

brigades of cavalry with a few battalions of bersaglieri, and some guns, for the practice of light manœuvres and outpost on a large scale.

The number of companies of pontooners, and in the Coast Artillery, were increased from 1st March. On the same date, too, a committee of officers, appointed to consider and report upon the best mode of rendering the Italian system of railways available for military purposes, commenced its sittings. It is composed of twelve officers selected from the headquarters staff, artillery and engineers, with a proportion of others from the medical and intendants departments.

To secure a suitable supply of draught and other cattle in the event of a mobilisation of the Italian troops, a census of all horses and mules is to be taken every second year, and those considered to be available for military purposes in case of a mobilisation, are, on such grounds, to be exempted from taxation.

A new system of general liability to military service has been proposed by the Minister of War, and is understood to be likely to become law. All persons to serve will be classed in three categories, of which the first will pass into the active army at once; the second will form a first recruit reserve; the third, a second. The service in the first two categories, between which exchanges will be permitted in time of peace, will be eight years in the active army, four in the Mobile Guards, and seven in the provincial Militia. Of the eight years with the active army, three years in the infantry and five years in the cavalry will be passed with the colours. The system of one year volunteers will be retained, but their number will be fixed annually by the King.

It is estimated that 500,000 men will be available for service in the first category, 140,000 in the second, and 260,000 in the third category.

HYDRAULIC POWER APPLIED TO ARTILLERY

The *Pall Mall Gazette* has an article on this subject, in which the following account is given of the trial of the *Hydra*, a gunboat, just built by Messrs. Mitchell, of Newcastle, for the Dutch Government:—"She is a vessel of the *Staunch* class, and a sister ship to the *Ara*, already supplied to the Dutch, and which was fitted by Sir William Armstrong with a rising and falling 12-ton gun worked by steam power. The principal dimensions of the vessel are as follows:—length over all, 80ft.; breadth, 25ft.; depth of hold, 8ft.; draft, 6ft.; displacement (with all weights on board) 150 tons; speed, eight miles an hour. She is provided with two pairs of distinct engines (one to each screw) and one boiler to each engine, so arranged that it may supply steam to either or to both engines. The engines are high pressure, compound, and surface condensing. They are, in fact, of the most modern and economical type in regard to consumption of fuel, burning only 1 lb. of coal per horse power per hour, instead of 2½ lb., which we believe may be taken to be the usual consumption to modern low pressure engines. Each pair of engines has an actual indicated horse power of about fifty; the coal which the vessel can carry in fourteen tons, so that steam can be maintained for six days. A small auxiliary 6 horse power engine is provided to drive the pumps for working the hydraulic machinery of the gun. The gun is on the rising and falling system, with which Mr. Jor Moncrieff has patented himself, but the system advocated by him

of utilising recoil—whether by means of a counterweight or by means of the direct hydro pneumatic principle—has not been adopted in this instance. The gun, mounted on radial arms, is raised by the application to these arms of hydraulic power, three air-chambers acting as air-accumulators, and a pressure of 750lb. per inch being obtained. By this means the gun can be raised from the loading position (in which the men and gun are almost below the water line) to the firing position in about fifteen or sixteen seconds. But the raising of a weight of twelve tons is evidently no great accomplishment of an hydraulic engineer. The really important problem in the application of this machinery to gunnery was to control and adjust the recoil, so that the gun, while descending completely, might not do so too slowly on the one hand, nor too violently on the other. This has been accomplished very ingeniously and effectively by means of what may best be described as an hydraulic buffer—viz., an arrangement for allowing the water which has done the work of raising the gun to escape from the cylinders when acted upon by recoil at a speed which can be accurately adjusted, so as exactly to bring the gun down to the loading position. On Saturday last the vessel was taken out to sea off Plymouth, and seven rounds were fired from her in the presence of a large number of naval and military officers. Of these rounds three were with 'service' charges of 35lb., four with 'battery' charges of 35lb., 'pebble' powder and 250lb. shot being used in each case. There was no hitch or failure of any kind. The gun was loaded, raised, and fired, and loaded again by three men with the greatest ease and expedition, the time from shot to shot (including laying) having been in one instance one minute and a half. In every case the gun descended after firing to the proper loading position with great steadiness and accuracy. The laying of the gun which fires from the vessel's bows, is effected by an officer stationed under a cover on the fore deck, who also has the steering apparatus, and that for firing (by electricity) under his control. The direction of the gun is given by moving the vessel right or left.

