## Correspondence.

### The Defense of New York Harbor—A New Torpedo.

*To the Editor of the Scientific American:*

I have several times observed articles and communications in the SCIENTIFIC AMERICAN on the subject of the defense of New York harbor. The substance of what follows was addressed by me some six weeks since to the editor of a leading journal in a neighboring colony, but no notice has yet been taken of it. Perhaps the mechanical genius for which America is so famed may see something in the idea, and give it practical effect.

It has often occurred to me that a much more effective description of torpedo remains to be invented than any yet constructed, and that by applying the rocket principle of propulsion to a suitably shaped case or hull, to be driven on or beneath the surface of the water, the great object of attaining a high rate of speed for a long distance might be gained, while the torpedo might be rendered dirigible, so long as its course remained visible, by means of electric wires, which would be unreeled from the hull as it advanced, and by which its connection with the shore or ship from which it was launched would be maintained, so that a properly balanced steering apparatus could be instantaneously operated. A 32 pound war rocket has a range of upward of two miles, which is far greater than the run of any torpedo yet invented. And when we consider the enormous power which must be required to drive such a weight through the air, and overcome the attraction of gravitation for such a distance, it is evident that if the missile were supported on the surface of the water, the same power would suffice to impel it for a vastly greater distance, or would drive a much greater weight for the same distance, though with diminished velocity. If we place a heavy spar, which will just float, in the water and give it an impulse, it will advance for a considerable distance, while all the force that we could exert would not enable us to project it into the air or to push it along if resting on the ground.

The Whitehead or fish torpedo is limited in size and range. Its charge of damp gun cotton is about 70 lb., and the distance it can run is only some 600 yards. For this short range its speed is comparatively high, having been known to reach the rate of 26 knots an hour. But it has numerous drawbacks. Its mechanism is complicated, costly, and easily deranged. It must be charged with compressed air by an independent engine. The requisite pressure on its receiver reaches the enormous degree of from 1,000 to 1,200 lb. to the inch to give it only the short run previously spoken of. It is not dirigible, and frequently misses its mark in experimental trials, while its efficiency in actual warfare remains to be proved. Owing to the shortness of its range, it requires the aid of a very fast steam launch to bring it within striking distance of its object, while such launch in its approach and retreat has to run the chance of being riddled with the hail of iron which may be discharged against it by the rapid-firing guns with which men-of-war all over the world are now being provided. Even if the torpedo goes straight for its object, it may be stopped in its career by a netting, which (owing to its small size and want of sufficient momentum) it cannot penetrate; or, if it should reach the side of an ironclad and explode, its comparatively small charge might do very little damage, as recent experiments have shown.

On the other hand, a rocket torpedo might be constructed of any size desired, with a range of several miles and a speed of fifty miles an hour, or even more. The operator charged with its direction could be stationed at an elevation, so as to observe its course, and instantly change it when necessary. It could carry an explosive charge of any weight desired, sufficient to sink the most powerful ironclad yet built, even if exploded at the distance from her at which her netting might be suspended. But no netting that could be carried would be likely to resist the impact of a body weighing several tons, armed with a powerful steel head, and moving with a velocity of fifty or sixty miles an hour.

The Brennan torpedo possesses certain advantages over the Whitehead in having a longer run and being dirigible, while it may be constructed of such a size as to carry a very large explosive charge; but it has its drawbacks. It requires a powerful engine on land or on shipboard to haul in the wires which set in motion its propelling machinery; and its speed is very limited, being far less than that of the Whitehead torpedo. Its use is thus necessarily confined to cases where a winding engine can be placed on the spot from which it is started. The rocket torpedo would be free from such impediments to its general employment. It would be entirely self-contained. It would require no swift torpedo launch to rush with it into dangerous proximity to the large machine guns or rapid-firing weapons of an ironclad. It would not need any independent engine or any complicated mechanism within itself for propulsion. It would be propelled by the simple discharge of the immense volume of gas generated by the combustion of the rocket composition, acting on the recoil or reaction principle. It would be always ready for action. It could be conveyed by vehicle or boat to its position, and there operated by the single individual managing the electric steering apparatus, without any appreciable danger from exposure. Such a weapon, it seems to me, would be particularly suitable for the protection of ports, harbors, and seaside towns all the world over, and might, to a large extent, supersede the construction of gigantic cannons and huge fortifications, and the vast expense of erecting these and maintaining garrisons.

WILLIAM RITCHIE.

Launceston, Tasmania, August 29, 1887.

