowly, but unmistakably, began to rise, and rose until it was checked by the guy rope about 40 ft. from the ground. And, what was even more convincing, as soon as the crank ceased to work, the balloon began to descend, and descended till it touched the earth. Mr. Coxwell was satisfied at once that the screw had lifted the balloon, but the Government representative, perched up on the notting and taking notes, was not so sure, and ordered the experiment to be repeated, which was done several times, and always with the same result. The balloon rose when the fan was at work, sometimes very slowly, but it always came down when the apparatus stopped. Major Beaumont having formed his own conclusion upon this part of the trial, the order was given to release the balloon in order to try the propeller in the higher air. It ascended almost perpendicularly, the Major still in the shrouds, and Mr. Coxwell standing on the edge of the car. The spectators below were unable to see what effect the steering apparatus had, as the balloon soon attained a considerable altitude and disappeared in misty clouds as it wafted away north eastward.

After the balloon had ascended about 1000ft. the steering apparatus was tried, but failed to have any apparent effect on the course of the balloon, but it developed one quality which was not expected, and which may or may not be of value. It enabled the aeronaut to make the balloon revolve either to the right or to the left, according to the way in which they worked it; but in the opinion of the Government officer it failed to fulfil its original object. After making a low dip over the Essex marshes, by letting out gas and repeating the trial, some ballast was discharged, and the balloon ascended to an altitude of two miles

PREPARING—The General Elections in the Province of Ontario, are expected to take place early in Spring; and already the politicians on both sides are bestirring themselves and making ready for a fray.