"The success of this experiment is no doubt important in relation to vessels of the gunboats class, but it is infinitely more important in relation to vessels where an all-round fire can be obtained. For directly it is demonstrated that ship-guns of large calibre can be thus readily raised for firing and lowered under cover for loading, the question naturally suggested itself. Why employ turrets? The new system is designed, in fact, to supersede turrets; and very few naval officers would refuse to admit that to get rid of turrets, while retaining equal or superior protection, is a consummation to be wished. In the new system the vessel becomes practically a floating Moncrieff gun pit; and if deep enough it will be simply invulnerable, except by vertical fire or by submarine attack. Nor would the use of armor plates—except perhaps, here and there, or in a modified form—be necessary to afford the gun detachment all the protection that would be required—since the service of the gun would all go on below the water line.

"But this brings us to the question whether a gun detachment would be necessary at all; and here we come into contact with the subject of hydraulic loading. It must be said briefly that this is accomplished by bringing the gun to a fixed position, and the performing the operations, of sponging

loading, and ramming home entirely by hydraulic agency. The loading would in every case be effected under cover. If the gun were in a turret, the muzzle would be depressed so as to bring it below the deck; if the gun were mounted on such an hydraulic lifting and lowering carriage as we have described, the muzzle would not have to be depressed at all. As regards bringing the gun to a fixed point for loading, in the case of a gun on board a gunboat (as in the *Hydra*) the loading position is necessary permanently fixed; in the case of a gun in a turret the action of the turn table (which is always brought into play to turn the port away from the enemy while loading) would be applied to bring the gun round to the loading apparatus. To meet a possible objection that this would take time, we may state that the whole operation from the firing of one round to the loading of the next, and the elevating of the gun and traversing the turret, can be effected with a 12-ton gun on a turret in twenty-four seconds. By the operation of sponging the gun is also washed out, the head of the sponge containing a button which, when pressed against the bottom of the bore, opens a valve and releases a jet of water into the bore, the water being derived from the column of water which has served to force the sponge home. The sponge is also made to do duty as an hydraulic rammer, the shot being run on a little trolley from the shot rack to the gun raised to the muzzle, by means of an hydraulic lift, and then rammed home by the sponge, actuated, as stated, by hydraulic power. The whole operation can be done by one man, involving, as it does, nothing but the manipulating of two handles."

TRIAL OF THE GUNS OF THE DEVASTATION.

This great monitor under the command of Captain Hewett, V. C., steamed out from Spithead this morning to a position, south-east of the Isle of Wight, where she could obtain a range for the trial of her enormous 35 ton guns without damage to ships passing up or down Channel south of the Isle of Wight. Captain Boys, commanding the Excellent Gunnery Establishment at Portsmouth, was on board to conduct the trials; the other officers on board who might be considered as being present officially included Captain A. Hood, C. B., Director of Naval Ordnance at the Admiralty; Captain Herbert, commanding the Gunnery Establishment at Devonport; and Colonel Field, of the Gun Carriage (War Department) Committee. The monitor left Spithead soon after ten a. m., and in about an hour afterwards had reached the desired position south-east of the Isle of Wight, with stanchions all down and cleared for action. The weather was very suitable for the day's work, the wind hardly reaching a force of four, and the sea being, as it always has been when the *Devastation* is under steam, quite smooth. The real trials of the day with the guns were preceded by two trial shots from the guns in the after turret, fired with the ordinary full charge of the gun's powder service, for the purpose of scaling the guns and adjusting compressors, &c. These were succeeded by sixteen shots fired at different angles of elevation, depression, and direction, and the whole was wound up with two shots at a target—a small flagstaff and flag floated on a boat's water breaker at 1600 and 1800 yards distance. The first remarkable result observed was the small—the very small—amount of concussion felt from the