### Petroleum in Italy.

*To the Editor of the Scientific American:*

On a visit I lately made to one of our most important watering places, called Salsomaggiore, a village at the foot of the Apennines, six miles east of Borgo San Domino, a railroad station on the main line to Brindisi, about fifty miles from my residence (Bologna), I inspected some artesian wells bored for petroleum under the management of Engineer Chls. Ribighini, who was many years in the American oil regions. The first attempt in Italy to find petroleum was made in 1864, by this same gentleman; but it failed for want of experience in the business.

Successively, in 1872, '73, '74, and '76, new attempts were made by other Italian engineers. All failed, owing to want of experience in the business, as well as for want of sufficient means.

The attempt made in 1864 was in Tocco Causaria, Province of Chieti, South Italy. The oil there seemed rather a bitumen of asphaltic nature. Gravity, 900° to 920°.

Other attempts were made in Central Italy, chiefly in the Provinces of Parma and Piacenza, at Ozzano, Miano, Langhirano, Montechino, and Veleja, where the oil is of superior quality, much like best Pennsylvania crude oil, 810° to 830° gravity.

In 1880 a French company took up Tocco Casauria and Rivazzano in Lombardy again, and three wells were bored in the former place by regular American systems and laborers. Oil was found in one of them, which ever since continues producing a small, but still paying, quantity of the same asphaltic oil.

Work, however, was suspended for want of money. At Rivazzano, four wells were bored, all down to 1,000 feet, but were suspended for want of the requisite tubings and other machinery to finish them. The indications of oil, however, seem to have been promising.

Here at Salsomaggiore, drilling was started in March, 1884, and five wells have been finished at various depths, from 500 to 2,200 feet. All of them showed oil, and two are still producing petroleum in paying quantities, though now reduced to two or three barrels a day.

A French company again started works here this year in May, also with Mr. Ribighini as consulting engineer.

One well is down 1,000 feet, with good oil indications, and another, started two weeks ago, is down 200 feet already.

Nothing can be more Americanly organized than these wells. Machinery, boilers, and engines are from Farrar & Trefts, of Buffalo, N. Y. Casings and pump tubings all American. The tools and rig have been perfectly imitated, in Italy, from American patterns.

The workmen are all Italians under an American foreman, who speaks highly of their skill and activity.

Whatever may be the success of this French company, I do not think the Italian petroleum wells will ever affect the American oil trade materially, for the following reasons:

1. The production of the wells, so far at least, seems small. Twenty barrels a day was the best of the five wells, which soon fell to two or three barrels, and so remains.

2. Cost of drilling is comparatively large, as they require to go down 1,500 to 1,600 feet, where oil seems most abundant.

The ground is loose, and requires much time and many columns of artesian tubes to keep it from caving in.

The cost, as far as I could understand, of one of these wells is from $4,000 to $6,000, exclusive of machinery, rigs, tubings, and tools.

3. The greatest drawback of all is the difficulty of finding sufficient capital for such speculations in Italy.

Italians are, as a rule, very skeptical as to any mining business, especially oil operations, and Europeans in general are more or less of the same disposition. Consequently, want of capital will always be the great impediment.

Could capital be procured, the advantages would be:

1. That it is now proved that the oil exists in Italy in paying quantities and over an immensely extended area, traces of it being found all along the last spurs of the Apennines, beginning at Genoa, Voghera, Piacenza, Parma, Modena, Bologna, and all the way down to Sicily, on Adriatic as well as on Mediterranean side.

2. The wells lately drilled have lasted a long time. The first, struck in July, 1884, is still in action, producing, as I stated, three barrels a day. The gas seems to be just the same to-day as when first struck, and is used in the village for lighting hotels and other establishments. Also in many houses for cooking.

3. The cost of running them is nominal, as they eject every one of them a large quantity of salt water with a little oil gas, and consequently only require a man to gather and barrel the oil.

In this way everything can be removed, and a single rig and set of machinery can be used, over and over again, to bore many wells. Laborers cost two to three francs a day.

4. And greatest advantage is the duty on foreign oil, so high that duty-free American refined oil sells at twenty francs for 100 kilos. Whereas, duty paid, it is sold for 67 to 68 francs.

Italian petroleum is free of tax, and will probably remain so many years.

In conclusion, I have no doubt that American capital and American enterprise, alone, could make this Italian petroleum business an important and paying one.

As it is, and as it will be, in European hands, no apprehension need be felt of its ever becoming dangerous to the American oil trade with Italy.

CARLO GARDINI, U. S. Consular Agent.

Bologna, September 5, 1887.

### The Manufacture of Cachets and Wafers.

The recent death of Limousin, the inventor of the wafer capsules (cachets, capsulæ amylaceæ), suggests the idea of again drawing attention to the utility of this form of medication.

While it would be an unprofitable undertaking for every dispensing pharmacist to undertake the preparation of his own wafers, it is believed that a profitable business could be carried on by at least one, or perhaps even more, manufacturers in each country. To a certain extent, the choice of this form of medication depends somewhat upon the rate with which its existence or availability is kept before the memory of the prescriber. It only needs a slight impetus, from time to time, to cause a preference in favor of the wafer capsule over some other forms of medication, although it is by no means intended to assert that this is in all cases the best form. We believe, however, that it is, for instance, preferable to gelatin capsules, in the case of quinine.

Formerly, the wafer capsules were pressed from the large square wafers (for which Nuremberg has long been celebrated). At the present time, however, they are baked specially. The cost of fitting up a factory is very small, and the arrangements required are simple, requiring but little room and only cheap labor. The most expensive item of the whole is the forms. These are made of two hinged pieces, the material being either steel or brass. One of the plates contains the concave, the other the convex pattern of the wafers.

These forms rest upon one or more specially constructed ovens heated either by gas or wood charcoal. As soon as the opened forms, resting on the hot oven, have acquired the proper temperature, which is easily recognized by allowing a drop of water to fall upon them, a certain quantity of a mass prepared from wheat starch is spread upon one of the plates and the other plate gradually folded over it. The latter, through its own weight, expands the mass so that it forms a perfectly uniform layer. The excess of the mass, which is squeezed out at the side, is simply scratched off. The forms are then opened, and the completely baked sheet taken out. This sheet contains as many half wafer capsules as there are patterns. When freshly taken from the form, these sheets are very brittle, but after being laid aside a few days, they absorb enough moisture from the air to permit being cut or trimmed. The next operation then is the cutting or punching out of the round wafers. For this purpose there are used either simply punches or punching machines worked by treadles, by means of which each separate wafer is cut out. These are then counted and put up in packages. A well trained girl is able to bake, in one day, 20,000 such wafers, and it requires the service of only two girls to punch these.

The mass of which the wafers are composed consists of the purest wheat starch, mixed with water. The best fuel is either gas or wood charcoal. There being only a few requisites, it will be easy to calculate the cost of a day's turnout.

The whole art and mystery of the manufacture centers in the forms, which must be absolutely true and perfect. If the forms are not exactly true, the wafers will be uneven. The least defect of the forms will be prominently visible upon the product.

The preparation of flat wafers, such as are used for making sealing wafers, sacramental wafers, wafer bottoms for ginger cake, etc., is much more simple than that of the medicinal wafers. The former are baked in similar metallic forms, which are, however, entirely smooth inside. The thickness of the wafers depends, of course, upon the distance intervening between the plates when they are closed.—*Amer. Druggist.*

FROM twenty-five to forty car loads of grapes and pears have each week for some time been leaving California for the East. Chicago is the best market for California fruit, and Denver ranks next.

### Impending Change in Street Car Propulsion.

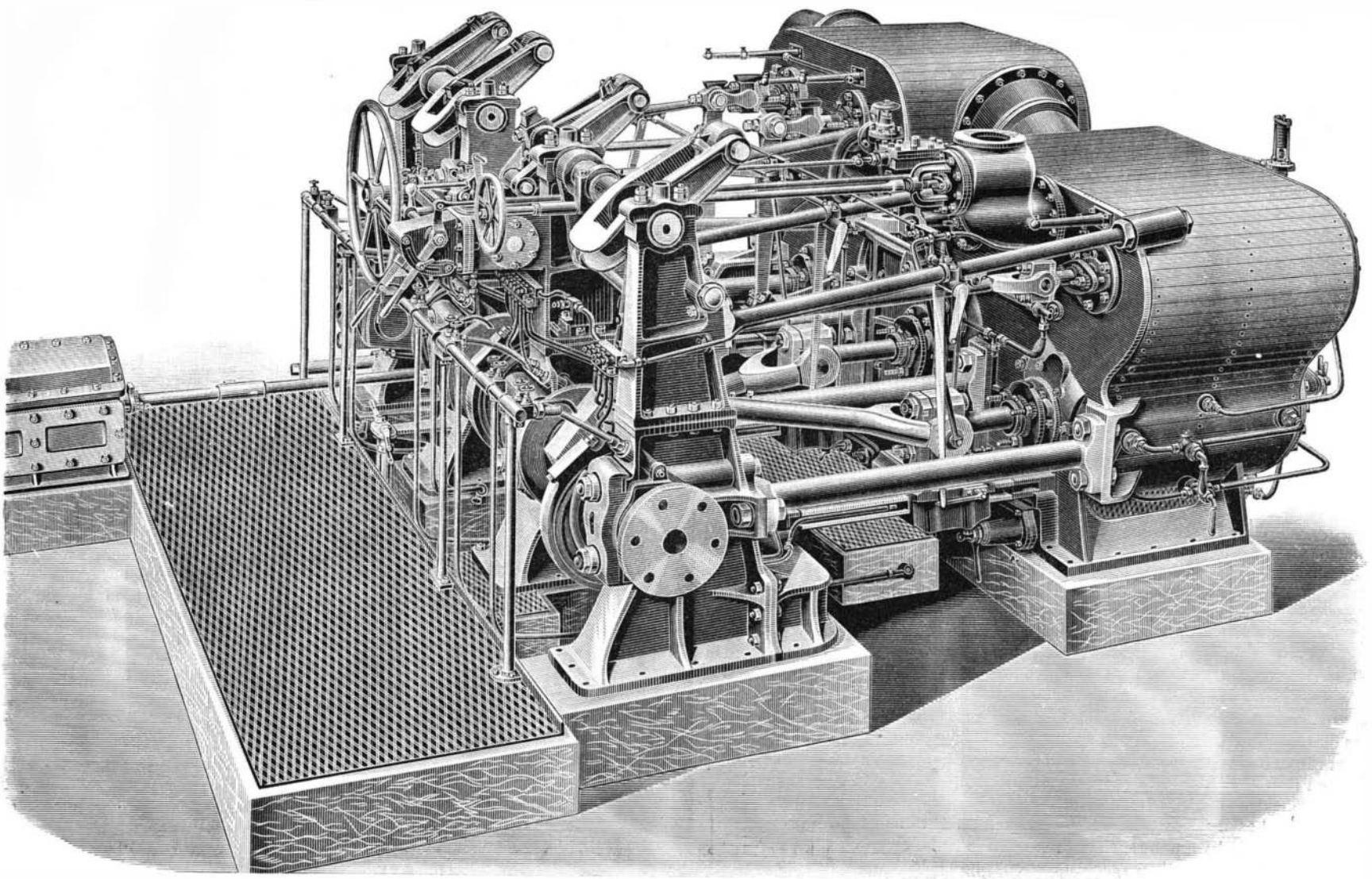
In his recent remarks before the American Institute of Electrical Engineers, Mr. Anthony Reckenzaun said:

With regard to the general application of electricity to street car propulsion, there is a very great future in store for us, and the time is very near when horses on street cars will be entirely abandoned. We have, I might say, almost passed the experimental stage, and we are now entering the more profitable stage of manufacturing and supplying street railways with electric motors. The advantages in electric motors are not only economy, but cleanliness and great saving of space at the depots and great saving of space in the streets. If you take crowded streets like Broadway, New York, and many other thoroughfares where every square inch of space in the street, you might say, is of value, and do away with horses, you save in length about twelve feet, and in width, of course, the width of the track. Now, it would seem ridiculous for me to make such a remark, but if there are hundreds of cars running in a crowded street, it makes many thousand square feet of space saved, and in that space other vehicles can pass. Another great advantage in electrical propulsion will be (apart from economy, which is certain to be a result) that we shall be able to travel at a greater speed. Horses cannot pull a car at a greater speed than six miles an hour. The average speed of all the horse cars in America and Europe is five miles an hour, including stoppages. Now, if we can travel at the rate of eight or ten miles an hour, a great deal of time will be saved, and passengers will avail themselves more of the new mode of traction. They will save a great deal of time. The traffic is constantly increasing. I have heard recently that the street car traffic of New York alone has increased in the last ten years fifty per cent. If it increases in the next ten years another fifty per cent, it would be impossible to cope with the traffic at all if we employ horses. The elevated railroads, it appears, are doing a large amount of business, almost as much as they are capable of doing, and the only loophole, it seems to me, out of the difficulty is either by building underground railroads or by propelling the street cars at a greater speed, so that the same number of cars will carry double the number of passengers in the same time.

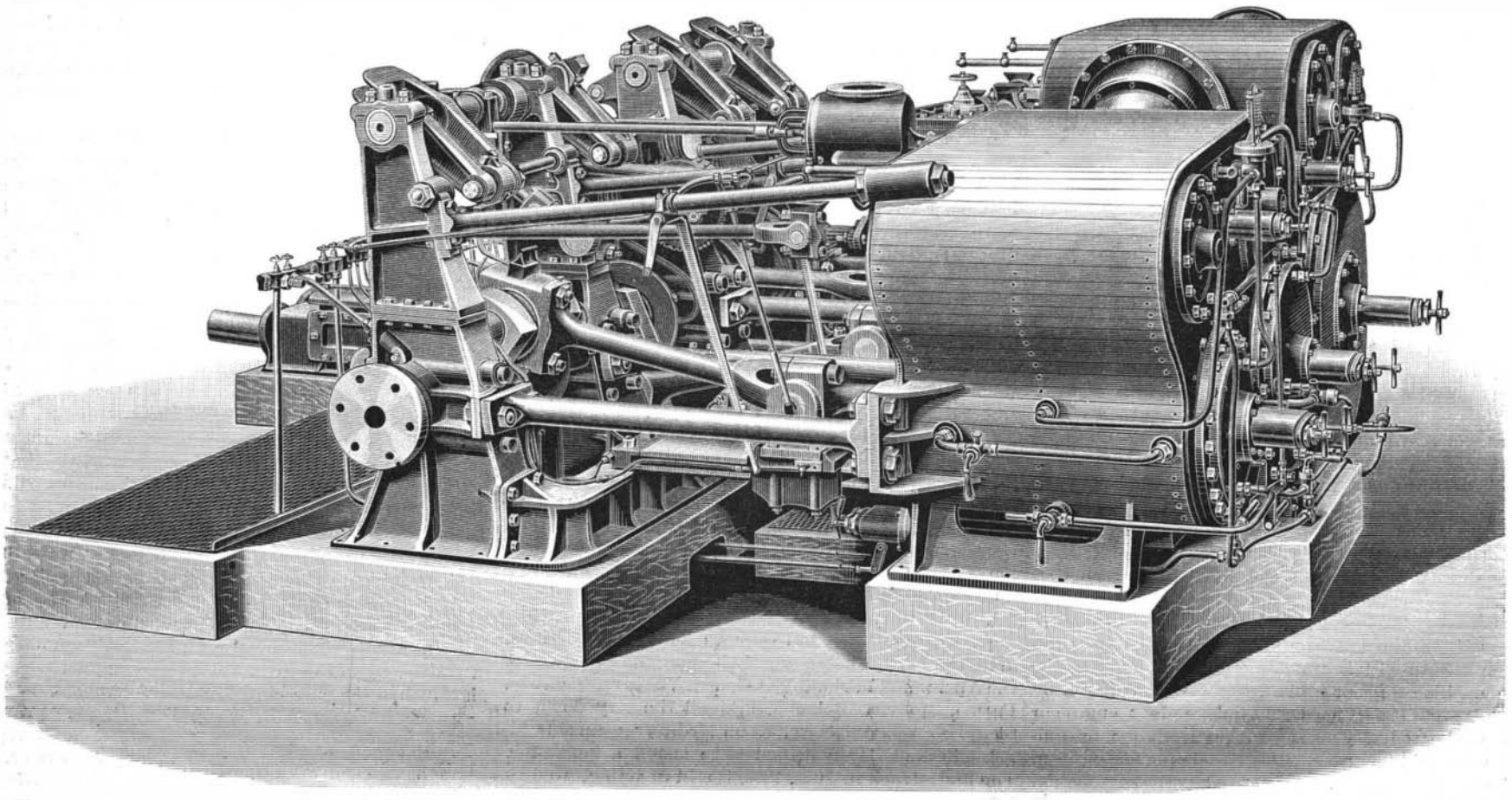
### ENGINES OF THE DOGALI.

The Dogali is a new and powerful war ship constructed for the Italian government by Sir William Armstrong, Mitchell & Co., Newcastle on-Tyne. We give a sectional elevation and perspective views of the engines as they stood in the erecting shop, for which we are indebted to the *Engineer*.

This vessel is the first war ship fitted with triple expansion engines. They were made by Messrs. R. & W. Hawthorn, Leslie & Co., of Newcastle-on-Tyne, and are of the twin screw horizontal type. Each set of main engines has three cylinders, 30 in., 45 in., and 73 in. diameter, with a stroke of 2 ft. 9 in. The piston valves are worked on Marshall's system, which admits of a very large range of expansion being adopted, and gives as equable a distribution of steam when working



IMPROVED TRIPLE EXPANSION ENGINES.



IMPROVED TRIPLE EXPANSION ENGINES OF THE ITALIAN CRUISER DOGALI.